SAMB

SYARIKAT AIR MELAKA BERHAD

DOKUMEN TAWARAN

RUJUKAN TAWARAN: SAMB / 15 / 2026

KERJA-KERJA MEMBEKAL DAN MEMASANG PAIP 200MM, 150MM DIAMETER KELULI LEMBUT DARI IKS DUYONG HINGGA KE JAMBATAN DUYONG SERTA LAIN-LAIN KERJA YANG BERKAITAN DI DAERAH MELAKA TENGAH, MELAKA

KETUA PEGAWAI EKSEKUTIF,
SYARIKAT AIR MELAKA BERHAD,
LOT 897, WISMA AIR,
JALAN HANG TUAH,
75300 MELAKA.

SYARIKAT AIR MELAKA BERHAD

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KANDUNGAN

SENARAI SEMAK PENGHANTARAN DOKUMEN TENDER

Penender diwajibkan menghantar dokumen di bawah untuk tujuan penilaian oleh pihak Syarikat Air Melaka Berhad (SAMB). Kegagalan pihak tuan/puan menghantar dokumen berikut boleh menyebabkan sebutharga tuan/puan tidak akan dipertimbangkan.

Bil	Dokumen	Semakan (Sila Tandakan √ Jika Berkaitan)	Semakan Oleh SAMB
	PENILAIAN TEKNIKAL		
1	Profil Syarikat	( )	( )
2	Pengalaman Kerja (sila sertakan surat tawaran)	( )	( )
3	Senarai Kenderaan dan Peralatan Kerja (Jika Berkaitan)	( )	( )
4	Senarai Nama Pekerja	( )	( )
5	Katalog Produk (Jika Berkaitan)	( )	( )
6	Sijil Suruhanjaya Perkhidmatan Air Negara (SPAN) yang masih sah (Jika Berkaitan)	( )	( )
7	Sijil IKRAM/SIRIM yang masih sah (Jika Berkaitan)	( )	( )
8	Salinan Sijil Kementerian Kewangan Malaysia yang masih sah (Jika Berkaitan)	( )	( )
9	Salinan Sijil Perolehan Kerja Kerajaan (SPKK) yang masih sah (Jika Berkaitan)	( )	( )
10	Salinan Pendaftaran Lembaga Pembangunan Industri Pembinaan Malaysia (LPIPM/CIDB) yang masih sah (Jika Berkaitan)	( )	( )
11	Salinan Pendaftaran Kementerian Kewangan & Sijil Taraf Bumiputera yang masih sah (Jika Berkaitan)	( )	( )
12	Salinan Pendaftaran Kementerian Dalam Negeri (KDN) yang masih sah (Jika Berkaitan)	( )	( )
13	Salinan Permit Suruhanjaya Perkhidmatan Air Negara (SPAN) (Jika Berkaitan)	( )	( )
14	Surat perlantikan wakil sah pengedar daripada pengilang. (Jika Berkaitan)	( )	( )
15	Jadual Perancangan Kerja Dan Tempoh Siap Kerja Yang Munasabah (Jika Berkaitan)	( )	( )

	PENILAIAN KEWANGAN		
16	Salinan bukti pembayaran pembelian dokumen Tender	( )	( )
17	Keseluruhan Dokumen Asal Tender Dikembalikan	( )	( )
18	Harga dan Tempoh Kerja Dicatatkan Dalam Borang Tender	( )	( )
19	Borang Tender Ditandatangan Oleh Pemilik Syarikat	( )	( )
20	Surat Akuan Pembida Diisi dan Ditandatangani oleh Pemilik Syarikat	( )	( )
21	Penyata Bank 3 Bulan Yang Terkini / Penyata Kewangan Satu (1) Tahun	( )	( )
22	Salinan Pendaftaran Suruhanjaya Syarikat Malaysia (SSM) Lengkap Beserta Maklumat Korporat	( )	( )
23	Salinan Borang 9, Borang 24 dan Borang 49 Bagi Syarikat Sdn Bhd	( )	( )
24	Penyata Akaun (2) Tahun yang telah diaudit.	( )	( )
	Lain-lain sijil yang berkaitan:- …… …… ……		

……
(Tandatangan Petender)
Nama :
No. I/C :
Tarikh :

Materi atau Cop Syarikat :

DISEMAK OLEH:

……
(Tandatangan Pegawai SAMB)
Nama :
Jawatan :
Tarikh :

BAHAGIAN A

ARAHAN KEPADA PETENDER

ARAHAN KEPADA PETENDER

SYARIKAT AIR MELAKA BERHAD
(SAMB)

MEMBEKAL DAN MEMASANG PAIP 450MM DIAMETER KELULI LEMBUT DARI PAIP SEDIA ADA DI SIMPANG KOLAM BUKIT BATU KE LEBUH AMJ SERTA LAIN-LAIN KERJA YANG BERKAITAN DI DAERAH MELAKA TENGAH, MELAKA

1. PERIHAL TENDER

Tender ini bertujuan untuk mendapatkan perkhidmatan kontraktor-kontraktor yang berdaftar bagi **Membekal Dan Memasang Paip 450mm Diameter Keluli Lembut Dari Paip Sedia Ada Di Simpang Kolam Bukit Batu Ke Lebuh AMJ Serta Lain-Lain Kerja Yang Berkaitan Di Daerah Melaka Tengah, Melaka.**

2. KELAYAKAN PETENDER

Tender ini adalah dipelawa kepada kontraktor-kontraktor yang berdaftar dengan ***LEMBAGA PEMBANGUNAN INDUSTRI PEMBINAAN MALAYSIA, LPIPM (CIDB) G4*** *Pengkhususan* ***CE20 dan CE21*** serta ***SPAN Permit IPA Jenis C3 (Bekalan Air)*** yang masih sah dan dibenarkan untuk membuat tawaran buat masa ini.

3. DOKUMEN TENDER

Satu Set Dokumen Tender boleh dimuat turun di laman sesawang Syarikat Air Melaka Berhad (www.samb.com.my). Petender hendaklah mengemukakan bayaran melalui Pindahan Wang ke akaun **Bank Islam 04015010075113** (**Syarikat Air Melaka Berhad**) sebanyak **RM 500.00.** Wang ini tidak akan dikembalikan.

4. PENYEDIAAN TENDER

4.1 Petender adalah dikehendaki mengisi segala maklumat-maklumat dengan sepenuhnya pada :-

a) Borang Tender
b) Ringkasan Tawaran
c) Jadual Kadar Harga
d) Latar Belakang Petender

4.2 Tulisan hendaklah terang dan dibuat dengan dakwat. Segala kesilapan hendaklah dipotong dengan cermat dan ditandatangan ringkas.

4.3 Jumlah harga pada Ringkasan Tawaran hendaklah dipindahkan ke dalam Borang Tender dan sekiranya berlaku perbezaan di antara harga didalam Ringkasan Tawaran dan harga di dalam Borang Tender, harga dalam Borang Tender akan diambil kira.

5. PENYERAHAN TENDER

5.1 Tender hendaklah dimasukkan kedalam satu sampul surat berlakri dan ditulis di bahagian luarnya dengan tajuk tender tersebut tanpa terdapat apa-apa tanda-tanda yang membolehkan identiti petender dikenali. Sampul surat yang telah berlakri itu hendaklah dihantar kepada:-

Ketua Pegawai Esekutif
Syarikat Air Melaka Berhad
Lot 897, Tingkat 7, Wisma Air,
Jalan Hang Tuah,
75300 Melaka.

sebelum **pukul 12.00 tengah hari** pada **15 Jun 2026**

5.2 Mana-mana tender yang diterima selepas tarikh tutup yang ditetapkan akan ditolak atau dikembalikan semula kepada petender.

5.3 Petender-petender hendaklah mengambil maklum bahawa Penilaian Tender ini akan mengambil kira dan mementingkan keupayaan petender untuk melaksanakan projek yang ditender, disamping kemunasabahan harga tender. Justeru itu, keupayaan petender-petender akan dinilai semasa penilaian tender. Penilaian tender akan dibuat berasaskan kedudukan kewangan, pengalaman kerja, kakitangan teknikal dan prestasi kerja semasa petender.

Petender-petender dikehendaki mengemukakan maklumat-maklumat dan dokumen seperti yang dikehendaki sepertimana di dalam Latar Belakang Petender.

5.4 Dokumen-dokumen ini sangatlah penting untuk membolehkan penilaian keupayaan yang sewajarnya dibuat ke atas petender. Sekiranya petender tidak atau gagal untuk mengemukakan

dokumen-dokumen tersebut, tender petender berkenaan akan ditolak dan tidak akan dipertimbangkan.

PETENDER DIKEHENDAKI MENYERTAKAN SATU SALINAN SIJIL PENDAFTARAN ASAL YANG BERKAITAN YANG TELAH DISAHKAN BERSAMA-SAMA DENGAN DOKUMEN TENDER SEMASA MENGEMUKAKAN TAWARAN.

6. TINDAKAN TATATERTIB

Earnest Money atau Deposit Tender tidak diperlukan semasa mengemukakan tender. Walau bagaimanapun jika petender menarik balik tawarannya sebelum sesuatu keputusan dibuat atau enggan menandatangan kontrak apabila tendernya diterima dalam tempoh sahlaku tender, iaitu sembilan puluh (90) hari dari tarikh akhir yang ditetapkan bagi penyerahan tender, maka pendaftarannya akan digantung selama dua (2) tahun bagi kesalahan pertama, lima (5) tahun untuk kesalahan kedua dan pendaftarannya akan dibatalkan untuk kesalahan ketiga.

7. MAKLUMAT-MAKLUMAT LANJUT

7.1 Jika terdapat apa-apa keraguan ke atas makna sebenar mana-mana bahagian dalam dokumen tender, petender hendaklah menghubungi Pegawai Penguasa untuk mendapatkan penjelasan sebelum menghantar tendernya. Penjelasan tersebut hanya sah jika ia di keluarkan secara rasmi dan bertulis oleh Pegawai Penguasa.

7.2 Dari masa ke semasa sebelum tarikh tutup tender, Pegawai Penguasa mungkin akan mengeluarkan pindaan atau tambahan untuk memberi penjelasan atau memperbaiki Dokumen Tender.

7.3 Satu salinan pindaan tender akan dikeluarkan secara rasmi kepada petender dan ianya akan menjadi sebahagian daripada Dokumen Tender. Penerimaan tambahan tersebut mestilah disahkan kedalam borang yang dikepilkan bersama-sama dengan pindaan tersebut.

8. HAK SAMB UNTUK MENERIMA/MENOLAK TENDER

SAMB tidak terikat untuk menerima tender terendah atau mana-mana tender atau memberi sebarang sebab diatas penolakan sesuatu tender. Keputusan Lembaga Tender SAMB adalah muktamad.

9. BON PERLAKSANAAN

Kontraktor yang dilantik dikehendaki mengemukakan Bon Perlaksanaan sebanyak 5% daripada jumlah harga kontrak dalam bentuk Jaminan Bank atau Jaminan Insuran.

10. KOS MENENDER

Segala perbelanjaan yang dikeluarkan untuk menyedia dan mengemukakan tawaran hendaklah dibuat atas perbelanjaan sendiri dan petender tidak dibenarkan membuat apa-apa tuntutan kepada Syarikat Air Melaka Berhad (SAMB) berkaitan dengan hal tersebut.

11. SAMB tidak akan bertanggungjawab atau membayar perbelanjaan atau kehilangan yang boleh berlaku disebabkan penyediaan dokumen tender dan siasatan di tapak.

12. Segala kerja yang dinyatakan dalam kadar harga atau spesifikasi akan dinyatakan di dalam kontrak.

Tarikh: Tandatangan Petender:

LAMPIRAN B

ARAHAN-ARAHAN YANG PERLU DIMASUKKAN KE DALAM ARAHAN KEPADA PETENDER.

A. **Maklumat Latar Belakang, Kewangan Dan Prestasi Petender**.

1. Petender-petender hendaklah mengambil makluman bahawa penilaian Tender ini akan mengambil kira dan mementingkan petender untuk melaksanakan projek yang ditender disamping kemunasabahan harga tender. Justeru itu keupayaan petender-petender akan dinilai semasa penilaian Tender. Penilaian ini akan dibuat berasaskan kedudukan kewangan, pengalaman kerja, kakitangan teknikal dan prestasi kerja semasa petender.

2. Untuk membolehkan Penilaian ini dibuat, petender-petender dikehendaki mengemukakan dokumen-dokumen berikut bersama-sama tendernya:-

   (i) Salinan Akaun Syarikat yang telah disahkan dan diaudit oleh Juru Audit yang bertauliah, bagi dua (2) tahun kewangan terakhir. (Bagi Syarikat Sdn. Bhd. sahaja)

   (ii) Salinan Penyata Bulanan Akaun Bank mengenai wang dalam tangan petender bagi tiga (3) bulan terakhir sebelum tutup tender

   (iii) Laporan Bank/Institusi kewangan mengenai kedudukan petender, atas format seperti BORANG CA, dalam satu sampul berlakri.

   (iv) Salinan Perakuan / Pengesahan siap kerja bagi setiap kerja yang telah disiap dan disenaraikan di BORANG D.

   (v) Salinan Borang KWSP `A' bagi bulan caruman terakhir bagi setiap kakitangan teknikal atau salinan perjanjian perkhidmatan professional yang diambil khidmat secara kontrak yang disenaraikan di BORANG E.

   (vi) Salinan sijil kelulusan / kelayakan setiap kakitangan teknikal kategori A dan B yang disenaraikan di BORANG E.

(vii) Laporan Penyelia Projek mengenai prestasi semasa petender, bagi setiap kerja semasa yang bukan projek SAMB yang disenaraikan di BORANG GA, dalam satu sampul berlakri. Dokumen-dokumen ini sangatlah penting untuk membolehkan penilaian keupayaan yang sewajarnya dibuat ke atas petender.

(viii) Petender juga haruslah mengemukakan Jadual Perancangan Kerja seperti format di BORANG H jika berkaitan dengan projek yang ditawarkan di dalam dokumen ini.

Sekiranya petender tidak atau gagal untuk mengemukakan dokumen-dokumen ini, terutamanya dokumen-dokumen (i), (ii), dan (vii) diatas, tender petender akan ditolak dan tidak akan dipertimbangkan.

3. Sekiranya petender gagal untuk mengemukakan salah satu bahagian daripada dokumen-dokumen (iii), (iv), (v), dan (vi), maklumat dan data-data yang tidak dapat disemak kerana ketiadaan atau ketidakcukupan dokumen-dokumen tersebut adalah tidak sah dan tidak boleh diambil kira dalam penilaian keupayaan petender yang berkenaan melainkan maklumat atau data-data tersebut membawa kesan negatif terhadap nilai keupayaannya. Ini bermakna kriteria-kriteria yang mana penilaiannya memerlukan maklumat atau data-data ini, akan diambil sebagai kosong.

4. Disamping mengemukakan dokumen-dokumen yang tersebut diatas petender-petender dikehendaki melengkapkan borang-borang berikut yang disertakan bersama Dokumen Tender ini, dengan sempurna dan mengembalikan bersama-sama dengan tender masing-masing.

(a) BORANG A - SURAT PENGAKUAN KEBENARAN MAKLUMAT DAN KEESAHAN DOKUMEN-DOKUMEN YANG DIKEMUKAKAN OLEH PETENDER.

(b) BORANG B - MAKLUMAT AM DAN LATAR BELAKANG PETENDER.

(c) BORANG C - DATA-DATA KEWANGAN.

(d) BORANG D - REKOD PENGALAMAN KERJA.

(e) BORANG E - KAKITANGAN TEKNIKAL.

(f) BORANG F - KEPUNYAAN LOJI DAN PERALATAN PEMBINAAN UTAMA.

(g) BORANG G - SENARAI KERJA KONTRAK SEMASA

(h) BORANG CA- LAPORAN BANK/INSTITUSI KEWANGAN MENGENAI KEDUDUKAN KEWANGAN PETENDER.

(i) BORANG GA- LAPORAN PENYELIA PROJEK ATAS PRESTASI KERJA (BUKAN / PROJEK SAMB) SEMASA PETENDER.

(j) BORANG H - JADUAL PERANCANGAN KERJA.

Borang-borang ini hendaklah diisi dengan maklumat-maklumat yang benar dan data-data yang tepat. Semua butiran perlu diisi dan jawapan yang jelas hendaklah diberikan terhadap semua pertanyaan di dalam borang-borang di atas. Jika perlu helaian tambahan boleh dilampirkan dan setiap helaian tambahan yang dilampirkan kepada borang-borang lain hendaklah ditandatangani oleh petender.

5. Bagi petender usahasama atau gabungan (seperti yang dibenarkan oleh CIDB) antara dua atau lebih kontraktor setiap ahli gabungan hendaklah masing-masing melengkapkan borang-borang yang tersebut di atas yang berasingan.

6. Semua maklumat dan dokumen-dokumen yang tersebut di atas hendaklah dikemukakan oleh petender bersama-sama tendernya sebelum tarikh tutup Tender dan petender tidak akan berpeluang lagi untuk mengemukakannya selepas itu.

7. Sekiranya petender didapati memberikan maklumat palsu atau sengaja menyorok (withold) atau tidak memberikan mana-mana maklumat yang memberikan kesan negatif terhadap keupayaannya, tendernya akan ditolak dan tindakan tatatertib akan diperakukan terhadapnya.

BAHAGIAN B

SYARAT-SYARAT KONTRAK (SAMB 100)

SYARIKAT AIR MELAKA BERHAD

SAMB

STANDARD FORM OF CONTRACT TO BE USED WHERE BILLS OF QUANTITIES FORM PART OF THE CONTRACT

FORM SAMB 100 (Rev. 1/2010)

CONDITIONS OF CONTRACT
TO BE USED WHERE BILLS OF QUANTITIES FORM PART OF THE CONTRACT

FORM SAMB 100 (Rev. 1/2010)

This form has been approved by Attorney General's Chamber

TABLE OF CONTENTS

CONTRACT NO : _____of 20 _____

EXPENDITURE to be met from: Head .....

Sub-head .....

Year of .....

A CONTRACT made on ..... day of ..... 20..... between the SAMB of Malaysia (hereinafter referred to as the "SAMB") of the one part and .....

(Company No. : .....) (hereinafter called the "Contractor") and having its registered address at .....

..... of the other part.

(The SAMB and the Contractor shall hereinafter individually be referred to "Party" or collectively as the "Parties")

WHEREAS:

A. The SAMB is desirous of .....

.....

at ..... (hereinafter referred to as the 'Works') and has caused Drawings, Summary of Tender, Provisional Bills of Quantities (if any), Specification describing the work to be done to be prepared.

B. The said Drawings numbered ..... (hereinafter referred to as the "Contract Drawings"), and the Summary of Tender, Provisional Bills of Quantities (if any), Specification, Form of Tender and Letter of Acceptance of Tender have been signed by or on behalf of the Parties hereto.

NOW IT IS HEREBY AGREED AS FOLLOWS:

1.0 DEFINITIONS AND INTERPRETATION

1.1 Definition

Unless the context otherwise requires, this Contract or an item or entry in the Appendices specifically otherwise provides, the following words and phrases in this Contract and the

Appendices shall have the meaning given below or ascribed in the clauses or Appendix item to which reference is made:

(a)	**"Contract"**	means this contract and the appendices attached hereto;
(b)	**"Contract Documents"**	means the documents forming the tender and acceptance thereof including: - Form of Tender; - Letter of Acceptance of Tender; - Contract Drawings; - Summary of Tender; - Specifications; - Treasury's Instructions; - Provisional Bills of Quantities (if any) ..... ; - ..... ; - ..... ; and all these documents shall be complementary to one another;
(c)	**"Contractor"**	means the person or persons, sole proprietor, partnership, firm or company whose tender for the Works has been accepted and who has or have signed this Contract and includes the Contractor's personal representatives, heirs, successors, executors, administrators, servant and agent;
(d)	**"Contract Period"**	means the time frame stipulated in clause 2;
(e)	**"Contract Sum"**	means the sum stipulated in clause 7;
(f)	**"Date for Completion"**	means the date fixed and stated in Appendix or any other date as provided for in clause 39;
(g)	**"Defects Liability Period"**	means the period stated in Appendix or if none stated, the period is twelve (12) months from the date of practical completion certified by the S.O. as provided for under clause 39.3;
.(h)	"**Nominated Sub-Contractor" or "Nominated Supplier"**	means all specialist, merchants, tradesmen and others executing any work or services, or supplying any materials or goods for which Prime Cost Sum (or P.C. Sums) are included in the Bills of Quantities or which the S.O. has given written instructions in regard to the expenditure of Provisional Sum and who may be nominated by the S.O. and employed by the Contractor as Sub-contractors or Suppliers;
(i)	**"On-Cost Charges"**	means any cost and expenses reasonably incurred by the SAMB;
(j)	**"Officer** Named"	means officer empowered to take action on behalf of the SAMB pertaining to clauses .....;

(k)	**"Prime Cost" or abbreviation "P.C. Sum"**	means a sum for works or services to be executed by a Nominated Sub-Contractor or sums for materials or goods to be obtained from a Nominated Supplier;
(l)	**"Provisional Sum"**	means a sum for work or for the supply of goods or materials which cannot be defined or detailed at the time the tender documents are issued;
(m)	**"Site"**	means the land and other places on, above, under, in or through which the Works are to be executed and any other lands or places provided or approved by the SAMB for working space or any other purposes as may be specifically designated in this Contract and whether the same may be on the Site or not;
(n)	**"S.O."**	means the Superintending Officer who shal be ....and/or his successors in office;
(o)	**"S.O.'s Representatives"**	means any person or persons delegated or authorised in writing by the S.O. to perform any of the duties of the S.O. as may be from time to time notified in writing to the Contractor by the S.O. pursuant to clause 3.3(a) of this Contract;
(p)	**"Works"**	means the works specified in the Contract Documents and shall include temporary works.

1.2 Interpretation

(a) The terms "approved or approval" and "directed or direction" wherever used in this Contract shall be in writing.

(b) Words importing the singular include the plural and vice versa where the context requires.

(c) The headings are for convenience of reference only and shall not be deemed to be part of this Contract or be taken into consideration in the interpretation or construction of this Contract.

(d) Unless otherwise specifically stated, a reference in this Contract and the Appendices to any clause means that clause in this Contract.

(e) This Contract and the Appendices are to be read as a whole and the effect or operation of any clause in this Contract or item in or entry in the Appendices shall, unless otherwise specifically stated, be read subject to any relevant qualification or modification in any other clauses in this Contract or item in or entry in the Appendices.

2.0 CONTRACT PERIOD

The Contract Period shall be for a period of ..... commencing from ..... ending on .....

3.0 THE S.O. AND S.O.'S REPRESENTATIVE

3.1 Duties of S.O. and S.O.'s Representative

The S.O. shall be responsible for the overall supervision and direction of the Works. All matters regarding the Works shall be dealt with by the Contractor with the S.O.

3.2 S.O.'s Representative

(a) The S.O. may from time to time appoint such number of S.O.'s Representative as he deems fit.

(b) The S.O.'s Representative shall be responsible to the S.O. and his duties are to watch and supervise the Works and to test and examine any materials or goods to be used or workmanship employed in connection with the Works.

3.3 S.O.'s Authority to Delegate

(a) The S.O. may from time to time in writing delegate to the S.O.'s Representative any of the powers and authorities vested in the S.O. as listed in the letter of delegation and shall furnish to the Contractor a copy of all such written delegation of powers and authorities.

(b) Any instruction or approval given by the S.O.'s Representative to the Contractor within the terms of such delegation shall bind the Contractor and the SAMB as though it had been given by the S.O. PROVIDED THAT failure of the S.O.'s Representative to disapprove any work or material shall not prejudice the power of the S.O. thereafter to disapprove such work or materials and to order the pulling down, removal or breaking up thereof.

(c) If the Contractor is not satisfied with any decision of the S.O.'s Representative, the Contractor shall refer the matter to the S.O. who shall confirm, reverse or vary the decision of the S.O.'s Representative.

(d) The delegation under this clause shall not preclude the S.O. from himself exercising or performing at any time any of the delegated powers and duties.

4.0 S.O.'S RIGHT TO TAKE ACTION

4.1 Notwithstanding any provision in this Contract it is hereby agreed that:

(a) the power of the S.O. to issue instruction requiring a variation under clause 24 shall be subject to the financial limits as set out in Appendix 1 hereto. If the instruction for a variation under clause 24 is more than the financial limits as set out in the Appendix 1, the S.O. shall obtain the prior written approval of the relevant authorities of the SAMB; and

(b) the right to act on behalf of the SAMB in respect of any matter which arises out of the provisions of clauses 51, 52, 53, 58 and 66 shall be exercised by the Officer Named in Appendix 1;

4.2 The Contractor shall not be entitled to extension of time or any additional cost or expense or whatsoever arising from compliance with this clause 4.

5.0 S.O.'S INSTRUCTIONS

5.1 The S.O. may from time to time issue further drawings, details and/or written instructions (all of which are hereafter collectively referred to as "S.O.'s instructions") in regard to-

(a) the Variation as referred to in clause 24 hereof;

(b) any discrepancy in or between the Contract Documents as referred to in clause 8.2(b) hereof;

(c) the removal from the Site of any materials or goods brought thereon by the Contractor and the substitutions of any other materials or goods therefore;

(d) the removal and/or re-execution of any works executed by the Contractor;

(e) the dismissal from the Works of any person mentioned in clause 23.6 hereof employed thereupon;

(f) the opening up for inspection of any work covered up;

(g) the amending and making good of any defects whatsoever under clause 48;

(h) any matter which is necessary and incidental to the carrying out and completion of the Works under this Contract; and

(i) any matter in respect of which the S.O. is expressly empowered by this Contract to issue instructions.

5.2 All instructions issued by the S.O. shall be in writing. The Contractor shall forthwith comply with all instructions issued to him by the S.O. If such instruction is given orally, the S.O. shall then issue a written instruction within seven (7) days from the date of such oral instruction is given.

5.3 If within seven (7) days after receipt of a written notice from the S.O. requiring compliance of an instruction and the Contractor does not comply therewith, then the S.O. without prejudice to any other rights or remedies available to the SAMB under this Contract, undertake the work departmentally or employ and pay another Contractor or any other persons to execute any work whatsoever which may be necessary to give effect to such instruction. All costs and expenses incurred in connection with such employment (including On-Cost Charges), shall be deducted from any money due or to become due to the Contractor under this Contract, and failing which such deductions shall be recovered from the Performance Bond or as a debt due from the Contractor.

5.4 The Contractor shall be responsible for all costs and expenses incurred by the SAMB in carrying out the Works under clause 5.3 and On-Cost Charges (calculated by applying the Percentage of On-Cost Charges stated in Appendix hereto to the amount incurred). The SAMB shall be entitled to deduct such costs, expenses and On-cost Charges or any part thereof from any monies due or to become due to the Contractor under this Contract or to recover the same from the Performance Bond or as a debt due from the Contractor.

6.0 SCOPE OF CONTRACT

6.1 The Contractor shall upon and subject to this Contract, construct and complete the Works using materials, goods and workmanship of the quality and standards therein specified in accordance with best industry practice.

6.2 The Contractor shall also undertake any consequential work in relation to the construction and completion of Works on the Site i.e. removal/diversion of public sewer, water mains, electrical

mains, gas mains and telephone mains and the installation of permanent connections thereto shall be borne by the SAMB. The SAMB shall reimburse the Contractor for such costs by adding it to the Contract Sum PROVIDED THAT such cost have not already been included in the Contract Sum by way of a Provisional Sum or otherwise.

PROVIDED FURTHER any temporary connection shall be obtained by the Contractor with no additional cost to the SAMB for purpose of carrying out their work.

6.3 The Contractor shall also make good any defect, imperfection, shrinkage or any other fault whatsoever which may appear during the Defects Liability Period in accordance with clause 48 hereof.

7.0 CONTRACT SUM

The SAMB hereby covenants to pay the Contractor in consideration of the construction and completion of the Works and making good of any defects whatsoever to the Works the sum of Ringgit:

.....

..... (RM.....) or such other sum as shall become payable under and at the times and in the manner specified in this Contract.

8.0 CONTRACT DOCUMENTS

8.1 Custody of the Contract Documents

(a) The Contract shall be prepared in two (2) original copies. The original copies of the Contract shall remain in the custody of the S.O. and the Contractor.

(b) Immediately after the execution of this Contract, the S.O. shall furnish to the Contractor without any charge (unless he shall have been previously furnished) with:

(i) two (2) copies of the Contract Drawings; and

(ii) two (2) copies of the Specification, unpriced Summary of Tender and Provisional Bills of Quantities (if any) and (if requested by the Contractor) one copy of the priced Summary of Tender and Provisional Bills of Quantities (if any) and one copy of the Schedule of Rates.

(c) The S.O. shall, as and when necessary and without charge to the Contractor, furnish him with two (2) copies of such further working drawings or details as are reasonably necessary either to explain and amplify the Contract Drawings or the Specification (if any) or to enable the Contractor to construct and complete the Works in accordance with this Contract. PROVIDED THAT nothing contained in the said working drawings or details shall impose any obligation beyond those imposed by the Contract Documents.

(d) The Contractor shall keep one copy of the Contract Drawings, the Specification, unpriced Summary of Tender and Provisional Bills of Quantities (if any), priced Summary of Tender and Provisional Bills of Quantities (if any) and other like documents referred to in sub-clause (c) hereof on the Site and the S.O. shall at alt reasonable times have access to the same.

(e) Upon final payment being made pursuant to the issuance of Final Account and Payment Certificate under clause 31, the Contractor shall return to the S.O. all drawings, details, specifications, unpriced copy of Summary of Tender, Provisional Bill of Quantities (if any) and priced Summary of Tender and Provisional Bill of Quantities (if any).

(f) None of the documents hereinbefore mentioned shall be used by the Contractor for any purpose other than this Contract.

8.2 **Sufficiency of Contract Documents**

(a) The Contract documents are to be taken as mutually explanatory of one another. The Contractor shall provide everything necessary for the proper execution of the Works until its completion according to the true intent and meaning of the Contract Documents taken together whether the true intent and meaning may or may not be particularly shown or described PROVIDED THAT it can be reasonably inferred therefrom.

(b) If the Contractor shall find any discrepancy in or divergence between any two or more of the Contract Documents including a discrepancy or divergence between parts of any one of them, he shall immediately give to the S.O. a written notice specifying the discrepancy or divergence and the S.O. shall issue instructions in regard thereto PROVIDED ALWAYS that such discrepancy or divergence shall not vitiate this Contract.

9.0 REPRESENTATIONS, WARRANTIES AND UNDERTAKINGS OF THE CONTRACTOR

9.1 **Representations and Warranties**

The Contractor hereby represents and warrants to the SAMB that—

(a) it is a corporation validly existing under the laws of Malaysia*;

(b) the Contractor has obtained a valid registration with the Construction Industry Development Board;

(c) it has the corporate power to enter into and perform its obligations under this Contract and to carry out the transactions and to carry on its business as contemplated by this Contract*;

(d) it has taken all necessary corporate actions to authorize the entry into and performance of this Contract and to carry out the transactions contemplated by this Contract*;

(e) as at the execution date, neither the execution nor performance by it of this Contract nor any transactions contemplated by this Contract will violate in any respect any provision of—

(i) its Memorandum and Articles of Association; or

(ii) any other document or agreement which is binding upon it or its asset*;

(f) no litigation, arbitration, tax claim, dispute or administrative proceeding is presently current or pending or, to its knowledge, threatened, which is likely to have a material adverse effect upon it or its ability to perform its financial or other obligations under this Contract;

(g) this Contract constitutes a legal, valid and binding obligation of the Contractor and is enforceable in accordance with its terms and conditions;

(h) it has necessary financial and technical capability to undertake the Works,

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**applicable only if the Contractor is a company registered under the Companies Act 1965.*

and the Contractor acknowledges that the SAMB has entered into this Contract in reliance on its representations and warranties as aforesaid.

9.2 **Undertakings of the Contractor***

The Contractor undertakes that-

(a) it shall comply with all requirements, statutory or otherwise, regulating or relating to the conduct, trade, business or profession of a contractor, and the Contractor shall be fully and solely liable for all costs incurred thereby;

(b) it shall pay all taxes that may be imposed on the profits made in respect of this Contract in accordance with the applicable laws; and

(c) it shall ensure that all his employees, including non-Malaysian personnel, comply with all relevant laws to which they are subject to including payment of income tax, which in respect thereto the Contractor shall make such deductions from the salaries of his employees as may be lawfully imposed by the relevant authority.

10.0 OBLIGATIONS OF THE CONTRACTOR

The Contractor shall—

(a) construct, complete, test and commission the Works in accordance with the Specifications, Contract Drawings and any other documents specified in the Contract Documents;

(b) perform the Works in a proper manner and in accordance with good management practice and to the best advantage of the SAMB;

(c) take all appropriate measures expected of a contractor providing similar works to ensure that the Works comply with the requirements of this Contract;

(d) perform the Works and discharge its obligations as contained in this Contract by exercising professional judgment and practice, requisite skill, care and diligence. In performing the Works, the Contractor shall provide well-outlined procedures in the form agreed by the SAMB for reporting and co-ordination purposes;

(e) at all times perform the Works in such manner as will always safeguard and protect the SAMB's interest in relation to the Works and take all necessary and proper steps to prevent abuse or uneconomical use of facilities, if any, made available by the SAMB to the Contractor;

(f) inform the SAMB immediately in writing of the occurrence of any factor or event, which is likely to affect the Works. Such notification shall not be construed as a discharge of any of the Contractor's obligations under this Contract;

(g) provide and maintain throughout the Contract Period such number, categories of qualified and competent personnel necessary to perform the Works;

(h) provide and maintain at its own cost and expense all equipment and materials necessary for the proper and effective performance of the Works;

(i) instruct and supervise its staffs and sub-contractor in carrying out the Works' repairs and other works in relation to the Works;

** applicable only if the Contractor is a company registered under the Companies Act 1965.*

(j) make good any defect, imperfection, shrinkage or any other fault whatsoever which may appear during the Defects Liability Period; and

(k) carry out any other obligations and responsibilities under this Contract.

11.0 INSPECTION OF SITE

11.1 The Contractor shall be deemed to have inspected and examined the Site and its surroundings and to have satisfied himself before submitting his tender as to the following:

(a) the nature of the ground and subsoil;

(b) the form and nature of the Site;

(c) the extent and nature of the work, materials and goods necessary for the completion of the Works;

(d) the means of communication with and access to the Site;

(e) the accommodation he may require; and

(f) in general to have obtained for himself all necessary information as to risks, contingencies and all circumstances influencing and affecting his tender.

11.2 Any information or document forwarded by the SAMB to the Contractor shall not relieve the Contractor of his obligations under the provisions of this clause.

12.0 PROGRAMME OF WORK

12.1 Within fourteen (14) days from the receipt of the Letter of Acceptance by the SAMB, the Contractor shall submit to the S.O for his approval -

{a) a work programme for the carrying out of the Works (hereinafter referred to as "Work Programme") in such form and details as determined by the S.O. showing the detail activities of the Works so as to enable the SAMB to monitor the progress thereof; and

(b) a general description in writing, of the arrangements and methods of construction which the Contractor proposes to adopt for the carrying out of the Works.

12.2 The S.O shall within ..... (.....) days after receipt of the Contractor's programme:

(i) approve the Work Programme in writing; or

(ii) reject the Work Programme in writing with reasons and/or request modifications; and/or

(iii) request the Contractor to supply further information to clarify or substantiate the Work Programme or to satisfy the S.O as to its reasonableness having regard to the Contractor's obligations under the Contract,

PROVIDED THAT if none of the above actions is taken within the said period of .... (.....) days the S.O shall be deemed to have approved the Work Programme as submitted.

12.3 The Contractor shall upon receipt from the S.O any request under clause 12.2(ii) or (iii) resubmit a modified Work Programme or provide further information as requested.

12.4 If at any time it should appear to the S.O that the actual progress of Works does not conform to the approved Work Programme referred to herein before the Contractor shall produce, at the request of the S.O., a revised Work Programme showing the modifications to the approved Work Programme necessary to ensure completion of the whole Works within the time for completion provided for in clause 39 hereof or extended time granted pursuant to clause 43 hereof.

12.5 The submission to and approval by the S.O or the S.O's Representative of such Work Programme or the furnishing of such particulars shall not relieve the Contractor of any of his duties or responsibilities under this Contract.

13.0 PERFORMANCE BOND/PERFORMANCE GUARANTEE SUM

13.1(a) The Contractor shall, on the date of the possession of Site, provide a Performance Bond or Performance Guarantee Sum as the case may be substantially in the form as in Appendix issued by an approved licensed bank or financial institution incorporated in Malaysia in favour of the SAMB for a sum equivalent to five percent (5%) of the total Contract Sum as specified in Appendix to secure the due performance of the obligations under this Contract by the Contractor. The Performance Bond shall remain valid and effective until twelve (12) months after the expiry of the Defect Liability Period or the issuance of the Certificate of Completion of Making Good Defects, whichever is the later.

(b) If the Contractor fails to submit the said Performance Bond as specified in sub-clause (a) above on the date of possession of site, then the Contractor shall be deemed to have opted for Performance Bond in the form of Performance Guarantee Sum as provided for under clause 13.2 hereof.

13.2 The Contractor may opt for a Performance Bond in the form of Performance Guarantee Sum in lieu of the Bank, Insurance or Finance Company Guarantee as specified in clause 13.1 hereof whereby deductions of ten percent (10%) shall be made from the first interim payments and subsequent interim payment until the total amount deducted aggregate to a sum equivalent to five (5) percent of the Contract Sum. The amount deducted shall be retained by the SAMB up to twelve (12) months after the expiry of the Defect Liability Period or the issuance of the Certificate of Completion of Making Good Defects, whichever is the later.

13.3 Notwithstanding anything contained in this Contract, the SAMB shall be entitled at any time to call upon the Performance Bond, wholly or partially, in the event that the Contractor fails to perform or fulfil its obligations under this Contract and such failure is not remedied in accordance with this Contract.

13.4 If a payment is made to the SAMB pursuant to any claim under the Performance Bond, the Contractor shall issue to the SAMB further security in the form of additional performance bond or bonds for an amount not less than the amount so paid to the SAMB on or prior to the date of such payment so that the total sum of the Performance Bond shall be maintained at all times at the value specified in clause 13.1(a).

13.5 The Performance Bond (or any balance thereof remaining for the credit of the Contractor) may be released or refunded to the Contractor on the completion of making good of all defects, shrinkages or other faults which may appear during the Defects Liability Period and upon the giving of the Certificate of Completion of Making Good Defects for the whole of the Works under clause 48.

13.6 Notwithstanding the above, in the event that this Contract is terminated under clause 51 hereof the said Performance Bond or any balance thereof shall be forfeited.

14.0 INDEMNITY IN RESPECT OF PERSONAL INJURIES AND DAMAGE TO PROPERTY

14.1 The Contractor agrees with the SAMB that—

(a) it shall perform all of its obligations under this Contract at its own risk and releases, to the fullest extent permitted by law, the SAMB and their agents and servants from all claims and demands of every kind resulting from any accident, damage, injury or death arising from the carrying out of the Works except where such accident, damage, injury or death is caused or contributed to by any act or omission or negligence of the SAMB or its agents and servants. The Contractor expressly agrees that in the absence of any such act, omission or negligence as aforesaid the SAMB shall have no responsibility or liability whatsoever in relation to such accident, damage, injury or death;

(b) it shall indemnify and keep indemnified the SAMB from and against all actions, suits, claims or demands, proceedings, losses, damages, compensation, costs (including legal cost), charges and expenses whatsoever to which the SAMB shall or may be or become liable in respect of or arising from—

(i) the negligent use, misuse or abuse by the Contractor or its personnel, servants, agents or employees appointed by the Contractor;

(ii) any loss or damage to property or injury of whatsoever nature or kind and howsoever or wherever sustained or caused or contributed to by carrying out of the Works by the Contractor to any person and not caused by the negligence or wilful act, default or omission of the SAMB, its agents or servants; or

(iii) any loss, damage or injury from any cause whatsoever to property or persons affected by the Works to the extent to which the same is occasioned or contributed to by the act, omission, neglect, breach or default of the Contractor or personnel, servants, agents or employees; and

(c) the obligations under this clause shall continue after the expiry or earlier termination of this Contract in respect of any act, deed, matter or thing happening before such expiration or termination of this Contract.

14.2 The Contractor shall indemnify, protect and defend at its own cost and expense, the SAMB and its agents and servants from and against all actions, claims and liabilities arising out of acts done by the Contractor in the performance of this Contract.

15.0 INSURANCE AGAINST PERSONAL INJURIES AND DAMAGE TO PROPERTY

15.1 **Taking of Insurance**

(a) Without prejudice to his liability to indemnify the SAMB under clause 14 hereof, the Contractor shall, as a condition precedent to the commencement of any work under this Contract, effect and maintain such insurances whether with or without an excess amount as specified in Appendix hereto as are necessary to cover the liability of the Contractor and all sub- contractors, whether nominated or otherwise.

(b) Such insurance shall be for the purpose of personal injuries or death, damage or loss to property, movable or immovable, arising out of, or in the course of, or by reason of the execution of the Works and caused by any negligence, omission, breach of contract or default of the Contractor or any sub-contractor, whether nominated or otherwise, or of any servants or agents of the Contractor or of any such sub-contractor, whether nominated or otherwise. Where an excess amount is specified in Appendix, the Contractor shall bear the amount of such excess. The policy or policies of insurance shall contain a cross liability clause indemnifying each of the jointly insured against claims made by on him by the other jointly insured.

(c) Such insurance as referred to under sub-clause (a) hereof shall be effected with an insurance company as approved by the SAMB and maintained in the joint names of the SAMB and Contractor and all sub-contractors, whether nominated or otherwise. Such insurance shall cover from the period of the date of possession of site until the date of issuance of Certificate of Making Good Defects for any claim occasioned by the Contractor or any sub-contractor in the course of any operations carried out by the Contractor or any sub-contractor for the purpose of complying with his obligations under Clause 48 hereof.

15.2 **Production of Policies**

It shall be the duty of the Contractor to produce and shall deposit the relevant policy or policies of the insurance together with receipts in respect of premiums paid to the S.O., whether demanded or not.

15.3 **Default in Insuring**

If the Contractor fails to effect or renew such insurances as are required to be effected and maintained under this Contract, the SAMB or the S.O. on its behalf may effect or renew such insurance and shall be entitled to deduct a sum equivalent to the amount in respect of the premiums paid and On-Cost Charges (calculated by applying the 'Percentage for On-cost Charges' stated in Appendix hereto to the premiums paid), from any money due or to become due to the Contractor under this Contract or to recover the same from the Performance Bond or as a debt due from the Contractor.

15.4 **Cancellation of Insurance**

(a) The Contractor shall ensure that any insurance policy effected hereto shall only be cancelled by the insurer after the expiry of thirty (30) days from the date of receipt by the SAMB of a written notice from the insurer advising of such impending cancellation PROVIDED THAT the Contractor has been issued with the Certificate of Making Good Defects in accordance with clause 48.

(b) The Contractor shall not at any time permit or cause to be done any act, matter or thing which may result in any insurance effected by virtue of this Contract being vitiated or rendered void or voidable or whereby the rate of the premium on any insurance effected shall be liable to be increased.

15.5 **Loss or Damage Occasioned by Insured Risk**

(a) In the event of any damage or loss occurring during the performance of this Contract, the Contractor shall repair, replace or make good such damage or loss from the amount of insurance claimed, if sufficient, or if insufficient, using his own resources.

16.0 **INDEMNITIES TO SAMB IN RESPECT OF CLAIMS BY WORKMEN**

16.1 **Workmen Compensation**

(a) The Contractor shall be liable for and shall indemnify and keep indemnified the SAMB and its officers or servants from all liabilities arising out of claims by any workman employed by the Contractor in and for the performance of this Contract for payment of compensation under or by virtue of the Workmen's Compensation Act 1952 and the Employee's Social Security Act 1969 or any other law amending or replacing such law and from all costs and expenses incidental and consequential thereto.

(b) The Contractor shall effect and maintain throughout the Contract Period a "Workmen Compensation Insurance" or any other applicable insurance for its personnel, servants, agents or employees required under the laws of Malaysia.

17.0 EMPLOYEES' SOCIAL SECURITY ACT, 1969

17.1 Registration with SOCSO

Without prejudice to his liability to indemnify the SAMB under clause 16, the Contractor shall register or cause to register all local workmen employed in the execution of the Works and who are subject to registration under the Employee's Social Security Scheme ("the SOCSO Scheme") in accordance with the Employee's Social Security Act 1969 or any subsequent modification or re-enactment of the said Act. For the purpose of this sub-clause, the term "local workmen" shall include workmen who are Malaysian citizens and those who have permanent resident status.

17.2 Contribution to SOCSO

The Contractor shall submit the Code Number and Social Security Numbers of all the workmen registered under the SOCSO scheme to the S.O. for verification. The Contractor shall make payment of all contribution from time to time on the first contribution day on which the same ought to be paid and until the completion of this Contract and it shall be the duty of the Contractor to produce to the S.O. contribution statement or payment vouchers as evidence of payment of such contribution, whether demanded or not.

17.3 Default in Complying with SOCSO

If the Contractor fails to comply with the terms of this Clause, the SAMB or the S.O. on its behalf may without prejudice to any other remedy available to the SAMB for breach of any terms of this Contract:

(a) withhold an amount from any money which would otherwise be due to the Contractor under this Contract and which in the opinion of the S.O. will satisfy any claims for compensation by workmen that would have been borne by SOCSO Scheme had the Contractor not made default in maintaining the contribution; and/or

(b) pay such contributions as have become due and remain unpaid and deduct the amount of such contributions including On-Cost Charges (calculated by applying the Percentage of On-Cost Charges stated in Appendix to the contributions paid), from any money due or to become due to the Contractor under this Contract, and failing which such contributions shall be recovered from the Performance Bond or as a debt due from the Contractor.

18.0 INSURANCE OF WORKS

18.1 Taking of Insurance

(a) The Contractor shall in the joint names of the SAMB and the Contractor insure against loss and damage by fire, lightning, explosion, storm, tempest, flood, ground subsidence, bursting or overflowing of water tanks, apparatus or pipes, aircraft and other aerial devices or articles dropped therefrom, riot and civil commotion, all work executed and all unfixed materials and goods, delivered to, placed on or adjacent to the Works and intended therefore (but excluding temporary buildings, plant, tools and equipment owned or hired by the Contractor or any sub-contractor, nominated or otherwise) to the full value thereof (plus any amount which may be specifically stated in Appendix or elsewhere in the Contract Documents) and shall keep such work, materials and goods so insured until the completion of the whole of the Works, notwithstanding any arrangement for Sectional Completion or Partial Occupation by the SAMB under this Contract. Such insurance policy or policies shall provide expressly for payment in the first place to the SAMB of any insurance monies due under the policy or policies.

(b) The said insurance with or without an excess clause as specified in Appendix hereto shall be effected with an insurance company approved by the S.O. and it shall be the duty of the Contractor to produce to the S.O. the said policy or policies and the receipts in respect of the premium paid. Where an excess clause is specified in Appendix, the Contractor shall bear the amount of such excess.

18.2 **Default in Insuring**

If the Contractor fails to effect or renew such insurance as are necessary under this clause, the SAMB or the S.O. on its behalf may renew such insurance and pay the premium in respect thereof and deduct the amount so expended including On-Cost Charges (calculated by applying the 'Percentage of On-cost Charges' stated in Appendix to the premiums paid), from any money due or to become due to the Contractor under this Contract, and failing which such premium shall be recovered from the Performance Bond or as a debt due from the Contractor.

18.3 **Payment of Insurance in the Event of any Loss/Damage**

Upon the occurrence of any loss or damage to the Works or unfixed materials or goods prior to the date the Works has been certified as practically completed by the S.O. in the Certificate of Practical Completion, the Contractor shall notwithstanding that settlement of any insurance claim has not been completed, with due diligence restore, replace or repair the same, remove and dispose of any debris and proceed with the carrying out and completion of the Works. All money if and when received from the insurance under this clause shall be paid in the first place to the SAMB and then (less any such amounts as are specifically required in Appendix or elsewhere in the Contract Documents) be released to the Contractor by instalments on the certificate for payment issued by the S.O., calculated as from the date of receipt of the money in proportion to the extent of the work of restoration, replacement or repair and the removal and disposal of debris previously carried out by the Contractor. The Contractor shall not be entitled to any payment in respect of the work of restoration, replacement or repair and the removal and disposal of debris other than the money received under the said insurance.

18.4 **Cancellation of Insurance Policy**

The Contractor shall ensure that any insurance policy effected hereto shall only be cancelled by the insurer after the expiry of thirty (30) days from the date of receipt by the SAMB of a written notice from the insurer advising of such impending cancellation PROVIDED THAT the Contractor has been issued with the Certificate of Making Good Defects in accordance with clause 48.

19.0 SETTING OUT

19.1 The Contractor shall be responsible for the true and proper setting out of the Works and for the correctness of the positions, levels, dimensions and alignments of all parts of the Works and for the provisions of all necessary instruments, appliances and labour in connection therewith.

19.2 If at any time during the progress of the Works any error in the positions, levels, dimensions or alignments of any part of the Works is discovered, the Contractor shall at his own expense rectify such error unless such error is based on incorrect data supplied in writing by the S.O.'s Representative in which case the expense of rectifying shall be borne by the SAMB.

19.3 If at any time during the progress of the Works, any error shall appear or arise in the setting-out required to construct the Works or in the position, levels, dimensions or alignment of any part of the Works, the Contractor, on being required to do so by the S.O., shall at his own expense rectify such error to the satisfaction of the S.O. The checking of any setting out of or of any line or level by the S.O. shall not in any way relieve the Contractor of his responsibility for the correctness thereof and the Contractor shall carefully protect and preserve all things used in the setting-out required for the construction of the Works until the S.O. agrees that the said things may be abandoned.

19.4 The Contractor shall give to the S.O. without charge such information as may be required by the S.O. to enable him to check the setting-out required for the construction of the Works including interpreting any marks made by the Contractor for the purpose of setting out.

20.0 UNFIXED MATERIALS AND GOODS

Unfixed materials and goods delivered to, placed on or adjacent to the Site and intended for incorporation therein, shall not be removed except for use upon the Works, unless the S.O. has consented in writing to such removal. Where the S.O. has included the value of such materials or goods in any certificate in accordance with clause 28, under which the Contractor has received payment, such materials and goods shall become the property of the SAMB, but the Contractor shall remain responsible for loss or damage to the same.

21.0 COMPLIANCE WITH THE LAW

21.1 The Contractor shall comply in all respects (including the giving of all notices and the paying of all fees required) with any law, regulation or by-law, or any order or directive issued by any public authority or public service company (hereinafter referred to as "Statutory Requirements"), relating to the Works or, in the case of public authority or public service company, with those systems the same are or will be connected. The Contractor shall submit to the S.O. all approvals received by the Contractor in connection therein. The Contractor shall keep the SAMB indemnified against all penalties and liability of every kind for breach of any such Statutory Requirements.

21.2 If after the Date of Tender (as specified in Appendix) there is any change or amendment in any written law, regulations and by-laws which necessitates any variation to the Works, the Contractor shall, before making such variation, give to the S.O. a written notice specifying and giving the reason for such variation and apply for the S.O.'s instruction in respect of the matter.

22.0 DESIGN

22.1 Design Liability

(a) Notwithstanding any design and specifications supplied by the SAMB, if the Contractor is required under this Contract to undertake the design of any part of the Works which is a stand alone design as determined by the SAMB, the Contractor shall ensure that such design is suitable, functional, safe, compatible and integrates with the design and specifications of the Works and it shall be undertaken, approved and endorsed by a competent and registered professional.

(b) The Contractor shall submit to the S.O. all drawings, specifications, calculations and any other relevant information pertaining to the stand alone design for approval. No work shall commence without prior written consent of the S.O.

(c) The Contractor shall be fully responsible and guarantee the SAMB that the stand alone design, integration, execution of the Works, materials and workmanship for the Works or part of the Works are independent of fault, suitable, functional, safe and compatible with the requirements of the SAMB.

(d) The approval of the stand alone design by the S.O pursuant to sub-clause (b) shall not absolve the Contractor from its responsibility under sub-clause (c) and the Contractor shall be liable and shall fully indemnify and keep the SAMB indemnified for any design defects, damage, inadequacies or insufficiency of such design.

22.2 **Design Guarantee Bond**

(a) The Contractor shall provide a Design Guarantee Bond for the stand alone design issued by an approved licensed bank or financial institution of the sum of Ringgit ... (RM...) amounting to 5% of the value of the said part of the Works substantially in the form as in Appendix [.....] upon or before the issuance of the Certificate of Practical Completion of the Works as a security for the Contractor's obligations and warranties under Clause 22.1. Such Design Guarantee Bond shall remain valid for a period of 5 years from the date of practical completion of the Works.

(b) If any defect or damage shall occur to that particular part of the Works as a result of any defect, fault, insufficiency, imperfection, shrinkages or inadequacy in the stand alone design including workmanship, materials or equipment which has become defective arising from design fault then the approved licensed bank or financial institution issuing the Design Guarantee Bond pursuant to sub-clause (a) above shall pay to the SAMB, on demand by the SAMB in writing notwithstanding any objection by the Contractor or any third party, the sum of ..... being equal to 5% of the value of the said part of the Works or such part thereof as may be demanded.

(c) If the Design Guarantee Bond is not deposited with the SAMB in accordance with sub-clause (a) above, the SAMB shall have the right to claim from the Performance Bond the sum of Ringgit (RM...) being equal to 5% of the value of the said part of the Works or such part thereof as may be demanded.

(d) If a payment is made to SAMB pursuant to clause (b), the Contractor shall ensure that further security in the form of an additional Design Guarantee Bond for an amount no less than the amount so paid to SAMB shall be issued to SAMB prior to or upon the date of such payment. If any of the issued Design Guarantee Bond were to expire prior to the validity period, a replacement Design Guarantee Bond shall be issued to SAMB on or prior to the date of expiry of the first mentioned Design Guarantee Bond in an amount not less than the amount of that Design Guarantee Bond.

23.0 EMPLOYMENT OF WORKMEN

23.1 **Workmen**

(a) The Contractor shall employ, in the execution of this Contract, only Malaysian citizens as workmen.

(b) If in any particular trade or skill required to complete the Works, the Contractor can show to the satisfaction of the S.O. that Malaysian citizens are not available, then the Contractor may employ non-Malaysian citizens subject to the approval of the SAMB.

(c) The Contractor shall on the commencement of the Works furnish to the Jabatan Tenaga Kerja of the State in which this Contract is performed all particulars connected with this Contract and such returns as may be called for from time to time in respect of labour employed by him on for the execution of this Contract, in accordance with the requirements of the Employment Act 1955, Employment (Restriction) Act 1968, and Internal Security (Registration of Labour) Regulation 1960 or any subsequent modification or re-enactment thereof.

(d) The Contractor shall maintain on the Site at all times during the progress of the Works an up to date register containing particulars of all workers employed by him.

(e) The Contractor shall cause his sub-contractors (including 'labour only' sub-contractors) and Nominated Sub-Contractors to comply with the provisions of this clause.

23.2 Compliance with Employment Act 1955, *etc.*

In the employment of workmen for the execution of this Contract, the Contractor shall comply, and shall cause his sub-contractors (including "labour only" sub-contractors) and Nominated Sub-Contractors to comply with all the requirements of the Employment Act 1955, Employment (Restriction) Act 1968, Employee's Provident Fund Act 1951, the Industrial Relations Act 1967 and any other law relating to the employment of workmen, or any subsequent modification or re-enactment thereof. PROVIDED THAT the Contractor shall not be entitled to any claim for additional costs and payments whatsoever in respect of his compliance with this clause.

23.3 **Days and Hours of Working**

No work shall be done on:

(a) the weekly day of rest;

(b) any public holiday which is recognised in the state where this Contract is being carried out; or

(c) between the hours of six in the evening and six in the following morning;

without the written permission of the S.O. PROVIDED THAT when such written application of the Contractor is approved by the S.O., the Contractor shall comply fully with all the requirements of the Employment Ordinance 1955 in regard thereto or any subsequent modification or re-enactment thereof and shall bear any costs for compliance therewith, and any extra costs incurred by the SAMB in connection with the supervision of the Works.

23.4 Wages Books and Time Sheets

(a) The Contractor shall keep and shall cause his sub-contractors (including "labour only" sub-contractors) and Nominated Sub-Contractors to keep proper wages books and time sheets showing wages paid to and the time worked by all workmen employed by him and his sub-contractors as aforesaid in and for the performance of this Contract.

(b) The Contractor shall produce such wages books and time sheets on demand for inspection by any persons duly authorised by the S.O.

(c) The Contractor shall furnish to the S.O. or S.O.'s Representative such information relating to the wages and conditions of employment of such workmen as the S.O. may from time to time require.

23.5 Default in Payment of Wages

In the event of default in the payment of —

(a) any money in respect of wages; and/or

(b) payment in respect of Employees Provident Fund Contributions,

of any workmen employed by the Contractor or his sub-contractors (including "labour only" sub-contractors) and Nominated Sub-contractors in and for the performance of this Contract, which a

claim has been filed with the Department of Labour, then the S.O. shall make payment to the Director General of Labour and/or Employees Provident Fund, as the case may be, out of any monies at any time due to the Contractor under this Contract and such payment shall be deemed to be a payment made to the Contractor by the SAMB under and by virtue of this Contract.

23.6 **Discharge of Workmen**

(a) The Contractor shall employ in and about the execution of the Works only such persons as are of good character, careful, skilled and experienced in their respective vocations and trades.

(b) The S.O. shall be at liberty to object to and require the Contractor to remove immediately from the Site any person employed by the Contractor in or about the execution of the Works who in the opinion of the S.O. misconducts himself or is incompetent or negligent in the proper performance of his duties. Such person shall not again be employed upon the Works without the prior written permission of the S.O.

(c) Any person so removed from the Works shall be replaced without delay by a substitute approved by the S.O. PROVIDED THAT the Contractor shall not be entitled to any claim for any expense whatsoever incurred by him in respect of any direction given by the S.O. under this clause.

24.0 VARIATIONS

24.1 The S.O. may issue instructions requiring a Variation in a form of a Variation Order. No variation required by the S.O. shall vitiate this Contract. Upon the issuance of such Variation Order, the Contractor shall forthwith comply with the Variation Order issued by the S.O.

24.2 The term 'Variation' means a change in the Contract Document which necessitates the alteration or modification of the design, quality or quantity of the Works as described by or referred to therein and affects the Contract Sum, including:

(a) the addition, omission or substitution of any work;

(b) the alteration of the kind or standard of any of the materials, goods to be used in the Works; or

(c) the removal from the Site of any work executed or materials or goods brought thereon by the Contractor for the purposes of the Works other than work, materials or goods which are not in accordance with this Contract.

24.3 Any variation made under this clause shall not relieve the Contractor from his obligations under clause 22.1(c).

25.0 VALUATION OF VARIATION

25.1 All variations instructed in writing by the S.O. in accordance with clause 24 hereof shall be measured and valued by the S.O. The valuation of Variations, unless previously or otherwise agreed, shall be made in accordance with the following rules:

a) The rates in the Schedule of Rates, after adjustment if necessary as provided in Clause 26.2 hereof, shall determine the valuation of work (other than work involving a whole addition of any item of work priced in the Summary of Tender, which shall be valued in accordance with rule (b) hereof) of similar character and executed under similar conditions as work priced therein;

b) The said rates, where work is not of similar character or executed under similar conditions as aforesaid, shall be the basis of rates for the same, so far as may be reasonable, failing which a fair valuation thereof shall be made by the S.O.;

c) Where work involves the addition of the whole of any similar item of work and executed under similar conditions a

d) s work priced in the Summary of Tender, the price of such item
of work in the Summary of Tender shall be the basis of the valuation of the said item of work. The rates in the Schedule of Rates shall determine the valuation of work omitted; provided that if the omission involves the omission of the whole of any item of work in the Summary of Tender, the price of such item of work in the Summary of Tender shall be the basis of valuation of the item omitted. Omission of the whole of an item of work in the Summary of Tender shall mean omission of the whole of the work where it is not required and shall not apply to the substitution of any work in the Summary of Tender.

25.2 Where work cannot properly be measured or valued, the S.O. may allow daywork price as specified in Appendix. Unless otherwise provided in the Bills of Quantities, the daywork prices for the purpose of this Contract shall be taken to mean the actual net cost to the Contractor of his materials, plant and labour for the work concerned. The Contractor shall be paid daywork prices, plus fifteen percent (15%), which shall include for the cost of all ordinary plant, tools, scaffolding, supervision and profit. PROVIDED ALWAYS that as a condition precedent to any right to any payment the Contractor shall produce vouchers, receipts and wage books specifying the time for labour and plant employed and materials used to the S.O. not exceeding seven (7) days after the work shall have been done.

25.3 The amount of variations shall be certified by the S.O. and added to or deducted from the Contract Sum as the case may be and the amount shall be adjusted accordingly.

26.0 SUMMARY OF TENDER

267 The Summary of Tender, Provisional Bills of Quantities (if any), shall be the basis of the Contract Sum. Any error in description or quantity or omission of Works from the Summary of Tender and Provisional Bills of Quantities (if any) shall not vitiate this Contract but shall be rectified and the amount in respect of such rectification shall be added to or deducted from the Contract Sum as the case may be.

26.2 The SAMB reserves the right to adjust the rates in the Schedule of Rates and the prices in the Summary of Tender submitted by the Contractor to ensure their reasonableness before acceptance of tender and the decision of the SAMB shall be final.

26.3 Any adjustment of the prices in the Summary of Tender by the preceding clause 26.2 above and any arithmetical error in the Summary of Tender shall before the signing of this Contract be so adjusted and rectified so that the total amount in the Summary of Tender shall correspond to the lump sum amount tendered by the Contractor in the Form of Tender. Provided always the lump sum amount shown in the Form of Tender shall remain unaltered. Provided further that Provisional and Prime Cost Sums shall not be subjected to such adjustment of prices.

26.4 Subject to the Clauses 8.2(a) and 11 hereof, the quality and quantity of the Works included in the Contract Sum shall be to be that which is shown upon the Contract Drawings or described in the Specification and/or the Summary of Tender. Where quantities of work are given in the Contract Drawings and/or the Specification and/or the Summary of Tender for the purpose of tendering, unless otherwise stated, these shall be deemed to form part of this Contract and the method of measurement of and payment for the same shall be made in accordance with the rules as set down in the Contract Drawings and/or the Specification and/or Summary of Tender.

Provisional Quantities

26.5 Where the quantities of Works are stated as "provisional" in the Bills of Quantities, such quantities are the estimated quantities which shall not be taken as the actual and correct quantities of Works to be executed by the Contractor in the fulfilment of his obligations under the Contract. The amount to be paid to the Contractor in respect of such Works upon completion of this Contract shall be ascertained by remeasurement of the work as it is actually executed. The rates in the "provisional" Bills of Quantities shall determine the valuation of the Works of similar character and executed under similar conditions as work priced therein. The said rates, where work is not of similar character or executed under similar conditions as aforesaid, shall be the basis of rates for the same so far as maybe reasonable, failing which a fair valuation thereof shall be made by the S.O..

26.5 For the purpose of clause 26.5, the amount to be paid to the Contractor shall be set off against the amount for such work in the Bills of Quantities, and the balance shall be added to or deducted from the Contract Sum as the case may be.

27.0 MEASUREMENT OF WORKS

27.1 The S.O. shall, when he requires any part or parts of the Works to be measured or remeasured for the purposes of clauses of Variation under clause 24 and provisional quantities under clause 26.5, give reasonable notice to the Contractor who shall attend or send a qualified agent to assist the S.O. or S.O.'s Representative in making such measurement and shall furnish all particulars required by the S.O.. Should the Contractor fail to attend or neglect or omit to send such agent, then the measurement made by the S.O. or approved by him shall be taken to be the correct measurement of the work.

27.2 Upon the completion of the measurement pursuant to clause 27.1, the S.O. shall supply the Contractor with such measurement in respect of the said parts.

28.0 PAYMENT TO CONTRACTOR AND INTERIM CERTIFICATES

28.1 When the Contractor has executed work including delivery to or adjacent to the Works of any unfixed materials or goods intended for incorporation into the Works in accordance with the terms of this Contract and their total value of work thereof has reached the sum referred to in Appendix, the S.O. shall at that time make the first valuation of the same.

28.2 Thereafter, once (or more often at the discretion of the S.O.) during the course of each succeeding month the S.O. shall make a valuation of the works properly executed and of unfixed materials and goods delivered to or adjacent to the Site, provided the total value of work properly executed and the value of unfixed materials and goods as specified in clause 28.4 hereof, delivered to the Site intended for incorporation into the Works in each subsequent valuation shall not be less than the sum referred to in Appendix.

28.3 Within fourteen (14) days from the date of any such valuation being made and subject to the provision mentioned in clause 28.1, the S.O. shall issue an Interim Certificate stating the amount due to the Contractor from the SAMB. PROVIDED THAT the signing of this Contract shall not be a condition precedent for the issue of the first Interim Certificate (and no other) so long as the Contractor has returned the Letter of Acceptance of Tender duly signed and has deposited with the S.O. or the SAMB the relevant insurance policies under clauses 15 and 18 hereof.

28.4 The amount stated as due in an Interim Certificate shall, subject to any agreement between the Parties as to payment by stages, be the estimated total value of the work properly executed and up to ninety percent (90%) of the value of the unfixed materials and goods delivered to or adjacent to the Site intended for incorporation into the permanent Works up to and including the date the valuation was made, less any payment (including advance payment) previously made

paid under this Contract. PROVIDED THAT such a certificate shall only include the value of the said unfixed materials and goods as and from such time as they are reasonably and properly and not prematurely delivered to or adjacent to the Site and adequately protected against weather, damage or deterioration.

28.5 This clause shall not apply to any unfixed materials and goods which are supplied and delivered by Nominated Suppliers for which payment shall be made for the full value of the unfixed materials and goods.

28.6 Within a number of days as stated in Appendix (or if none stated then within thirty (30) days of the issue of any such Interim Certificate), the SAMB shall make a payment to the Contractor as follows:

(a) where the Performance Bond is in the form of a Banker's, Insurance or Finance Company Guarantee, payment shall be made on the amount certified as due to the Contractor in the said Interim Certificate; or

(b) where the Performance Bond is in the form of a Performance Guarantee Sum, payment of ninety percent (90%) on the amount certified as due to the Contractor shall be made with the remaining ten percent (10%) being retained by the SAMB as a Performance Guarantee Sum. PROVIDED THAT when the sum retained is equivalent to five percent (5%) of the Contract Sum then in any subsequent Certificate, payment shall be made on the full amount certified as due to the Contractor.

29.0 ADJUSTMENT OF CONTRACT SUM

The amount to be added to or deducted from the Contract Sum in respect of expense or loss due to fees and charges in relation to the supply of water and electricity and permanent connections to water, electricity, telephone and sewerage mains under clause 6.2, variations under clause 24, rectification of errors in Bill of Quantities under clause 26.3, fluctuation of price under clause 30, payment of P.C. Sums and Provisional Sums under clause 34, opening up work for inspection and testing of materials or goods and executed work under clause 35.2, loss and expense under clause 44 and costs of disposal of fossils, *etc.* under clause 65 hereof, shall be certified by the S.O.

30.0 FLUCTUATION OF PRICE (NOT APPLICABLE)

In accordance with the Special Provisions to the Conditions of Contract for Fluctuation of Price as contained in Appendix (if applicable), the amount payable by the SAMB to the Contractor upon the issue by the S.O. of an Interim Certificate under clause 28 hereof shall be increased or decreased accordingly. The net total of any such increases or decreases shall be given effect to in determining the Contract Sum.

31.0 FINAL ACCOUNT AND PAYMENT CERTIFICATE

31.1 As soon as is practicable but not later than three (3) months after the issuance of the Certificate of Practical Completion, the Contractor shall submit full particulars complete with receipts, vouchers records that would substantiate the Contractor's claim under clause 44 together with any documents, supporting vouchers and any explanation and calculations including documents relating to the accounts of Nominated Sub-Contractors or Nominated Suppliers, which may be necessary to enable the Final Account to be prepared by the S.O. PROVIDED ALWAYS the Contractor had given the notice of claim in writing within the stipulated time or times in the said provisions.

31.2 If the Contractor fails to submit full particulars of all claims within the stipulated period, the S.O. shall forthwith make the assessment based on the available documents submitted by the Contractor for the purpose of the Final Account. The SAMB shall be discharged from all liabilities in connection with the claims.

31.3 Within three (3) months after the expiry of the Defects Liability Period for the whole of the Works or three (3) months after the issue of the Certificate of Completion of Making Good Defects under clause 48 hereof, whichever is the later, the S.O. shall issue the Final Certificate.

31.4 The Final Certificate shall be supported by documents, and full particulars complete with receipts, vouchers records showing the S.O.'s final valuation of Works and any amount determined in clause 31.1 in accordance with the terms of this Contract. After setting out or allowing for all payments or other expenditure of the SAMB or any permitted deductions made by the SAMB or the S.O. on its behalf, the Final Certificate shall state any final balance due from the SAMB to the Contractor or from the Contractor to the SAMB, as the case may be, which shall thereupon become the debt payable. Such certificate shall also take account of any outstanding permitted deductions not yet made by the SAMB under the terms of this Contract whether by way of liquidated damages or otherwise.

31.5 No final payment due to the Contractor under the Final Certificate, shall be made unless and until the Contractor shall have satisfied the S.O. by means of a Statutory Declaration made by or on behalf of the Contractor to the effect that the workmen who have been employed by the Contractor on the Works including workmen employed by sub-contractors, whether nominated or otherwise (including "labour only" sub-contractors) have received all wages due to them in connection with such employment, and that all dues or contributions under the Employment Act 1955, the Employee's Social Security Act 1969, the Employee's Provident Fund Act 1965 and any other laws relevant to the employment of workmen, have been paid.

32.0 EFFECT OF S.O.'S CERTIFICATES

No certificate of the S.O. under any provision of this Contract shall be considered as conclusive evidence as to the sufficiency of any work, materials or goods to which it relates, nor shall it relieve the Contractor from his liability to amend and make good all defects, imperfections, shrinkages, or any other faults whatsoever as provided by this Contract. In any case, no certificate of the S.O. shall be final and binding in any dispute between the SAMB and the Contractor if the dispute is brought whether before an arbitrator or in the Courts.

33.0 DEDUCTION FROM MONEY DUE TO CONTRACTOR

The SAMB or the S.O. on its behalf shall be entitled to deduct any money owing from the Contractor to the SAMB under this Contract from any sum which may become due or is payable by the SAMB to the Contractor under this Contract or any other contracts to which the SAMB and Contractor are Parties thereto. The S.O. in issuing any certificate under clauses 28 and 31, shall have regard to any such sum so chargeable against the Contractor, provided always that this provision shall not affect any other remedy to which the SAMB may be entitled for the recovery of such sums.

34.0 PRIME COST / PROVISIONAL SUMS

34.1 In respect of any and every Prime Cost or P.C. Sum provided in the Contract, the amount due to any Contractor shall be determined by deducting the said Prime Cost or P.C. Sum and the relevant profit and/or attendance charges from the Contract Sum and substituting for the same with the actual amount due to relevant Nominated Sub- Contractor or Nominated Supplier as valued in accordance with the relevant sub-contract and the sums due to any Contractor by way

of profit and/or attendance charges at the rates or prices stipulated in the Contract Documents (if any).

34.2 The Provisional Sum may be expended at such times and in such amounts as the S.O. may direct. Such sum if not used either wholly or in part shall be deducted from the Contract Sum. The value of works which are executed by the Contractor in respect of Provisional Sums shall be ascertained in accordance with clause 25 hereof. The said value of such work executed by the Contractor shall be set off against all such Provisional Sums and the balance shall be added to or deducted from the Contract Sum as the case may be.

34.3 Any work to be executed, or materials or goods to be supplied for which Provisional Sums are provided in the Bills of Quantities may, if the S.O. so decides, be treated as P.C. Sum items and shall be dealt with in accordance with clause 34.1.

34.4 Where the Contractor in the ordinary course of his business directly carries out works for which P.C. Sums are provided in the Bills of Quantities and where such works are set out in Appendix hereto and the S.O. is prepared to accept tenders from the Contractor for such works the Contractor shall be permitted to tender for the same or any of them without prejudice to SAMB's right to reject the lowest or any tender. If the tender of the Contractor for any work included in the P.C. Sum is accepted, such tender shall be held to include the profit and attendance charges, and the Contractor shall not be entitled to the profit and attendance charges as contained in the Bills of Quantities notwithstanding any provision to the contrary under clause 34.1.

35.0 MATERIALS, GOODS AND WORKMANSHIP

35.1 All materials, goods and workmanship shall be of the respective kinds and standards described in the Specification and of good quality and in accordance with the standard of the workmanship in the industry. The Contractor shall upon the request of the S.O. furnish him with the relevant certificates and/or vouchers to prove that the materials and goods comply with the Specification.

35.2 The Contractor shall, entirely at his own cost, provide samples of materials and goods for testing purposes. The Contractor shall, when instructed by the S.O. to open up for inspection any work covered up, or arrange for or carry out any test of any materials or goods (whether or not already incorporated in the Works) or of any executed work which the S.O. may in writing require and the cost of such opening up or testing (together with the cost of making good in consequence thereof) shall be added to the Contract Sum unless provided for in the Bills of Quantities by way of Provisional Sums or otherwise or unless the inspection or test shows that the work, materials or goods are not in accordance with this Contract.

35.3 The Contractor shall pay all duties and taxes which may be imposed by law, such as customs duties and sales tax, on all materials, goods and equipment, whether purchased or imported in the Contractor's name or his agent, which are incorporated in the Works or used directly in the construction, completion or maintenance of the Works.

35.4 Except where otherwise specified, the Contractor shall pay all tonnage and other royalties, rent fees and other payments or compensation (if any) for getting stone, sand, gravel, clay or other materials required for the Works.

36.0 INSPECTION AND TESTING OF MATERIALS, GOODS AND EQUIPMENT

36.1 Further to the Contractor's obligations under clause 10, the Contractor shall submit to the S.O. for his approval, proposals for inspecting the design and setting out of the Works and testing the materials and workmanship to ensure that the Contractor's obligations under the Contract are fulfilled.

36.2 The Contractor shall carry out the inspection and tests approved under clause 36.5 or elsewhere in the Contract and such further tests as the S.O. may reasonably require, including to open up for inspection any work covered up or to carry out any test of any materials or goods (whether or not already incorporated in the Works or any executed Works).

36.3 The S.0 may issue instructions to the Contractor to remove from the Site or rectify any work, goods which are not in accordance with this Contract at his own cost.

36.4 The Contractor shall, as may be required by the S.O. from time to time, provide such assistance, instruments, machines, labour and materials as are normally required for the purpose of examining, measuring and testing of any work, as well as and the quality, weight or quantity of the materials used, and shall supply samples of materials before incorporation in the Works for testing.

36.5 Unless the Contract otherwise provides, the cost of making any test shall be borne by the Contractor if such test is:

(a) proposed by the Contractor; or

(b) clearly intended by or provided for in the Contract.

36.6 Notwithstanding anything in clause 36.5, if the Contractor carries out any further test as required by the S.O. pursuant to clause 36.2 and the result of such test shows the workmanship or materials is not in accordance with the provisions of the Contract, then the cost of such test shall be borne by the Contractor. But if the result of such test shows the workmanship or materials comply with the provisions of the Contract, then the cost of such test shall be borne by the SAMB.

37.0 CONSTRUCTIONAL PLANT, EQUIPMENT, VEHICLES AND MACHINERIES

37.1 The Contractor shall pay all port dues including (but not by way of limitation) wharfage dues, pilotage fees, anchorage, berthage and mooring fees, quarantine dues, loading porterage and overtime fees for constructional plant, equipment, vehicles and machineries for use directly in connection with the construction, completion of the works brought into and despatched from Malaysia by the Contractor (or in his name by agents).

37.2 The Contractor shall furnish to the S.O. all such shipping documents, invoices and other documentation as may be required by the Customs Authorities in connection with the importation of goods, materials, constructional plant, equipment, vehicles and machineries.

37.3 In the case of constructional plant, equipment, vehicles, and machineries imported on the Contractor's behalf by importing agents and the like both the shipping documents and the invoices of the original suppliers or manufacturers must indicate clearly that the consignment is for the Contractor's account.

37.4 The procedure in respect of the requirements of the foregoing shall be determined by the Customs Authorities. The Contractor shall make written application to the S.O. and shall provide the relevant documentation of all constructional plant, equipment, vehicles and machineries to be imported into Malaysia not less than forty-five (45) days before the arrival of the said constructional plant, equipment, vehicles and machineries.

37.5 The Contractor shall pay all charges and other expenses in connection with the landing and shipment of all constructional plant materials and other things of whatsoever nature brought into or despatched from Malaysia for the purpose of the Contract.

37,6 The Contractor shall make his own arrangement in obtaining clearance through the Customs of constructional plant, equipment, vehicles and machineries. However, if required, the S.O.'s assistance may be sought.

37.7 Under this Contract, the Contractor shall be required to furnish all lists of constructional plant, equipment, vehicles and machineries to the S.O. whether the constructional plant, equipment, vehicles and machineries are hired or acquired.

38.0 POSSESSION OF SITE

38.1 No work under this Contract shall commence unless and until the Performance Bond stipulated under clause 13 and such insurance policy as specified under clauses 15 and 18 shall have been deposited with the SAMB, PROVIDED THAT for the purposes of this clause only (but for no other), if the Contractor shall produce to the SAMB the cover note of the said insurance policy and the receipt of premium paid, it shall be a sufficient discharge of his obligations under this clause.

38.2 Unless the Contract Documents shall otherwise provide, possession of the Site as complete as may reasonably be possible but not so as to constitute a tenancy, shall be given on or before the "Date for Possession" stated in the Letter of Acceptance to the Contractor who shall thereupon and forthwith commence the Works (but subject to clause 38.1) and regularly and diligently proceed with and complete the Works on or before the Date for Completion as stated in Appendix.

38.3 The "Date for Completion" of the Works as referred to under clause 39 hereof shall be calculated from the said "Date for Possession". PROVIDED ALWAYS that the possession of Site may be given in section or in parts and any other restrictions upon possession of the Site shall be stated in the Appendix to these Conditions or in the Contract Documents.

38.4 In the event of any delay in giving possession of the Site from the "Date for Possession" as stated in Letter of Acceptance or delay in giving any section or part of the Site as provided in clause 38.3, the S.O. may issue instructions in regard to the revision of the "Date for Possession" and the "Date for Completion" shall be appropriately revised under clause 43.1(h) hereof, but the Contractor shall not be entitled to claim for any loss or damage caused by such delay in giving possession of the Site, nor shall he be entitled to terminate this Contract.

38.5 In the event that the giving of the possession of the whole Site is delayed beyond ninety (90) days of the "Date for Possession" stated in the Letter of Acceptance, the S.O. shall give written notice to the Contractor of the causes of such delay. Upon the receipt of the said written notice issued by the S.O., the Contractor may, inform the S.O. in writing of its decision within fourteen (14) days of receipt of the said notice either to:

(a) agree to proceed with the Works when the Site is subsequently made available, in which case clause 38.4 shall apply in particular, the Contractor shall not be entitled to claim for any loss or damage caused by such delay in giving possession of the Site, or

(b) terminate this Contract, without prejudice to any other rights or remedies that the SAMB and the Contractor may have as a result of the termination.

38.6 In the event that the giving of possession of any section or part of the Site (whether provided for in clause 38.3 or otherwise) is delayed beyond ninety (90) days from the Date of Possession stated in the Appendix or the date the Contractor is scheduled to commence work on that section or part of the Works in accordance with the approved programme of Works as referred to in clause 12 hereof as the case may be, then the S.O. shall give written notice to the Contractor of the causes of such delay. Upon receipt of the said written notice, the Contractor may inform the S.O. in writing, within fourteen (14) days of receipt of the said notice of its decision either to:

(a) agree to proceed with the Works when the section or part of the Site is subsequently made available, in which case sub-clause 38.5(a) above shall apply and in particular, the Contractor shall not be entitled to claim for any loss or damage caused by such delay as aforesaid; or

(b) request for S.O.'s instruction to omit the relevant section or part of the Works from the Contract. If the S.O. agrees to such request then the relevant section or part of the Works shall be duly omitted and deemed to be a variation to the Contract. Such variation shall not vitiate this Contract. If the S.O. does not agree to such request as aforesaid, then the Contractor shall be entitled to claim for any loss and/or expenses caused by and in respect of such delay beyond ninety (90) days as aforesaid.

39.0 COMPLETION OF WORKS

39.1 Subject to clauses 38.3 and 41, the Contractor shall complete the whole of the Works on or before the "Date for Completion" as stated in the Appendix or such extended time as may be allowed under clause 43 hereof.

39.2 If the Contractor considers that the works have achieved practical completion, the Contractor shall notify the S.O. in writing to that effect.

39.3 Within 14 days of receipt of such notice, the S.O. shall carry out testing/ inspection of the Works. Pursuant to such inspection/testing, the S.O. shall —

(a) issue the Certificate of Practical Completion to the Contractor if in his opinion the whole Works have reached Practical Completion and have satisfactorily passed any inspection/test carried out by the S.O. The date of such completion shall be certified by the S.O. and such date shall be the date of the commencement of the Defects Liability Period as provided in clause 48 hereof; or

(b) give instruction to the Contractor specifying all defective works which are required to be completed by the Contractor before the issuance of the Certificate of Practical Completion.

39.4 If the S.O. has given instruction pursuant to clause 39.3(b), no Certificate of Practical Completion shall be issued to the Contractor until the Contractor has effectively carried out the remedial work within reasonable period to the satisfaction of the S.O.

39.5 The Works shall not be regarded as practically complete unless it has fulfilled the following:

(a) the Works have been completed in accordance with the terms and conditions of this Contract;

(b) the SAMB can have full, proper and beneficial use of the Works for their intended purpose, notwithstanding that there may be works of a very minor defects PROVIDED THAT such works do not prevent or diminish the full, proper and beneficial use as aforesaid;

(c) the Works have passed any commissioning tests required in the Contract Document;

(d) the Works shall be made available to the SAMB in a condition fit for occupation; and

(e) all the essential services, including access roads, landscape, car parks, drains, sanitary, water and electricity installation, fire hydrant, sewerage and refuse disposal equipment and fire lifts specified in this Contract.

39.6 When the whole of the Works have reached practical completion to the satisfaction of the S.O., the date of such completion shall be certified by him and such date shall be the date of the commencement of the Defects Liability Period as provided in clause 48 hereof.

40.0 DAMAGES FOR NON-COMPLETION

40.1 If the Contractor fails to complete the Works by the Date for Completion or within any extended time granted pursuant to clause 43, the S.O. shall forthwith issue a Certificate of Non-Completion to the Contractor.

40.2 Without prejudice to the SAMB's right to terminate this Contract, when the S.O. issues the Certificate of Non-Completion, the SAMB shall be entitled to recover from the Contractor, Liquidated and Ascertained Damages calculated at the rate stated in Appendix 1 from the period of the issuance of the Certificate of Non-Completion to the date of issuance of Certificate of Practical Completion or the date of termination of this Contract. The S.O. may deduct such Liquidated and Ascertained Damages from any money due or to become due to the Contractor, failing which such damages "shall be recovered from the Performance Bond or as a debt due from the Contractor. The S.O. shall inform the Contractor in writing of such deduction.

40.3 The Liquidated and Ascertained Damages stated in Appendix 1 shall be deemed to be a reasonable amount of loss which the SAMB will suffer in the event that the Contractor is in breach of this clause. The Contractor by entering into this Contract agrees to pay to the SAMB the said amount(s) if the same become due without the need of the SAMB to prove his actual damage or loss.

40.4 The payment or deduction of such Liquidated and Ascertained Damages shall not relieve the Contractor from his obligation to complete the Works or from any of its obligations and liabilities under the Contract.

41.0 SECTIONAL COMPLETION

41.1 Where different completion dates for different sections or parts of the Works are stated and identified in Appendix or elsewhere in the Contract Documents and different and separate Liquidated and Ascertained Damages are provided for each section or part of the Works, the provisions of this Contract in regard to:

(a) Certificate of Practical Completion;

(b) Delay and Extension of Time;

(c) Liquidated Ascertained Damages; and

(d) Defects Liability Period,

but not Insurance of the Works under clause 18, Performance Bond under clause 13 and final payment on the Final Certificate under clause 31 hereof shall, in the absence of any express provision to the contrary elsewhere in the Contract Documents apply as if each such section or part was the subject of a separate and distinct contract between the SAMB and the Contractor.

41.2 For the avoidance of doubt, nothing contained in clause 41.1 shall entitle the Contractor to the release of the whole or any part of the Performance Bond or Performance Guarantee Sum deposited by him. The Performance Bond or Performance Guarantee Sum shall be released or be refunded only upon the issue of the Certificate of Making Good Defects of the whole of the Works or in respect of the last section of the Works, as the case may be.

42.0 PARTIAL OCCUPATION/TAKING OVER BY SAMB

42.1 If at any time before the whole of the Works have reached practical completion pursuant to clause 39, the SAMB with the consent of the Contractor (which consent shall not be unreasonably withheld) shall take possession of and occupy any part or parts of the same (any such part being hereinafter in this Clause referred to as 'the relevant part'), then notwithstanding anything expressed or implied elsewhere in this Contract.

Certificate of *Partial* Occupation

(a) within seven (7) days from the date on which the SAMB shall have taken possession of the relevant part, the S.O. shall issue a Certificate of Partial Occupation in respect of the relevant part stating the estimated value of the said relevant part, and for all the purposes of this Clause (but for no other) the value so stated shall be deemed to be the total value of the said relevant part;

Defects Liability Period

(b) for the purposes of clauses 39 and 48 hereof, the relevant part shall be deemed to have reached practical completion and the Defects Liability Period in respect of the relevant part shall be deemed to have commenced on the date on which the SAMB shall have taken possession and occupied. thereof;

Certificate of Making Good Defects

(c) at the end of the Defects Liability Period of the relevant part and if in the opinion of the S.O. any defect, imperfection, shrinkage or any other fault whatsoever in respect of the relevant part which he may have required to be made good under clause 48.1, shall have been made good by the Contractor, the S.O. shall issue a certificate to that effect;

***Reduction of Liquidated Ascertained* Damages**

(d) if, before the time of completion of the whole of the Works or, if applicable any section, a Certificate of Practical Completion has been issued for any part of the Works or of a section, the rate of the liquidated and ascertained damages for delay in completion of the remainder of the Works or of that section shall, for any period of delay after the date stated in such Certificate of Practical Completion, be reduced in the proportion which the value of the part so certified bears to the value of the whole of the Works or section, as applicable;

Insurance of the Works

(e) notwithstanding the partial occupation by the SAMB of the relevant part the Contractor shall insure and keep insured the Works in the manner as stipulated under clause 18 and the Contractor shall give notice to the insurer of such partial occupation; and

***Performance Bond Not* Affected/**

(f) it is expressly agreed that nothing contained in the preceding paragraphs shall entitle the Contractor to the release of the Performance Bond or any part thereof deposited by him under clause 13 hereof, the intention being that the said Performance Bond or any part thereof shall be released or refunded only upon the completion of making good all defects, imperfections, shrinkages or other faults which may appear during the Defects Liability Period and upon the giving of the Certificate of Completion of Making Good Defects for the whole of the Works under clause 48 hereof.

43.0 DELAY AND EXTENSION OF TIME

43.1 Upon it becoming reasonably apparent that the progress of the Works is delayed, the Contractor shall forthwith give written notice to the S.O as to the causes of delay and relevant information with supporting documents enabling the said officer to form an opinion as to the cause and calculation of the length of delay. If in the opinion of the S.O the completion of the Works is likely to be delayed or has been delayed beyond the Date for Completion stated in Appendix 1 or beyond any extended Date for Completion previously fixed under this Clause due to any or more of the following events:

(a) force majeure as provided under clause 58;

(b) exceptionally inclement weather;

(c) suspension of Works under clause 50;

(d) directions given by the S.O., consequential upon disputes with neighboring owners provided the same is not due to any act, negligence or default of the Contractor or any sub-contractor, nominated or otherwise;

(e) S.O.'s instructions issued under clause 5 hereof, PROVIDED THAT such instructions are not issued due to any act, negligence, default or breach of this Contract by the Contractor or any sub-contractor, nominated or otherwise;

(f) the Contractor not having received in due time instructions in regard to the nomination of sub-contractors and/or suppliers provided in this Contract, necessary instructions, drawings or levels for the execution of the Works from the S.O. due to any negligence or default of the S.O. PROVIDED THAT the Contractor shall have specifically applied in writing on a date which having regard to the Date for Completion stated in Appendix or to any extension of time then fixed under this clause, was neither unreasonably distant from nor unreasonably close to the date on which it was necessary for him to receive the same;

(g) delay in giving possession of the Site as provided under clause 38.4 hereof other than claim in effecting insurance and Performance Bond;

(h) delay on the part of artists, tradesmen or others engaged by the SAMB in executing work not forming part of this Contract;

(i) the Contractor's inability for reason beyond his control and which he could not reasonably have foreseen at the date of closing of tender of this Contract to secure such goods, materials and/or services as are essential to the proper carrying out of the Works; or

(j) delay on the part of the Nominated Sub-contractors and/or Nominated Suppliers to perform their works, due to reasons as stated above in sub-clauses (a) to (i),

then the S.O. may if he is of the opinion that the extension of time should be granted, so soon as he is able to estimate the length of the delay beyond the date or time aforesaid issue a Certificate of Delay and Extension of Time giving a fair reasonable extension of time for completion of the Works.

PROVIDED THAT all such delays are not due to any act, negligence, default or breach of contract by the Nominated Sub-contractor and/or Nominated Supplier and/or the Contractor, or

any of the servants or agents of such Nominated Sub-contractor or Nominated Supplier or the Contractor.

PROVIDED ALWAYS that the Contractor has taken all reasonable steps to avoid or reduce such delay and shall do all that may reasonably b'! required to the satisfaction of the S.O. to proceed with the Works.

PROVIDED FURTHER that the Contractor shall not be entitled to any extension of time where the instrúctions or acts of the S.O. are necessitated by or intended to remedy any default of or breach of contract by the Contractor.

44.0 CLAIMS FOR LOSS AND EXPENSE

44.1 If at any time during the regular progress of the Works or any part thereof has been materially affected by reason of delays as stated under clause 43.1 (c), (d), (e), (f} and (h), and the Contractor has incurred direct loss and/or expense beyond that reasonably contemplated and for which the Contractor would not be reimbursed by a payment made under any other provision in this Contract, then the Contractor shall within thirty (30) days of the occurrence of such event or circumstances or instructions give notice in writing to the S.O. of his intention to claim for such direct loss or expense together with an estimate of the amount of such loss and/or expense, subject always to clause 44.2 hereof.

44.2 As soon as is practicable but not later than ninety (90) days after practical completion of the Works, the Contractor shall submit full particulars of all claims for direct loss or expense under clause 44.1 together with all supporting documents, vouchers, explanations and calculations which may be necessary to enable the direct loss or expense to be ascertained by the S.O.. The amount of such direct loss or expense ascertained by the S.O. shall be added to the Contract Sum.

44.3 If the Contractor fails to comply with clauses 44.1 and 44.2, he shall not be entitled to such claim and the SAMB shall be discharged from all liability in connection with the claim.

45.0 INVESTIGATION BY THE SAMB AND OTHER PERSONS IN CASE OF ACCIDENT, FAILURE OR OTHER EVENT

Where the SAMB, its employee or any person or body appointed or authorised by it carries out any investigation in relation to any accident, failure or other event which has occurred to, in or in connection with the Works. or any part thereof for the purpose of determining the cause or reason for the said accident, failure or event, the Contractor shall render all such necessary assistance and facilities as may be required by the SAMB, its employee or such person or body, including the giving of access to all specifications, designs, records and other available information relating to the Works.

46.0 ACCESS FOR WORKS, *ETC.*

46.1 Access for S.O.

(a) The S.O. and any person authorised by the S.O. shall at all times have access to the Works and to the factories, workshops or other places of the Contractor or of any sub-contractor or supplier where any equipment, materials, goods or work are manufactured, fabricated, assembled, prepared or stored for the Contract.

(b) Where any such equipment, materials, goods or work are being manufactured, fabricated, assembled, prepared or stored in the factories, workshops or other places of

a sub-contractor or supplier, the Contractor shall by a term in the sub-contract secure a similar right of access to those factories, workshops or other places for the S.O. and any person authorised by the S.O., and shall take reasonable steps required of him by the S.O. to enforce or assist in enforcing such right.

(c) Any person so removed from the Works shall be replaced without delay by a substitute approved by the S.O.; PROVIDED THAT the Contractor shall not be entitled to any claim for any expense whatsoever incurred by him in respect of any direction given by the S.O. under this Clause.

46.2 Access for Other Contractors and Workmen

The Contractor shall in accordance with the requirements of the S.O. afford all reasonable access and facilities to any other person engaged by the SAMB and their workmen and of any other constituted authorities for the purposes of executing any work on or near the Site.

47.0 SUB-CONTRACT OR ASSIGNMENT

47.1 The Contractor shall not without the prior written consent of the S.O. (which consent shall not be unreasonably delayed or withheld) sub- contract the design for any portion of the Works under clause 22 of this Contract. Where the S.O. consents to any sub-contract under this clause, such consent shall not in any way absolve the obligations of the Contractor under clause 10.

47.2 The Contractor shall not sub- contract the whole or any substantial part of the Works without the prior written consent of the S.O. (which consent shall not be unreasonably delayed or withheld). Any such consent, if given, shall not relieve the Contractor from any liability or obligation under this Contract and he shall be responsible for the due observance by such sub-contractors, of all the terms, stipulations and conditions under this Contract.

47.3 Notwithstanding any sub-contract made pursuant to clauses 47.1 and 47.2, the Contractor shall be fully responsible for the acts, defaults or neglects of any sub-contractor, including 'labour only' sub-contractors, his agents, servants or workmen as if they were the acts, defaults or neglects of the Contractor, his agents, servants or workmen; PROVIDED THAT the provision of labour on a piecework basis shall not be deemed to be a sub-contract under this clause.

47.4 It shall be a condition in any sub-contract which has been consented to by the SAMB that upon termination of the Contractor's employment under the Contract, the employment of the sub-contractor under the sub-contract shall terminate immediately. No claim whatsoever shall be made by the Contractor and/or sub-contractor against the SAMB for any work done or materials or goods supplied.

47.5 If the Contractor sub-contracts the Works, in whole or in part, to any person without getting prior written consent of the S.O. as provided under this clause, the S.O. shall have the right to instruct the Contractor to forthwith terminate such sub-contract and the Contractor shall be liable for all costs and expense relating to such termination.

47.6 The Contractor shall not assign the Contract or any part thereof, or any benefit or interest therein or thereunder otherwise than by way of assignment in favour of the Contractor's banker or any financial institution or Corporation of any monies due or to become due under this Contract without prior written consent of the S.O.

48.0 DEFECTS AFTER COMPLETION

48.1 Completion of Outstanding Work and Remedying Defects

(a) At any time during the Defects Liability Period as stated in Appendix hereto (or if none stated the period is twelve (12) months from the date of practical completion of the Works), any defect, imperfection, shrinkage or any other fault whatsoever which may appear and which are due to materials or goods or workmanship not in accordance with this Contract, the S.O. shall issue written instruction to the Contractor to make good such defects, imperfections, shrinkages or any other fault whatsoever at the Contractor's own cost. The Contractor shall complete all such works with due expedition or within such time as may be specified by the S.O.

(b) Without prejudice to sub-clause (a), any defect, imperfection, shrinkage or any other fault whatsoever which may appear during the Defects Liability Period to be made good by the Contractor, shall be specified by the S.O. in the Schedule of Defects which he shall deliver to the Contractor not later than fourteen (14) days after the expiration of the Defects Liability Period. The defects, imperfections, shrinkages or any other fault whatsoever specified in the Schedule of Defects shall be made good by the Contractor at his own costs and to be completed within a reasonable time but in any case not later than three (3) months after the receipt of the said Schedule. PROVIDED THAT the S.O. shall not be allowed to issue any further instruction requiring the Contractor to make good of any defect, imperfection, shrinkage or any other fault whatsoever after the issuance of the said Schedule of Defects or after fourteen (14) days from the expiration of the said Defects Liability Period, whichever is the later.

48.2 Default in Remedying Defects

If the Contractor shall fail to comply with either clause 48.1(a) and/or 48.1(b) within the time so specified, the materials or works so affected may be made good in such manner as the S.O. may think fit, in which case the costs incurred including On-Cost Charges (calculated by applying the Percentage of On-Cost Charges stated in Appendix to the costs incurred), shall be deducted from any money due or to become due, to the Contractor under this Contract and failing which such costs shall be recovered from the Performance Bond or as a debt due from the Contractor.

48.3 Diminution in Value of Works

If any defect, imperfection, shrinkage or any other fault whatsoever is such that, in the opinion of the S.O., It shall be impracticable or inconvenient to the SAMB to have the Contractor to remedy the same, the S.O. shall ascertain the diminution in the value of the Works due to the existence of such defects, imperfections, shrinkages or any other fault whatsoever. The amount of such diminution shall be recoverable by the SAMB from the Contractor as a debt due under the Contract and failing which such diminution shall be recovered from the Performance Bond.

48.4 Certificate of Completion of Making Good Defects

When in the opinion of the S.O. the Contractor has made good the defects, imperfections, shrinkages or any other fault whatsoever which he is required to make good under clauses 48.1(a) or (b), or both, the S.O. shall issue a certificate to that effect, and the date specified in such certificate shall be the date on which the Contractor has completed making good such defects, imperfections, shrinkages or any other fault whatsoever. The said Certificate shall be referred to as the "Certificate of Completion of Making Good Defects".

49.0 UNFULFILLED OBLIGATIONS

Notwithstanding the issue of the Certificate of Completion of Making Good Defects under clause 48.4 hereof the Contractor and the SAMB shall remain liable for the fulfilment of any obligation incurred under the provisions of the Contract, prior to the issue of the said certificate, which remains unfulfilled at the time such certificate is issued, and for the purpose of determining the nature and extent of any such obligation, the Contract shall be deemed to remain in force between the Parties hereto.

50.0 SUSPENSION OF WORKS

50.1 Suspension and Resumption of Works

(a) The S.O. may at any time instruct the Contractor to suspend part or all of the Works.

(b) Upon receipt of such written instruction, the Contractor shall suspend part or all of the Works for such time and in such manner as specified in the instruction and shall duly protect, store and secure the Works or such part of the Works against any deterioration, loss or damage.

(c) During the suspension period, the Contractor shall continue to perform its obligations under this Contract, which are not affected by the instruction to suspend, including the obligation to effect and maintain insurances and Performance Bond.

(d) The S.O. may instruct the Contractor to resume the Works at any time thereafter. Upon receipt of such instruction the Contractor shall resume the Works, and the Parties shall jointly examine the Works affected by the suspension. The Contractor shall make good any deterioration or defect in or loss of the Works which has occurred during the suspension. The Contractor shall also take all necessary actions to mitigate the expenses incurred

50.2 Extension of Time

If the Contractor suffers delay and/or incurs expenses in complying with the instruction under clause 50.1(a), and in resumption of the Works, and if such delay and/or expenses was not foreseeable by the Contractor, the Contractor shall give notice for extension of time under clause 43 and the provisions thereof shall apply accordingly. PROVIDED THAT the Contractor shall not be entitled to such extension if the suspension is due to a cause attributable to the Contractor and he shall not be entitled to payment of loss and expense if he —

(a) fails to take measures specified in clause 50.1(b); and

(b) fails to take all necessary action to mitigate the expenses incurred.

In the event such suspension shall continue for a period exceeding twelve (12) months, the Parties shall then discuss whether to mutually terminate the Contract or suspend the Works for a further period.

50.3 Consequences of Mutual Termination

(a) If the Contract is mutually terminated under this clause-

(i) clause 51.1(c)(i) shall be applicable; and

(ii) payment obligations including all costs and expenditure incurred by the SAMB and the Contractor shall be ascertained in accordance with clause 54.

51.0 EVENTS AND CONSEQUENCES OF DEFAULT BY THE CONTRACTOR

51.1 Default of Obligations

(a) **Events of Default**

In the event the Contractor -

(i) faits to commence works at the Site within two (2) weeks after the Date for Possession;

(ii) suspends or abandons the carrying out of the Works or any part thereof for a continuous period of ..... ( ) days;

(iii) fails to proceed regularly and diligently with the performance of his obligations under the Contract;

(iv) fails to execute the Works in accordance with the Contract;

(v) persistently neglects to carry out his obligations under the Contract;

(vi) refuses or persistently neglects to comply with a written notice from the S.O. in relation to any defective work or equipment, materials or goods which are defective or do not meet the requirements of the Contract;

(vii) fails to comply with the provisions of clause 47; or

(viii) fails to comply with any terms and conditions of this Contract,

then the SAMB shall give written notice to the Contractor specifying the default, and requiring the Contractor to remedy such default within fourteen (14) days of the receipt of the default notice or any period determined by the SAMB.

(b) **Termination**

If the Contractor fails to remedy the breach within such period, the SAMB shall have the right to forthwith terminate this Contract by giving a written notice to that effect

(c) **Consequences of Termination**

If this Agreement is terminated under clause 51.1(b) -

(i) the Contractor shall -

(A) forthwith cease all operations of the Works;

(B) carry out any protection works so as to secure the Site, equipment, goods, materials therein against any deterioration, loss or damage and to do all necessary things so as to leave the Site in a clean and tidy condition;

(C) remove its personnel and workmen from the Site;

(D) vacate the Site within the time stipulated by the S.O., remove all temporary buildings, plant, tools, equipment, goods and unfixed materials which have not been paid by the SAMB, as specified by the S.O. Failing which, the SAMB may (but without being responsible for any

loss or damage) remove and sell any such property belonging to the Contractor, holding the proceeds, less all cost incurred, to the credit of the Contractor;

(E) either -

(aa) terminate all third party contracts entered into by the Contractor for the purposes of this Contract;

(bb) assign to the SAMB, if so required by the S.O., at no cost or expense to the SAMB, the benefit of any agreement for the supply of materials or goods and/or for the execution of any work or services for the purposes of this Contract; or

(cc) allow such third party to enter into a contract with the SAMB or any person deemed necessary by the SAMB for the purpose of completing the Works;

PROVIDED THAT the SAMB shall not be obliged to pay any third party for any materials or goods delivered or any work executed or services for the purposes of this Contract (whether before or after the date of termination) for which the SAMB has paid but the Contractor has failed to make payment to the third party;

(F) at no cost to the SAMB, hand over to the SAMB all plans, designs, specification and other relevant documents relating to the Works;

(G) pay to the SAMB for any losses and damages as a result of termination of this Contract in the manner provided under clause 56; and

(H) not be released from any of its obligations under the Contract.

(ii) the SAMB shall —

(A) call upon the Performance Bond or forfeit the Performance Guarantee Sum;

(B) enter and repossess the Site;

(C) be entitled to carry out and complete the Works on its own or employ any other person to carry out and complete the Works; and

(D) be entitled to claim against the Contractor for any losses, costs, expenses and damages suffered as a result of termination of this Contract in the manner provided under clause 56.

(iii) for the avoidance of doubt, the Parties hereby agree that the Contractor shall not be entitled to any form of losses including loss of profit, damages, claims or whatsoever upon termination of this Contract under this clause.

51.2 **General Default**

(a) **Events of Default**

If at any time during the Contract Period-

(i) the Contractor becomes bankrupt;

(ii) the Contractor becomes insolvent or compounds with or enters into an arrangements or compositions with its creditors;

(iii) an order is made or resolution ih effectively passed for the winding-up of the Contractor (except for the purpose of restructuring or amalgamation with the written consent of the SAMB, which consent shall not be unreasonably withheld);

(iv) a provisional liquidator, receiver or manager of its business or undertaking duly appointed, or possession taken by or on behalf of creditors or debenture holders secured by a floating charge of any property comprised in or subject of the floating charge; or

(v) execution is levied against a substantial portion of the Contractor's assets,

then the SAMB shall have the right to terminate this Contract forthwith by giving notice to that effect.

(b) **Consequences of Termination**

(i) In the event the termination of this Contract under clause 51.2 takes place, clauses 51.1(c)(i) and 51.1(c)(ii) shall apply.

(ii) For the avoidance of doubt, the Parties hereby agree that the Contractor shall not be entitled to any form of losses including loss of profit, damages, claims or whatsoever upon termination of this Contract under this clause.

52.0 TERMINATION ON NATIONAL INTEREST

52.1 Termination

(a) Notwithstanding any provision of this Contract, the SAMB may terminate this Contract by giving not less than thirty (30) days written notice to that effect to the Contractor (without any obligation to give any reason thereof) if the SAMB considers that such termination is necessary for national interest, national policy or national security.

(b) For the purpose of this clause, what constitutes "national interest", "national policy" and "national security", shall be solely made and determined by the SAMB and such determination shall for all intent and purposes be final and conclusive and shall not be open to any challenge whatsoever.

52.2 Consequences of Termination

Upon such termination of this Contract under clause 52.1-

(a) payment obligations including all costs and expenditure incurred by the SAMB and the Contractor shall be ascertained in accordance with clause 54; and

(b) clause 51.1(c)(i) and clause 51.1(c)(ii)(B) and (C) shall apply.

53.0 TERMINATION ON CORRUPTION, UNLAWFUL OR ILLEGAL ACTIVITIES

53.1 Termination

Without prejudice to any other rights of the SAMB, if the Company, its personnel, servants or employees is convicted by a court of law for corruption or unlawful or illegal activities in relation to this Contract or any other agreement that the Contractor may have with the SAMB, the SAMB shall be entitled to terminate this Contract at any time, by giving immediate written notice to that effect to the Contractor.

53.2 Consequences of Termination

Upon such termination under clause 53.1 —

(a) the SAMB shall be entitled to all losses, costs, damages and expenses including any incidental costs and expenses incurred by the SAMB arising from such termination;

(b) clause 51.1(c)(i) and (ii) shall apply; and

(c) for the avoidance of doubt, the Parties hereby agree that the Contractor shall not be entitled to any other form of losses including loss of profit, damages, claims or whatsoever upon termination of this Contract.

54.0 PAYMENTS UPON SUSPENSION AND TERMINATION ON NATIONAL INTEREST

54.1 If this Contract is terminated under clause 50 or clause 52, the amount to be paid (in so far as such amounts or items have not already been covered by payments on account made to the Contractor) shall be the following:

(a) the value of all work carried out up to the date of termination;

(b) the amounts payable in respect of any preliminary items so far as the Work or service comprised therein has been carried out or performed and a proper proportion of any such items which have been partially carried out or performed;

(c) the cost of materials or goods reasonably ordered for the Works which have been delivered to the Contractor or of which the Contractor is legally liable to accept delivery (such materials or goods becoming the property of the SAMB upon such payment being made to the Contractor);

(d) a sum being the amount of any expenditure reasonably incurred by the Contractor in so far as such expenditure has not been recovered by any other payments referred to in this sub-clause; and

(e) the reasonable cost of any protection works and removal of equipment and site facilities pursuant to termination as provided under this Contract,

PROVIDED THAT such amount to be paid by the SAMB shall be confined only to those items as are clearly and expressly stated in sub-clauses (a)-(e) above.

54.2 For the avoidance of doubt, the Parties hereby agree that the Contractor shall not be entitled to any other form of losses including loss of profit, damages, claims or whatsoever other than stipulated under clause 54.1(a)-(e). The Parties further agree that the amount agreed above by the SAMB shall constitute as a full and final settlement between the Parties.

54.3 Upon termination of this Contract under clause 50 and clause 52, a final account of this Contract shall be prepared and issued by the S.O.

55.0 EVENTS AND CONSEQUENCES OF DEFAULT BY THE SAMB

Default of Obligations

(a) Events of Default

If the SAMB without any reasonable cause fails to perform of fulfil any of its obligations which adversely affects the Works,

then the Contractor may issue a notice specifying the default by the SAMB and requiring the SAMB to remedy the same within the period specified therein taking into account the nature of the remedy to be carried out by the SAMB or such other period as may be agreed by both Parties from the date of receipt of such notice.

(b) Termination

If the SAMB fails to remedy the default period specified in such notice issued under Clause 55 (a) within the stipulated period time therein, the Contractor shall have the right to forthwith terminate this Contract by giving a written notice to that effect.

(c) Consequences of Termination

If this Contract is terminated under Clause 55 (b)

i. the SAMB shall pay to the Contractor —

(a) the value of the Works carried out up to the date of termination;

(b) the amounts payable in respect of any preliminary items so far as the Work or service comprised therein has been carried out or performed and a proper proportion of any such items which have been partially carried out or performed;

(c) the cost of materials or goods reasonably ordered for the Works which have been delivered to the Contractor or of which the Contractor is legally liable to accept delivery (such materials or goods becoming the property of the SAMB upon such payment being made to the Contractor); and

(d) a sum being the amount of any expenditure reasonably incurred by the Contractor in so far as such expenditure has not been recovered by any other payments referred to in this sub-clause.

ii. For the avoidance of doubt, the Parties hereby agree that the Contractor shall not be entitled to any other form of losses including loss of profit, damages, claims or whatsoever upon termination of this Contract.

56.0 CERTIFICATE OF TERMINATION COSTS

56.1 As soon as the arrangements for the completion of the Works made by the SAMB enable the S.O. to make a reasonably accurate assessment of the ultimate cost to the SAMB of completing the Works following the termination of the Contractor's employment and the engagement of other contractors or persons, and the. amount of direct loss and/or damage caused to the SAMB due to the termination has been ascertained by the S.O., then the
S.O. may issue a certificate (hereinafter referred to as the "Certificate of Termination Costs")

stating the Completion Cost (hereinafter defined) and the Final Contract Sum (hereinafter defined).

56.2 The Completion Cost comprises the following sums, costs or expenditure:

(a) the sums previously paid to the Contractor by the SAMB;

(b) the sums paid or payable to other contractors or persons engaged by the SAMB to complete the Works;

(c) any sums paid to sub-contractors or suppliers under clause 61;

(d) any costs or expenditure incurred or to be incurred including On-Cost Charges incurred by the SAMB in completing the Works; and

(e) the amount of direct loss and/or damage caused to the SAMB due to the termination.

56.3 The Final Contract Sum comprises of the following amounts or sums:

(a) the amount which would have been payable under the Contract on completion in accordance with the Contract, allowing any variations or other matters which would have resulted in an adjustment of the original Contract Sum; and

(b) any other sums which the SAMB might be entitled under the terms of the Contract to deduct from the original Contract Sum,

had the Contractor's employment not been terminated.

56.4 The Certificate of Termination Costs shall state the difference between the Final Contract Sum and the Completion Cost. If the Final Contract Sum is less than the Completion Cost, the difference shall be a debt payable by the Contractor to the SAMB and if greater the difference shall be a debt payable by the SAMB to the Contractor.

56.5 The Certificate of Termination Costs shall be binding and conclusive on the Contractor as to the amount of such loss or damage specified therein.

56.6 In the event the completion of the Works being undertaken departmentally, allowance shall be made, when ascertaining the amount to be certified as costs and expense incurred by the SAMB, for cost of supervision, interest and depreciation on plant and all other usual overhead charges and profit as would be incurred if the Works were completed by other contractors or persons.

57.0 SURVIVING RIGHTS

Any termination under this Contract shall not affect the liability of either Party hereto for any of its acts or omissions during the period of the Contract and both Parties shall thereafter continue to be so liable and shall keep the other Party hereto indemnified and hold harmless in respect of any claims arising therefrom.

58.0 EFFECT OF FORCE MAJEURE

58.1 Neither the SAMB nor the Contractor shall be in breach of its obligations under this Contract if it is unable to perform its obligation under this Contract (or any part of thereof), other than the payment obligations as a result of the occurrence of an Event of Force Majeure.

58.2 An "Event of Force Majeure" is an event beyond the control of both Parties which are:

(a) war (whether declared or not), hostilities, invasion, act of foreign enemies;

(b) insurrection, revolution, rebellion, military or usurped power, civil war, terrorism;

(c) natural catastrophe including but not limited to earthquakes, floods, subterranean spontaneous combustion or any operation of the forces of nature against which an experienced contractor could not reasonably have been expected to take precautions;

(d) nuclear explosion, radioactive or chemical contamination or radiation (unless caused by the negligence act, omission or default of the Contractor, its agents or personnel);

(e) pressure waves caused by aircraft or other aerial devices traveling at sonic or supersonic speeds; and

(f) riot, commotion or disorder, unless solely restricted to employees of the Contractor or its personnel, servants or agents.

58.3 If an Event of Force Majeure occurs by reason of which either Party is unable to perform any of its obligation under this Contract (or any part thereof}, the Party shall inform the other Party immediately of the occurrence of that Event of Force Majeure with full particulars thereof and the consequences thereof.

58.4 If either Party considers the Event of Force Majeure to be of such severity or to be continuing for such period of time that it effectively frustrates the original intention of this Contract, then the Parties may agree that this Contract may be terminated upon mutual agreement of the Parties.

58.5 If this Contract is terminated by an Event of Force Majeure pursuant to the above clause, all rights and obligations of the Parties under this Contract shall forthwith terminate and neither Party shall have any claim against the other Party and neither Party shall be liable to each other save for any rights and liabilities accruing prior to the occurrence of the Event of Force Majeure.

58.6 Neither Party shall be entitled to rely upon the provisions above if both Parties reasonably determine that an Event of Force Majeure has not occurred.

58.7 For avoidance of doubt, the Parties shall continue to perform those parts of those obligations not affected, delayed or interrupted by an Event of Force Majeure and such obligations shall, pending the outcome of this clause continue in full force and effect.

59.0 SITE AGENT AND ASSISTANTS

Unless otherwise provided elsewhere in this Contract, the Contractor shall keep constantly on the Site a competent, efficient, suitability qualified, experienced and good character site agent and his assistants in each trade as may be necessary who must be capable of receiving instructions in Bahasa Malaysia, and in default it shall be the responsibility of the Contractor to provide replacement for them and all wages and other expenses in connection with the employment of such replacement site agent and assistants. Any directions, explanations or instructions given to such site agent by the S.O. shall be deemed to have been given to the Contractor under this Contract.

60.0 NOMINATED SUB-CONTRACTORS AND/OR NOMINATED SUPPLIERS

60.1 The S.O. shall obtain tenders for Nominated Sub-Contractor's or Nominated Supplier's work or services, or for the supply of materials or goods in respect of which Prime Cost Sums or

Provisional Sums are included in the Bills of Quantities, and the Contractor shall, on the written instruction of the S.O., enter into such sub-contracts with the Nominated Sub-Contractor or Nominated Supplier as the case may be and such sub-contracts shall be in the form as referred to in clause 60.2(b).

60.2 The S.O. shall not nominate as a sub-contractor or a supplier in connection with the Works:

(a) a person against whom the Contractor shall make in writing within twenty one (21) days from the date of the S.O.'s instruction under clause 60.1 hereof what the S.O. considers to be reasonable objection;

(b) a person who will not enter into a sub-contract with terms and conditions as provided in the SAMB standard form of sub-contract for Nominated Sub-contractor (Form PWD 203N) or for Nominated Supplier (Form PWD 203P), as the case may be; or

(c) a person who will not give to the SAMB such indemnity with terms and conditions as provided in the SAMB standard form of Letter of Indemnity for Nominated Sub-contractors (Form PWD 203N7) or for Nominated Suppliers (Form PWD 203P7), as the case may be.

60.3 If pursuant to clause 60.2, the Contractor is not required to enter into a sub-contract with a Nominated Sub-contractor or Nominated Supplier, as the case may be, the S.O. shall do one or more of the following:

(a) nominate an alternative sub-contractor or supplier, as the case may be, in which case clause 60.2 hereof shall apply;

(b) by order under clause 24 vary the Works or the work or services, materials or goods, the subject of the Prime Cost Sums or Provisional Sum as aforesaid, including if necessary the omission of any such work or services, materials or goods so that they may be provided by workmen, contractors or suppliers, as the case may be, employed by the SAMB either concurrently with the Works or at some other date in which case the Contractor shall not be entitled to claim for any losses therefrom; or

(c) in accordance with clause 34.4 arrange for the Contractor to execute such work or services, or to supply such materials or goods.

61.0 PAYMENT TO NOMINATED SUB-CONTRACTOR OR SUPPLIER

61.1 The S.O. in issuing Interim Certificates under clause 28 or the Final Certificate under clause 31 hereof shall state separately the amount of interim or final payment due to each Nominated Sub-Contractors or Suppliers which amount subject to clause 61.2 hereof, shall be paid by the SAMB direct to the Nominated Sub-contractors or Suppliers. The amount paid by the SAMB direct to the Nominated Sub-contractors or Suppliers shall be deemed to be a payment to the Contractor by the SAMB under and by virtue of this Contract.

61.2 Subject to the relevant provisions in the sub-contract (Form PWD 203N or Form PWD 203P as the case may be), the Contractor shall be entitled to be paid and the SAMB may pay to the Contractor out of any money otherwise due to a Nominated Sub-contractors or Suppliers:

(a) any amount which the SAMB or the S.O. on its behalf in exercise of any rights under this Contract has deducted from any money due to the Contractor and such deduction is in respect of some act or default solely of the Nominated Sub-contractors or Suppliers, his servants or agents;

(b) any amount agreed by the Nominated Sub-Contractor or Suppliers as due to the Contractor, or any amount awarded in arbitration or litigation in favour of the Contractor which arises out of or under the sub-contract; and

(c) the amount of any claim for loss and/or expense actually incurred by the Contractor by reason of any breach or failure to observe the provisions of the sub-contract by the Nominated Sub-contractors or Suppliers under the sub-contract.

61.3 Any amount paid to the Contractor in accordance with this clause shall be deemed to be a payment to the Nominated and/or Sub-Contractors or Suppliers under the sub-contract.

62.0 NO LIABILITY OF SAMB TO NOMINATED AND/OR SUB-CONTRACTOR OR SUPPLIER

Nothing in clauses 60 or 61 or anything else contained in this Contract shall render the SAMB in any way liable to any Nominated and/or Sub-Contractor or Supplier.

63.0 RESPONSIBILITIES OF CONTRACTOR TO NOMINATED AND/OR SUB-CONTRACTORS OR SUPPLIERS

63.1 The Contractor shall be fully responsible to ensure that the Nominated Sub-Contractor or Suppliers shall conform with the terms and conditions of this Contract and shall be fully responsible for the acts, defaults or breach of any terms and/or conditions of this Contract by the Nominated Sub-Contractors or Suppliers on their part in the same way as for his own or those of other sub-contractors or suppliers engaged by himself. The SAMB shall in no circumstances be liable to the Contractor for the default of any Nominated Sub-Contractors or Suppliers.

63.2 In the event of repudiation or abandonment of his sub-contract by any Nominated Sub-contractor or Supplier, or the determination by the Contractor of the employment of the Nominated Sub-contractor or Supplier for any reason whatsoever under the sub-contract, the Contractor shall do one of the following :

(a) with the consent of the S.O. (such consent not to be unreasonably withheld) employ another competent sub-contractor or supplier to complete the sub-contract; or

(b) undertake to complete the sub-contract himself.

PROVIDED THAT in any of such events the Contractor is entitled to be paid the same sum for the work or services to be executed, or materials or goods to be supplied, as would have been payable had the original Nominated Sub-contractor or Supplier completed the sub-contract without any default on its part.

64.0 INTELLECTUAL PROPERTY RIGHTS

64.1 The Copyright and all other proprietary rights whatsoever in the Works and other material developed and supplied by the Contractor pursuant to or under this Contract shall vest in and shall be the sole property of the SAMB and the Contractor shall not during or at any time after completion of the Works or after the expiry or termination of this Contract, in any way, question or dispute the ownership of the SAMB. The proprietary rights in the Works shall vest in the SAMB free and clear of all liens, claims and encumbrances on the Works.

64.2 The Contractor shall be responsible for any claim that the equipment supplied infringes a patent, copyright or registered design.

64.3 If the SAMB's use or possession of the equipment is likely to constitute an infringement, then the Contractor shall promptly and at its own expenses procure for the SAMB the right to continue using and possessing the equipment; or modify or replace the equipment so as to

avoid the infringement (in which event the Contractor shall compensate the SAMB for the amount of any direct loss or damage sustained or incurred by the SAMB during such modification or replacement).

64.4 The Contractor shall indemnify the SAMB against any claim for the infringement of any letters patent, copyright or registered designs by the use of any equipment or of information supplied under this Contract and against all costs and damages which the SAMB may incur in any action for which such infringements or for which the SAMB may become liable in any such action.

65.0 ANTIQUITIES

65.1 All fossils, coins, antiquities and other objects of interest or value which may be found on the Site or in excavating the same during the progress of the Works shall become absolute property of the SAMB and upon discovery of such an object the Contractor shall forthwith-

(a) not to disturb the object and shall cease work if and in so far as the continuance of the work would endanger the object or prevent or impede its excavation or its removal;

(b) take all steps which may be necessary to preserve the object in the exact position and condition in which it was found; and

(c) inform the S.O. of the discovery and precise location of the object.

65.2 The S.O. shall issue instructions in regard to what is to be done concerning the object reported by the Contractor under clause 65.1 and (without prejudice to the generality of his power) such instructions may require the Contractor to permit the examination, excavation or removal of the object by a third party. Any such third party shall for the purpose of clause 15 be deemed to be a person for whom the SAMB is responsible and not to be a sub-contractor.

65.3 If compliance with the provisions of clause 65.1 or with an instruction issued under clause 65.2 has involved the Contractor in direct loss and/or expense for which he would not be reimbursed by a payment made under any other provisions of this Contract then the amount of such loss and/or expense shall be added to the Contract Sum.

66.0 ARBITRATION

66.1 If any dispute or difference shall arise between the SAMB and the Contractor out of or in connection with the contract, then parties shall refer such matter, dispute or difference to the officer named in Appendix for a decision.

66.2 The officer named in Appendix's decision shall be in writing and shall subject to clause 66.4 hereof, be binding on the Parties until the completion of the Works and shall forthwith be given effect to by the Contractor who shall proceed with the Works with all due diligence whether or not notice of dissatisfaction is given by him.

66.3 If the Parties —

(a) fails to receive a decision from the officer named in the Appendix within forty-five (45) days after being requested to do so; or

(b) is dissatisfied with any decision of the officer named in the Appendix,

then such dispute or difference shall be referred to arbitration within forty-five (45) days to an arbitrator to be agreed between the Parties and failing such agreement, to be appointed by the Director of the Regional Centre for arbitration in Kuala Lumpur on the application of either Party hereto. Such arbitration shall be heard at the Kuala Lumpur Regional Centre for Arbitration and shall be conducted in accordance with the rules for arbitration of the Kuala Lumpur Regional Centre for Arbitration using the facilities and the system available at the Centre.

66.4 Such reference, except on any difference or dispute under clause 51 hereof shall not be commenced until after the completion or alleged completion of the Works or determination or alleged determination of the Contractor's employment under this Contract, or abandonment of the Works, unless with the written consent of the SAMB and the Contractor.

66.5 In the event that such consent has been obtained in accordance with clause 66.4, the reference of any matter, dispute or difference to arbitration pursuant to this clause and/or the continuance of any arbitration proceedings consequent thereto shall in no way operate as a waiver of the obligations of the parties to perform their respective obligations under this Contract.

66.6 In any arbitration proceedings conducted pursuant to clause 66.3, the Parties may make any counter claim in relation to any dispute or difference arising from the Contract.

66.7 Upon every or any such reference the costs of such incidental to the reference and award shall be in the discretion of the Arbitrator who may determine the amount thereof, or direct the amount to be taxed as between solicitor and client or as between party and party, and shall direct by whom and to whom and in what manner the same be borne, award and paid.

66.8 The award of the Arbitrator shall be final and binding on the Parties.

66.9 In the event of the death of the arbitrator or his unwillingness or inability to act, then the SAMB and the Contractor upon agreement shall appoint another person to act as the arbitrator, and in the event the SAMB and the Contractor fail to agree on the appointment of an arbitrator, an arbitrator shall be appointed by the Director of the Regional Centre for Arbitration in Kuala Lumpur.

66.10 In this clause, "reference" shall be deemed to be reference to arbitration within the meaning of the Arbitration Act 2005.

66.11 The arbitration shall be nment by the Arbitration Act 2005 and the laws of Malaysia.

67.0 NOTICE, *ETC.*

67.1 Any notice, approval, consent, request or other communication required or permitted to be given or made under this Contract shall be in writing in Bahasa Malaysia or English language.

67.2 Such notice shall be effected by:

(i) hand delivery or courier and an acknowledgement of receipt obtained;

(ii) leaving the notice at the registered office or site office of the Contractor in which case it shall be deemed to have been duly delivered; or

(iii) registered post in which case it shall be deemed to have been received seven (7) days after the date of posti

67.3 The address of the SAMB and the Contractor is as shown below or such other address as either party may have notified the sender:

to the SAMB:

Address:

to the Contractor:

Address:

67.4 It shall be the duty of the parties to notify the other if there is a change of address or entity by giving a written notice within fourteen (14) days. In the event of the Contractor failing to notify the S.O. of such an address or any change in his address, such written notices and instructions shall be deemed to have been served upon the Contractor if they are sent in the manner stated above to the address stated in this Contract or to the Contractor's site office.

68.0 SAFETY AT THE SITE

68.1 Compliance with Safety Requirements

The Contractor shall comply with all relevant laws, regulations, rules, by-laws, directive or order by the relevant authorities on the requirements of safety-at-work ("Safety Requirements") and shall ensure his personnel, workmen and sub-contractors at all times during the execution of Works comply with such Safety Requirements.

68.2 Submission of Safety Programme

(a) Within 14 days from the receipt of the Letter of Acceptance by the SAMB, the Contractor shall submit to the S.O a safety programme to ensure that all construction activities required for the execution of the Works are carried out in a safe manner and in compliance with Safety Requirements.

(b) The safety programme shall be subject to the approval of the S.O. The submission to and approval by the S.O of the safety programme shall not relieve the Contractor of any of his obligations and liabilities pertaining to the safety requirement under the Contract.

68.3 Safety Officer and Personnel

a) The Contractor shall appoint a suitably qualified and experienced person as safety officer who shall be responsible for compliance with Safety Requirements and all safety matters relating to the Works. The Contractor shall, from time to time, provide such other personnel and resources as may be required to ensure the effective implementation of the safety programme on Site.

b) The Contractor shall conduct training programmes for all workmen including workmen of his sub-contractors for compliance with the Safety Requirements.

68.4 Safety Measures

(a) The Contractor shall ensure that the constructional plant together with all other tools and equipment and other items used in the execution of the Works are in a safe, sound and good condition and capable of performing the functions for which they are intended.

(b) The Contractor is responsible for instituting a safe method of construction on Site for all the workers and shall ensure that his sub-contractors whether nominated or otherwise institute the same method of construction for their workers.

(c) Without limiting his liability under the Contract, the Contractor shall provide all workmen on Site with the necessary safety equipment including but not limited to safety boots, safety helmets and protective clothing.

69.0 ADVANCE PAYMENT

69.1 The Contractor shall be entitled to an advance payment on the Contract amounting to 25% of the value of the Contract Sum less Provisional Sums (hereinafter referred to as the "Builder's Work") but subject to a maximum of RM10 million on compliance with the following conditions:

(a) on return of the Letter of Acceptance duly signed by the Contractor together with the Performance Bond (if any), insurance policies, confirmation from SOCSO Authorities and the receipts for all premium paid;

(b) production of a Banker's/Insurance/Finance Company Guarantee in the approved format equal in value to the advance proposed to be paid;

(c) Submission of the Banker's Guarantee / Insurance Guarantee / Financial Company Guarantee not later than 3 months from the date of possession of Site.

69.2 The advance payment shall be recouped when the cumulative total value of the Builder's Work executed and certified (including the amount certified for materials on site) reaches (25%) twenty five percent of the total contract value of Builder's Work, by way of a fixed percentage deduction from the total certified value of the Builder's Work executed (including the amount certified for materials on site) during the period covered by an Interim Payment Certificate, in all the subsequent Interim Payment Certificates on the basis that the advance payment made shall be fully recovered in the Interim Payment Certificate in which the cumulative total certified value of the Builder's Work executed (including the amount certified for materials on site) reaches seventy-five (75) percent of the total contract value of the Builder's work*. The deduction shall be calculated as follows:

$$\$ D = 200 \text{ A percent of } \$P \quad / \quad B$$

Where $ D = cumulative deduction to be made in Interim Payment Certificate,

$ A = total amount of advance paid,

$ B = total contract value of Builder's Work

$ P = gross certified value of Builder's Work executed (including the amount certified for materials on site) or agreed cumulative scheduled payments in excess of 25% of $ B

69.3 The liability under the advance guarantee shall be terminated upon realization by the SAMB of the full sum of advance paid. However, if the full sum of the advance paid cannot be realized before the completion date of the contract or. any authorised extension thereof or the case of the contract been determined before the date of the determination, then the balance of the advance repayable to the SAMB shall be recovered from the advance guarantee

70.0 **AMENDMENT**

No modification, amendment or waiver of any of the provisions of this Contract shall be effective unless made by mutual consent and made in writing by way of supplementary agreement specifically referring to this Contract and duly signed by the Parties. The provisions in respect of such amendment, variation or modification thereof shall be supplemental to and be read as integral part of this Contract which shall remain in full force and effect as between both Parties.

71.0 CONFIDENTIALITY

71.1 This Contract and all such drawings, records, data, books, reports and all matters pertaining hereto shall be considered as confidential matter and shall not be disclosed to any third party without prior written mutual agreement, save and except where-

(a) disclosure of such information is necessary for the purposes of raising finance to undertake the obligations of the Contractor under this Contract;

(b) disclosure of such information is made to the Contractor's consultants, auditors or advisers;

(c) disclosure of such information is required by law or by any SAMB agency or for the performance of any obligations under this Contract; or

(d) the information has entered public domain.

71.2 Where information has been disclosed to third parties pursuant to clause 69.1, the Contractor undertakes to ensure that such third parties shall not disclose the information to any other third party.

71.3 The restrictions contained in this clause shall survive the termination of this Contract and shall continue to bind both Parties without limit in point of time.

72.0 STAMP DUTY

The Contractor shall solely bear the stamp duties, legal costs and fees in the preparation and execution of this Contract and anything incidental thereto.

73.0 SEVERABILITY

If any provision of this Contract is held to be illegal or is invalid under any laws or regulations effective and applicable during the term of this Contract such provision shall be fully severable and this Contract shall be construed as if such illegal or invalid provision had never comprised as part of this Contract and the remaining provisions of this Contract shall remain in full force and effect and shall not be affected by the illegal or invalid provision or by its severance from this Contract.

74.0 WAIVER

Failure by any Party to enforce at any time, any provision of this Contract shall not be construed as a waiver of its right to enforce the breach of such provision or any other provision in this Contract or as a waiver of any continuing, succeeding or subsequent breach of any provision or other provision of this Contract.

75.0 LAWS APPLICABLE

This Contract shall be governed by and construed in accordance with the laws of Malaysia and the Parties irrevocably submit to the exclusive jurisdiction of the courts of Malaysia.

76.0 SUCCESSORS BOUND

This Contract shall be binding upon the respective successors-in-title of the Parties.

77.0 EPIDEMICS AND MEDICAL ATTENDANCE

77.1 The Contractor shall maintain the Site in clean and sanitary condition and shall comply with all requirements of the SAMB Health and Sanitary Authorities. In the event of any outbreak of illness of an epidemic nature, the Contractor shall comply with and carry out such regulations, orders and requirements as may be made by the SAMB or the local medical or health authorities for the purpose of dealing with and overcoming the same.

77.2 The Contractor shall ensure that sufficient first aid kits are made available at suitable locations on the Site.

78.0 TECHNOLOGY TRANSFER

If the Contractor appoints foreign professionals, the Contractor shall endeavour to ensure that the employees of the SAMB are trained or exposed to the expertise of such foreign professionals pursuant to a programme for technology transfer.

79.0 GENERAL DUTIES AND PERFORMANCE STANDARD

78.1 Industry Practice

The Contractor shall provide and perform the Works in a proper manner in accordance with good management and best industry practice and to the best advantage of the SAMB and shall comply with all law, statutes and any guidelines or direction issued by the SAMB to the contractor from time to time.

79.2 Competency

The Contractor shall provide and perform its obligations under this Contract and take all appropriate measures expected of a competent company using due care and skills of a professional person providing similar service or works to ensure that the Works comply with the terms and conditions of this Contract.

79.3 **SAMB's Interest**

The Contractor shall at all times perform the Works in such manner as will always safeguard and protect the SAMB's interest and take all necessary and protect the SAMB' interest take all necessary and proper steps to prevent abuse and in accordance with the provisions of this Contract.

80.0 RESTRICTION AND PROCEDURE ON USE OF IMPORTED MATERIALS AND GOODS

80.1 The Contractor shall use local goods/materials as listed in the 'Senarai Bahan/Barangan Buatan Tempatan' issued by IKRAM QA Services Sdn. Bhd. and/or issued by SIRIM QA Services Sdn. Bhd., whichever is relevant. If the Contractor fails to comply with this requirement, the SAMB may reject the goods/materials which are found to be not in compliance with this requirement.

80.2 For local goods/materials not listed as aforesaid, such goods/materials may be allowed if prior testing and certification from IKRAM QA Services Sdn. Bhd. or SIRIM QA Services Sdn. Bhd., whichever is relevant, has been obtained. Where such testing cannot be carried out by IKRAM QA Services Sdn. Bhd. or SIRIM QA Services Sdn. Bhd. the Contractor may, with the S.O.'s prior approval, have the testing to be done by another agency.

80.3 Under no circumstances shall the Contractor be permitted to incorporate or supply imported materials, plant, equipment, vehicles or other goods into the Works or forming part of the scope of the Works except those approved by the SAMB, prior to the execution of the Contract. The Contractor shall at his own cost entirely substitute any materials, plant, equipment, vehicles or other goods proposed to be imported but not approved by the SAMB, with suitable local materials, plant, equipment, vehicles or other goods, including making any necessary subsequential changes or adjustment to the design of the Works to accommodate such substitution, all to the concurrence of the S.O..

80.4 The Contractor shall ensure that the procurement of approved imported materials, plant, equipment, vehicles or other goods are obtained directly from the country of origin based on F.O.B. or other similar basis. The transportation and insurance of such imported materials, plant, equipment, vehicles or other goods from the country of origin to the Site shall be arranged by the Contractor through the SAMB's Multi Modal Transport Operators (hereinafter referred to as MTO) as listed in Appendix. The Contractor shall allow in his tender all costs and time required in complying with the requirements of this Clause including the cost required for the services provided by the MTO.

80.5 The Contractor shall submit documentary evidence of compliance with this clause to the S.O. within one (1) month from the date of each delivery to the Site of such materials, plant, equipment, vehicles or other goods.

81.0 TIME

Time whenever mentioned shall be of the essence of this Agreement.

IN WITNESS WHEREOF the Parties hereto have executed this Agreement on the day and year first above written.

SIGNED for and on behalf of	)	
	)	.....
THE SAMB OF MALAYSIA	)	
	)	
in the presence of:	)	.....
	)	
*[1] The Common Seal of	)	
	)	
(Co. No. :)	)	
was hereunto affixed	)	
in the presence of:	)	

.....	.....
Director	Director/Secretary
Name : NRIC	Name :
No.:	NRIC No.:

[1] *applicable only if the Contractor is a company registered under the Companies Act 1965*

APPENDIX TO THE CONDITIONS OF CONTRACT

Clause
4.1(a) Officer(s) empowered to approve variations according to the limits as set out in Treasury's Instructions No. 202 as amended.

Financial Limits	Officer

4.1(b) Officer(s) empowered to take action on behalf of the SAMB in respect of:

Clauses 51, 52, 53, 58 and 66 .....

13 Performance Bond

Amount of Guarantee ... . RM.....

Guarantor Bank/Insurance Company/
Finance Company ... ...

Guarantee No. ... .

15 Minimum insurance cover for any one accident or series of accidents arising out of one event ... ... RM.....

Policy No..... .....

Period of insurance.....

15.1 (b) Amount of excess ..... RM.....

Clause		
17.	SOCSO Scheme registration number	
18.	Amount to be added to full value of Contract Sum as the insured sum	RM.....
	Total Amount Insured	RM.....
		Policy of insurance.....
18 (b)	Amount of excess.....	RM.....
21.2	Date of Tender.....	
28.1	Value of work to be executed including materials and goods to be delivered before First Interim Certificate will be issued.....	RM.....
28.2	Value of work to be executed including Materials and goods to be delivered before each Subsequent Interim Certificate will be issued.....	RM.....
28.6	Period for honouring payment certificate (if none stated, then within thirty (30) days of the issue of the Certificate.....	RM.....
34.4	Work covered by P.C. Sums for which the Contractor Will be permitted to tender.....	RM.....
38.2	'Date for Possession' of the Site.....	RM.....
39.1	'Date for Completion' for whole of the Works.....	
40.2	Liquidated and Ascertained Damages at the rate of.....	RM.....

Clause

41.1 Sectional Completion:

Identification of Sections or parts	Date for Possession [Clause 38.3]	Date for Completion	Liquidated & Ascertained Damages

48.1 (a) Defects Liability Period (if none stated, Then the period is twelve (12) months.....

5.3,5.4,15.3, 17.3(b), 18.2 Percentage of on-cost charges..... 5%

48.2, 56.2(d) Percentage of on-cost charges..... 10%

BAHAGIAN B1

ADDENDA NO.1 KEPADA SYARAT-SYARAT KONTRAK

Addenda No. 1 – kepada Syarat-syarat Kontrak SAMB 100 (Rev. 1/2010) mengandungi 1 helai muka yang menjadi sebahagian daripada kontrak tersebut dan hendaklah dibaca dan diertikan sedemikian (termasuk muka surat ini)

_____	_____
Tandatangan Kontraktor	Tandatangan Pegawai
Nama Penuh:_____ (Huruf Besar)	Nama Penuh:_____ (Huruf Besar)
Atas Sifat : _____	Atas Sifat : _____
No My Kad : _____	No My Kad : _____
Yang diberi kuasa dengan sempurnanya untuk menandatangani untuk dan bagi pihak	Untuk dan bagi pihak Syarikat Air Melaka Berhad
_____	_____
Meteri atau Cop Kontraktor	Cop Rasmi Syarikat
Saksi:_____	Saksi:_____
Nama Penuh :_____	Nama Penuh :_____
No. My Kad : _____	Jawatan : _____
Alamat : _____	
_____	
_____	

KLAUSA PENCEGAHAN RASUAH DALAM DOKUMEN

PEROLEHAN SAMB

"Penamatan mengenai rasuah, aktivitl menyalahi undang-undang atau tidak sah"

(a) Tanpa menjejaskan apa-apa hak lain Lembaga SAMB, jika [syarikat/firma], kakitangan, pengkhidmat atau pekerjanya disabitkan oleh mahkamah undang-undang bagi rasuah atau aktiviti menyalahi undang-undang atau menyalahi undang-undang berhubung dengan [perjanjian/kontrak] ini atau mana-mana perjanjian yang [syarikat/firma] itu mungkin ada dengan SAMB, yang SAMB berhak untuk menamatkan [perjanjian/kontrak] ini pada bila-bila, dengan memberi notis bertulis serta merta bagi maksud itu kepada [syarikat/firma].

(b) Jika penamatan berlaku, SAMB berhak untuk mendapat balik semua kerugian, kos, kerosakan dan perbelanjaan (termasuk apa-apa kos dan perbelanjaan sampingan) yang dilakukan oleh SAMB yang timbul daripada penamatan tersebut.

(c) Bagi mengelakkan sebarang keraguan, pihak-pihak dengan ini bersetuju bahawa [syarikat/firma] tidak layak menuntut apa-apa bentuk kerugian termasuk kehilangan keuntungan, kerosakan, tuntutan atau apa jua selepas penamatan [perjanjian/kontrak] ini.

BAHAGIAN C

BORANG TENDER (SAMB 100B)

BORANG INI HENDAKLAH DIGUNAKAN JIKA KUANTITI MENJADI SEBAHAGIAN DARIPADA KONTRAK
(*THIS FORM IS TO BE USED WHERE QUANTITIES FORM PART OF THE CONTRACT)*

Kontrak No :……..tahun 20…….bagi
***Contract No**: of for*

Kerja–Kerja tersebut dibawah ini yang dibuat pada …….haribulan
The under – mentioned Work entered into on the day of

…… 20 ……. oleh pihak - pihak yang bertandatangan di
by the undersigned parties,

bawah ini, adalah berhubung dengan Borang Tender ini yang menjadi sebahagian
refers to this Form of Tender which is and shall be read

daripada Kontrak tersebut dan yang hendaklah dibaca dan diertikan sedemikian.
And construed as part of the said Contract.

……	……
Tandatangan Kontraktor *Singnature of Contractor*	Tandatangan Pegawai *Singnature of Officer*
(Nama Penuh……..) *Name in Full*	(Nama Penuh……..) *Name in Full*
Atas Sifat…… *In the capacity of*	Jawatan……... *Designation*
yang diberi kuasa dengan sempurnanya untuk menandatangani untuk dan bagi pihak *duly authorized to sign for and on behalf of*	Untuk dan bagi pihak **Syarikat Air Melaka Berhad** *For and on behalf of* **Syarikat Air Melaka Berhad**

……
Meteri atau cap Kontraktor
Contractor's seal or chop

Saksi……. *Withness*	Saksi……. *Withness*
(Nama Penuh…… *Name in Full*	(Nama Penuh…… *Name in Full*
Pekerjaan…….. *Occupation*	Jawatan……... *Designation*
Alamat…….. *Address*	

SYARIKAT AIR MELAKA AIR BERHAD

BORANG TENDER
(FORM OF TENDER)

TENDER BAGI……..
TENDER FOR

MEMBEKAL DAN MEMASANG PAIP 450MM DIAMETER KELULI LEMBUT DARI PAIP SEDIA ADA DI SIMPANG KOLAM BUKIT BATU KE LEBUH AMJ SERTA LAIN-LAIN KERJA YANG BERKAITAN DI DAERAH MELAKA TENGAH, MELAKA

mengikut Pelan-Pelan No .....-.....
in accordance with Drawing Nos.
……
……
dan lain-lain pelan terperinci yang diberi untuk menerangkannya.
and any other detail drawing suppliesd in amplification thereof.

Salinan - salinan Dokumen Meja Tender yang merangkumi Perjanjian Kontrak,
Copies of the Tender Table Documents comprising the Contract Agreement,

Pelan-pelan tersebut di atas, Spesifikasi dan Dokumen Tender yang lain boleh dilihat di tempat yang
the above - mentioned Drawings, Specification and other Tender Documents may be seen at the place

dinyatakan dalam Notis Tender dalam masa waktu pejabat pada mana - mana hari bekerja
specified in the Tender Notice during office hours on any working day

hingga tarikh akhir yang ditetapkan bagi penyerahan tender.
until the final date fixed for the submission of tenders.

Kepada :
To :

Ketua Pegawai Esekutif
Syarikat Air Melaka Berhad
Lot 897, Wisma Air
Jalan Hang Tuah,
75300 Melaka
(Pihak menerima tender)

TUAN,

Di bawah dan tertakluk kepada Syarat - Syarat Membuat Tender yang dilampirkan bersama ini,
Under and subject to the Conditions of Tendering annexed hereto,

yang bertandatangan di bawah ini adalah dengan ini membuat tender dan menawar untuk
the undersigned does hereby tender and offer to

melaksana dan menjalankan Kerja - kerja dan peruntukan - peruntukan dan membekalkan semua
execute and perform the Works and provisions and supply all

buruh, bahan dan loji dan segala benda dari tiap - tiap jenis yang masing - masing disebut,
labour, materials and plants and everything of every kind respectively named,

ditunjuk, diperihal dan dimasudkan dalam atau yang hendaklah ditakrifkan daripada Dokumen
shown, described and alluded to in, or to be inferred from the Tender

Tender, yang hendaklah dilaksanakan dan dibekalkan oleh pihak Kontraktor, bagi Kerja - kerja yang
Documents, to be executed and supplied on the part of Contractor, for the Works

diperihalkan di atas, dengan menepati Dokumen Tender tersebut bagi jumlah wang pukal yang
above described, in conformity with the Tender Documents for the lump sum

disebutkan di bawah ini.
named herein below.

2. Yang bertandatangan di bawah ini bersetuju menjadi terikat oleh dan tunduk kepada Syarat-
The undersigned agrees to be bound by and submit to the Conditions

Syarat Kontrak dan Spesifikasi tersebut dan bersetuju bahawa jika Tender yang disetujuiterima,
of Contract and Specification and agrees that if this Tender is accepted, the
harga dan kadar harga dalam Jadual Kadar Harga dan Ringkasan Tender hendaklah diteliti dan
price and rates in the Schedule of Rate and Summary of Tender Shall be scrutinized and
diselaraskan oleh Pegawai Penguasa tentang kemunasabahannya tetapi jumlah wang pukal yang
adjusted by the Superintending Officer as to their reasonableness but the lump sum tendered
ditenderkan di bawah ini hendaklah tetap tak berubah. Jadual Kadar harga, selepas diselaraskan
herein below shall remain unaltered. The Schedule of Rates, after adjustment
sebagaimana yang diperuntukkan dalalm Syarat-sayarat Kontrak, hendaklah menjadi asas bagi
as by the Condition of Contract provided, shall form the basic of valuation of
menilaikan apa-apa perubahan yang mungkin diarahkan oleh Pegawai Penguasa dari semasa ke
any variation which may from time to time be ordered by the superintending
ke semasa, tetapi jika sesuatu perubahan itu melibatkan peninggalan atau pertambahan menyeluruh
Officer, but where a variation involves the omission or addition of the whole of
sesuatu butiran kerja yang terhadapnya harga ada diberikan dalam Ringkasan Tender, maka
any item of work against which the price is given in the Summary of Tender, then
harga dalam Ringkasan Tender itu hendaklah menjadi asas bagi menilaikan perubahan itu.
such price in the Summary of Tender shall from the basic of valuation of such variation.
Yang bertandatangan di bawah ini selanjutnya bersetuju bahawa Ringkasan Tender itu hendaklah
The undersigned agrees that the Summary of Tender shall also form the
juga menjadi asas bagi menilaikan Perakuan Bayaran Sementara.
basic for the valuation of Interim Payment Certificate.

3. Dan selanjutnya, yang bertandatangan di bawah ini bersetuju menyiapkan Kerja-Kerja itu
And futher, the undersigned agrees to complete the Works
dalam masa.....hari/minggu/bulan* dari tarikh pemilikan tapakbina atau dalam apa-apa tempoh lanjutan
within..... days/weeks/months from the date of possession of site or within such extended time
yang diperuntukan dalam Syarat-Syarat Kontrak.
as by the Conditions of Contract provided.

4. Jumlah amaun Tender ini ialah jumlah wang pukal sebanyak Ringgit……
The total amount of this Tender is the lump sum of Ringgit
……
……

iaitu, RM ……
i.e.

5. Yang bertandatangan di bawah ini berharap dibenarkan membuat tender, dalam sedikit masa
The undersigned desires to be permitted to tender, in due course,
lagi bagi kerja berikut yang mana dijalankan secara langsung oleh yang bertandatangan di bawah ini
for the following work which the undersigned in the ordinary course of
dalam perjalanan biasa perniagaannya dan yang baginya Wang Kos Prima atau Wang
business directly carries out and for which Prime Cost or Provisional Sums
Peruntukan sementara telah dimasukkan dalam amaun Tender ini:
have been included in the amount of this Tender:
……
……
……
……

6. Bahawasanya adalah diketahui bahawa Syarikat Air Melaka Berhad sentiasa berhak menyejuterima atau menolak
Whereas it is understood that the Syarikat Air Melaka Berhad reserves the right to accept or
Tender ini, sama ada ianya lebih rendah atau lebih tinggi daripada tender-tender yang lain, atau
to refuse this Tender, whether it be lower or higher than any other tender, or
sama amaunnya. Yang bertandatangan di bawah ini bersetuju yang Tender ini akan berterusan
of the same amount. The undersigned agrees that this Tender shall remain
sah dan tidak akan ditarik balik dalam tempoh sembilan puluh (90) hari dari tarikh akhir yang
valid and shall not be withdrawn within ninety (90) days from the final date

ditetapkan bagi penyerahan tender dan bersetuju bahawa tiada apa-apa had, syarat atau janji
fixed for the submission of tenders and agrees that no other term, condition or stipulation
lain akan dikenakan oleh kami selepas tarikh tersebut.
shall be imposed by us after the said date.

7. Yang bertandatangan di bawah ini bersetuju, jika Tender ini disetujuterima, mendeposit,
The undersigned agrees, in the event of acceptance of this Tender, to deposit,
dengan seberapa segera yang praktik selepas penerimaan Surat Setujuterima Tender tetapi sebelum
as soon as is practicable after the receipt of the Letter of Acceptance of Tender but before the
bermulanya Kerja-Kerja, perkara-perkara berikut:
commencement of the Works, the followings:

(a) Bon Perlaksanaan;
Performance Bond;

(b) Polisi Insurans Tanggungan Awam (iaitu insurans terhadap bencana kepada orang-orang
Insurance Policy for Public Liability (i.e. insurance agains injury to persons
dan kerosakan kepada harta) atau Nota Liputan beserta dengan resit bagi premium yang
and damage to property or the Cover Notes together with receipts of premium paid in
telah dibayar;
respect thereof;

(c) Nombor pendaftaran di bawah Skim Keselamatan Sosial Pekerja (PERKESO); dan / atau
Registration number under Employee's Social Security (SOCSO) Scheme; and / or

(d) Polisi Insurans Pampasan Pekerja atau Nota Liputan beserta dengan resit bagi premium
Insurance Policy for Workmen's Compensation or the Cover Notes together with receipts
yang telah dibayar.
of premium paid in respect thereof.

Yang bertandatangan di bawah ini selanjutnya bersetuju mendeposit Polisi Insurans bagi Kerja-
The undersigned further agrees to deposit the Insurance Policy for the Works
Kerja itu dan melaksanakan Perjanjian Kontrak yang formal dalam masa yang munasabah
And to execute the formal Contract Agreement within a reasonable time
selepasnya itu.
thereafter.

8. Yang bertandatangan di bawah ini dengan ini juga bersetuju bahawa Borang Tender ini
The undersigned hereby also agrees that this Form of Tender together
berserta Surat Setujuterima Tender ini (jika ada) hendaklah menjadi kontrak yang mengikat
with the Letter of Acceptance of Tender (if any) shall constitute a binding contract
antara kita walaupun Perjanjian Kontrak yang formal belum dilaksanakan.
between us notwithstanding that a formal Contract Agreement has not been executed.

9. Yang bertandatangan di bawah ini mengesahkan, selepas menyemak sendiri, bahawa dokumen-
The undersigned confirms, after a personal scrutiny, that the documents
dokumen dan pelan-pelan yang digunakan oleh yang bertandatangan di bawah ini untuk menyusun
and drawings used by the undersigned in compiling
Tender ini adalah salinan-salinan yang sebenarnya bagi dokumen-dokumen dan pelan-pelan yang
this Tender are true copies of the documents and drawings included
dimasukkan dalam Dokumen Meja Tender.
in the Tender Table Documents.

10. Yang bertandatangan di bawah ini bersetuju bahawa:
The undersigned agrees that:

(a) jika Tender ini ditarik balik sebelum tamatnya Tempoh Sah Tender atau apa-apa tempoh
if this Tender is withdrawn before the expiry of the Tender Validity Period or any
lanjutan, atau
extended period thereof, or

(b) jika yang bertandatangan di bawah ini mengenakan apa-apa had, syarat atau janjian
if the undersigned imposes any additional terms, condition or stipulation
tambahan kepada Tender ini selepas tarikh akhir yang ditetapkan bagi penyerahan tender,
to the Tender after the final date fixed for the submission of tenders,

atau
or

(c) jika sekiranya Tender telah disetujuterima, yang bertandatangan di bawah ini enggan dan *in the event that the Tender having been accepted, the undersigned refuses and* tidak melaksanakan Perjanjian Kontrak yang formal atau mendeposit Bon Perlaksanaan *fails to execute the formal Contract Agreement or to deposit the Performance Bond* sebagaimana dikehendaki oleh Syarat-Syarat Kontrak atau tidak meneruskan Kerja - Kerja *as required by the Conditions of Contract or fails to proceed with the Works;*

maka, dalam mana-mana hal itu, tanpa menyentuh apa-apa hak lain yang ada padanya,
then, in any of such event, without prejudice to any other rights it may posses, the

Syarikat Air Melaka Berhad sentiasa berhak mengambil tindakan tatatertib terhadap yang bertandatangan
Syarikat Air Melaka Berhad reserves the rights to take disciplinary action against the undersigned or to

di bawah ini atau membatalkan pendaftaran yang bertandatangan di bawah sebagai kontraktor
cancel the registration of the undersigned as a Syarikat Air Melaka Berhad contractor, as the

Syarikat Air Melaka Berhad sebagaimana difikirkan perlu oleh Syarikat Air Melaka Berhad.
Syarikat Air Melaka Berhad deems fit.

Bertarikh pada……..haribulan…….., 20……
Dated this day of 20

……

Tandatangan Petender
Signature of Tenderer

Nama Penuh……..
Name in Full

Atas sifat……
In the capacity of

Yang diberi kuasa dengan sempurnanya
Untuk menandatangani Tender ini untuk
Dan bagi pihak:
duly authorised to sign this Tender for and
on behalf of:

…….

Menteri atau cap Petender
Tenderer's seal or chop

Saksi……
Witness

Nama Penuh……
Name in full

Pekerjaan…….
Occupation

Alamat…….
Address
……

BAHAGIAN D

SURAT AKUAN PEMBIDA &
SURAT AKUAN PEMBIDA BERJAYA

SURAT AKUAN PEMBIDA

MEMBEKAL DAN MEMASANG PAIP 450MM DIAMETER KELULI LEMBUT DARI PAIP SEDIA ADA DI SIMPANG KOLAM BUKIT BATU KE LEBUH AMJ SERTA LAIN-LAIN KERJA YANG BERKAITAN DI DAERAH MELAKA TENGAH, MELAKA

(No. Rujukan Tender : SAMB / 15 / 2026)

Saya, …….....(Nama Wakil Syarikat) No. Kad Pengenalan.....yang mewakili ……...…. (Nama Syarikat) nombor Pendaftaran.....(MOF/PKK/CIDB/ROS/ROC/ROB) dengan ini mengisytiharkan bahawa saya atau mana-mana orang yang mewakili syarikat ini:

i. tidak akan menawarkan, menjanjikan atau memberikan apa-apa suapan kepada mana-mana orang dalam mana-mana Kementerian/Agensi atau mana-mana orang lain, sebagai suapan untuk dipilih dalam mana-mana perolehan; dan
ii. tidak akan melakukan atau terlibat dengan tipuan bida dalam mana-mana perolehan.

Bersama ini dilampirkan Surat Perwakilan Kuasa bagi saya mewakili syarikat seperti tercatat di atas untuk membuat pengisytiharan ini.

2. Sekiranya saya, atau mana-mana individu yang mewakili syarikat ini didapati terlibat dalam pakatan tipuan bida dengan syarikat lain berkenaan perolehan di atas atau menawarkan, menjanjikan atau memberikan apa-apa suapan kepada mana-mana orang dalam .....(Nama Kementerian/Agensi} atau mana-mana orang lain sebagai dorongan untuk dipilih dalam perolehan seperti di atas, maka saya sebagai wakil syarikat bersetuju tindakan-tindakan berikut boleh diambil:

2.1 Hilang kelayakan untuk dinilai dan dilantik bagi perolehan di atas; dan
2.2 Lain-lain tindakan undang-undang/tatatertib mengikut undang-undang/peraturan perolehan Kerajaan yang berkuat-kuasa

3. Saya sesungguhnya faham bahawa--

3.1 saya atau mana-mana orang yang berkaitan dengan syarikat boleh didakwa bagi kesalahan* di bawah Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 [Ata 694] dan Kanun Keseksaan [Akta 574] serta boleh dihukum di bawah undang-undang masing-masing atas kegagalan saya atau mana-mana orang yang mewakili syarikat ini untuk mematuhi perkara (i) dalam surat akuan ini; atau

3.2 tindakan boleh dikenakan ke atas syarikat di bawah Akta Persaingan 2010 [Akta 712] atas kegagalan saya atau mana-mana orang yang mewakili syarikat ini untuk mematuhi perkara ii) dalam surat akuan ini. Sekiranya syarikat didapati melanggar peruntukan seksyen 4(2)(d) Akta 712, syarikat boleh didenda tidak melebihi sepuluh peratus (10%) daripada pusing ganti (turn over) seluruh dunia sepanjang tempoh suatu pelanggaran itu berlaku.

4. Sekiranya terdapat mana-mana orang cuba memperolehi atau meminta apa-apa suapan daripada saya atau mana-mana orang yang berkaitan dengan syarikat ini sebagai dorongan untuk dipilih dalam perolehan seperti di atas, maka saya berjanji akan dengan segera melaporkan perbuatan tersebut kepada pejabat Suruhanjaya Pencegahan Rasuah Malaysia (SPRM) atau balai polis yang berhampiran. Saya sedar bahawa kegagalan saya berbuat demikian adalah merupakan suatu kesalahan di bawah seksyen 25 (1) Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 [Akta 694] dan boleh dihukum di bawah seksyen 25 (2) akta yang sama, apabila disabitkan boleh didenda tidak melebihi RM100,000 atau penjara selama tempoh tidak melebihi sepuluh tahun atau kedua-duanya.

5. Saya sesungguhnya faham bahawa syarikat melakukan kesalahan jika seseorang yang bersekutu dengan syarikat** memberikan, menjanjikan atau menawarkan suapan untuk memperoleh atau mengekalkan perniagaan atau faedah dalam menjalankan perniagaan di bawan Seksyen 17A, Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 [Akta 6941, apabila disabitkan kesalahan boleh didenda tidak kurang daripada sepuluh kali ganda jumlah atau nilai suapan, atau RM1 juta, atau dipenjarakan selama tempoh tidak melebihi dua puluh tahun atau kedua-duanya.

Yang benar,

Tandatangan :……
Nama :……
No.KP :……
Tarikh :……
Cap Syarikat :……

Catatan:

i) *termasuk kesalahan ditetapkan dalam Jadual (Perenggan 3 (a), takrif "kesalahan ditetapkan") Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 [Akta 694] yang boleh dihukum di bawah Kanun Keseksaan [Akta 574].

ii) **seseorang yang bersekutu dengan syarikat merujuk kepada seksyen 17A (6) Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 [Akta 694], iaitu seseorang itu bersekutu dengan organisasi komersial jika dia seorang pengarah, pekongsi atau pekerja organisasi komersial itu atau dia ialah orang yang melaksanakan perkhidmatan untuk atau bagi pihak organisasi komersial itu.

iii) Surat Akuan ini hendaklah dikemukakan bersama surat perwakilan kuasa.

iv) Takrifan perusahaan di bawah Akta 712 merangkumi syarikat yang terlibat dengan perolehan

Pihak Syarikat :Penama pada sijil pendaftaran untuk menandatangani Surat ini.
Pihak Kerajaan :Pegawai yang diberi kuasa oleh Menteri di bawah seksyen 2 Akta Kontrak Kerajaan1949 untuk menandatangani kontrak.

SURAT AKUAN PEMBIDA BERJAYA

KERJA-KERJA MEMBEKAL DAN MEMASANG PAIP 200MM, 150MM DIAMETER KELULI LEMBUT DARI IKS DUYONG HINGGA KE JAMBATAN DUYONG SERTA LAIN-LAIN KERJA YANG BERKAITAN DI DAERAH MELAKA TENGAH, MELAKA

(No. Rujukan Tender : SAMB / 15 / 2026)

Saya, …….....(Nama Wakil Syarikat) No. Kad Pengenalan……..... yang mewakil.....(Nama Syarikat) nombor Pendataran .....(MOF/PKK/CIDB/ROS/ROC/ROB) dengan ini mengisytiharkan bahawa saya atau mana-mana orang yang mewakili syarikat ini:

i. tidak akan menawarkan, menjanjikan atau memberikan apa- apa suapan kepada mana-mana orang dalam mana-mana Kementerian/Agensi atau mana-mana orang lain, sebagai suapan untuk dipilih dalam mana-mana perolehan;
ii. tidak akan melakukan atau terlibat dengan tipuan bida dalam mana-mana perolehan.

Bersama ini dilampirkan Surat Perwakilan Kuasa bagi saya mewakili syarikat seperti tercatat di atas untuk membuat pengisytiharan ini.

2. Sekiranya saya, atau mana-mana individu yang mewakili syarikat ini didapati terlibat dalam membuat pakatan harga dengan syarikat lain atau apa-apa pakatan sepanjang proses perolehan atau menawarkan, menjanjikan atau memberikan apa-apa suapan kepada mana-mana orang dalam .....(Nama Kementerian/Agensi) atau mana-mana orang lain sebagai dorongan untuk dipilih dalam perolehan seperti di atas, maka saya sebagai wakil syarikat bersetuju tindakan-tindakan berikut boleh diambil:

2.1 Penarikan balik tawaran kontrak bagi perolehan di atas; atau
2.2 Penamatan kontrak bagi perolehan di atas; dan
2.3 Lain-lain tindakan undang-undang/tatatertib mengikut undang-undang/peraturan perolehan Kerajaan yang berkuatkuasa.

3. Saya sesungguhnya faham bahawa--

3.1 saya atau mana-mana orang yang berkaitan dengan syarikat boleh didakwa bagi kesalahan* di bawah Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 [Akta 694] dan Kanun Keseksaan [Akta 574] serta boleh dihukum di bawah undang-undang masing-masing atas kegagalan saya atau mana-mana orang yang mewakili syarikat ini untuk mematuhi perkara (i) dalam surat akuan ini; atau

3.2 tindakan boleh dikenakan ke atas syarikat di bawah Akta Persaingan 2010 [Akta712) atas kegagalan saya atau mana-mana orang yang mewakili syarikat ini untuk mematuhi perkara ii). Sekiranya syarikat didapati melanggar peruntukan seksyen 4(2)(d) Akta 712, syarikat boleh didenda tidak melebihi sepuluh peratus (10%) daripada pusing ganti (turn over) seluruh dunia sepanjang tempoh suatu pelanggaran itu berlaku.

4. Sekiranya terdapat mana-mana orang cuba memperolehi atau meminta apa-apa suapan daripada saya atau mana-mana orang yang berkaitan dengan syarikat ini sebagai dorongan untuk dipilih dalam perolehan seperti di atas, maka saya berjanji akan dengan segera melaporkan perbuatan tersebut kepada pejabat Suruhanjaya Pencegahan Rasuah Malaysia (SPRM) atau balai polis yang berhampiran. Saya sedar bahawa kegagalan saya berbuat demikian adalah merupakan suatu kesalahan di bawah seksyen 25 (1) Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 [Akta 694] dan boleh dihukum di bawah seksyen 25 (2) akta yang sama, apabila disabitkan boleh didenda tidak melebihi RM100,000 atau penjara selama tempoh tidak melebihi sepuluh tahun atau kedua-duanya.

5. Saya sesungguhnya faham bahawa syarikat melakukan kesalahan jika seseorang yang bersekutu dengan syarikat** memberikan, menjanjikan atau menawarkan suapan untuk memperoleh atau mengekalkan perniagaan atau faedah dalam menjalankan perniagaan di bawah seksyen 17A Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 [Akta 694], apabila disabitkan kesalahan boleh didenda tidak kurang daripada sepuluh kali ganda jumlah atau nilai suapan, atau RM1 juta, atau dipenjarakan selama tempoh tidak melebihi dua puluh tahun atau kedua-duanya.

Yang benar,

Tandatangan :……
Nama :……
No.KP :……
Tarikh :……
Cap Syarikat :……

Catatan:

i) *termasuk kesalahan ditetapkan dalam Jadual (Perenggan 3 (a), takrif "kesalahan ditetapkan") Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 [Akta 694] yang boleh dihukum di bawah Kanun Keseksaan [Akta 574].

ii) **seseorang yang bersekutu dengan syarikat merujuk kepada seksyen 17A (6) Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 [Akta 694], iaitu seseorang itu bersekutu dengan organisasi komersial jika dia seorang pengarah, pekongsi atau pekerja organisasi komersial itu atau dia ialah orang yang melaksanakan perkhidmatan untuk atau bagi pihak organisasi komersial itu.

iii) Surat Akuan ini hendaklah dikemukakan bersama surat perwakilan kuasa.

iv) Takrifan perusahaan di bawah Akta 712 merangkumi syarikat yang terlibat dengan perolehan Kerajaan.

BAHAGIAN E

SURAT SETUJUTERIMA TENDER (SAMB 100D)

SURAT SETUJUTERIMA TENDER
(KERJA)

NO KONTRAK : _____

Untuk kerja-kerja yang disebutkan di bawah ini dibuat pada haribulan _____2025 oleh pihak-pihak yang bertandatangan di bawah ini, merujuk kepada Surat Setujuterima Tender yang menjadi sebahagian daripada kontrak tersebut dan yang hendaklah dibaca dan diertikan sedemikian

_____	_____
Tandatangan Kontraktor	Tandatangan Pegawai
Nama Penuh: _____ (Huruf Besar)	Nama Penuh: _____ (Huruf Besar)
Atas Sifat:	Atas Sifat:
Yang diberi kuasa dengan sempurnanya untuk menandatangani untuk dan bagi pihak	Untuk dan bagi pihak Syarikat Air Melaka Berhad
Meterai atau Cap Kontraktor	
Saksi: _____	Saksi:_____
Nama Penuh: _____	Nama Penuh: _____
Pekerjaan: _____	Pekerjaan: _____
Alamat: _____	Alamat: _____
_____	_____
_____	_____

SYARIKAT AIR MELAKA BERHAD

SURAT SETUJUTERIMA TENDER
(KERJA)

Rujukan: **SAMB.** _____

Ketua Pegawai Eksekutif,
Syarikat Air Melaka Berhad,
Wisma Air, Tingkat Bawah, 1,5-9
Jalan Hang Tuah,
75300 Melaka.

Tarikh: _____

_____
_____
_____
_____

Tuan/Puan,

Tender untuk:

KERJA-KERJA MEMBEKAL DAN MEMASANG PAIP 200MM, 150MM DIAMETER KELULI LEMBUT DARI IKS DUYONG HINGGA KE JAMBATAN DUYONG SERTA LAIN-LAIN KERJA YANG BERKAITAN DI DAERAH MELAKA TENGAH, MELAKA

Dengan ini adalah diberitahu bahawa Tender tuan/puan bagi kerja-kerja tersebut di atas berharga Ringgit Malaysia: _____ _____ **(RM _____)** telah disetujuterima, tertakluk kepada had, syarat dan perjanjian dalam Dokumen Tender yang menjadi asas Tender ini dan juga kepada surat ini.

2. Tuan/Puan dikehendaki melaksanakan Perjanjian Kontrak yang formal dalam sedikit masa lagi. Bagaimanapun, sehinggalah Perjanjian Kontrak yang formal itu dilaksanakan, Tender tuan/puan berserta Surat Setujuterima Tender ini akan menjadi kontrak yang sah mengikat di antara tuan/puan dan Syarikat.

3. Tuan/Puan akan diberitahu bila Dokumen Kontrak siap sedia untuk ditandatangani. Bagaimanapun sebelum Dokumen Kontrak ditandatangani, harga dan kadar harga dalam Jadual Kadar Harga dan/atau Ringkasan Tender atau Senarai Kuantiti, mengikut mana yang berkenaan, hendaklah teliti dan diselaraskan oleh Pegawai Penguasa tentang kemunasabahannya tetapi Jumlah Harga Kontrak seperti tersebut di atas hendaklah tetap tidak berubah.

4. Tuan/Puan dikehendaki menyatakan pilihan kaedah Bon Perlaksanan sama ada:-

i) Jaminan Bank / Bank Islam /Bank Pembangunan & Infrastruktur Malaysia Berhad (BPIMB) atau
ii) Jaminan Syarikat Kewangan atau
iii) Jaminan Insurans/ Takaful

5. Tarikh milik tapak bina, seperti yang disebutkan dalam Syarat-syarat Kontrak, ialah pada _____. Walaubagaimanapun, tuan/puan hanya boleh memulakan kerja setelah tuan/puan menyerahkan kepada Pegawai Penguasa perkara-perkara berikut:-

a) Polisi Insurans Tanggungan Awam (iaitu insurans terhadap bencana kepada orang-orang dan kerosakan kepada harta) nilai insurans tidak kurang daripada **RM** _____

b) Polisi Insurans Kerja iaitu **RM** _____

c) Nombor-nombor pendaftaran di bawah Skim Keselamatan Sosial Pekerja (PERKESO) atau

d) Polisi Insuran Pampasan Pekerja berjumlah tidak kurang daripada **RM** _____

Walau bagaimanapun, bagi memulakan kerja-kerja dan bukan maksud lain, tuan boleh menyerahkan nota-nota liputan bagi maksud polisi-polisi insurans tersebut dan resit-resit premium yang telah dibayar itu kepada Pegawai Penguasa. Tuan dikehendaki menyerahkan Polisi-polisi Insurans yang berkenaan (jika belum diserahkan) menurut perenggan 5 di atas, dalam tempoh tidak lewat daripada tiga puluh (30) hari selepas Nota-nota Liputan diserahkan.

6. Tuan/Puan perlu memilih salah satu daripada kaedah di para 4 (i), 4 (ii) atau 4 (iii), tuan/puan hendaklah menyerahkan Bon Pelaksanaan bernilai **RM** _____

7. Kegagalan tuan memulakan kerja dalam tempoh dua (2) minggu dari tarikh milik tapak akan mengakibatkan pengambilan kerja tuan/puan di bawah kontrak ditamatkan sejajar dengan Fasal 51(b) (i) Syarat-syarat Kontrak.

8. Berdasarkan kepada Tempoh Siap Kerja yang ditenderkan selama _____ ~~hari/minggu/~~bulan*. Tarikh Siap untuk seluruh kerja-kerja di bawah kontrak ini ialah _____

9. Surat ini dihantar kepada tuan/puan dalam tiga (3) salinan. Sila kembalikan salinan asal dan satu (1) salinan, yang telah ditandatangai oleh tuan/puan dan disaksikan dengan sempurna, di ruang yang berkenaan, ke pejabat ini dalam tempoh tujuh (7) hari dari tarikh surat ini.

Sekian, terima kasih.

"MELAKAKU MAJU JAYA, RAKYAT BAHAGIA, MENGGAMIT DUNIA"
"BIJAK LAKSANA TUAH, BERANI LAKSANA JEBAT"
"MALAYSIA MADANI"
"INTERGRITI, PROFESIONALISME, IBADAH"

_____
(DATUK MOHD SALEH BIN JUSMAN)
Ketua Pegawai Eksekutif
Syarikat Air Melaka Berhad

Dengan ini yang bertandatangan di bawah ini mengaku penerimaan surat di atas.

_____	_____
Tandatangan Kontraktor	Tandatangan Saksi
Nama Penuh:	Nama Penuh:
	Nama Jawatan:
Atas Sifat:	
Diberikan dengan sempurna untuk menandatangi untuk dan bagi pihak:	Alamat: _____
_____	_____
Meteri atau Cop Kontraktor	_____
Tarikh:_____	Tarikh:_____

BAHAGIAN F

BORANG JAMINAN BANK

LAMPIRAN B

BORANG JAMINAN BANK/JAMINAN SYARIKAT KEWANGAN/
JAMINAN INSURANS UNTUK BON PERLAKSANAAN
(KONTRAK KERJA)

Sebagai balasan kepada Kontrak No. _____ yang dibuat antara Syarikat Air Melaka Berhad, kemudian daripada ini dirujuk sebagai "Syarikat" dan _____, kemudian daripada ini dirujuk sebagai "Kontraktor", bagi _____
_____
_____
(nama projek), kemudian daripada ini dirujuk sebagai "Kontrak", kami yang bertandatangan di bawah, atas pemohonan Kontraktor, mengaku janji yang tak boleh batal unuk memberi Jaminan kepada Syarikat ke atas perlaksanaan yang sepatutnya Kontrak tersebut mengikut cara sebagaimana yang terdapat kemudian daripada ini.

MAKA Penjamin dengan ini bersetuju dengan Syarikat seperti berikut:

1. Apabila sahaja Syarikat membuat tuntutan bertulis, maka Penjamin hendaklah dengan serta merta membayar kepada Syarikat nilai yang ditentukan di dalam tuntutan tersebut tanpa mengira sama ada terdapat apa-apa bantahan atau tentangan daripada Kontraktor atau Penjamin atau mana-mana pihak Ketiga yang lain dan tanpa bukti atau bersyarat. Dengan syarat sentiasanya bahawa jumlah tuntutan yang dibuat tidak melebihi sebanyak Ringgit _____ _____ (nyatakan nilai Jaminan dalam perkataan) (RM_____) dan bahawa tanggungan Penjamin untuk membayar kepada Syarikat di bawah Perjanjian ini tidak melebihi nilai tersebut di atas.

2. Syarikat berhak untuk membuat apa-apa tuntutan separa jika dikehendakinya dan jumlah kesemua tuntutan separa itu hendaklah tidak melebihi nili Ringgit _____ _____ (nyatakan nilai Jaminan dalam perkataan) (RM _____) dan liabiliti Penjamin untuk membayar kepada Syarikat jumlah yang disebutkan terdahulu hendaklah dikurangkan dengan perkadaran yang bersamaan dengan apa-apa bayaran separa yang telah dibuat oeh Penjamin.

3. Penjamin tidak boleh dilepaskan dari Jaminan ini oleh sebarang perkiraan yang dibuat antara Kontraktor dan Syarikat sama ada dengan atau tanpa persetujuan Penjamin atau oleh sebarang perubahan tentang kewajipan yang diaku janji oleh Kontraktor atau oleh sebarang penangguhan sama ada dari segi perlaksanaan, masa, pembayaran atau sebaliknya.

4. Jaminan ini adalah Jaminan yang berterusan dan tak boleh batal dan berkuat kuasa sehingga _____ (kemudian daripada ini disebut "Tarikh Mati Asal") (*Initial Expiry Date)* iaitu dua belas (12) bulan selepas tarikh tamat tempoh kecacatan atau dalam keadaan di mana Kontrak dibatalkan, satu (1) tahun selepas tarikh Kontrak dibatalkan. Penjamin hendaklah melanjutkan Tarikh Mati Asal *(Initial Expiry Date)* jaminan ini untuk tempoh tambahan selama tidak melebihi satu (1) tahun daripada Tarikh Mati Asal *(Initial Expiry Date)* (kemudian daripada ini disebut "Tarikh Mati Lanjutan") *(Entended Expiry Date)* apabila diminta oleh Syarikat dan Jaminan ini adalah dengan ini dilanjutkan. Jumlah agregat maksimum yang Syarikat berhak di bawah Perjanjian ini mestilah sentiasa dipastikan tidak melebihi jumlah Ringgit _____
(nyatakan nilai Jaminan dalam perkataan) (RM _____).

5. Apa-apa tanggungjawab dan tanggungan Penjamin di bawah Perjanjian ini hendaklah luput apabila Perjanjian ini tamat pada Tarikh Mati Asal *(Initial Expiry Date)* atau Tarikh Mati Lanjutan *(Entended Expiry Date)* melainkan jika sebelumnya Syarikat telah meminta secara bertulis kepada Penjamin untuk membayar sejumlah wang tertentu yang masih belum dijelaskan mengikut peruntukan kontrak.

6. SEMUA TUNTUTAN BERKAITAN DENGAN JAMINAN INI, JIKA ADA, MESTILAH DITERIMA OLEH PIHAK BANK/SYARIKAT KEWANGAN /SYARIKAT INSURANS DALAM TEMPOH SAH LAKU JAMINAN INI ATAUPUN DALAM MASA EMPAT (4) MINGGU DARI TAMATNYA TARIKH JAMINAN INI, MENGIKUT MANA YANG LEBIH KEMUDIAN.

PADA MENYAKSIKAN HAL DI ATAS pihak-pihak kepada Perjanjian ini telah menurunkan tandatangan dan meteri mereka pada hari dan tahun yang mula-mula tertulis di atas.

Ditandatangani untuk)
Dan bagi pihak Penjamin)
di hadapan)
)
)

_____
Nama: _____
Jawatan:_____
Cop Bank/Syarikat
Kewangan/Syarikat Insurans:

_____
Saksi

Nama: _____
Jawatan:_____
Cop Bank/Syarikat Kewangan/Syarikat Insurans.

BAHAGIAN G

SPESIFIKASI

TECHNICAL SPECIFICATION

SPAN TS 21827: Part 1: 2013

SPECIFICATION FOR STEEL PIPES, FITTINGS AND JOINTS FOR WATER AND SEWAGE - Part 1: Technical delivery requirements

SPAN

Suruhanjaya Perkhidmatan Air Negara

First Edition

June 2013

Published by:

Suruhanjaya Perkhidmatan Air Negara
(National Water Services Commission)
Prima Avenue 7, Block 3510
Jalan Teknokrat 6
63000 Cyberjaya Selangor
Malaysia

DEVELOPMENT OF SPAN TECHNICAL SPECIFICATION

National Water Services Commission (SPAN) was established in 2008 to regulate the water services industry in Malaysia. SPAN envisions a sustainable, reliable and affordable water services for all by regulating the water services industry through fair, effective and transparent implementation of the Water Services Act (Act 655). Since inception in 2008, SPAN has been striving to institute improvements in term of standards and performance in the country's water and sewerage services sector.

SPAN aims to enhance efforts towards improving standards, quality and operational efficiency of water and sewerage services industry to ensure sustainability. One of the approaches is to achieve higher standards and quality by developing technical specifications for products and systems used in the industry. Hence, Technical Working Groups have been formed by Research, Development and Innovation Division to formulate technical and performance specifications for adoption in water services industry.

This Technical Specification is a result of joint effort by members from various relevant stakeholders of the industry. This series of Technical Specification consists of the following parts, under the general title *Specification for Steel Pipes, Fittings and Joints for Water and Sewage*:

Part 1 : Technical delivery requirements

Part 2 : Tube requirements

The specification provides requirement for seamless and welded carbon steel pipes, fittings and joints in respect of the pipe end preparation, in sizes 60.3mm to 2743mm outside diameter, for the conveyance of water for human consumption and conveyance of sewage. It includes external and internal protection against the corrosive action of the surrounding medium and conveyed fluid.

The continual development of technical and performance specifications is crucial in moving the industry towards higher standards which will uplift the image of local water industry. With the publication of this Technical Specification, it is hoped that it will contribute towards a better quality and performance of Steel Pipes, Fittings and Joints products to ensure its long lasting performance and durability.

Dato' Teo Yen Hua
Chief Executive Officer
National Water Services Commission (SPAN)

Contents

COMMITTEE REPRESENTATION

The System, Product, Material and Research & Development Committee of National Water Services Commission (SPAN) consists of representatives from the following organizations:

Suruhanjaya Perkhidmatan Air Negara (SPAN)

Public Works Department (PWD/JKR)

Ministry of Science, Technology and Innovation (MOSTI)

Jabatan Bekalan Air, KeTTHA (JBA)

Jabatan Perkhidmatan Pembetungan, KeTTHA (JPP)

Department of Standard Malaysia (DSM)

The Working Group of steel pipes, fittings and joints for water and sewage which developed this SPAN Technical Specification consists of representatives from the following organizations:

Suruhanjaya Perkhidmatan Air Negara (SPAN)

Public Works Department (PWD/JKR)

IKRAM QA Services Sdn. Bhd.

SIRIM QAS International Sdn. Bhd.

The Institution of Engineers, Malaysia (IEM)

Association of Consulting Engineers, Malaysia (ACEM)

Malaysian Iron and Steel Industry Federation (MISIF)

Syarikat Bekalan Air Selangor Sdn. Bhd. (SYABAS)

Perbadanan Bekalan Air Pulau Pinang Sdn. Bhd. (PBAPP)

SAJ Holdings Sdn. Bhd. (SAJH)

Lembaga Air Perak (LAP)

PPI Industries Sdn. Bhd.

Boon & Cheah Steel Pipes Sdn. Bhd.

FOREWORD

This SPAN Technical Specification was developed by the Working Group of Steel Pipes, Fittings and Joints for Water and Sewage under the authority of System, Product, Material and Research & Development Committee of National Water Services Commission (SPAN).

This specification is adapted and improved from the following standards:-

i)	MS 1968 : 2007	-	Non-Alloy Steel Tubes and Fittings for the Conveyance of Aqueous Liquids Including Water for Human Consumption – Technical Delivery Conditions.
ii)	BS 534 : 1990	-	Steel Pipes, Joints and Specials for Water and Sewage.

Compliance with SPAN Technical Specification does not of itself confer immunity from legal obligations.

Specification for steel pipes, fittings and joints for water and sewage

1 Scope

This SPAN Technical Specification specifies requirements for seamless and welded carbon steel pipes, fittings and joints in respects of the pipe end preparation, in sizes 60.3 mm to 2743 mm outside diameter, for the conveyance of water for human consumption and conveyance of sewage. It includes external and internal protection against the corrosive action of the surrounding medium and conveyed fluid.

NOTE 1 This specification does not apply to those steel tubes and tubular with screwed and socketed joints, which are covered by the requirements of BS EN 10255.

NOTE 2 For recommendations on the basis of design and service limitations, reference should be made to CP 2010: Part 2.

2 Normative references

The following normative references are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the normative reference (including any amendments) applies.

EN 10020, *Definition and classification of grades of steel.*

EN 10021, *General technical delivery conditions for steel products.*

EN 10052, *Vocabulary of heat treatment terms for ferrous products.*

EN 10266, *Steel tubes, fittings and structural hollow sections – Symbols and definitions of terms for use in product standards.*

EN 10027-1, *Designation systems for steels – Part 1: Steel names.*

EN 10027-2, *Designation systems for steels – Part 2: Steel numbers.*

BS EN ISO 15607, *Specification and qualification of welding procedures for metallic materials – General rules.*

BS EN ISO 15609-1, *Specification and qualification of welding procedures for metallic materials – Welding procedure specification – Part 1: Arc welding.*

BS EN ISO 15614-1, *Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys.*

EN 287-1, *Approval testing of welders – Fusion welding – Part 1: Steels.*

EN 10204, *Metallic products – Types of inspection documents.*

EN ISO 377, *Steel and steel products – Location and preparation of samples and test pieces for mechanical testing.*

EN ISO 14284, *Steel and iron – Sampling and preparation of samples for the determination of chemical composition (ISO 14284:1996).*

BS EN ISO 6892-1, *Metallic materials – Tensile testing. Part 1: Method of test at ambient temperature.*

BS EN ISO 5173, *Destructive tests on welds in metallic materials – Bend tests.*

EN 571-1, *Non-destructive testing – Penetrant testing – Part 1 : General principles.*

BS EN ISO 17638, *Non-destructive testing of welds – Magnetic particle testing (ISO 17638:2003).*

BS EN ISO 17640, *Non-destructive testing of welds – Ultrasonic testing – Techniques, testing levels and assessment (ISO 17640:2010).*

BS EN 1435, *Non-destructive testing of welds – Radiographic testing of welded joints.*

MS 1583, *Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water.*

BS EN 1092-1, *Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN designated. Steel flanges.*

BS EN 1759-1, *Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, class-designated. Steel flanges, NPS ½ to 24.*

BS EN ISO 8501-1, *Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness – Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings.*

BS 3396-1, *Woven glass fibre fabrics for plastics reinforcement. Specification for loom-state fabrics.*

BS EN 10300, *Steel tubes and fittings for onshore and offshore pipelines. Bitumen hot applied materials for external coating.*

BS 4164, *Specification for coal-tar-based hot applied coating materials for protecting iron and steel, including a suitable primer.*

MS EN 197-1, *Cement. Part 1: Composition, specifications and conformity criteria for common cements.*

MS EN 12620, *Aggregates for concrete.*

BS 4027 : 1996, *Specification for sulphate-resisting Portland cement.*

3. Terms and definitions

3.1 General

For the purposes of this SPAN Technical Specification the terms and definitions given in EN 10020, EN 10021, EN 10052 and EN 10266 (excluding the term tube and fitting in EN 10266) and the following apply.

The symbols used in this SPAN Technical Specification are defined in EN 10020, EN 10021, EN 10052 and EN 10266.

Other symbols for sampling and testing are given in the appropriate sampling and testing standards referenced in clauses 9 and 10.

3.2 Tube

A straight conduit for conveyance of fluid, of bare circular cross section, with plain or prepared ends.

3.3 Pipe

Tube complete with coating and lining.

3.4 Fitting

A component fitted to a pipe for jointing, connecting or changing the direction or bore of a pipe including special fitting made from manipulated tube or fabricated pipe, i.e. bend, gusseted bend and tee.

3.5 Effective length

The actual length that a pipe contributes when correctly assembled in a run of piping. This dimension excludes the additional length contributed by a slip-on type coupling when this is used.

3.6 Cut length

Pipes cut to a specified length on which only a small tolerance is allowed.

3.7 Allowable operating pressure (PFA)

Maximum hydrostatic pressure that a component is capable of withstanding continuously in service.

3.8 Glass tissue

A uniformly porous mat, of minimum mass 40g/m², made of glass monofilaments in random arrangement bonded with a thermosetting resin.

3.9 Reinforced glass tissue

Glass tissue with the addition of strand of glass yarn to give additional longitudinal tensile strength, the whole being bonded with a thermosetting resin.

3.10 Woven glass cloth

A loom state fabric, of minimum mass 120g/m², made of low alkali glass, complying with BS 3396-1 and uniformly woven from continuous filament yarn to form a porous cloth with selvedges well made, substantially straight and even, or a lock woven square mesh lacquer bonded fabric.

3.11 Composite glass fibre fabric

A reinforcement consisting of glass lock welded fabric and glass fibre combined.

Note. This reinforcement may be impregnated uniformity with a suitable bitumen or coal tar derived material.

3.12 Lining

A durable material applied to the internal surface of tubes and fittings to protect the metal from corrosion, erosion or chemical attack.

3.13 Coating

A durable material applied to the external surface of tubes and fittings to protect the metal.

4. Classification and designation

4.1 Classification

All steel covered by this SPAN Technical Specification are classified as non-alloy steels in accordance with EN 10020.

4.2 Designation

4.2.1 For products covered by this SPAN Technical Specification, the steel designation consists of the number of this Technical Specification (SPAN TS 21827 : Part 1) and either the steel name in accordance with EN 10027-1 or the steel number in accordance with EN 10027-2 (see Table 1 of SPAN TS 21827 : Part 2).

4.2.2 The steel name consist of the following:

- the capital L for line pipe;
- the specified minimum yield strength of the steel for wall thicknesses less than or equal to 16 mm, expressed in MPa^2 (see table 3 of SPAN TS 21827 : Part 2).

5. Information to be supplied by the purchaser

5.1 Mandatory Information

The following information shall be supplied by the purchaser at the time of inquiry and order.

5.1.1 Pipes

a) The quantity (mass or total length or number);

b) The term ‘pipe’;

c) The number of this Technical Specification;

d) The designation (see 4.2);

e) The dimensions (Outside diameter and thickness. See 7.6 of SPAN TS 21827 : Part 2);

f) The type of coating and lining requirements (see Clause 13 and 16);

g) The type of joint required (see 15.1);

h) The type of flange required (see 15.3);

i) The application (water or sewage) (see 12.1);

j) The options required (see 5.3).

5.1.2 Fittings

a) The quantity (number);

b) The type of fitting (see 7.6);

c) The number of this Technical Specification;

d) The designation (see 4.2);

e) The dimensions (see 7.6);

f) The maximum and, where vacuum conditions exist, the minimum, allowable operating pressure (PFA) (see 7.1);

g) The type of coating and lining required (see Clause 13 and 16);

h) The type of joint required (see 15.1);

i) The type of flange required (see 15.3);

j) The application (water or sewage) (see 12.1);

k) The options required (see 5.3).

5.2 Options

A number of options are specified in this Technical Specification and these are listed below. In the event that the purchaser does not indicate his wish to implement any of these options, at the time of enquiry and order the products shall be supplied in accordance with the basic specification.

Option: 1) The type of pipe, seamless (S), butt welded (BW), electric welded (EW) or submerged arc weld (SAW) shall be as specified (see 6.3.4.1 of SPAN TS 21827 : Part 2).

Option: 2) Rectification of the body of SAW fittings by welding shall not be permitted (see 7.4).

Option: 3) The ends of fittings shall be prepared for butt welding (see 7.8).

Option: 4) An alternative bevel end preparation for butt welding shall be provided (see 7.8.4.2).

Option: 5) Products shall be supplied with specific inspection and testing (see 8.1).

Option: 6) An inspection certificate 3.1 or an inspection report 3.2 shall be supplied (see 8.2).

Option: 7) The method of non destructive testing for the welds of fittings shall be as specified (see 10.4).

Option: 8) The individual sleeve joints are required to be pressure tested after welding (see 15.2.5).

Option: 9) The surface finish shall be to first quality in accordance with BS EN ISO 8501-1 (see 16.2.3).

Option: 10) An adhersion test is required (see 16.6.2).

Option: 11) The sulphate-resisting Portland cement lining is required (see 16.7.1.1).

Option: 12) The curing period for more than 7 days is required (see 16.7.1.6).

Option: 13) The number of cube crushing tests required (see 16.7.5).

Option: 14) Material for completing the internal and external protection of joints at site is required (see 16.9.1 and 16.9.2).

5.3 Examples of an order

Example 1

8 km of submerged arc welded pipes in accordance with SPAN TS 21827: Part 1 with outside diameter of 914mm and a thickness of 10.0 mm made from steel L275 with corrosion protection of bitumen coating and cement mortar lining, the preparation of pipe ends for flange joints and subjected to specific inspection and testing.

8000 m – pipe – SPAN TS 21827: Part 1 – L275 – 914 x 10.0 – bitumen coating – cement mortar lining – flange joints - Option 1: SAW, and 5.

Example 2

5 gusseted bends in accordance with SPAN TS 21827: Part 1 with outside diameter of 914mm and thickness of 10.0mm made from steel L275, with a 30˚ angle for operation at 10 bar gauge pressure, with corrosion protection of bitumen coating and concrete lining and supplied with an inspection certificate 3.1.

5 – gusseted bends – SPAN TS 21827: Part 1 – L275 – 914 x 10.0 - 30˚ - 10bar – bitumen coating – concrete lining – Option 6: 3.1.

6. Materials

6.1 Pipes

6.1.1 Pipes shall be manufactured from tubes manufactured in accordance with SPAN TS 21827: Part 2 and shall be protected against corrosion as specified in Clause 13.

6.1.2 The requirements and test method for tubes are specified in SPAN TS 21827: Part 2. All tubes shall be manufactured and supplied with full compliance to SPAN TS 21827: Part 2.

6.1.3 Whenever the tube is purchased from the external supplier, the tube shall be from a certified supplier complying to SPAN TS 21827: Part 2.

6.2 Fittings

6.2.1 The steel from which the fittings are made shall be in accordance with 6.1 and 6.2 of SPAN TS 21827: Part 2.

6.2.2 Fittings shall be manufactured from tubes manufactured in accordance with SPAN TS 21827: Part 2 or from plate or strip made from one of the steel grades specified in Table 1 of SPAN TS 21827: Part 2.

6.2.3 All welds of fittings made from plate or strip and all fabrication welds shall be arc welds and the preparation for welding and the welding shall be carried out to qualified procedures using competent welders. Procedures in accordance with BS EN ISO 15607, BS EN ISO 15609-1 and BS EN ISO 15614-1 carried out by welders qualified in accordance with EN 287-1 meet this requirement.

6.2.4 The NDT activities for fittings shall be in accordance with 6.3.3 of SPAN TS 21827: Part 2.

7. Requirements for fittings

7.1 General

Fittings, when inspected and tested in accordance with clauses 9 and 10, shall comply with the requirements of 7.2 to 7.8. In addition to the requirements of this SPAN Technical Specification the general technical delivery conditions specified in EN 10021 apply.

Fittings shall be designed to withstand a pressure of not less than 1.5 times the allowable operating pressure.

NOTES It is essential that the allowable operating pressure (PFA) is stated in the enquiry and order (see 5.2.2.f).

7.2 Chemical composition

Cast analysis and product analysis requirement shall comply with the requirement of 7.2.1 and 7.2.2 of SPAN TS 21827: Part 2.

7.3 Mechanical properties

7.3.1 Tensile test

The minimum yield strength, tensile strength range and minimum elongation for fittings covered by this SPAN Technical Specification shall be in accordance with Table 3 of SPAN TS 21827: Part 2.

For even curvature bends and fittings made from plate or strip the tensile test properties shall be determined after forming.

7.3.2 Weld bend test

7.3.2.1 The seam weld of fittings and fittings components made from plate or strip shall pass a weld bend test in accordance with 10.2.4 of SPAN TS 21827: Part 2 on the root and face of the weld using a mandrel of diameter specified in Table 3 of SPAN TS 21827: Part 2. No cracks or imperfections shall be permitted in the weld metal, fusion line, heat affected zone or parent metal, except as permitted in 7.3.2.2.

7.3.2.2 The opening out of an imperfection due to incomplete root penetration or lack of fusion shall not be cause for rejection, provided that the imperfection has sound metal at the back and on each side of it. Cracks originating at the edges of the test piece which are less than 6mm long and which do not penetrate through the wall shall not be cause for rejection.

7.4 Appearance

Fittings shall be free from external and internal surface defects which can be established by visual inspection in accordance with this SPAN Technical Specification.

The outside surface condition, and where practicable, the inside surface condition shall be such that surface defects, and/or surface imperfections requiring rectification, can be identified.

It shall be permissible to rectify surface imperfections by grinding or machining provided that after so doing the wall thickness in the rectified area is not less than the specified minimum thickness. All ground or machined areas shall blend smoothly in the contour of the fittings.

Surface imperfections which encroach on the minimum permissible wall thickness shall be considered defects and shall not be permitted. Rectification of such defects in fittings by grinding or machining

followed by welding shall be permitted on the body of fittings unless Option 2 is specified by the purchaser.

Option 2 Rectification of the body of SAW fittings by welding shall not be permitted.

7.5 Soundness

7.5.1 General

Fittings shall meet the requirements for soundness and freedom from internal imperfections specified in 7.5.2 and 7.5.3.

7.5.2 Leak tightness

All fittings shall be leak tight. Leak tightness shall be demonstrated either by a hydrostatic test in accordance with 10.3.2 of SPAN TS 21827: Part 2 or by an electromagnetic test in accordance with 10.3.3 of SPAN TS 21827: Part 2.

7.5.3 Soundness of welds

The welds of all fittings shall be shown to be sound when tested in accordance with the requirements of 10.4.

7.6 Types and dimension of fittings

7.6.1 General

The fittings covered by the requirements of this SPAN Technical Specification are even curvature bends, gusseted bends, and tees, the dimensions shall be in accordance with 7.6.2, 7.6.3 and 7.6.4 respectively.

7.6.2 Even curvature bends

7.6.2.1 For general applications, the dimensions of even curvature bends, formed by manipulation of tubes, for tubes with outside diameters from 60.3mm to 323.9mm shall be as given in Table 1 (see Figures 1 and 2). The purchaser shall specify the outside diameter, wall thickness and angle of the bend at the time of enquiry and order (see 5.2.2.e).

NOTE 1 Tighter radius bends may be agreed between the purchaser and manufacturer.

NOTE 2 Bends are commonly specified with angles of 11˚ 15', 22˚ 30', 45˚ and 90˚ but they may be of any angle as required by the purchaser.

7.6.2.2 The bending radius R (see Figure 1 and 2) for tube with outside diameters greater than 323.9mm up to and including 1016mm shall be specified by the purchaser at the time of enquiry and order (see 5.2.2.e).

NOTE Even curvature manipulated bends in diameters greater than 1016mm may be available by agreement with the supplier.

7.6.2.3 The length of straight S, specified in Table 1 shall be the minima applicable to bends prepared for butt welding. The lengths of straight S may be modified to suit other types of joint but shall be not less than the values specified in Table 1 or 1.5 D for tubes of diameter greater than 323.9mm.

7.6.2.4 When bitumen lining is required on even curvature manipulated bends of diameter greater than 168.3mm, the tube length in the bend shall be limited to 1800mm or a gusseted bend used.

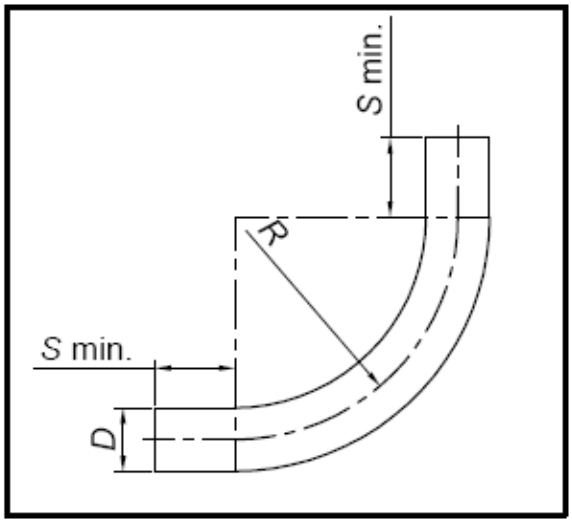


Figure 1. Even curvature bend of 90°

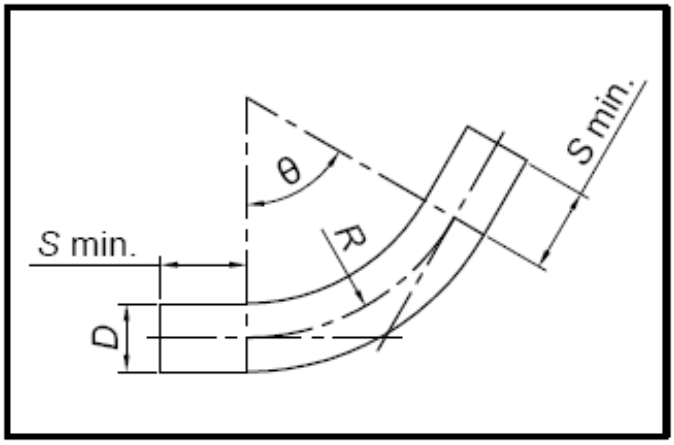


Figure 2. Even curvature bend less than 90°

Table 1. Dimensions of even curvature bends: tube outside diameters from sizes 60.3 mm to 323.9 mm inclusive

Tube		Bend	
Diameter D (mm)	Minimum thickness T (mm)	R (mm)	S min[a] (mm)
60.3	3.6	250	150
76.1	3.6	325	150
88.9	4.0	400	150
114.3	4.5	500	150
139.7	4.5	625	190
168.3	4.5	750	225
219.1	5.0	1000	300
273	6.3	1250	375
323.9	7.1	1500	450

[a] See Figures 1 and 2.

7.6.3 Gusseted bends

Gusseted bends shall be of the general form shown in Figures 3 or 4 or 5 dependent on the angle of the bend. For bends with angle θ greater than 45˚ in tubes of 457mm diameter and above, the bend radius R shall be not less than 1.0 D. For other conditions the bend radius R shall be not less than 1.5 D. The diameter, thickness, the type (1, 2 or 3) and the angle θ shall be specified by the purchaser and the dimensions L and R agreed between purchaser and manufacturer at the time of enquiry and order (see 5.2.2.e).

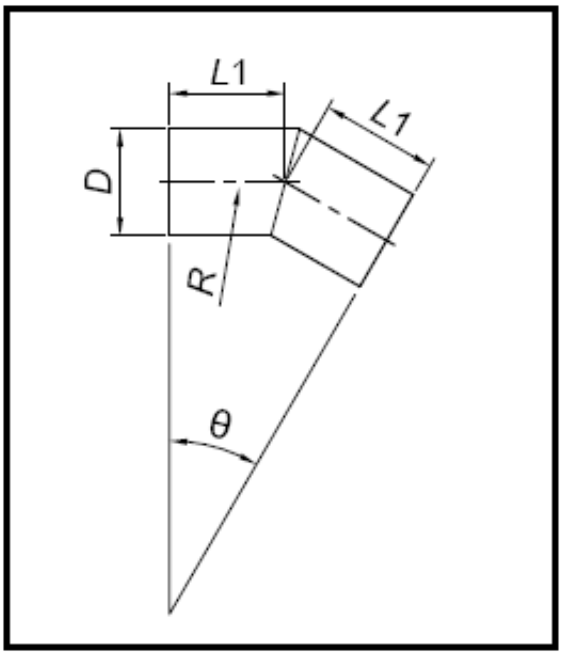


Figure 3. Gusseted bend type 1, θ ≤ 30˚

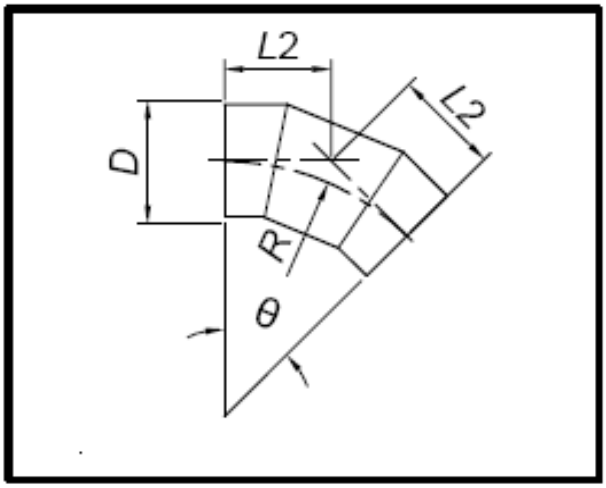


Figure 4. Gusseted bend type 2, 31˚ < θ ≤ 60˚

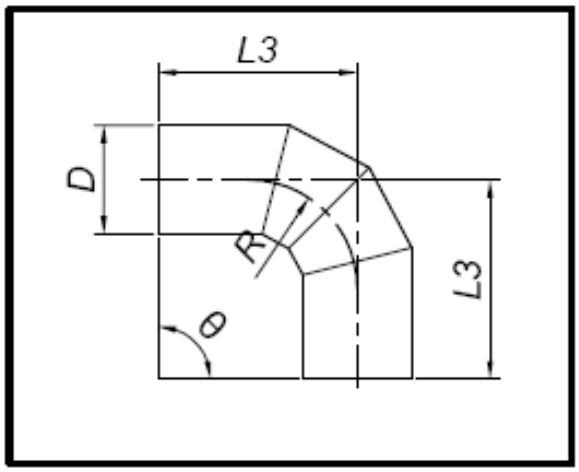


Figure 5. Gusseted bend type 3, 61° < θ ≤ 90°

7.6.4 Tees

Tees shall be supplied with plain ends (see Figure 6) or with ends suitable for sleeve joints (see Figure 7) or with flanges attached to the branch and/or the barrel (see Figure 8). Dimensions of standard tees shall be given in Table 2. The purchaser shall specify the diameter and wall thickness of the barrel and branch at the time of enquiry and order (see 5.2.2.e).

When sleeve joint tees or tees with flanges on the branch and/or on the barrel are required the dimensions C, E and F shall be as shown in Figures 7 and 8 as appropriate.

Note : For information on the dimensions of sleeves see 15.2.

Table 2. Dimensions of tees : tube outside diameters from sizes 60.3mm to 2743mm inclusive.

	Barrel	Branch		
Diameter D or D1 (mm) (see Figure 6)	F (Min) (mm)	G (mm)	E (mm)	H (mm)
		0.5 D plus		
60.3	240	200	100	100
76.1	240	200	100	100
88.9	250	200	100	110
114.3	270	200	100	130
139.7	280	200	110	140
168.3	290	200	110	140
219.1	370	250	110	150
273	410	250	130	160
323.9	450	250	130	180
355.6	530	300	150	200
406.4	600	300	150	230
457 to 711	1.5 D1 but with minimum of 0.5 D	300	230	300
762 to 914		380	300	300
1016 to 2540		380	380	380
2642		400	400	400
2743		420	420	420

Note 1. Dimensions F, G, E and H should be rounded to the nearest 10mm.

Note 2. The effective length of the barrel of tees with sleeve joint for welding equals 2 F.

Note 3. Any barrel may have a branch of equal or smaller diameter attached to it.

Note 4. Reinforcement may be required to prevent overstressing.

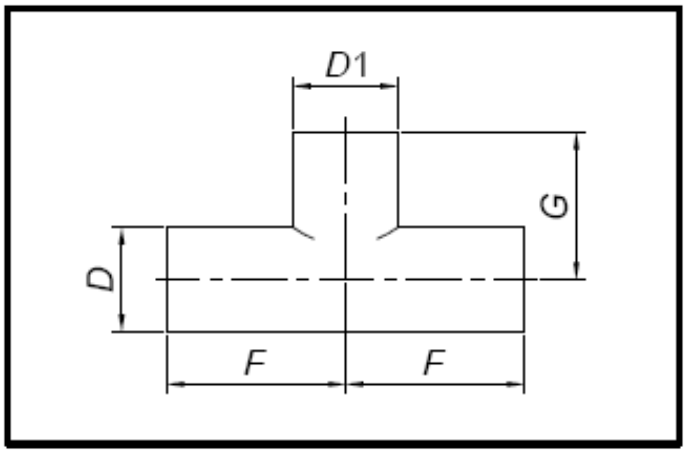


Figure 6. Plain end tee for butt-welded joint

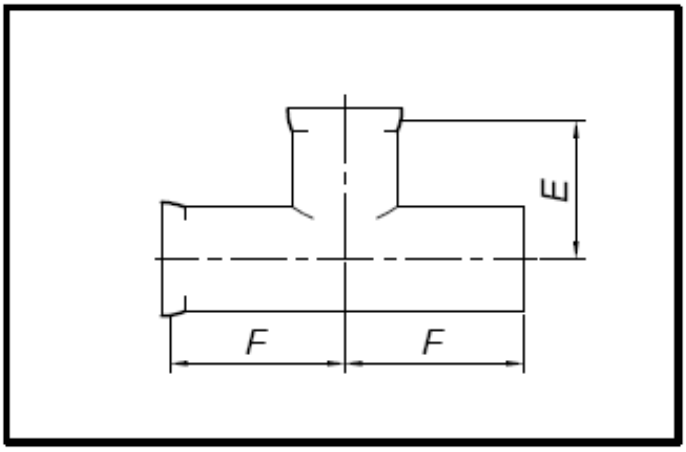


Figure 7. Sleeve joint tee for welding

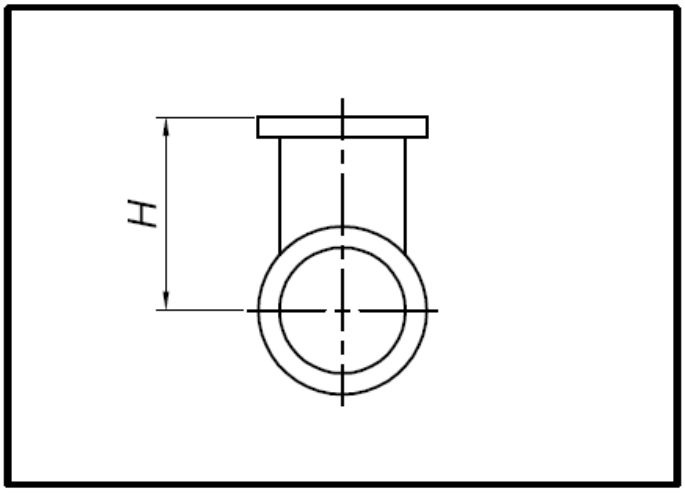


Figure 8. Tee with flanged branch

7.7 Tolerance for Fittings

7.7.1 General

The ends of fittings (except for socketed or flanged tees) shall be prepared to match those of the pipes to which they are to be joined.

7.7.2 Bends

Bends shall be supplied with plain ends cut nominally square to the axis of the bend unless the purchaser specifies end preparation for butt welding in accordance with 7.8 (option 3). The ends shall be free from excessive burrs.

Option 3 The ends of fittings shall be prepared for butt welding.

NOTE Information on end preparation for jointing other than butt welding is given in Clause 15 and may be agreed between the purchaser and the manufacturer.

Tolerance on the angle between the end faces shall be within ±1 % of the specified bend angle θ (see Figure 1 to 5).

The radius R of the bend shall be within ±1 % of the specified radius.

The minimum wall thickness of even curvature bends shall be not less than that permitted in the tube of equivalent material to which it is intended to be connected.

The tolerance on leg length L_1, L_2 and L_3 for gusseted bends (see Figure 3 to 5) shall be ±35mm for outside diameters less than or equal to 219.1mm and ±70mm for outside diameters greater than 219.1mm. When a fixed leg length is specified the tolerance on the leg length shall be ±6mm.

7.7.3 Tees

Plain end tees shall be supplied with the ends cut nominally square to the axis of the barrel and the branch as appropriate unless the purchaser specifies end preparation for butt welding in accordance with 7.8 (option 3). The ends shall be free from excessive burrs.

Option 3 The ends of fittings shall be prepared for butt welding.

NOTE Information on end preparation for jointing other than butt welding is given in Clause 15 and may be agreed between the purchaser and the manufacturer.

The tolerance on the angle of branch relative to the axis of the barrel shall be ±1°.

The tolerance on the dimensions E, F, G and H (see Figures 6 to 8) shall be ±6mm.

7.8 End preparation of fittings for butt welding

7.8.1 General

The purchaser may specify that the ends of fittings shall be prepared for butt welding in accordance with 7.8.2 to 7.8.4.

Option 3 The ends of fittings shall be prepared for butt welding.

7.8.2 Diameter tolerance at fittings ends

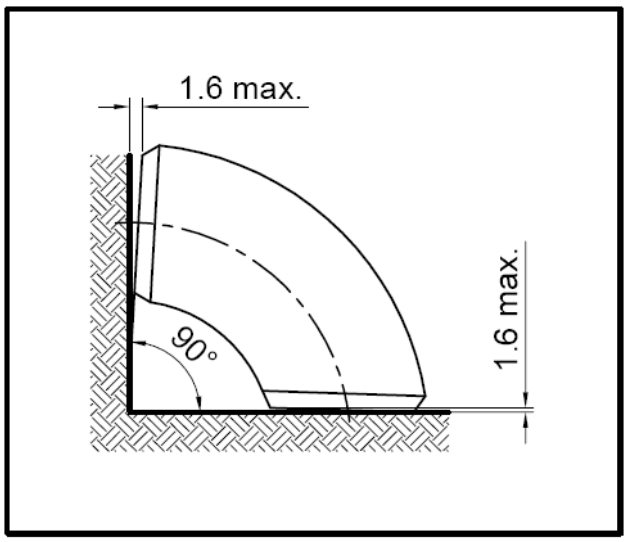
The tolerance on the outside diameter of the fittings for a distance to be agreed at each end shall be in accordance with Table 3. Out of roundness shall be within the limits for the diameter tolerance for fittings with D/T less than or equal to 100. For D/T values above 100 the out of roundness shall be agreed between the purchaser and the manufacturer.

Table 3. End tolerance on diameter (D)

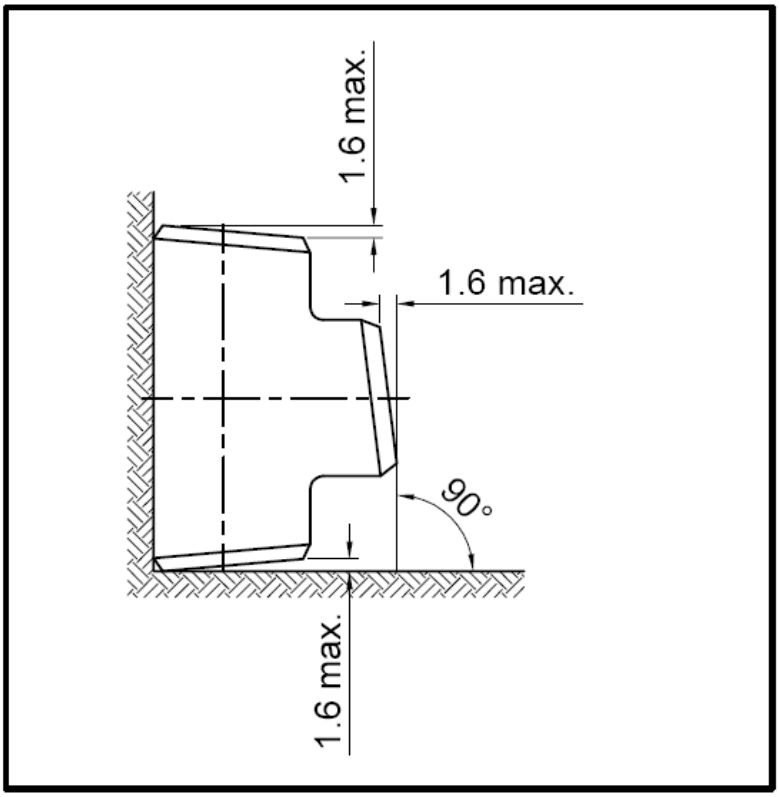
Outside diameter (mm)	End tolerance
≤ 219.1	± 0.5mm or ± 0.5% D whichever is the greater
219.1 < D ≤ 2032	± 1.6mm
>2032	± 3mm

7.8.3 Squareness of ends

The ends of fittings shall be at right angles to the axis of the fittings within 1.6mm measured across the diameter as shown in Figure 9.



a) Bends



b) Tees

Figure 9. Squareness of ends

7.8.4 Bevelled ends

7.8.4.1 The ends of fittings of thickness less than 3.2mm shall be supplied without bevelled ends.

7.8.4.2 Fittings of thickness equal to or greater than 3.2.mm shall be supplied with ends bevelled as shown in Figure 10 unless option 4 is specified by the purchaser.

Option 4 An alternative bevel end preparation for butt welding shall be provided; the purchaser shall specify the type of preparation required.

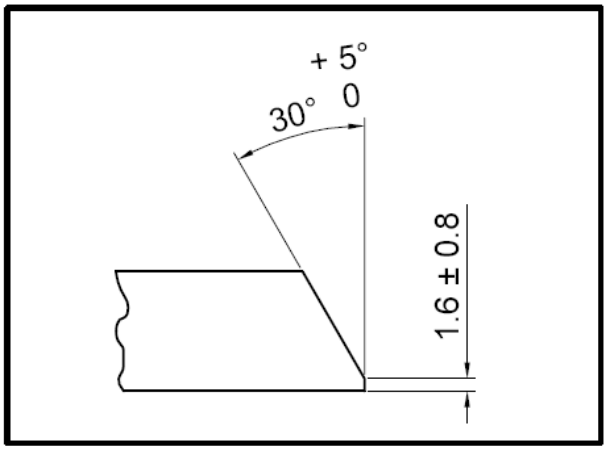


Figure 10. Butt-weld end preparation

8. Inspection

8.1 General

Compliance with the requirements of this SPAN Technical Specification shall be checked by non-specific inspection and testing (see EN 10021) unless option 5 is specified by the purchaser.

Option 5 The products shall be supplied with specific inspection and testing (see EN 10021).

8.2 Inspection documents

When products according to this SPAN Technical Specification are checked by non-specific inspection and testing, a test report type 2.2 in accordance with EN 10204 shall be supplied. When products according to this SPAN Technical Specification are checked by specific inspection and testing (see option 5), an inspection certificate type 3.1 in accordance with EN 10204 shall be supplied unless option 6 is specified by the purchaser.

Option 6 For product checked by specific inspection and testing an inspection certificate type 3.1 or an inspection report type 3.2 in accordance with EN 10204 shall be supplied. The type of document to be supplied shall be specified by the purchaser.

When an inspection document 3.1 or 3.2 is specified the purchaser shall notify the manufacturer of the name and address of the organization or person who is to carry out the inspection and produce the inspection document. In the case of an inspection report 3.2 it shall also be agreed which party is to issue the document.

8.3 Summary of inspection and testing

8.3.1 Fittings

Fittings or components of fittings which are manufactured from tubes or formed into tubes prior to the completion of the fittings shall be tested at the tubular stage in accordance with 8.3.1 of SPAN TS 21827: Part 2 and Table 4. Fittings or components not tested as a tube, or when forming has been undertaken, shall be tested in accordance with 8.3.1 of SPAN TS 21827: Part 2 and Table 4, where applicable.

Even curvature bends previously tested as a tube shall only be subject to a tensile test in accordance with 10.2.1 of SPAN TS 21827: Part 2 after forming.

All welds which have not been tested as part of a tube shall be tested in accordance with 10.4 before the application of any coating or lining material.

Fittings shall be subject to visual examination (see 10.5) and dimensional inspection (see 10.6).

Table 4. Number of fittings in a test unit

Outside diameter mm	Number of fittings
≥ 60.3 ≤ 114.3	100
> 114.3 ≤ 323.9	100
> 323.9	100
NOTE Any residual fraction of a test unit should be considered as a test unit.	

9. Sampling of fittings

9.1 Frequency of testing

For non-specific inspection and testing, the tests shall be carried out by the manufacturer in accordance with their own procedures (see EN 10021).

For specific inspection and testing, the tests shall be carried out on the products to be supplied or on test units of which the product to be supplied is a part (see EN 10021).

9.1.1 Test unit

When specific inspection and testing is carried out, the test unit shall consist of the number of fittings specified in Table 4 of the same type, specified diameter, specified thickness, steel grade and manufactured using the same processing conditions e.g. welding process, heat treatment.

In addition, for fusion welded products, the test unit shall consist of products which have been welded using the same type of flux and filler wire.

9.1.2 Number of sample products

One sample fittings shall be selected for the mechanical test (one per test unit), and where appropriate, the product analysis (one per steel grade).

9.1.3 Type of test and number of tests

See 8.3.

9.2 Location, orientation and preparation of samples and test pieces

9.2.1 General

Samples and test pieces shall be taken from the end of fittings in the final delivery condition in accordance with Figure 11 and EN ISO 377.

9.2.2 Product analysis

Samples for product analysis shall be taken from the test pieces or samples for mechanical testing or from the whole thickness of the tube at the same location as for the mechanical test samples, in accordance with EN ISO 14284.

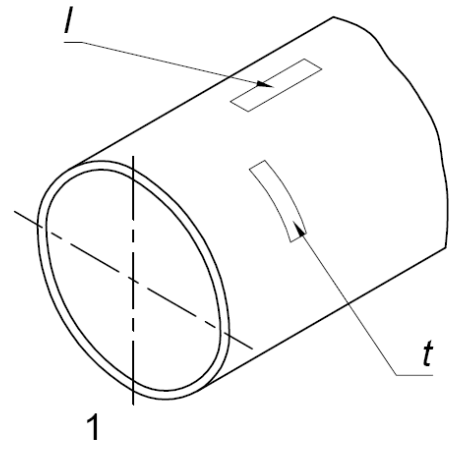
9.2.3 Tensile test

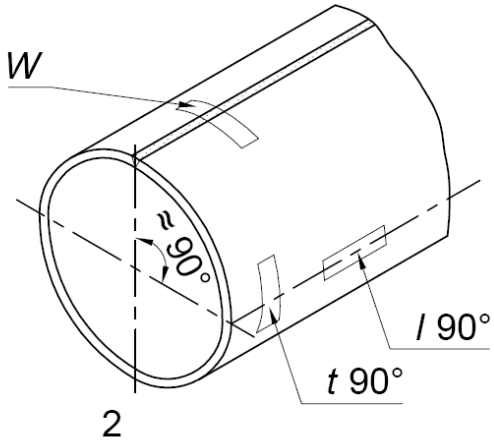
The test piece for the tensile test shall be a test piece taken from the sample fitting in accordance with BS EN ISO 6892-1.

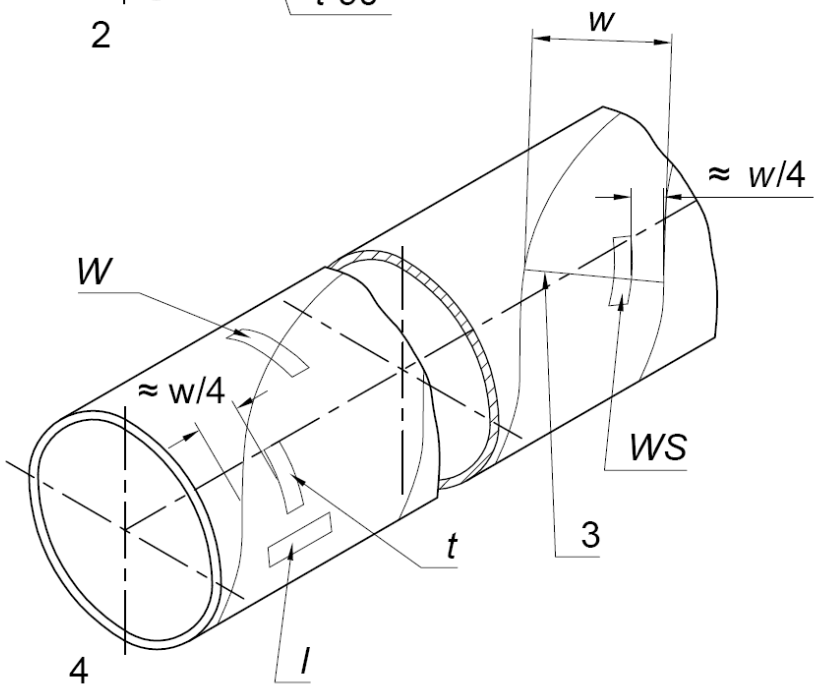
The test piece may be taken either longitudinally or transversely at the discretion of the manufacturer.

9.2.4 Weld bend test

The test piece for the weld bend test shall be in accordance with BS EN ISO 5173.







Key

1	Seamless tube
2	Longitudinally welded tubes
3	Strip end weld
4	Helically welded tubes
W	Sample of the weld
WS	Sample of the strip end weld
w	Width of the strip

Figure 11 – Location and direction of test pieces for the tensile and weld bend test

10. Test methods

10.1 Chemical analysis

Chemical analysis test method for fittings shall be in accordance with 10.1 of SPAN TS 21827: Part 2.

10.2 Mechanical tests

Mechanical tests method for fittings shall be in accordance with 10.2 of SPAN TS 21827: Part 2 with exclusion of 10.2.2 and 10.2.3 of SPAN TS 21827: Part 2.

10.3 Leak tightness test

See 7.5.2.

10.4 Non destructive testing of the welds of fittings

The seam weld of fittings or fittings components which have not previously been tested (i.e. as a tube) shall be tested in accordance with 10.4.3 of SPAN TS 21827: Part 2.

All welds other than seam welds shall be tested by one of the following methods;

a) Penetrant testing in accordance with EN 571-1;

b) Magnetic particle testing in accordance with BS EN ISO 17638;

c) Ultrasonic testing in accordance with BS EN ISO 17640;

d) Radiographic testing in accordance with EN 1435.

The method of non-destructive testing is at the discretion of the manufacturer unless a specific method from those given above is specified by the purchaser.

The acceptance level shall be agreed between the purchaser and manufacturer.

Option 7 The method of non destructive testing is specified by the purchaser from those listed in 10.4.

10.5 Visual examination

The fittings shall be visually examined for compliance with the requirements of 7.4.

10.6 Dimensional inspection

Fittings shall be inspected for compliance with the requirements of 7.6, 7.7 and 7.8. A gauge is normally used for measurement of outside diameter.

However, for fittings with outside diameter equal to or greater than 406.4mm, a circumference tape may be used.

11. Retests, sorting and reprocessing.

For retests, sorting and reprocessing of pipes and fittings the conditions of EN 10021 shall apply.

12. Marking.

12.1 Each pipe and fitting shall be legibly marked by stencilling or other indelible marking with the following information in the sequence indicated:

(a) the manufacturer's name or identification mark;

(b) the number of this SPAN Technical Specification (SPAN TS 21827: Part 1);

(c) the steel name (see 4.2.2);

(d) the dimensions;

(e) the type of coating and lining applied (see 16.1);

(f) the certification mark of certification body;

(g) in the case of specific inspection and testing;

- an identification number (e.g. order or item number) which permits the correlation of the product or delivery unit with the related inspection document;
- the mark of the inspection representative when specific inspection is required;

(h) when the type of pipe, seamless (S), butt welded (BW), electric welded (EW) or submerged arc weld (SAW) is specified (see option 1) the letter representing the type of pipe, as appropriate.

(i) the (SEWAGE) when sewage application is specified by the purchaser (see 5.1.1.i & 5.1.2.j).

Marking on the pipes shall commence not more than 300mm from one end.

12.2 For pipes that are bundled and fittings that are bagged, the information given in 12.1, shall be either stamped on one or more metal or other durable tags, or printed on banding clips or straps, which shall be securely attached to each bundle. Not more than one steel grade shall be included in any one bundle.

13. The corrosion protection requirement

For protection against corrosion, the pipes and fittings shall be protected with a coating and lining. The type of coating and lining shall be agreed between the purchaser and the supplier at the time of enquiry and order (see 5.1.1.f and 5.1.2.g).

The methods of protection against corrosion and the selections of coatings and linings shall be in accordance with Clause 16.

14. Effect of non-metallic products on water quality

When used under the conditions for which they are designated, non-metallic products in contact with or likely to come into contact with potable water shall comply with MS 1583.

15. Types of joints

15.1 General

15.2 to 15.5 specifies the type of joints, except for the preparation for butt welding, requirements for which are given in 7.8 of SPAN TS 21827: Part 1 and Part 2. The types of joints are as follows:-

(a) Sleeve joints for welding;

(b) Flange joints;

(c) Slip-on type couplings;

(d) Push fit and gasket type couplings.

NOTE 1 It is essential that the type of joint is stated in the enquiry and order (see 5.1.1.g and 5.1.2.h).

NOTE 2 Illustrations showing the basic design principle for the more common types of joints appropriate in this Technical Specification are given in Figures 12 – 16. The actual details of the joints may differ from one manufacturer to another.

15.2 Sleeve joints for welding

15.2.1 General

Sleeve joint for welding shall comply with 14.2.2 or 14.2.3 or 14.2.4.

The joints shown in Figure 12 may differ in detail from one manufacturer to another provided the dimensions identified are maintained.

On sizes smaller than 711 mm OD, the joints should be welded in the outside only. On sizes 711 mm OD and larger, welding may be either inside, or outside, or both side and outside.

In general, sleeve welded joints are not suitable for lined tubes (pipes) in sizes 610 mm OD and smaller. When these sizes are required to be lined, consideration should be given to mechanical joints or other forms of joints designed to avoid damage to the lining.

15.2.2 Type 1 joints

For type 1 joints (see Figure 12) the tubes shall be supplied with spigot end parallel and sleeve end either parallel or with the diameter tapered to approximately 0.8mm per 25mm length of sleeve. The minimum length of sleeve shall be 75mm.

The sleeve shall be sized to ensure that the spigot will enter the sleeve freely and be engaged by the socket when fully home.

15.2.3 Type 2 joints

For type 2 joints (see Figure 12) the tubes shall be supplied with spigot end and the sleeve end parallel. The collar forming the sleeve shall be fabricated with not more than one longitudinal weld and shall be welded externally and internally to the sleeve tube. The minimum sleeve length shall be $(150 + 2t)$mm, where t is the thickness of the sleeve, to ensure an adequate space between the spigot end and the internal collar weld to effect the inside joint weld if required.

The sleeve shall be sized to ensure that the spigot will enter the sleeve freely and be engaged by the socket when fully home.

15.2.4 Type 3 joints

For type 3 joints (see Figure 12) the tubes shall be supplied with the contact surfaces of the spigot end and sleeve end formed to the same spherical radius. The spherical radius shall be not less than half of the outside diameter of the tube. When fitted together the mean penetration of each spigot into the sleeve shall be not less than four times the tube thickness. (See note 1).

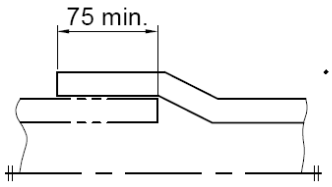
NOTE 1 These types of sleeve joint may be used to accommodate small changes in pipe line direction provided the spigot and the sleeve are engaged around the whole circumference and the mean penetrated is not less than four times the tube thickness.

15.2.5 Individual sleeve joints

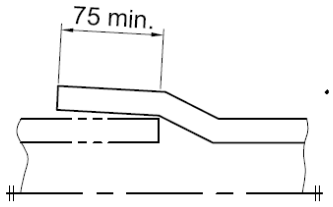
When individual sleeve joints are required to be pressure tested after welding, each sleeve shall be provided with a nominal size ¼ tapped hole complying with BS EN 10226-1 fitted with a matching plug. The tapped holes shall be within the end 30mm of the sleeves and be clear of any possible shop or field welding runs.

The purchaser should state Option 8 in the enquiry and order if the individual sleeve joints are required to be pressure tested after welding.

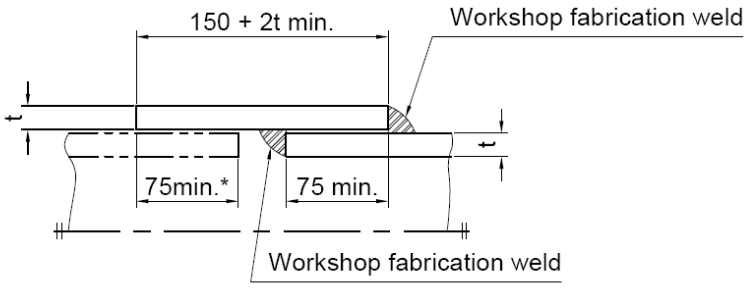
Option 8 The individual sleeve joints are required to be pressure tested after welding.



Type 1 (parallel sleeve)

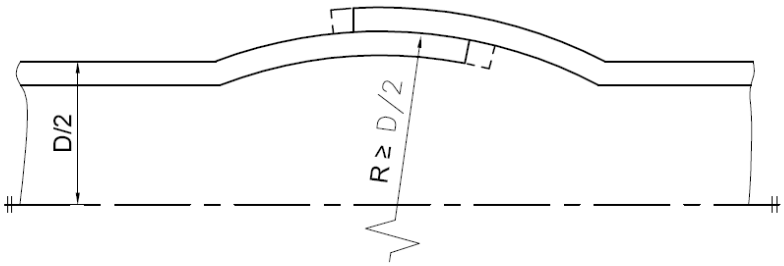


Type 1 (taper sleeve; taper approximately 0.8 mm on diameter for each 25 mm on length of socket)



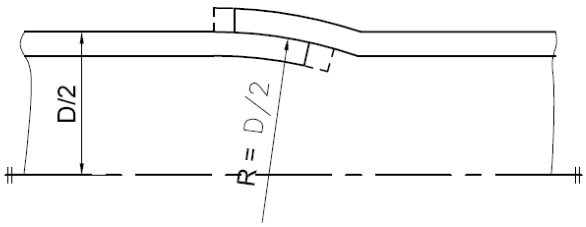
* For guidance

Type 2 (collar sleeve)



Spherical joint

(R > D/2 where D is the outside diameter)



Hemispherical joint

(R > D/2 where D is the outside diameter)

Type 3 (surfaced sleeve)

All dimensions are in millimeters

Figure 12. Sleeve welded joints

15.2.6 Welding collars

Welding collars shall be as shown in Figure 13 and shall be at least equal in thickness to the adjoining components; the length of sleeve shall be not less than 250mm.

When positioned for welding the collar should be a good fit on the outside diameter of the components to be joined. To ensure good welding conditions the gap shall be not greater than 6mm.

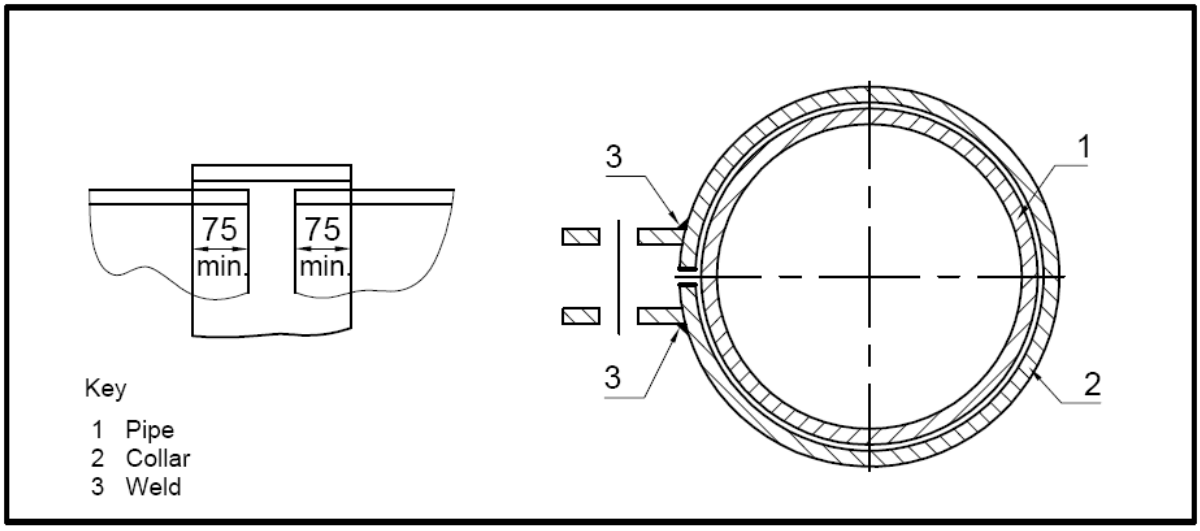


Figure 13. Welding collar

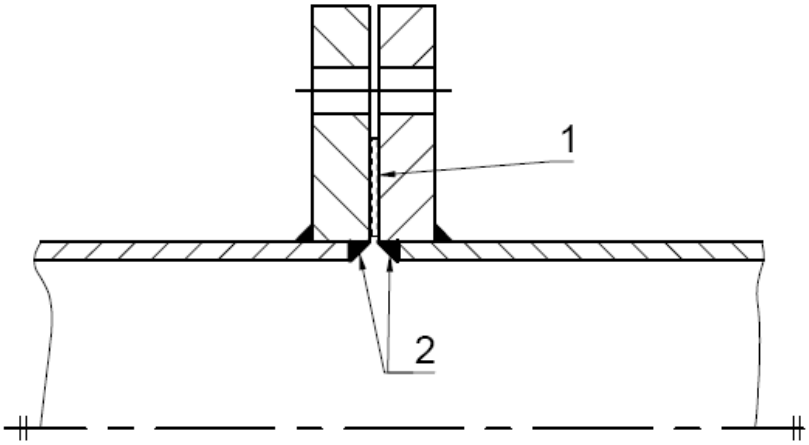
15.3 Flange joints

15.3.1 Flange joints shall have flanges in accordance with BS EN 1092-1 or BS EN 1759-1, as appropriate to the design conditions (see Figure 14).

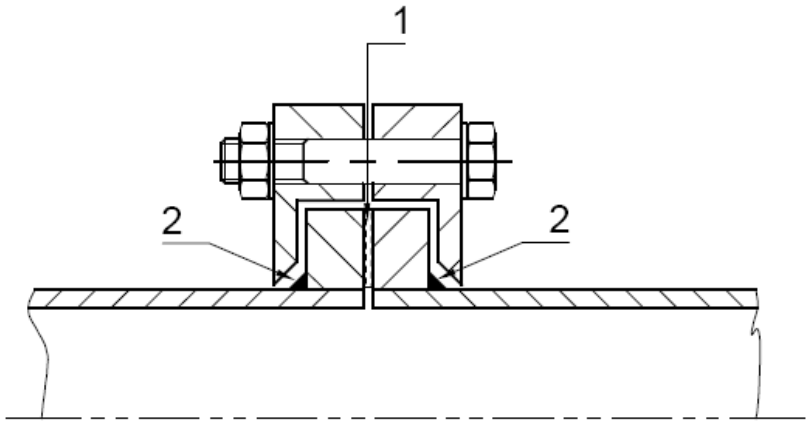
Note It is essential that the type of flange required is stated in the enquiry and order (see 5.1.1.h and 5.1.2.i).

The purchaser shall specify the type of flange required.

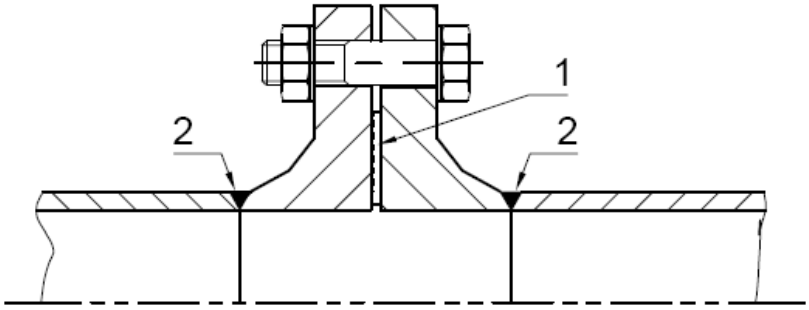
15.3.2 Welding shall be carried out to procedures in accordance with BS EN 15607, BS EN ISO 15609-1 and BS EN ISO 15614 by welders qualified to EN 287-1.



i.



ii.



iii.

Key

1. Gasket
2. Weld

i. Plate flange

ii. Loose flange

iii. Welded neck flange

Figure 14 : Flange joints.

15.4 Slip-on type couplings

15.4.1 Slip on type coupling for use with plain end tube shall be of the general form shown in Figure 15.

15.4.2 The lengths of the coupling sleeves (S) shall be as given in Table 5.

The details of the joints shown in Figure 15 may differ from one manufacturer to another provided the dimensions identified are maintained.

Table 5. Slip-on type couplings – lengths of coupling sleeves.

Tube Size outside diameter D (mm)	Sleeve length (mm) S	Tolerence on sleeve lengths (mm)
≤ 60.3	80	± 3
76.1 to 323.9	100	
355.6 to 914	150	
1016 to 1829	178	
2032 and 2743	254	
NOTE 1 Other sleeve lengths may be used for special service conditions but are not covered by this standard		
NOTE 2 Coupling sleeves with a form of centre register may be specified by the purchaser.		

15.4.3 When slip-on type couplings are used the tube ends for length L shall be within the tolerances on outside diameter as specified in Table 6 when checked by the measuring the circumference and shall permit the passage of a ring gauge, which has a bore 1.6mm larger than the maximum permissible diameter of the tube.

15.4.4 Surface irregularities such as peaks, flats or depressions shall be blend smoothly into the surface of the tube and their height or depth shall not exceed 0.25mm.

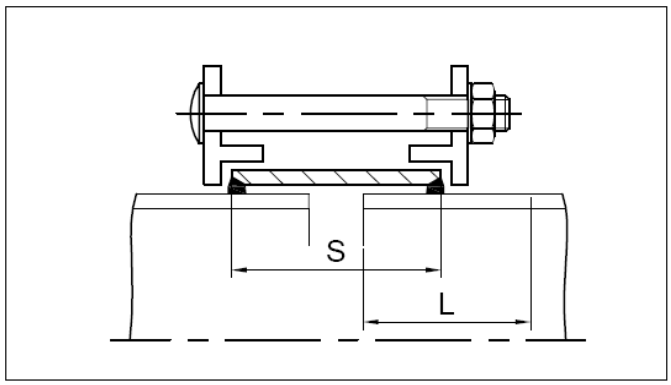


Figure 15. Slip-on type couplings

Table 6. Slip on type couplings – tolerances on outside diameter D over length L

Tube Size outside diameter D (mm)	Tolerance on D (mm)	Length L over which tolerance applies (mm)
≤ 114.3	± 0.8	100
139.7 to 323.9	+ 1.6 / - 0.8	100
355.6 to 1422	± 1.6	150
1524 to 1829	± 3	150
2032 to 2743	± 3	200

15.5 Push fit and gasket type couplings

15.5.1 Push fit and gasket type couplings shall be of the general form shown in Figure 16.

15.5.2 The insertion depth, socket size and wall thickness shall be as given in Table 7. The details of the joint shown in Figure 16 may differ from one manufacturer to another.

The connection is produced by inserting the tube spigot end into the socket end which contains a rubber gasket. By inserting the spigot end into the socket, the rubber ring is deformed in an axial direction and seals the connection by the resilience present in the rubber ring.

The connection in diameters up to and including 323.9mm is suitable for operating pressures up to maximum 40 bar. For larger diameters the maximum operating pressure is related to the diameter and thickness of the tubes. To absorb axial forces in the connection, special rubber rings may be required.

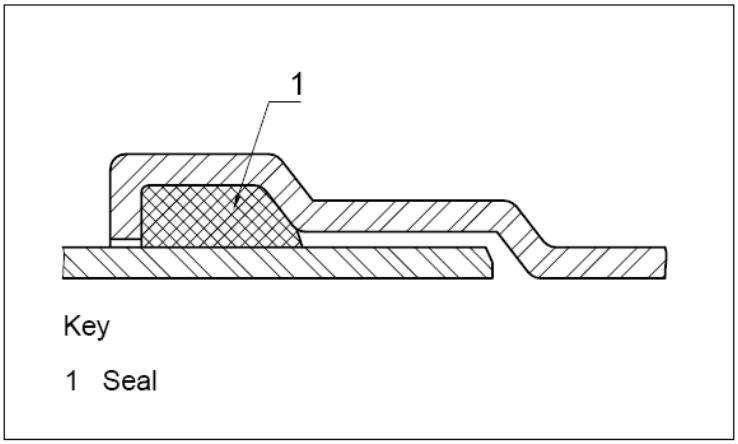


Figure 16. Push fit and gasket type couplings.

Table 7. Insertion depths, socket sizes and wall thicknesses for push fit and gasket type couplings.

Tubes Outside Diameter D (mm)	Nominal wall thickness T (mm)	Insertion depth (mm)	Socket Outside Diameter (mm)
114.3	3.2	110	151
117.5	3.2	110	151
139.7	4.0	110	178
144	4.0	110	178
168.3	4.0	131	203
219.1	4.5	133	258
273	5.0	143	312
323.9	5.6	150	366
355.6	5-7.1[a]	120-150	405
406.4	5-7.1[a]	120-150	405
457	5-7.1[a]	120-150	510
508	5-7.1[a]	120-150	560
610	5-8[a]	120-200	660
610	8	200	690
711	8	200	791
813	8	200	893
914	8	200	994
1016	8	200	1096

[a] Dependent on maximum working pressure.

15.6 Special joints

Other types of joint are available. If such joints are to be used any special requirements for the end preparation of the tube should be specified by the purchaser and agreed with the manufacturer at the time of enquiry and order.

16. Protection against corrosion

16.1 General

This part of SPAN Technical Specification specifies methods of protecting tubes and fittings against corrosion. It covers external protection by bitumen, coal tar based and plastics materials, and internal protection by bitumen, concrete and cement mortar.

Other types of protection system shall be covered by other relevant standards or specifications approved by the Commission.

It is permissible for other surface protection system to be applied in which cases it is necessary for an agreement between the purchaser and the manufacturer to be reached.

The type of external and internal protection specified and the symbol to represent them under this specification are as follows:-

a) Bitumen coating (B)

b) Plastic Cladding (P)

c) Epoxy coating (E)

d) Bitumen Lining (BL)

e) Concrete Lining (C)

f) Cement Mortar Lining (M)

16.2 Surface preparation

16.2.1 General

The surfaces to be protected shall be clean and free from scale, loose rust, oil, grease or other foreign matter. Surface preparations for other than cement mortar or concrete linings shall be effected by one of the following methods:

(a) Acid pickling

(b) Abrasive, mechanical or flame, descaling

16.2.2 Acid pickling

Where surface preparation is by acid pickling, the tubes and fittings shall be immersed in an acid solution until all the scale has been removed, washed in clean water and the surface suitably inhibited.

16.2.3 Abrasive descaling

Where surface preparation is by abrasive descaling, the surface finish shall be at least to second quality in accordance with BS EN ISO 8501-1 unless option 9 is specified by the purchaser.

Option 9 The surface finish shall be to first quality in accordance with BS EN ISO 8501-1.

16.3 Coatings and linings

16.3.1 Bitumen

Coatings are applied hot or cold and, where bitumen coatings are applied by dipping, the tubes and fittings shall be immersed in a bath of molten bitumen until they attain the temperature of the bath. They shall be drained after the removal from the bath, where necessary for the purposes of jointing any excess coating shall be removed from the ends. Where coatings are applied by spray or brush, the application shall be such as to provide a smooth continuous coating.

NOTE 1 These bitumen coatings may be suitable for extended service.

16.4 External protection

16.4.1 Priming

Before the application of bitumen or coal tar external protection, tubes and fittings shall be primed with a compatible priming coat. Materials and methods complying with BS EN 10300 or BS 4164 shall be used as appropriate.

16.4.2 Bitumen sheathing

The materials shall consist of natural or blown petroleum bitumen mixed with an inert filler i.e. type 2 or type 3 in accordance with BS EN 10300.

The tubes and fittings shall be covered with a layer of sheathing material, applied as a hot coating or mastic to provide a seamless, consolidated and smooth layer having a minimum thickness as given in Table 8.

Table 8. Thickness of bitumen shearing material.

Pipe outside diameter (mm)	Minimum thickness (mm)
88.9 – 168.3	3
193.7 – 323.9	4.5
355.6 - 2743	6

16.4.3 Reinforced bitumen sheathing

Reinforced sheathing shall be bitumen complying with 16.4.2 with the addition of an overlapping spiral wrapping of woven glass cloth firmly embedded in to the sheathing

16.4.4 Bitumen enamel wrapping (filled bitumen with glass tissue)

The tubes shall be covered with a layer of bitumen containing mineral filler applied hot, i.e. type 2 in accordance with BS EN 10300, and an inner wrapping of glass tissue and an outer wrapping of bitumen impregnated reinforced glass tissue, the inner wrapping being embedded in the bitumen. For tubes, the glass tissue wrappings shall be wound spirally with an overlap. For fittings, the glass tissue wrapping shall be wound spirally or circumferentially with an overlap. There shall be not less than 1 mm of enamel between the tube surface and the inner wrapping and also between the inner and outer wrapping. The protection shall have a minimum thickness of 3 mm.

16.4.5 Reinforced bitumen enamel wrapping

Reinforced wrapping shall be bitumen enamel wrapping complying with 16.4.4 except that the outer wrapping shall be of composite glass fibre fabric.

16.4.6 Coal tar enamel wrapping (filled coal tar with glass tissue)

The tubes and fittings shall be covered with a layer of type 2 filled coal tar in accordance with BS 4164 and an inner wrapping of glass tissue and an outer wrapping of coal tar impregnated reinforced glass tissue, the inner wrapping being embedded in the coal tar. For tubes, the glass tissue wrapping shall be wound spirally on the tubes with an overlap. For fittings the glass tissue wrapping shall be wound spirally or circumferentially with an overlap. There shall be not less than 1 mm of enamel between the tube surface and the inner wrapping and also between the inner and outer wrapping. The protection shall have a minimum thickness of 3 mm.

16.4.7 Non-stick and reflective finish

For bitumen or coal tar coated pipes a non-stick and reflective coating shall be applied to the finish external protection.

16.4.8 Plastics cladding

Tubes shall be covered with an even layer of hot melt adhesive undercoat with a minimum thickness of 0.1 mm. The undercoat shall consist of a non-setting, pressure sensitive adhesive based on a blend of elastomer resin and fluxing oil.

Immediately after the application of this undercoat, a seamless sheath of medium/high density polyethylene shall be continuously applied and shrunk on to the tube to provide a smooth outer sheath, free from pinholes and cracks. The thickness of the polyethylene shall be in accordance with Table 9.

The minimum thickness of polyethylene shall be the thickness as given in table 9 minus 12.5%.

Table 9. Thickness of polyethylene

Tube outside diameter (mm)	Polyethylene thickness (mm)
≤ 60.3	0.6
88.9 – 114.3	0.9
139.7 - 457	1.3

16.5 Internal protection

16.5.1 Priming

Before internal bitumen protection is applied, tubes and fittings shall be primed with a compatible priming coat. Materials and methods complying with BS EN 10300 shall be used.

16.5.2 Bitumen lining of tubes

16.5.2.1 The materials shall consist of a uniform blend of natural or blown bitumen mixed with an inert filler to produce a homogeneous composition of type 2 in accordance with BS EN 10300.

16.5.2.2 The lining material, in a hot fluid condition, shall be applied centrifugally to straight lengths of tube to give a smooth continuous lining, having a minimum thickness as given in Table 10.

16.5.3 Bitumen lining of fittings

The lining material and the finished lining shall comply with the corresponding requirement of clause 16.5.2 for straight tubes.

NOTE. In view of the variety of methods adopted for the lining of fittings, this specification does not specify the procedure to be followed.

Table 10. Thickness of bitumen lining material

Tube outside diameter (mm)	Minimum thickness (mm)
60.3 – 323.9	1.5
355.6 – 610	3
660 – 914	4.5
1016 - 2743	6

16.6 Tests on applied external and internal protections

16.6.1 'Holiday' test

All coated tubes (pipes) and fittings shall be checked for continuity of the applied protection in accordance with appendix A using a 'Holiday' detection unit. Discontinuities and pinholes indicated by the test shall be made good.

16.6.2 Adhesion test

When an adhesion test is carried out it shall comprise one of the following methods. The manufacturer shall select the first test method.

a) The ring test.

A ring 75mm wide shall be cut cold from one end of finished pipes. The ring shall be flattened at a temperature between 10° C and 20° C to 50 % of the original diameter. The lining and/or coating shall not part from the metal under this test.

b) The strip test

Using a tool with a thin sharp blade, two cuts approximately 50 mm apart shall be made through the protection to the metal pipes. Sudden impact, which would cause untimely separation, shall be avoided. The blade shall be worked under the protection and an attempt made to peel it from the metal. The adhesion shall be considered satisfactory if removal of the protection causes cohesive failure and the protection does not peel cleanly from the primer or the pipe surface.

The test shall be performed when the protection has been allowed to cure at a temperature not less than 10ºC or more than 35 ºC for a minimum of 48 h after application.

When an adhesion test is required, this should be stated by the purchaser in the enquiry and order (Option 10).

Option 10 An adhersion test is required.

16.6.3 Repairs

Any defective coatings and linings shall be made good using compatible materials.

16.7 Concrete lining and cement mortar lining

16.7.1 Concrete lining of tubes

16.7.1.1 The lining shall be concrete made from Portland cement complying with MS EN 197-1 or from sulphate-resisting Portland cement complying with BS 4027:1996 and fine aggregate complying with MS EN 12620, except that the maximum size of aggregate shall not exceed one-third the thickness of the lining.

The manufacturer has the option of supplying pipe lined with either Portland cement or sulphate-resisting Portland cement unless Option 11 is specified by the purchaser in the enquiry and order.

Option 11 The sulphate-resisting Portland cement lining is required.

NOTE The use of additives or any other admixture is not covered by this specification. Such use is not permitted unless specifically agreed in detail with the purchaser.

The minimum cement content shall be 330kg/m³ and the maximum water cement ratio shall not exceed 0.46:1.

16.7.1.2 The water used in the preparation of the concrete shall be neither deleterious to concrete nor deleterious to the water that the pipe is eventually intended to convey. (see clause 14).

16.7.1.3 The concrete lining in contact with potable water shall not discolour the water, impart any objectionable taste or odour or release any toxic substances into the water or support any microbial growth. (see clause 14).

16.7.1.4 The concrete shall give, upon testing, the compressive strength and density specified in 16.7.5.

16.7.1.5 The tube shall be charged in a single operation and spun at a suitable speed to achieve a minimum rate of radial acceleration of 250m/s² ($25g_n$) until the uniform thickness of concrete lining given in Table 11 has been attained over the whole of the inner surface with the exception of stock backs for jointing.

The spinning of the tube shall continue until surplus water has been dispersed and the greatest possible density of lining obtained. Any damage caused to the lining by the removal of the end rings shall immediately be made good by hand before the lining is set. Not more than I h shall elapse between the removal of the lined pipe from lining machine and the commencement of the approved curing procedure.

16.7.1.6 After being lined, the fresh lining shall be marked with the date of lining and the pipe shall be stored undisturbed for the lining to be cured for at least 7 days for maturing. Means shall be employed to prevent the lining from drying too rapidly, particularly during the 48 h. period after the lining operation. The lining shall be kept damp by spraying with water or by other means, e.g. by closing the pipe with end caps until curing is complete.

16.7.1.7 The surface of the lining shall be smooth and free from irregularities.

Fine surface crazing, hair cracks, or cracks up to 0.25mm in width in saturated linings and not over 300mm in length shall not be cause for rejection.
Cracks over 0.25 mm in width in saturated linings, and crack over 300 mm in length or other defective linings shall be made good using compatible materials.

16.7.1.8 The pipes may be dispatched at any time after the seven-day curing period provided the cube strength of the test cube after 7 days of curing has achieved the required strength as specified in 16.7.5 unless option 12 is specified by the purchaser.

Option 12 The curing period for more than 7 days is required.

Table 11. Thickness of concrete lining

Outside diameter of tube or special (mm)	*Minimum thickness of concrete (mm)	Tolerance (mm)
Up to and including 168.3	6	+3, -0
193.7 – 323.9	10	+3, -0
355.6 – 610	13	+3, -0
660 – 1219	19	+6, -0
1422 - 2743	25	+6, -0
* Thicker linings may be specified		

16.7.2 Concrete lining of fittings

16.7.2.1 When it is practicable to do so, fittings shall be made from cut lengths of mature lined straight pipes.

NOTE. See 16.7.2.3 for situations where it is impracticable to do so.

The lining shall be cut back from the end or ends to be beveled and welded, for a sufficient distance to ensure that any of the concrete which is intended to remain as part of the lining shall not suffer damage by the cutting or welding process. The lining shall be made good by rendering by hand.

16.7.2.2 Hand rendering of fittings shall consist of freshly mixed concrete of a mixture equivalent to that of the lining being repaired, and shall be thoroughly compacted and finished to a smooth surface of the correct form.

16.7.2.3 Fittings other than those made from cut length of measured lined straight pipes shall be lined by hand rendering as specified in 16.7.2.2. The rendering of fittings of 323.9 mm outside diameter and above shall be reinforced with expanded metal or equivalent, securely attached to the inner surface.

16.7.2.4 Curing shall comply with 16.7.1.6.

16.7.3 Centrifugally applied cement mortar lining

16.7.3.1 The lining shall be cement mortar made from Portland cement complying with MS EN 197-1 or from sulphate-resisting Portland cement complying with BS 4027:1996 and specially graded washed silica sand complying with grading zone 4 in table 5 of MS EN 12620.

The manufacturer has the option of supplying pipe lined with either Portland cement or sulphate-resisting Portland cement unless Option 11 is specified by the purchaser in the enquiry and order.

Option 11 The sulphate-resisting Portland cement lining is required.

NOTE The use of additives or any other admixture is not covered by this standard. Such use is not permitted unless specifically agreed in detail with the purchaser.

The cement mortar shall have a minimum cement content of 1000 kg/m^3 and a water cement ratio of between 0.30 : 1 and 0.45 : 1 by mass.

16.7.3.2 The water for mixing shall comply with 16.7.1.2. (see clause 14)

16.7.3.3 The lining in contact with potable water shall comply with the requirements of 16.7.1.3. (see clause 14)

16.7.3.4 The cement mortar lining shall be carried out by one of the following methods.

(a) Centrifugally spraying and subsequent rotation to achieve smoothing.

(b) Centrifugally spraying and simultaneously smoothing by trowelling.

The spray operation shall be such that a continuous feed of freshly mixed mortar shall be evenly applied to the whole bore of the tube in a single pass in one continuous operation. Where smoothing by rotating is utilized, the duration and speed of rotation shall be kept to a minimum to prevent separation of the constituents of the mortar.

16.7.3.5 The curing process shall comply with 16.7.1.6.

16.7.3.6 The surface of the lining shall be smooth and free from irregularities.

Fine surface crazing, hair cracks or cracks up to 0.25mm wide in saturated linings and not over 300mm in length shall not be a cause for rejection.

Cracks over 0.25 mm in width in saturated linings, cracks over 300 mm in length or other defective linings shall be made good using compatible materials.

16.7.3.7 Formed ends of linings, when specified by the purchaser in the enquiry and order, shall be made after the spraying and smoothing processes unless formed by the insertion of removable formers or end rings.

16.7.3.8 Lining thickness shall be not less than the minimum thicknesses given in Table 12.

16.7.3.9 Hand finishing of the end of the bore of the pipe, for not more than 100 mm, shall be permitted to rectify the thinning of linings.

16.7.3.10 Fittings shall be centrifugally spray lined to the same requirements as straight pipes or, if this is precluded by their shape, be hand finished and cured so as to achieve comparable results.

Table 12. Thickness of cement mortar lining

Outside diameter of tube or special (mm)	*Minimum thickness of cement mortar (mm)	Tolerance (mm)
Up to and including 323.9	6	+ 2, - 0
355.6 – 610	7	+ 2, - 0
660 – 1219	9	+ 2, - 0
1422 - 2743	12	+ 3, - 0
* Thicker linings may be specified		

16.7.4 Spun cement mortar lining

The lining materials, thicknesses and tests shall comply with the requirements for the centrifugally applied cement mortar lining as specified in 16.7.3. The method of application and the curing of the linings shall comply with the requirements for spun concrete linings as specified in 16.7.1.

16.7.5 Tests on concrete and cement mortar used for lining

Test blocks of the same material as used for the pipe lining shall be made in 100 mm or 150 mm cube moulds and subjected to cube crushing tests. Each block shall be removed from its mould as soon as practicable and cured under conditions of temperature and humidity identical with those in which the lining of the pipe is cured.

The cube strength of the test cube shall be not less than 17N/mm² after 7 days of curing and 31N/mm² after 28 days of curing. The density of the test cube shall be not less than 2300kg/m³ in the case of concrete and 2100 kg/m³ in the case of cement mortar.

Purchaser may specify Option 13 on the number of cube crushing tests required.

Option 13 The number of cube crushing tests required.

16.8 Stop Back of protection at ends

16.8.1 Pipes and fittings supplied with concrete or cement mortar linings which are to be joined together by internal welding shall have the lining stopped back at the ends a distance sufficient to permit welding of the joints without damage to the lining.

16.8.2 Pipes and fittings supplied with bitumen, and linings shall have the external protection stopped back a distance sufficient to permit assembly of the joint. The internal protection shall extend to pipe end.

Pipes and fittings to be joined together by welding shall have the external and internal protection stopped back at the end as follows

(a) *Butt welded joint*. 75mm from the ends of pipes to be welded.

(b) *Sleeve welded joint*. For sleeve and spigot sleeve length plus 75mm

In all cases, priming shall extend to the ends of the pipes.

16.9 Completion of protections at joints

16.9.1 External protection

When material is supplied to make good the joints, or to repair minor damage of sheathed or wrapped pipes and fittings, the material supplied shall be compatible with the factory coating.

The purchaser should state in the enquiry and order his requirements for material to be supplied (Option 14).

Option 14 Material for completing the internal and external protection of joints at site is required.

A sufficient quantity of primer, bitumen based or coal tar based composition, and glass tissue cloth where appropriate, should be supplied with each consignment to cover the joints after laying and to repair minor damage.

16.9.2 Internal protection

When material is supplied to make good the joints, or to repair minor damage of bitumen lined pipes or fittings, the material supplied shall be compatible with the factory coating.

The purchaser should state in the enquiry and order his requirements for material to be supplied (Option 14).

Option 14 Material for completing the internal and external protection of joints at site is required.

A sufficient quantity of lining material should be supplied with each consignment to ensure continuity of the internal protection at joints and to repair minor damage.

16.10 Protection of coated and lined pipes against damage in storage, transport and handling

16.10.1 Coated pipes and fittings shall be protected against damage in storage, transport and handling, e.g. by using straw or wood wool pads.

16.10.2 The ends of all lined pipes and fittings shall be covered to exclude foreign matter during transit and storage.

NOTE. Suitable protection may be in the form of plugs, discs or plastic sheeting.

Appendix A : Electrical test for continuity. (Normative).

A.1 Principle.

Possible faults in the protection are examined for using a high tension scanning electrode.

A.2 Equipment.

A.2.1 Variable voltage detector (Holiday detector).

A.2.2 Scanning electrode, in the form of a metallic brush or a jointed spiral spring or conductive rubber.

A.3 Procedure.

Ensure that the pipe and fittings protection is free from surface moisture. Connect the metal substrate, if possible, to earth.

Check at the time of testing that the spark length from the apparatus is 10mm or twice the minimum specified thickness of the coating, whichever is the greater.

Place the electrode in contact with the surface to be tested. Operate the electrode with a continuous movement at the rate recommended by the manufacturer of the equipment. In the absence of such recommendations, operate the electrode at a rate of approximately 0.2m/s.

When the brush passes over a fault, a spark will be produced between the electrode and the pipe.

Locate the fault.

Acknowledgements

Members of the Working Group on Steel Pipes, Fittings and Joints for Water and Sewage

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TECHNICAL SPECIFICATION

SPAN TS 21827: Part 2: 2013

SPECIFICATION FOR STEEL PIPES, FITTINGS AND JOINTS FOR WATER AND SEWAGE

Part 2 : Tube requirements

SPAN

Suruhanjaya Perkhidmatan Air Negara

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DEVELOPMENT OF SPAN TECHNICAL SPECIFICATION

National Water Services Commission (SPAN) was established in 2008 to regulate the water services industry in Malaysia. SPAN envisions a sustainable, reliable and affordable water services for all by regulating the water services industry through fair, effective and transparent implementation of the Water Services Act (Act 655). Since inception in 2008, SPAN has been striving to institute improvements in term of standards and performance in the country's water and sewerage services sector.

SPAN aims to enhance efforts towards improving standards, quality and operational efficiency of water and sewerage services industry to ensure sustainability. One of the approaches is to achieve higher standards and quality by developing technical specifications for products and systems used in the industry. Hence, Technical Working Groups have been formed by Research, Development and Innovation Division to formulate technical and performance specifications for adoption in water services industry.

This Technical Specification is a result of joint effort by members from various relevant stakeholders of the industry. This series of Technical Specification consists of the following parts, under the general title *Specification for Steel Pipes, Fittings and Joints for Water and Sewage*:

Part 1 : Technical delivery requirements

Part 2 : Tube requirements

The specification provides requirement for seamless and welded carbon steel pipes, fittings and joints in respect of the pipe end preparation, in sizes 60.3mm to 2743mm outside diameter, for the conveyance of water for human consumption and conveyance of sewage. It includes external and internal protection against the corrosive action of the surrounding medium and conveyed fluid.

The continual development of technical and performance specifications is crucial in moving the industry towards higher standards which will uplift the image of local water industry. With the publication of this Technical Specification, it is hoped that it will contribute towards a better quality and performance of Steel Pipes, Fittings and Joints products to ensure its long lasting performance and durability.

Dato' Teo Yen Hua
Chief Executive Officer
National Water Services Commission (SPAN)

Contents

COMMITTEE REPRESENTATION

The System, Product, Material and Research & Development Committee of National Water Services Commission (SPAN) consists of representatives from the following organizations:

Suruhanjaya Perkhidmatan Air Negara (SPAN)

Public Works Department (PWD/JKR)

Ministry of Science, Technology and Innovation (MOSTI)

Jabatan Bekalan Air, KeTTHA (JBA)

Jabatan Perkhidmatan Pembetungan, KeTTHA (JPP)

Department of Standard Malaysia (DSM)

The Working Group of steel pipes, fittings and joints for water and sewage which developed this SPAN Technical Specification consists of representatives from the following organizations:

Suruhanjaya Perkhidmatan Air Negara (SPAN)

Public Works Department (PWD/JKR)

IKRAM QA Services Sdn. Bhd.

SIRIM QAS International Sdn. Bhd.

The Institution of Engineers, Malaysia (IEM)

Association of Consulting Engineers, Malaysia (ACEM)

Malaysian Iron and Steel Industry Federation (MISIF)

Syarikat Bekalan Air Selangor Sdn. Bhd. (SYABAS)

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PPI Industries Sdn. Bhd.

Boon & Cheah Steel Pipes Sdn. Bhd.

FOREWORD

This SPAN Technical Specification was developed by the Working Group of Steel Pipes, Fittings and Joints for Water and Sewage under the authority of System, Product, Material and Research & Development Committee of National Water Services Commission (SPAN).

This specification is adapted and improved from the following standards:-

i)	MS 1968 : 2007	-	Non-Alloy Steel Tubes and Fittings for the Conveyance of Aqueous Liquids Including Water for Human Consumption – Technical Delivery Conditions.
ii)	BS 534 : 1990	-	Steel Pipes, Joints and Specials for Water and Sewage.

Compliance with a SPAN Technical Specification does not of itself confer immunity from legal obligations.

Specification for steel pipes, joints and fittings for water and sewage. Part 2: Tube requirements.

1 Scope

This SPAN Technical Specification specifies requirements for the products listed below used for the conveyance of water for human consumption and sewage:

- seamless and welded non-alloy steel tubes;
- end preparation of tube ends for butt welding.

NOTE This Technical Specification contains informative annex giving guidance on tube sizes relevant to each manufacturing process covered.

This SPAN Technical Specification covers a range of tube outside diameters from 60.3 mm to 2743 mm.

2 Normative references

The following normative references are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the normative reference (including any amendments) applies.

EN 10020, *Definition and classification of grades of steel.*

EN 10021, *General technical delivery requirement for steel and iron products.*

EN 10052, *Vocabulary of heat treatment terms for ferrous products.*

EN 10204, *Metallic products – Types of inspections documents.*

EN 10220, *Seamless and welded steel tubes – Dimensions and masses per unit length,*

BS EN ISO 8492, *Metallic materials – Tubes – Flattening test.*

BS EN ISO 8493, *Metallic materials – Tubes – Drift Expanding Test (ISO 8493:1998).*

EN 10266, *Steel tubes, fittings and structural hollow sections – Definitions and symbols for use in product standards.*

EN 10027-1, *Designation systems for steels – Part 1: Steel names.*

EN 10027-2, *Designation systems for steels – Part 2: Steel numbers.*

EN 10256, *Non-destructive testing of steel tubes – Qualification and competence of level 1 and level 2 non-destructive testing personnel.*

BS EN ISO 9712, *Non-destructive testing. Qualification and certification of NDT personnel.*

EN ISO 377, *Steel and steel products – Location and preparation of samples and test pieces for mechanical testing.*

EN ISO 14284, *Steel and iron – Sampling and preparation of samples for the determination of chemical composition (ISO 14284:1996).*

BS EN ISO 6892-1, *Metallic materials – Tensile testing. Part 1: Method of test at ambient temperature.*

BS EN ISO 5173, *Destructive tests on welds in metallic materials – Bend tests.*

CR 10261, *Iron and steel – Review of available methods for chemical analysis.*

EN ISO 2566-1, Steel – *Conversion of elongation values – Part 1: Carbon and low alloy steels (ISO 2566-1:1984)*.

BS EN ISO 10893-1, *Non-destructive testing of steel tubes. Automated electromagnetic testing of seamless and welded (except submerged arc-welded) steel tubes for the verification of hydraulic leaktightness.*

BS EN ISO 10893-2, *Non-destructive testing of steel tubes. Automated eddy current testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of imperfections.*

BS EN ISO 10893-3, *Non-destructive testing of steel tubes. Automated full peripheral flux leakage testing of seamless and welded (except submerged arc-welded) ferromagnetic steel tubes for the detection of longitudinal and/or transverse imperfections.*

BS EN ISO 10893-6, *Non-destructive testing of steel tubes. Radiographic testing of the weld seam of welded steel tubes for the detection of imperfections.*

BS EN ISO 10893-8, *Non-destructive testing of steel tubes. Automated ultrasonic testing of seamless and welded steel tubes for the detection of laminar imperfections.*

BS EN ISO 10893-10, *Non-destructive testing of steel tubes. Automated full peripheral ultrasonic testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of longitudinal and/or transverse imperfections.*

BS EN ISO 10893-11, *Non-destructive testing of steel tubes. Automated ultrasonic testing of the weld seam of welded steel tubes for the detection of longitudinal and/or transverse imperfections.*

3 Terms, definitions and symbols

3.1 General

For the purposes of this SPAN Technical Specification the terms and definitions given in EN 10020, EN 10021, EN 10052 and EN 10266 (excluding the term tube in EN 10266) and the following apply.

The symbols used in this SPAN Technical Specification are defined in EN 10020, EN 10021, EN 10052 and EN 10266.

Other symbols for sampling and testing are given in the appropriate sampling and testing standards referenced in clauses 9 and 10.

3.2 Tube

A straight conduit for conveyance of fluid, of bare circular cross section, with plain or prepared ends.

3.3 Effective length

Actual length that a tube contributes when correctly assembled in a run of piping.

3.4 Allowable operating pressure (PFA)

Maximum hydrostatic pressure that a component is capable of withstanding continuously in service.

3.5 Employer

Organization for which a person works on a regular basis. The employer may be either the tube manufacturer or a third party organization providing non-destructive testing (NDT) services.

4 Classification and designation

4.1 Classification

All steel covered by this SPAN Technical Specification are classified as non-alloy steels in accordance with EN 10020.

4.2 Designation

4.2.1 For products covered by this SPAN Technical Specification, the steel designation consists of the number of this Technical Specification (SPAN TS 21827 : Part 2) and either the steel name in accordance with EN 10027-1 or the steel number in accordance with EN 10027-2 (see Table 1).

4.2.2 The steel name consist of the following:
- the capital L for line pipe;
- the specified minimum yield strength of the steel for wall thicknesses less than or equal to 16 mm, expressed in MPa [(2)] (see table 3)

5 Information to be supplied by the purchaser

5.1 Mandatory information

The following information shall be supplied by the purchaser at the time of enquiry and order.

(a) the quantity (mass or total length or number);

(b) the term ‘tube’;

(c) the number of this Technical Specification;

(d) the designation (see 4.2);

(e) the dimensions (see 7.6);

(f) the options required (see 5.2)

5.2 Options

A number of options are specified in this SPAN Technical Specification and these are listed below. In the event that the purchaser does not indicate his wish to implement any of these options at the time of enquiry and order, the products shall be supplied in accordance with the basic specification

Option: 1) The type of tube, seamless (S), butt welded (BW), electric welded (EW) or submerged arc weld (SAW) shall be as specified (see 6.3.4.1).

Option: 2) The maximum copper content shall be specified (see 7.2.1).

Option: 3) A product analysis shall be supplied (see 7.2.2).

[(2)] 1 N/mm^2 = 1 MPa

Option: 4) Rectification of the body of submerged arc welded tubes by welding shall not be permitted (see 7.4).

Option: 5) The tubes shall be supplied in approximate lengths (see 7.6.2).

Option: 6) The tubes shall be supplied in exact lengths (see 7.6.2).

Option: 7) The ends of tubes shall be prepared for butt welding. (see 7.8.1).

Option: 8) An alternative bevel end preparation for butt welding shall be provided (see 7.8.4.2).

Option: 9) Product shall be supplied with specific inspection and testing (see 8.1).

Option: 10) An inspection certificate 3.1 or an inspection report 3.2 shall be supplied (see 8.2).

Option: 11) The type of leak tightness test shall be specified (see 10.3.1).

Option: 12) The hydrostatic test shall be carried out at pressure 1.5 x P.F.A (see 10.3.2).

Option: 13) Radiographic test for skelp end welds is required (see 10.4.3.2).

Option: 14) The tubes shall be supplied with a temporary mill protection (see clause 13).

5.3 Examples of an order

Example 1

5 km of submerged arc welded tubes in accordance with SPAN TS 21827 : Part 2 with an outside diameter of 914 mm and a thickness of 10.0 mm made from steel L275 with the preparation of tube ends for butt welding and subjected to specific inspection and testing.

5000 m – tube – SPAN TS 21827: Part 2 – L275 – 914 x 10.0 – Option 1: SAW, 8 and 10.

6 Manufacturing process

6.1 Steel manufacturing process

The steel manufacturing process is at the discretion of the tube manufacturer.

6.2 Deoxidation process

The steel shall be fully killed.

6.3 Product manufacture and delivery conditions

6.3.1 General

The NDT activities shall be in accordance with 6.3.2 for Electric Welded and Butt Welded tube and 6.3.3 for Submerged Arc Welded tube.

6.3.2 Electric Welded and Butt Welded tube.

The NDT activities shall be carried out by competent personnel who have undergone sufficient training. A Certificate or any form of training record of the competent personnel shall be produced by the employer to prove competency.

The operating authorization issued by the employer shall be in accordance with a written procedure.

6.3.3 Submerged arc welded tube (SAW).

The NDT activities shall be carried out by qualified and competent level 1, level 2 and / or level 3 NDT personnel authorized to operate by the employer.

Qualification shall be in accordance with EN 10256 or, at least an equivalent to it.

NOTE 1 It is recommended that level 3 personnel are certified in accordance with BS EN ISO 9712, or, at least, an equivalent to it.

The operating authorization issued by the employer shall be in accordance with a written procedure.

NDT operations shall be authorized by a level 3 individual approved by the employer.

NOTE 2 The definitions of level 1, 2 and 3 can be found in appropriate standards e.g. BS EN ISO 9712 or EN 10256.

6.3.4 Tube

6.3.4.1 Tube shall be manufactured from one of the steel specified in Table 1 by one of the following processes.

(a) Seamless (S);

(b) Butt welded (BW);

(c) Electric welded (EW);

(d) Submerged arc weld (SAW);

The welds of butt welded tube shall be longitudinal; the welds of electric welded and submerged arc welded tubes shall be either longitudinal or helical.

The tube manufacturing process is at the discretion of the manufacturer unless the type of tube, seamless or welded, is specified by purchaser (option 1).

Option 1 The type of tube, seamless (S), butt welded (BW), electric welded (EW) or submerged arc weld (SAW) shall be as specified.

NOTE The manufacturing process is related to the tube diameter and thickness. Information on the typical range of sizes and thicknesses available for each process is given in annex A.

6.3.4.2 The tubes shall be supplied as welded, cold formed or cold finished at the discretion of the manufacturer.

6.3.4.3 The delivered tubes shall not include welds used for joining together lengths of the hot or cold rolled strip prior to forming except as specified in 6.3.4.4.

6.3.4.4 For helically welded submerged arc welded tubes the weld joining lengths of strip may be part of the delivered tube provided that the weld is made by the same method of welding as the helical seam weld.

7 Requirements

7.1 General

Tubes when inspected and tested in accordance with clause 9 and 10, shall comply with the requirements of 7.2 to 7.8 as appropriate. In addition to the requirements of this SPAN Technical Specification the general technical delivery conditions specified in EN 10021 apply.

7.2 Chemical composition

7.2.1 Cast analysis

The cast analysis of the steel shall comply with the requirements of Table 1.

Table 1 – Chemical composition limits of the cast analysis

Steel grade		C%	Si%	Mn%	P%	S%
Steel name	Steel number	max	max	max	max	max
L235	0252	0.16	0.35	1.20	0.030	0.025
L275	0260	0.20	0.40	1.40	0.030	0.025
L355[a]	0419	0.22	0.55	1.60	0.030	0.025

[a] For steel L355 addition of niobium, titanium and vanadium are permitted at the discretion of the manufacturer. In this case the inspection documents shall state the level of these elements.

Elements not included in Table 1 may be present but shall not be intentionally added to the steel without the agreement of the purchaser, except for elements which may be added for finishing the cast. All appropriate measures shall be taken by the steelmaker to prevent the addition of undesirable elements from scrap or other materials used in steelmaking process.

A maximum copper content lower than that permitted by EN 10020 may be specified by the purchaser to facilitate subsequent forming operations.

Option 2 The maximum copper content is specified lower than that permitted by EN 10020 for non alloy steel.

7.2.2 Product analysis

For products supplied with specific inspection and testing, and when specified by purchaser, a product analysis shall be provided for each grade of steel supplied.

Option 3 A Product analysis shall be provided for each grade of steel supplied.

Table 2 specifies the permissible deviations of the product analysis from the specified limits for cast analysis given in Table 1.

Table 2 – Permissible deviation of the product analysis from the specified cast analysis limits given in Table 1

Element	Limiting values %	Permissible deviation %
C	≤ 0.20	+ 0.02
	> 0.20	+ 0.03
Si	≤ 0.55	+ 0.05
Mn	≤ 1.60	+ 0.10
P	≤ 0.030	+ 0.005
S	≤ 0.025	+ 0.005
Cu	≤ 0.35	+ 0.05
	> 0.35	+ 0.07

NOTE When welding tubes produced according to this SPAN Technical Specification account should be taken of the fact that the behaviour of the steel during and after welding is dependent not only on the steel, but also on the conditions of preparing for and carrying out the welding.

7.3 Mechanical properties

7.3.1 Tensile test

The minimum yield strength, tensile strength range and minimum elongation for the tubes covered by this SPAN Technical Specification shall be accordance with Table 3.

NOTE The tensile test properties may be affected by subsequent heating or reheat treatments. Purchasers who intend to heat or reheat treat any of the products are advised to discuss the application and proposed heating or reheat treatment with the manufacturer.

Table 3 – Mechanical properties at room temperatures

Steel name	Tensile strength R_m MPa	Minimum yield strength R_e [a] MPa for thickness in mm		Minimum elongation A% (L_o =5.65 $\sqrt{S_o}$)		Diameter of mandrel for the weld bend test	For the drift expanding test[c] % increase in d/D[d] ratio	
		T ≤ 16	T > 16	l[b]	t[b]		≤ 0.8	> 0.8
L235	360 to 500	235	225	25	23	3T	10	12
L275	410 to 560	275	265	21	19	4T	8	10
L355	500 to 650	355	345	21	19	4T	6	8

[a] Re shall be R_{eH} or if yield phenomenon is not present $R_{p0.2}$ or $R_{t0.5}$ (*See Tensile Test*)

[b] l ~ longitudinal
t ~ transverse

[c] Applicable only to tubes of diameter less than or equal to 150 mm and thickness less than or equal to 10 mm

[d] d = D - 2T

7.3.2 Flattening test

Except as permitted by 7.3.3 BW and EW tubes shall pass a flattening test in accordance with 10.2.2. No cracks or imperfections shall be permitted in the metal or in the weld except that cracks originating at the edges of the test piece which are less than 6 mm long and which do not penetrate through the wall shall not be cause for rejection.

7.3.3 Drift expanding test

The drift expanding test may replace the flattening test for tubes up to and including 150 mm diameter and 10 mm thickness at the discretion of the manufacturer.

BW and EW tubes shall pass a drift expanding test in accordance with 10.2.3. No cracks or imperfections shall be permitted in the metal or in the weld, except that slight incipient cracking at the edges of the test piece shall not be cause for rejection.

7.3.4 Weld bend test

7.3.4.1 The weld of submerged arc welded tubes shall pass a weld bend test in accordance with 10.2.4 on the root and face of the weld using a mandrel of diameter specified in Table 3. No cracks or imperfections shall be permitted in the weld metal, fusion line, heat affected zone or parent metal, except as permitted in 7.3.4.2.

7.3.4.2 The opening out of an imperfection due to incomplete root penetration or lack of fusion shall not be cause for rejection, provided that the imperfection has sound metal at the back and on each side of it. Cracks originating at the edges of the test piece which are less than 6 mm long and which do not penetrate through the wall shall not be cause for rejection.

7.4 Appearance

Tubes shall be free from external and internal surface defects which can be established by visual inspection in accordance with this SPAN Technical Specification.

The outside surface condition, and where practicable, the inside surface condition shall be such that surface defects, and/or surface imperfections requiring rectification, can be identified.

It shall be permissible to rectify surface imperfections by grinding or machining provided that after so doing the wall thickness in the rectified area is not less than the specified minimum thickness. All ground or machined areas shall blend smoothly into the contour of the tube.

Surface imperfections which encroach on the minimum permissible wall thickness shall be considered defects and shall not be permitted. Rectification on such defects in SAW tubes by grinding or machining followed by welding shall be permitted on the body of SAW tubes unless option (4) is specified by the purchaser.

Option 4 Rectification of the body of SAW tubes by welding shall not be permitted

Rectifying on the weld seam of BW and EW tubes is not permitted. Rectification of the seam weld of SAW tubes in accordance with an established procedure shall be permitted. The rectified tube shall be tested in accordance with 10.3 and 10.4 as appropriate.

7.5 Soundness

7.5.1 General

Tubes shall meet the requirements for soundness and freedom from internal imperfections specified in 7.5.2 and 7.5.3.

7.5.2 Leak Tightness

All tubes shall be leak tight. Leak tightness shall be demonstrated either by a hydrostatic test in accordance with 10.3.2 or by an electromagnetic test in accordance with 10.3.3.

NOTE SAW tubes are tested in accordance with 10.3.2.

7.5.3 Soundness of Welds

The welds of all tubes shall be shown to be sound when tested in accordance with the requirement of 10.4.

7.6 Dimensions of tubes

7.6.1 Outside diameter and thickness

The outside diameters and thicknesses of tubes appropriate to this SPAN Technical Specification are given in Table 4. With the exception of tubes of 2642 mm and 2743 mm diameter, they are in accordance with EN 10220.

NOTE 1 The relationship between nominal outside diameter (OD) and nominal size (DN) is shown in Table 4.

NOTE 2 Other diameters and/or thicknesses may be available by agreement with the manufacturer.

Table 4 - Tube outside diameter and thickness

DN	OD mm	Nominal Pipe Thickness mm
50	60.3	2.9
65	76.1	3.2
80	88.9	3.2
100	114.3	3.6
125	139.7	3.6
150	168.3	3.6
200	219.1	4.0
250	273	4.0
300	323.9	4.0
350	355.6	4.5
400	406.4	4.5
450	457	5.0
500	508	5.0
600	610	6.3
650	660	6.3
700	711	6.3
750	762	6.3
800	813	7.1
850	864	7.1
900	914	8.0
1000	1016	8.0
1200	1219	10.0
1400	1422	10.0
1600	1626	11.0
1800	1829	12.5
2000	2032	14.2
2200	2235	16.0
2300	2337	16.0
2400	2438	16.0
2500	2540	17.5
2600	2642	17.5
2700	2743	17.5

NOTE The purchaser may specify nominal thickness thicker than the thickness specified in Table 4 and subjected to the tolerance requirement in accordance with Clause 7.7

7.6.2 Length

Tubes shall be supplied in random lengths in accordance with Table 5 unless otherwise specified by the purchaser.

NOTE 1 The range of lengths depends upon the tube manufacturing process.

The purchaser may specify the delivery length either as an approximate length within the range 6 m to 16 m (see option 5) as an exact length (see option 6).

NOTE 2 Approximate lengths and exact lengths differ in the tolerance on the length (see 7.7.6).

Option 5 The tubes shall be supplied in approximate lengths. The length within the range 6m to 16m shall be specified by purchaser.

Option 6 The tubes shall be supplied in exact lengths. The length shall be specified by the purchaser.

Table 5 – Random lengths – specified length ranges and minimum average length

Specified lengths range m	Minimum average length in 100% of order item m
3 – 8	6
4 – 12	8
5.5 – 14	11
6.5 – 16.5	13
7.5 – 18	14.5

7.7 Tolerances for tubes

7.7.1 General

Except as specified in 7.8, the tolerances on the diameter and out of roundness of tubes shall not exceed the values specified in 7.7.2 and 7.7.3 for the appropriate method of manufacturer.

7.7.2 Outside diameter

Except specified in 7.8.1, the tolerances on outside diameter shall be as given in 7.7.2.1, 7.7.2.2 and 7.7.2.3.

7.7.2.1 Seamless tube

The tolerance on outside diameter shall not exceed ± 1 % of the diameter with a minimum of ± 0.5 mm.

7.7.2.2 Electric welded and butt welded tube

The tolerance on outside diameter shall not exceed the values given in Table 6.

Table 6 – Tolerance on the outside diameter for EW and BW tubes

Outside diameter (mm)	Tolerance
≤ 219.1	± 1% of diameter with a minimum of ± 0.5 mm
> 219.1	± 0.75% of diameter

7.7.2.3 Submerged arc welded tubes

The tolerance on the outside diameter shall not exceed ± 0.75% of diameter with a maximum of ±6 mm for diameters up to and including 2032 mm. For tube of diameter greater than 2032 mm the tolerance shall be agreed between the purchaser and the manufacturer.

7.7.3 Out of roundness

For tubes with a ratio of outside diameter to thickness (D/T) less than or equal to 100, the out of roundness, calculated in accordance with the following equation, shall not exceed 2%.

$$\text{Out of roundness (O)} = 100\frac{(D_{max} - D_{min})}{D}$$

where

D_{max} is the maximum outside diameter (mm) and D_{min} is the minimum outside diameter (mm) measured in the same plane.

For tubes with D/T greater than 100 a maximum for the out of roundness shall be agreed between the purchaser and the manufacturer.

7.7.4 Wall thickness

The tolerance on thickness shall not exceed the values given in 7.7.4.1, 7.7.4.2, or 7.7.4.3 for the corresponding method of manufacture.

7.7.4.1 Seamless tubes

The tolerance on thickness shall not exceed the values give in Table 7.

Table 7 – Tolerance on thickness for seamless tubes

Outside diameter mm	Tolerance on thickness for T/D ratio (%)			
	≤ 2.5	> 2.5 ≤ 5.0	> 5.0 ≤ 10.0	> 10.0
≤ 219.1	± 12.5 % or ± 0.4 mm whichever is the greater			
> 219.1	± 20%	± 15 %	± 12.5 %	± 10 %

7.7.4.2 Electric welded and butt welded tubes

The tolerances on thickness excluding the weld area shall not exceed +10%, -0%.

The minimum thickness in the area of the weld shall be not less than that permitted for the body of the tube.

The external weld bead of electric welded tube shall be removed by trimming and that of butt welded tube shall be rolled flush.

The height of the internal weld bead shall not exceed 1.5mm.

7.7.4.3 Submerged arc welded tubes

The tolerance on thickness excluding the weld bead shall not exceed +7.5%, -0%.

The height of the internal and external weld bead shall not be greater than the values given in Table 8.

Table 8 – Maximum height of weld bead for submerged arc welded tubes

Thickness mm	Maximum bead height mm
≤ 12.5	3.5
> 12.5	4.5

7.7.5 Tube ends

Tubes shall be supplied with plain ends cut nominally square to the axis of the tube unless the purchaser specifies end preparation for butt welding in accordance with 7.8. The ends shall be free of excessive burrs.

NOTE Information on the end preparation for jointing other than butt welding is given in SPAN TS 21827 : Part 1 and may be agreed between the purchaser and the manufacturer.

7.7.6 Length

7.7.6.1 Approximate length

The lengths supplied shall not deviate from the specified length by more than ± 500 mm.

7.7.6.2 Exact length

The lengths supplied shall not deviate from the specified length by more than the value given in Table 9.

Table 9 – Tolerance for exact length

Length L mm	Tolerance of length	
	Tube outside diameter	
	< 406.4 mm	≥ 406.4 mm
2000 < L ≤ 6000	+15, -0 mm	+25, -0 mm
6000 < L ≤ 12000	+30, -0 mm	+50, -0 mm
L > 12000	+ by agreement, -0 mm	

7.7.7 Straightness

The tubes shall not deviate from straightness by more than 0.2% of the total length measured at the centre of the tube length.

7.8 End preparation of tubes

7.8.1 General

The purchaser may specify that the ends of tubes shall be prepared for butt welding in accordance with 7.8.2 to 7.8.4.

Option 7 The ends of tubes shall be prepared for butt welding.

7.8.2 Diameter tolerance at tube ends

The tolerance on the outside diameter of the tubes for a distance of 100 mm from each end shall be in accordance with Table 10. Out of roundness shall be within the limits for the diameter tolerance for tubes with D/T less than or equal to 100. For D/T values above 100 the out of roundness shall be agreed between the purchaser and the manufacturer.

Table 10 – End tolerance on diameter (D)

Outside diameter mm	End tolerance
≤ 219.1	± 0.5 mm or ± 0.5% whichever the greater
219.1 < D ≤ 2032	± 1.6 mm
> 2032	± 3 mm

7.8.3 Squareness of ends

The ends of tubes shall be at right angles to the axis of the tube within 1.6 mm measured across the diameter as shown in Figure 1.

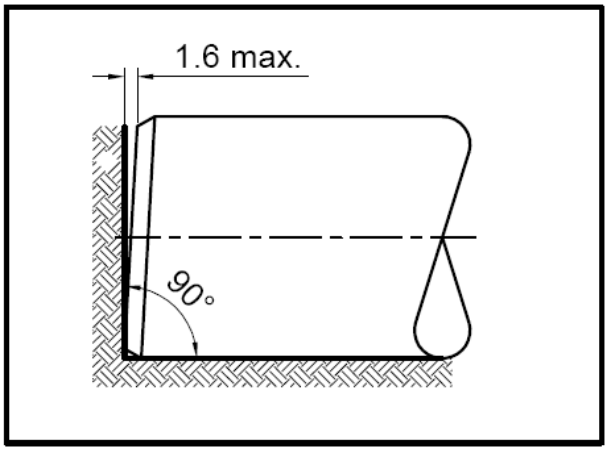


Figure 1 – Squareness of ends for tube

7.8.4 Bevelled ends

7.8.4.1 The ends of tubes of thickness less than 3.2 mm shall be supplied without bevelled ends.

7.8.4.2 Tubes of thickness equal to or greater than 3.2 mm shall be supplied with ends bevelled as shown in Figure 2 unless Option 8 is specified by the purchaser.

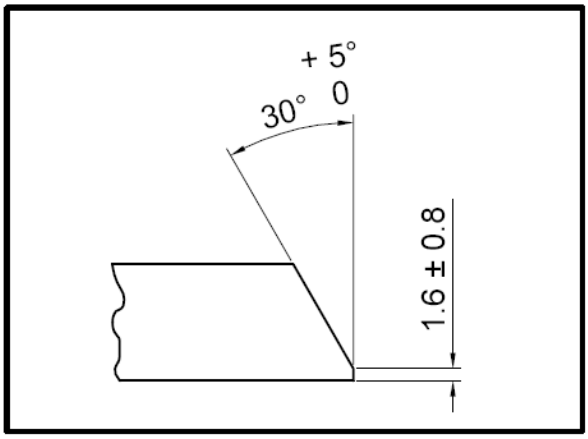


Figure 2 – Butt-weld end preparation

Option 8 An alternative bevel end preparation for butt welding shall be provided; the purchaser shall specify the type of preparation required.

8 Inspection

8.1 General

Compliance with the requirements of this SPAN Technical Specification shall be checked by non-specific inspection and testing (see EN 10021) unless option 9 specified by the purchaser.

Option 9 The products shall be supplied with specific inspection and testing (see EN 10021).

8.2 Inspection documents

When products according to this SPAN Technical Specification are checked by non-specific inspection and testing, a test report type 2.2 in accordance with EN 10204 shall be supplied.

When products according to this SPAN Technical Specification are checked by specific inspection and testing (see option 9), an inspection certificate type 3.1 in accordance with EN 10204 shall be supplied unless option 10 is specified by the purchaser

Option 10 For product checked by specific inspection and testing an inspection certificate type 3.1 or an inspection report type 3.2 in accordance with EN 10204 shall be supplied. The type of document to be supplied shall be specified by the purchaser.

When an inspection document 3.1 or 3.2 is specified the purchaser shall notify the manufacturer of the name and address of the organization or person who is to carry out the inspection and produce the inspection document. In the case of an inspection report 3.2 it shall also be agreed which party is to issue the document.

8.3 Summary of inspection and testing

8.3.1 Tubes

Inspection and testing shall be carried out as summarized in Table 11 for non-specific inspection and testing and in Table 12 for specific inspection and testing.

Table 11– Requirements for non-specific inspection and testing of tubes

Type of test	Seamless tube	Electric welded tube	Submerged arc welded tube	Butt weld tube
Cast analysis	1 representative	1 representative	1 representative	1 representative
Tensile test	Manufacturers procedure	Manufacturers procedure	Manufacturers procedure	Manufacturers procedure
Flattening test [a]	Manufacturers procedure	Manufacturers procedure	-	Manufacturers procedure
Drift expanding test [a]	-	Manufacturers procedure	-	Manufacturers procedure
Weld bend test	-	-	Manufacturers procedure	-
Leak tightness test	All hydrostatic or electro-magnet	All hydrostatic or electro-magnet	All hydrostatic	All hydrostatic or electro-magnet
Visual examination	See 10.5	See 10.5	See 10.5	See 10.5
Dimensional inspection	See 10.6	See 10.6	See 10.6	See 10.6
Non-destructive test of the weld	-	All	See 10.4.3.1 & 10.4.3.2	All

[a] The drift expanding test is an alternative for electric welded and but welded tubes of outside diameter equal to or less than 150 mm and thicknesses less than 10 mm.

Table 12 – Requirements for specific inspection and testing of tubes

Type of test	Seamless tube	Electric welded tube	Submerged arc welded tube	Butt welded tube
Cast analysis	1 per cast	1 per cast	1 per cast	1 per cast
Tensile test	1 per test unit	1 per test unit	1 per test unit	1 per test unit
Flattening test [a]	1 per test unit	1 per test unit	-	1 per test unit
Drift expanding test [a]	-	1 per test unit	-	1 per test unit
Weld bend test	-	-	2 per test unit	-
Leak tightness test	All hydrostatic or electro-magnetic	All hydrostatic or electro-magnetic	All hydrostatic	All hydrostatic or electro-magnetic
Visual examination	10.5	10.5	10.5	10.5
Dimensional inspection	10.6	10.6	10.6	10.6
Non-destructive test of the weld	-	All	See 10.4.3.1 & 10.4.3.2	All
Product analysis (Optional)	One per grade of steel			

[a] The drift expanding test is an alternative for electric welded and but welded tubes of outside diameter equal to or less than 150 mm and thicknesses less than 10 mm.

9 Sampling of tubes

9.1 Frequency of testing

For non-specific inspection and testing, the tests shall be carried out by the manufacturer in accordance with their own procedures (see EN 10021).

For specific inspection and testing, the tests shall be carried out on the products to be supplied or on test units of which the product to be supplied is a part (see EN 10021).

9.1.1 Test unit

When specific inspection and testing is carried out the test unit shall consist of the number of tubes specified in Table 13 of the same type, specified diameter, specified thickness, steel grade and manufactured using the same processing conditions e.g. welding process, heat treatment.

In addition, for fusion welded products, the test unit shall consist of products which have been welded using the same type of flux and filler wire.

Table 13 – Number of tubes in a test unit

Outside diameter mm	Number of tubes
≤ 48.3	1000
> 48.3 ≤ 114.3	400
> 114.3 ≤ 323.9	200
> 323.9	100
NOTE Any residual fraction of a test unit should be considered as a test unit.	

9.1.2 Number of sample products

One sample tube shall be selected for the mechanical test (one per test unit), and where appropriate, the product analysis (one per steel grade).

9.1.3 Type of test and number of tests

See 8.3.

9.2 Location, orientation and preparation of samples and test pieces

9.2.1 General

Samples and test pieces shall be taken from the end of a tube in the final delivery condition in accordance with Figure 3 and EN ISO 377.

9.2.2 Product analysis

Samples for product analysis shall be taken from the test pieces or samples for mechanical testing or from the whole thickness of the tube at the same location as for the mechanical test samples, in accordance with EN ISO 14284.

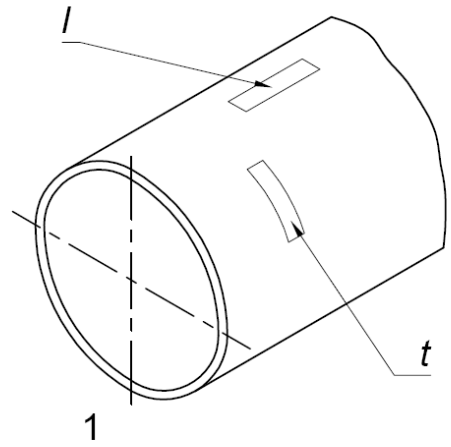
9.2.3 Tensile test

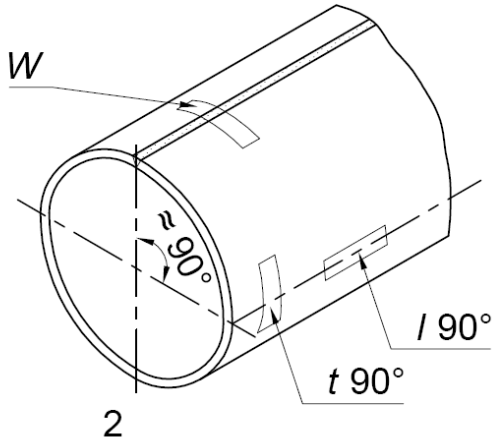
The test piece for the tensile test shall be either a full tube section or a test piece taken from the sample tube in accordance with BS EN ISO 6892-1.

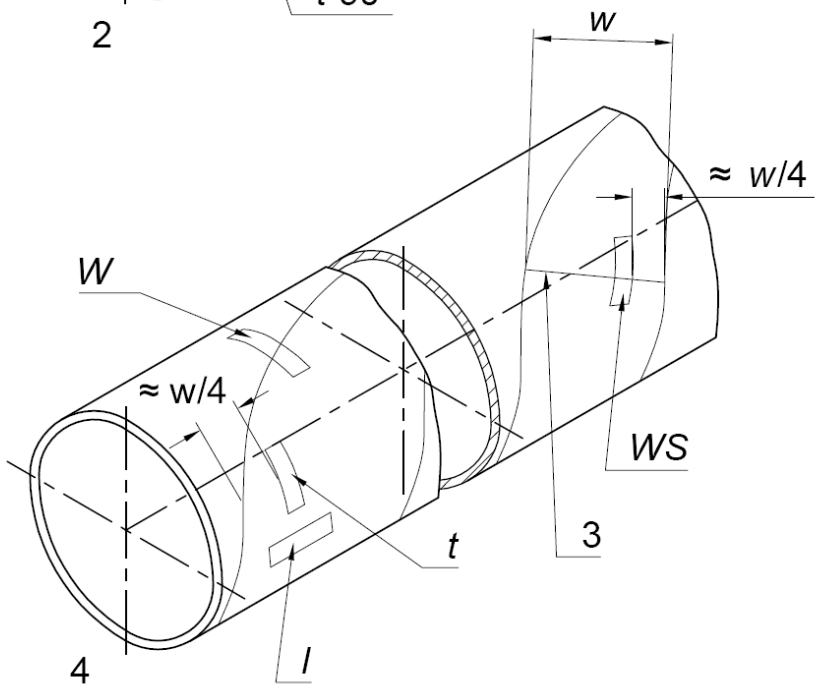
The test piece may be taken either longitudinally or transversely at the discretion of the manufacturer.

9.2.4 Flattening test

The test piece for the flattening test shall consist of a full tube section in accordance with BS EN ISO 8492.







Key

1	Seamless tube
2	Longitudinally welded tubes
3	Strip end weld
4	Helically welded tubes
W	Sample of the weld
WS	Sample of the strip end weld
w	Width of the strip

Figure 3 – Location and direction of test pieces for the tensile and weld bend test

9.2.5 Drift expanding test

The test piece for the drift expanding test shall consist of a full tube section in accordance with BS EN ISO 8493.

9.2.6 Weld bend test

The test piece for the weld bend test shall be in accordance with BS EN ISO 5173.

10 Test method

10.1 Chemical analysis

The elements to be determined shall be those in Table 1. The choice of a suitable physical or chemical analytical method for the analysis shall be at the discretion of the manufacturer. In cases of dispute the method used shall be agreed, taking into account CR 10261.

10.2 Mechanical test

Mechanical test shall be carried out at a temperature between 10˚C and 35˚C.

10.2.1 Tensile test

The tensile test shall be carried out in accordance with BS EN ISO 6892-1 and the following determined:

- tensile strength (R_m);
- upper yield strength (R_{eH});
- if the yield phenomenon is not present, the 0.2% non-proportional extension proof strength ($R_{p0.2}$) or the 0.5% total extension ($R_{t0.5}$) shall be determined. In cases of dispute, the 0.2% proof strength ($R_{p0.2}$) shall apply.
- the percentage elongation after fracture with reference to a gauge length L_o of $5.65\sqrt{S_o}$

If a non-proportional test piece is used, the percentage elongation value shall be converted to the value for a gauge length $L_o = 5.65\sqrt{S_o}$ using the conversion tables given in EN ISO 2566-1.

So is the original cross-sectional are of the gauge length.

10.2.2 Flattening test

The flattening test shall be carried out in accordance with BS EN ISO 8492.

The weld of welded tubes shall be positioned at 90° to the direction of flattening and the test piece shall be flattened until the distance between the platens is not greater than 67% of the original outside diameter.

10.2.3 Drift expanding test

The drift expanding test shall be carried out in accordance with BS EN ISO 8493.

One end of the test piece shall be expanded using a cone with an included angle (β) of 60° until the increase in outside diameter is not less than the appropriate value given in Table 3.

10.2.4 Weld Bend Test

This weld bend test shall be carried out in accordance with BS EN ISO 5173.

The test pieces shall be bent through an angle of 180° around a bar of the diameter specified in Table 3.

10.3 Leak tightness test

10.3.1 General

The tubes shall pass a leak tightness test. The test shall be either a hydrostatic test in accordance with 10.3.2 or an electromagnetic test in accordance with 10.3.3. The choice of test is at the discretion of the manufacturer unless option 11 is specified.

Option 11 The purchaser shall specify the type of leak tightness test, hydrostatic test (see 10.3.2) or electromagnetic test (see 10.3.3).

10.3.2 Hydrostatic test

The tube shall withstand the test without leakage or visible deformation. The hydrostatic test shall be carried out at a test pressure of 70 bar or *P*, calculated from the following equation, whichever is the lower, unless option 12 is specified by the purchaser.

$$P = \frac{20ST}{D}$$

where

P is the test pressure in bar

D is the specified outside diameter (mm)

T is the specified wall thickness (mm)

S is the stress in MPa corresponding to 70% of the specified minimum yield strength (see Table 3) for the type of steel concerned.

NOTE This hydrostatic leak tightness test is not a strength test.

Option 12 The hydrostatic leak tightness test shall be carried out at 1.5 x PFA (allowable operating pressure) provided that this value is not greater than *P* as calculated from the above equation.

10.3.3 Electromagnetic test

When an electromagnetic test for leak tightness is carried out the tubes shall be tested in accordance with BS EN ISO 10893-1.

10.4 Non-destructive test of the seam weld of welded tubes

10.4.1 General

The non-destructive test of the seam weld of welded tube shall be carried out in accordance with 10.4.2 for electric welded or butt welded tube and 10.4.3 for submerged arc welded tube.

10.4.2 Electric Welded tube and Butt Welded tube

The test shall be carried out using ultrasonic or eddy current in accordance with BS EN ISO 10893-2, BS EN ISO 10893-3, BS EN ISO 10893-10 or BS EN ISO 10893-11 to acceptance level 4 for the continuous examination of the weld area.

The test method is at the discretion of the manufacturer.

10.4.3 Submerged arc welded tubes

10.4.3.1 Radiographic test for the weld seam.

The radiographic test in accordance with BS EN ISO 10893-6, image quality R2 or any other type of suitable non-destructive test shall be undertaken on at least 2% of all welds on each tube.

10.4.3.2 Radiographic test for skelp end welds.

If is specified by the purchaser, the skelp end welds for helically welded tube shall be tested using the radiographic test method in accordance with BS EN ISO 10893-6, image quality R2.

Option 13 Radiographic test for skelp end welds is required.

10.5 Visual examination

Tubes shall be visually examined for compliance with the requirement of 7.4.

10.6 Dimensional inspection

Tubes shall be inspected for compliance with the requirements of 7.6, 7.7 and where specified in 7.8. A gauge is normally used for measurement of outside diameter.

However, for tubes with outside diameter equal or greater than 406.4 mm a circumference tape may be used.

11 Retest, sorting and reprocessing

For retest, sorting and reprocessing the condition of EN 10021 shall apply.

12 Marking

12.1 Each tube shall be legibly marked by stencilling or other indelible marking with the following information in the sequence indicated:

(a) the manufacturer's name or identification mark;

(b) the number of this SPAN Technical Specification (SPAN TS 21827: Part 2);

(c) the steel name (see 4.2.2);

(d) the dimensions (see 7.6);

(e) the certification mark of certification body;

(f) in the case of specific inspection and testing;

- an identification number (e.g. order or item number) which permits the correlation of the product or delivery unit with the related inspection document;
- the mark of the inspection representative when specific inspection is required

(g) when the type of tube, seamless (S), butt welded (BW), electric welded (EW) or submerged arc weld (SAW) is specified (see 6.3.4.1, Option 1) the letter representing the type of tube, as appropriate.

Marking on the tube shall commence not more than 300 mm from one end.

12.2 For tubes that are bundled, the information given in 12.1, shall be either stamped on one or more metal or other durable tags, or printed on banding clips or straps, which shall be securely attached to each bundle. Not more than one steel grade shall be included in any one bundle.

13 Protective coating or lining

The tubes shall be supplied bare unless Option 14 is specified at the time of enquiry and order.

Option 14 The tubes shall be supplied with a temporary mill protection.

Annex A : Size range of tube manufacturing processes
(Informative)

Table A.1 gives an indication of the range of sizes and thicknesses of tube generally available from the manufacturing processes covered by this SPAN Technical Specification. Sizes and thicknesses outside the indicated range may also be available.

Table A.1 – Tube sizes generally available from manufacturing processes covered by this SPAN Technical Specification

Dimensions in millimetres

Manufacturing process	Outside diameter range	Thickness Range
Seamless (S)	60.3 – 711	2.0 – 100
Butt Welded (BW)	60.3 – 114.3	2.0 – 6.3
Electric Welded (EW)	60.3 – 610	1.4 – 16
Submerged Arc Welded (SAW)	168.3 – 2743	6.3 – 50

Acknowledgements

Members of the Working Group on Steel Pipes, Fittings and Joints for Water and Sewage

En. Marzuki bin Mohammad / Pn. Nurhayati Azian bt. Noh (Chairman)	Suruhanjaya Perkhidmatan Air Negara
Pn. Siti Aisah Md Lasim / Pn. Yee Li Ping (Secretariat)	Suruhanjaya Perkhidmatan Air Negara
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Mr. Teo Chuen Kloon	Boon & Cheah Steel Pipes Sdn. Bhd.
Hj. Rosmizam Alias	PPI Industries Sdn. Bhd.

BAHAGIAN H

RINGKASAN TAWARAN DAN SENARAI KUANTITI

SYARIKAT AIR MELAKA BERHAD

CADANGAN MEMBEKAL DAN MEMASANG PAIP 200MM, 150MM DIAMETER KELULI LEMBUT DARI IKS DUYONG HINGGA KE JAMBATAN DUYONG SERTA LAIN-LAIN KERJA YANG BERKAITAN DI DAERAH MELAKA TENGAH, MELAKA

GRAND SUMMARY

NO	DESCRIPTION	PART	PAGE NO.	AMOUNT (RM)
1	GENERAL AND PRELIMINARIES	A	4	
2	PIPELINES	B	13	
3	MISCELLANEOUS WORKS	C	5	
4	TAPPING WORKS	D	4	
5	SUPPLY PIPE AND FITTINGS	E	6	
6	PROVISIONAL SUM	F	1	40,000.00
	TOTAL AMOUNT CARRIED TO FORM OF TENDER (AMOUNT INCLUSIVE OF SST)			

RINGGIT MALAYSIA : _____

_____

COMPLETION PERIOD = 7 MONTHS

_____
(Signature of Tenderer)
Name :
Designation:
I/C No :
Date :

_____
(Signature of Witness)
Name :
Designation:
I/C No :
Date :

Company Stamp:

SYARIKAT AIR MELAKA BERHAD

CADANGAN MEMBEKAL DAN MEMASANG PAIP 200MM, 150MM DIAMETER KELULI LEMBUT DARI IKS DUYONG HINGGA KE JAMBATAN DUYONG SERTA LAIN-LAIN KERJA YANG BERKAITAN DI DAERAH MELAKA TENGAH, MELAKA

PART A - GENERAL AND PRELIMINARIES

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
A.1	Provide Performance Bond.	Lump Sum			
A.2	Provide Insurance of the works and public liability.	Lump Sum			
A.3	Provide Workmen's Compensation insurance.	Lump Sum			
A.4	Allow cost for SOCSO.	Lump Sum			
A.5	Mobilisation and demobilisation of plant and workmen.	Lump Sum			
A.6	Provide temporary suitable areas to be used as pipe dumps close to the pipeline route.	Lump Sum			
A.7	Provide and maintain all apparatus and flagmen required for adequate traffic control including warning signs signals, barricades, road barriers and blinking lamps as specified and to the approval JKR Specifications For Occupational Safety And Health (OSHA) For Engineering Construction Works and temporary road diversion and maintenance to relevant authorities.	Lump Sum			
A.8	Provide qualified Site Safety & Health Supervisor (SSS) to the satisfacation of the S.O for the entire duration of the construction period to be stationed minimum 15 hours a week at the site. <u>Traffic Management and Control</u> Traffic Management and Control shall be carried out in accordance with the Project Specifications and the requirements and approvals of the relevant authorities.	Lump Sum			
A.9	The Contractor shall provide a Traffic Management Plan (TMP), including traffic impact study, preparation of the TMP, Traffic management Team, submission of reports, and all related requirements.	Lump Sum			
A.10	Allow for clearing up sites during the progress and upon completion including making good all affected works.	Lump Sum			
	Page Total To Bill Summary				

PART A - GENERAL AND PRELIMINARIES

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
A.11	Allow for all necessary precautions and provide all necessary protection, so as not damage any existing utilities and services and to carry out temporary relocation works including reinstatement work, if required.	Lump Sum			
A.12	Allow for all temporary works for pipe laying in high water table and water logged area for all works to be kept clear of water.	Lump Sum			
A.13	Allow for cleaning of public roads including traces of constructional plants, tractors, etc. with pressurised water hose.	Lump Sum			
A.14	Allow for cost incurred to provide steel plate of suitable thickness to cover all in filled trenches on road after working hours daily.	Lump Sum			
A.15	Provide, install, maintain approved project sign boards and including removal after completion of the contract.	Nos	2		
A.16	Provide a Licensed Surveyor to carry out survey works on alignment of overall pipeline route and longitudinal profile to show detail level boundaries, chainage, dimensions, reference points, bench mark and all other features as required.	Lump Sum			
A.17	Allow for the preparation and submission of As-Built Drawing in form of hardcopy and softcopy (Autocad & shp file) for all pipelines laid under these works in GPS format with co-ordinates X, Y,Z for all bends, tees, valves, pillar hydrant, s-bend, etc. to be endorsed by a Licensed Surveyor and to comply with SAMB's. Submission must consist of cover page, detail drawing, overall drawing and longitudinal profile. Each item must in saparate folder. Autocad and GIS format within 90 day after CPC issuance. i. 3 set of flash drive. ii. 3 set of A3 size paper with hard cover binding to S.O.	Lump Sum			
	Page Total To Bill Summary				

PART A - GENERAL AND PRELIMINARIES

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
A.18	Allow for all necessary machineries, apparatus and other required including trial holes/pit for prospecting and locating public utilities and other services such as existing water mains, electrical and telephone cables, support and protect such services and repair damages caused by the Contractor's Works.	Lump Sum			
A.19	Prepare and provide monthly progress report, one set of soft copy and six (6) prints progress colour photographs and allow for provision of monthly claim form for the entire duration of the contract period.	Lump Sum			
A.20	Allow cost for complying with a Health, Safety and Security requirements.	Lump Sum			
A. 21	Allow cost for complying with Lembaga Pembangunan Industri Pembinaan Malaysia (CIDB) Act 1994 and The Construction Industry (Levy Collection) Regulations 1996 at 0.125% of the contract value.	Lump Sum			
	Page Total To Bill Summary				

SYARIKAT AIR MELAKA BERHAD

CADANGAN MEMBEKAL DAN MEMASANG PAIP 200MM, 150MM DIAMETER KELULI LEMBUT DARI IKS DUYONG HINGGA KE JAMBATAN DUYONG SERTA LAIN-LAIN KERJA YANG BERKAITAN DI DAERAH MELAKA TENGAH, MELAKA

PART A - GENERAL AND PRELIMINARIES

ITEM	PAGE NO	AMOUNT (RM)
	BILL SUMMARY Page 1 Page 2 Page 3	
	Total Carried To Grand Summary	

SYARIKAT AIR MELAKA BERHAD

CADANGAN MEMBEKAL DAN MEMASANG PAIP 200MM, 150MM DIAMETER KELULI LEMBUT DARI IKS DUYONG HINGGA KE JAMBATAN DUYONG SERTA LAIN-LAIN KERJA YANG BERKAITAN DI DAERAH MELAKA TENGAH, MELAKA

PART B - PIPELINES

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	All Quantities In Bills Of Quantities For All Items Are Provisional Quantities **PIPELINE AND ASSOCIATED WORKS** **NOTES:-** This notes shall be read together with specification and other requirement in this contract and the rates that indicated herein shall be complied and completed accordingly and shall be bound with the method of measurement for the interim payment unless otherwise stated. Trench Excavation a. Excavate in all materials in tracks, footpaths, road verges, road and drain reserves, metalled roads, plantations, swamps, wastelands, earth bunds, rains and water courses including refilling of trenches, compaction as specified, disposal of surplus material and restoration of surfaces. b. All trench excavation shall be measured once only to the full depth of trench. c. Rate include trench excavation in metalled road. d. The rate for trench excavation shall include for all piloting and prospecting for existing pipes and services as specified and provide Surveyor for data collection on all features installed (X,Y and Z, (mean sea level)) levelling and alignment during trench excavation issuance of progressively As-Built Drawing, endorsement of the drawing by Licensed Land Surveyor as accordance to Item 1.34 - Specification. Excavate trenches commencing from ground level, get out and part return, disposal of surplus material and restoration of surfaces all as specified in accordance to the note, Item 2.0 - Specification.				
	Page Total To Bill Summary				

SYARIKAT AIR MELAKA BERHAD

CADANGAN MEMBEKAL DAN MEMASANG PAIP 200MM, 150MM DIAMETER KELULI LEMBUT DARI IKS DUYONG HINGGA KE JAMBATAN DUYONG SERTA LAIN-LAIN KERJA YANG BERKAITAN DI DAERAH MELAKA TENGAH, MELAKA

PART B - PIPELINES

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
B.1	For 200mm nominal diameter spigot and socket wrapped (SSW) mild steel pipes.	M	1500		
B.2	For 150mm nominal diameter spigot and socket wrapped (SSW) mild steel pipes.	M	800		
B.3	For 200mm nominal diameter plain ended mild steel pipes.	M	12		
B.4	For 150mm nominal diameter plain ended mild steel pipes.	M	60		
B.5	For 100mm nominal diameter plain ended mild steel pipes.	M	12		
B.6	Extra over for cutting metalled road including welding pits. The rate shall include cutting of one or both side of the metalled road using approved pavement / diamond cutter as specified.	M	2300		
B.7	Extra over for trench excavation under existing concrete drain including making good all affected works and reinstatement to original condition, as directed by the S.O	M	100		
B.8	Extra over for trench excavation under existing road kerb, gabion including making good all affected works and reinstatement to original, condition, as directed by the S.O	M	100		
B.9	Extra over for trench excavation under existing guardrail including making good all affected works and reinstatement to original condition, as directed by the S.O	M	100		
B.10	Extra over for trench excavation under existing pedestrian walkway including making good all affected works and reinstatement to original condition, as directed by the S.O	M	100		
B.11	Additional excavation outside and below normal limits of trench excavation for valve and thrust blocks, welding pits, sand bedding and valves chamber.	M3	100		
B.12	Extra over for trench excavation in items for pipes in rocks. Rate to include for over break.	M3	5		
	Page Total To Bill Summary				

SYARIKAT AIR MELAKA BERHAD

CADANGAN MEMBEKAL DAN MEMASANG PAIP 200MM, 150MM DIAMETER KELULI LEMBUT DARI IKS DUYONG HINGGA KE JAMBATAN DUYONG SERTA LAIN-LAIN KERJA YANG BERKAITAN DI DAERAH MELAKA TENGAH, MELAKA

PART B - PIPELINES

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	PIPE LAYING WORKS NOTES:- a. The rates for pipe laying works shall include of loading and unloading of pipes to Contractors store/pipe dumps or on site of pipes, specials, joints and fittings and laying in position including provide Surveyor for data collection on all features installed (X,Y and Z (mean sea level)), levelling and alignment during laying pipe works, issuance of progressively As- Built Drawing, endorsement of the drawing by Licensed Land Surveyor as accordance to Item 1.34 - Specification. b. The method of measurement for the payment the pipe laying shall inclusive of loading and unloading of pipes, collecting from store/pipe dumps or on site of pipes, transporting, hauling, handling, repairing linings, sheathing and paintwork where required, laying in position ready for jointing, provide Surveyor for data collection on all the features installed (X,Y and Z (mean sea level)), levelling and alignment during trench excavation and laying pipes works, issuance of progressively As-Built Drawing, endorsement of the drawing by Authorized License Surveyor building in and painting as specified steel pipes, specials, joints and fittings. The propotionate work done payments for pipe laying shall 70% upon complete of pipe laying works and 100% upon the As-Built Drawing Endorsed by Licensed as accordance to the item 1.34 - Specification. **PIPEWORK LAYING UNDERGROUND** Mild Steel Pipe Notes: Unless otherwise stated:- a. Rate only for contractor to lay and install the pipe including welding works for jointing. b. Rate also include collecting and transporting the pipe from store/ pipe dumps site to Contractor's store or dumps on site including maintaining and transporting the surplus and c. Rate to include for modification works to the existing pipeworks system as instructed by the S.O.				
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PART B - PIPELINES

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	d. All mild steel pipes and specials will be coated and wrapped externally at pipe joints for with denso petrolatum tapes and as approved by S.O. for laying underground and painted with two coates of zinc chromate at the place of manufacture for laying above ground. e. All mild steel pipes and specials shall be concrete lined internally and bitumen coated externally. f. All flange shall be suitable to a rating of 16 bars in accordance with details as shown in the Drawings. g. The thickness of steel shells and concrete lining shall be as stated in the Specification. h. All spigot and socket ended mild steel pipes with 650mm ND and below shall be suitable for externally welded slips joints. i. The thickness of the collar shall be 1.5mm more than the thickness of the two adjoining pipes or specials. j. All plain ended pipes and specials with 650mm ND and below shall be suitable for externally welded collar joints mechanical coupling and flange joints. k. Rate to include supply and fixing of jointing materials such as nuts, bolts, washers, gaskets, etc. l. All rubber ring/gasket shall be EPDM material. m. Mechanical couplings, stepped couplings and flange adaptors supplied shall be in conformation with the Specification which include:- i). end rings and center sleeve shall be ductile iron and internally and externally coated with fusion bonded epoxy powder coating. n. All bolts, nuts and washers shall be hot dipped galvanised / Stainless steel. o. Rate for installation shall include pipe cutting/ chamfering/ welding.				
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PART B - PIPELINES

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	p. For laying underground straight pipes, for the purpose of payments, the length of standard length pipes or cut length pipes shall be the "effective length as laid" measured along q. The rate for laying pipes, fittings and specials shall include the cost for successful pressure testing. r. Collecting from the store and pipe dumps on site as shown and informed by the S.O. transporting, stringing, hauling, handling, repairing linings and sheathing where required and laying in position ready for jointing and/or building in all work for pipe and painting as specified steel pipes, specials, joints and fittings. (For all pipe supply by Contractor) Steel Pipe Lay mild steel pipes and fittings (underground) in accordance to the note, Item 4.0 - Specification and manufacturer's instruction. (pipes laid underground)				
B.13	For 200mm nominal diameter spigot and socket wrapped (SSW) mild steel pipes in standard and cut length .	M	1500		
B.14	For 150mm nominal diameter spigot and socket wrapped (SSW) mild steel pipes in standard and cut length .	M	800		
B.15	For 200mm nominal diameter plain ended mild steel pipes.	M	12		
B.16	For 150mm nominal diameter plain ended mild steel pipes	M	60		
B.17	For 100mm nominal diameter plain ended mild steel pipes	M	12		
	SPECIALS AND FITTINGS Steel bends				
B.18	200mm nominal diameter x over than 45 degrees and up to 90 degrees plain ended bend.	Nos	5		
B.19	200mm nominal diameter x over than 30 degrees and up to 45 degrees plain ended bend.	Nos	50		
B.20	150mm nominal diameter x over than 45 degrees and up to 90 degrees plain ended bend.	Nos	12		
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PART B - PIPELINES

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
B.21	150mm nominal diameter x over than 30 degrees and up to 45 degrees plain ended bend.	Nos	82		
B.22	100mm nominal diameter x over than 45 degrees and up to 90 degrees plain ended bend.	Nos	8		
B.23	100mm nominal diameter x over than 30 degrees and up to 45 degrees plain ended bend.	Nos	3		
	Steel Tees				
B.24	200mm nominal diameter plain ended barrel x 200mm nominal diameter plain ended barrel flange branch.	Nos	6		
B.25	200mm nominal diameter plain ended barrel x 150mm nominal diameter plain ended barrel flange branch.	Nos	11		
B.26	200mm nominal diameter plain ended barrel x 100mm nominal diameter plain ended barrel flange branch.	Nos	2		
B.27	150mm nominal diameter plain ended barrel x 150mm nominal diameter plain ended barrel flange branch.	Nos	11		
B.28	100mm nominal diameter plain ended barrel x 100mm nominal diameter plain ended barrel flange branch.	Nos	1		
	Air Valve Tee				
B.29	200mm nominal diameter plain ended barrel x 50mm nominal diameter plain ended barrel flange branch.	Nos	1		
	Washout Tee				
B.30	200mm nominal diameter x 100mm nominal diameter level invert flanged branch.	Nos	5		
B.31	150mm nominal diameter x 100mm nominal diameter level invert flanged branch.	Nos	3		
	Fire Hydrant And Mild Steel Short Pipes				
B.32	100mm nominal diameter double outlet Pillar Hydrant with yellow paint of high reflection intensity.	Nos	2		
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PART B - PIPELINES

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
B.33	100mm nominal diameter x 0.5m long with flange ended straight steel pipes.	Nos	2		
B.34	100mm nominal diameter x 90 deg double flange duckfoot bend.	Nos	2		
	Taper				
B.35	200mm nominal diameter x 150mm nominal diameter.	Nos	2		
B.36	150mm nominal diameter x 100mm nominal diameter.	Nos	1		
	PIPEWORK LAYING ABOVE GROUND				
	Mild Steel Pipe				
	Unless otherwise stated				
	a. Steel plate thickness of all pipeworks shall be as stated in the Specfication.				
	b. The following items refer to specified portion of the work including crossing over streams, drains, culverts, rivers, swampy grounds and valleys as detailed in the Drawings.				
	c. The notes on PIPE WORK, VALVES, CUTTING PIPES AND JOINTING PIPEWORK mentioned elsewhere in section of the Bill of Quantities shall apply.				
	d. Unless otherwise specified all pipes and specials will not be externally coated and wrapped. The rate for unwrapped and specials shall include painting with zinc phosphate prime as specified at the place of manufacture.				
B.37	200mm nominal diameter straight pipes in standard and cut length uncoated but painted.	M	60		
B.38	150mm nominal diameter straight pipes in standard and cut length uncoated but painted.	M	72		
B.39	200mm nominal diameter plain ended barrel x 50mm nominal diameter plain ended barrel flange branch uncoated but painted.	Nos	5		
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PART B - PIPELINES

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
B.40	200mm nominal diameter x over than 30 degrees and up to 45 degrees plain ended steel bend uncoated but painted.	Nos	10		
B.41	150mm nominal diameter x over than 30 degrees and up to 45 degrees plain ended steel bend uncoated but painted.	Nos	18		
	JOINTING AND CUTTING PIPE WORK a. The contract rates shall include for preparing pipe ends of cut pipe or specials suitable for making flange adaptor and mechanical coupling joints or welded collar joints and making good external coating and internal lining. b. The contract rates for making all joints shall also include for taking over, handling, transporting and placing in position mechanical couplings, flange adaptors, all jointing materials complete and collars from factory or from making good and for completing the external and internal protection of pipes and joints as specified in specification. c. Making a welded slip joint shall include one external circumferential weld for pipes 650mm dia. and below, one external and one internal weld with air testing of annular space so formed for pipes 650 mm dia. and above. d. Making a welded collar joint for pipes 650 mm dia. And above shall include two internal and two external circumferential and one longitudinal welds with air testing of the two annular spaces so formed. e. All joints shall unless otherwise stated be externally wrapped and internally protected and painted pipes shall include for painting after installation as specified. f. The rates for joints on unwrapped and painted pipes shall include for painting after installation as specified. g. The rates for jointing and cutting works shall include supply and fixing of bolts, nuts, washers, rubber rings, rubber insertion,etc.and all necessary jointing materials.				
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PART B - PIPELINES

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	Welded Joints				
B.42	Making welded slip-joint on 200mm nominal diameter spigot and socket pipes and specials.	Nos	250		
B.43	Making welded slip-joint on 150mm nominal diameter spigot and socket pipes and specials.	Nos	134		
B.44	Making welded collar-joint on 200mm nominal diameter steel plain ended pipes and specials inclusive of cutting and making good for preparation.	Nos	160		
B.45	Making welded collar-joint on 150mm nominal diameter steel plain ended pipes and specials inclusive of cutting and making good for preparation.	Nos	190		
B.46	Making welded collar-joint on 100mm nominal diameter steel plain ended pipes and specials inclusive of cutting and making good for preparation.	Nos	10		
	Flange Adaptor				
B.47	200mm nominal diameter.	Nos	12		
B.48	150mm nominal diameter.	Nos	40		
B.49	100mm nominal diameter.	Nos	10		
	Mechanical Coupling Joints				
B.50	200mm nominal diameter.	Nos	12		
B.51	150mm nominal diameter.	Nos	40		
B.52	100mm nominal diameter.	Nos	10		
	Loose Flange				
B.53	200mm nominal diameter. (including of welding)	Nos	12		
B.54	150mm nominal diameter. (including of welding)	Nos	40		
B.55	100mm nominal diameter. (including of welding)	Nos	10		
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PART B - PIPELINES

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	Blank Flange				
B.56	200mm nominal diameter.	Nos	2		
B.57	150mm nominal diameter.	Nos	11		
B.58	100mm nominal diameter.	Nos	1		
	Hdpe Joint				
B.59	180mm/160mm nominal diameter	Nos	2		
	VALVES AND FITTINGS				
	To collect from store/pipe dumps, loading and unloading, transporting, handling, laying and fixing in position ready for jointing and making joints. Rate to include excavation, backfilling, supply and fixing bolt & nut, painting after installation.Valves and fittings supply by contractor measured separately.				
B.60	200mm nominal diameter double flange sluice valve.	Nos	6		
B.61	150mm nominal diameter double flange sluice valve.	Nos	13		
B.62	100mm nominal diameter double flange sluice valve.	Nos	10		
B.63	50mm nominal diameter double orifice air valve complete with 50mm diameter isolating sluice valve.	Nos	6		
B.64	25mm nominal diameter air valve. (Rate to include fixing of Cast Iron Saddle)	Nos	9		
	PIPE CONNECTION TO EXISTING PIPES				
	Make all necessary preparation, piloting and location existing pipe, excavate and reinstate to its original condition. Sum to include cutting of existing pipe, preparing pipe end ready for jointing, and fixing of all steel specials, all HDPE specials, all collar joint/mechanical couplings, dewatering and all temporary works at the following locations.				
B.65	Complete connection from new water main 200mm MS pipes to existing water main 600mm MS pipes using hot tapping including to supply mild steel tapping sleeve.	Nos	1		
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PART B - PIPELINES

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
B.66	Complete connection from new water main 200mm MS pipes to existing water main 450mm MS pipes using hot tapping including to supply mild steel tapping sleeve.	Nos	1		
B.67	Complete connection from new water main 200mm MS pipes to existing water main 200mm pipes. (for all type of pipes) including to do end cap at existing pipeline.	Nos	2		
B.68	Complete connection from new water main 200mm MS pipes to existing water main 150mm pipes. (for all type of pipes) including to do end cap at existing pipeline.	Nos	10		
B.69	Complete connection from new water main 150mm MS pipes to existing water main 100mm pipes. (for all type of pipes) including to do end cap at existing pipeline. DMA(District Meter Area) meter.	Nos	1		
B.70	Removal of the existing 150mm AC Electro-Magnetic Flow meter. Site name: MT 16, Duyong Existing pipe: 150mm AC pipe Removal of the existing 150mm diameter Electro-Magnetic Flow Meter installed on the existing 150mm AC pipe, including all necessary excavation, dismantling, handling, loading, transportation and delivery to SAMB's store or as directed by the S. O. The works shall include removal of all associated signal cabling, converters, cabinets, fittings and accessories, disconnection and reconnection of existing pipelines complete with all necessary fittings. The works shall also include backfilling with approved materials, reinstatement to the original condition, and all other related works. All works shall be completed in accordance with the approved drawings, specifications and the S.O's instructions.	Lump Sum			
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ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
B.71	Supply, Installation, Testing and Commissioning of New Electro-Magnetic Flow Meter Site Name: MT 16, Duyong New Pipe: 200mm MS Pipe Supply, install, test and commission one (1) unit 200mm nominal diameter Electro-Magnetic Flow Meter complete for installation on the new 200mm MS pipe for District Meter Area (DMA) and Non-Revenue Water (NRW) monitoring and including one (1) unit of data logger for flow data recording. Supply and install DMA cabinet fabricated from stainless steel / powder-coated mild steel / FRP (as specified). The enclosure shall have a minimum protection rating of IP55. Cabinet shall be complete with approved safety locking system and adequate ventilation. The works shall include all necessary excavation, handling, loading, transportation, installation, signal and communication cabling, earthing system and all other related works. The scope shall include supply and installation of all required pipes, specials, joints, fittings, flanges and accessories to ensure complete and proper connection of the system. The works shall also include excavation, sand bedding, concreting, reinstatement to the original condition, testing and commissioning, all in accordance with the approved drawings, specifications and manufacturer's requirements, and the S.O's instructions. <u>Notes:</u> i. Flowmeter must be comply with SAMB's requirement. ii. Location for flowmeter will be decided by SAMB's. ii. <u>Specification for the data Logger;</u> Cello 4s-2G and 4G (NBIOT AND LTE CAT M1) Dual Channel (Flow & Pressure) Data Logger. iii. <u>Specification for the flow meter;</u> To supply Battery Operated Electromagnetic Flowmeter Remote Type c/w IP68, submersible kit, silica gel, internal battery & earthing ring.	Lump Sum			
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SYARIKAT AIR MELAKA BERHAD

CADANGAN MEMBEKAL DAN MEMASANG PAIP 200MM, 150MM DIAMETER KELULI LEMBUT DARI IKS DUYONG HINGGA KE JAMBATAN DUYONG SERTA LAIN-LAIN KERJA YANG BERKAITAN DI DAERAH MELAKA TENGAH, MELAKA

PART B - PIPELINES

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PART C - MISCELLANEOUS WORKS

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	MISCELLANEOUS				
	Concrete Works.				
	Rate to include all necessary strutting and cutting of formwork to suit and building in pipework.				
C.1	Mass concrete in Grade 20/25 for thrust and anchor blocks, concrete surround for pipes and valves support.	M3	50		
	Chamber				
	Supply ,haul, handle and lay precast concrete sections for valve chamber and indicators. Rate to include supply and fixing of heavy duty cover and associated steel works, excavation, backfill, compaction and painting as specified and as per S.O Instruction.				
C.2	a. Top precast concrete panel	Nos	30		
C.3	b. Middle precast concrete panel	Nos	60		
C.4	c. Bottom precast concrete panel	Nos	30		
	Precast Concrete Marker Post				
	Supply and install precast concrete marker post grade 20/25. The rate to include excavation, backfill and painting after installation.				
C.5	a. Pipe marker	Nos	4		
C.6	b. Sluice valve marker	Nos	18		
C.7	c. Scour valve marker	Nos	9		
C.8	d. Air valve marker	Nos	1		
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PART C - MISCELLANEOUS WORKS

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	PIPE JACKING WORKS				
	Pipe jacking and road crossing works.				
C.9	Mobilisation and demobilisation of plant, equipment and personnel for each site.	Lump Sum			
C.10	Design, excavate, construct and maintain jacking or boring pit including sheet pilling, bracing, walling, concrete thrust wall,anchor foundation, guide rails, etc.for jacking the pipes efficiently and safely at the under crossing for each site.	Nos	1		
C.11	Design, excavate, construct and maintain receiving pit including sheet pilling, bracing, walling, etc. for receiving the jacked pipes at the under crossing for each site.	Nos	1		
C.12	Supply, deliver and carry out jacking of 450mm diameter Class "2Z" reinforced concrete pipe of nominal length 3000mm inclusive of steel connecting collar, as sleeve for 200mm diameter mild steel pipe. Rate to include handling and positioning of jacking pipe, provision of jacking equipment, hydraulic jack, boring, equipment, cutting, head, slurry pipes, water pumps, power supply, etc.for safe and efficient jacking operation at the under crossing. (Auger method or equivalent).	M	30		
C.13	Extra over item C.12 or jacking or boring in rock.	M	5		
C.14	Supply labour only and equipment to lay DN200mm steel pipe within "2Z" reinforced concrete pipe sleeve. Rate to include collar, welding, joints and cutting, etc.	M	30		
C.15	Pressure grout the jacked pipes to fill the annular space between the jacked pipes and the 200mm diameter mild steel pipes. Rate shall include all necessary stops ends and associated materials.	M	30		
C.16	Dismantle and remove jacking and receiving pits including all temporary concrete block, etc. on completion. Rate to include backfilling of the pits with sand and reinstatement of the ground and surrounding at each site.	Lump Sum			
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PART C - MISCELLANEOUS WORKS

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	Testing And Commissioning				
C.17	Allow for pressure and leakage testing of all pipelines as specified. Rate to include supply of clean water and proper disposal to waterway after testing.	Lump Sum			
C.18	Allow for sterilising and flushing of all pipelines as specified. Rate to include supply of treated water, chemical used and proper disposal to waterways after neutralization where required by the S.O. All necessary cost for final flushing of the pipe is deemed to be included.	Lump Sum			
	Restoration of metalled road				
	Notes: Contractor shall immediately carry out the road restoration works at the area which has been affected due to pipe laying works as per existing condition comprising of trimming, compacting road formation level to gradient, rolled, premix and all necessary works including disposed surplus excavated material as specified. (Rate to include the use of paver and all equipment as specified by JKR's Arahan Teknik)				
C.19	Supply, fill and compact approved sand to pipe trench, welding pits, sand bedding and pipe surround as directed by S.O. Rate to include all necessary stop ends. (quarry dust is not allowed).	M3	2600		
C.20	Supply, spread and compact 450mm thick approved crusher run granite not exceeding 75mm size. Rate to include all necessary stop end and application of bituminous prime coat.	M2	1800		
C.21	Supply, spread and compact pipe trench with asphaltic concrete binder course (ACBC 28) to original thickness or a minimum of 60mm or to the requirement by the authorities. Rate to include prime coat and all necessary stop ends and compliance with the requirements of local authorities.	M2	3000		
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PART C - MISCELLANEOUS WORKS

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
C.22	Supply, spread and compact pipe trench with asphaltic concrete wearing course (ACWC 14) to original thickness or a minimum of 50mm or to the requirement by the authorities.Rate to include tack coat, all necessary stop ends and compliance with the requirements of local authorities.	M2	3000		
	Turfing				
C.23	Supply and spread top soil on level slope ground to a thickness of 50mm.	M2	50		
C.24	Spot turfing on level ground.	M2	50		
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SYARIKAT AIR MELAKA BERHAD

CADANGAN MEMBEKAL DAN MEMASANG PAIP 200MM, 150MM DIAMETER KELULI LEMBUT DARI IKS DUYONG HINGGA KE JAMBATAN DUYONG SERTA LAIN-LAIN KERJA YANG BERKAITAN DI DAERAH MELAKA TENGAH, MELAKA

PART C - MISCELLANEOUS WORKS

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PART D - TAPPING WORKS

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	All Quantities In BQ For All Item Are Provisional Quantities. **TAPPING TO HOUSEHOLDS** Tapping Works Note:- a. The rate shall include engaging a licensed plumber, excavation works and reinstatement works. b. Rate to include supply, loading and unloading, transportation, handling, installation of D.I/S.Loan Saddle - (epoxy coated / fusion bonded type, galvanised and anti-rust bolts and nuts), steam socket, ferrule, brass press fitting, male/female socket /elbow, reducing sockets, long bend, and all other necessary works and fittings required for tapping from new mains as specified. All materials shall be obtained from SPAN approved sources and installed as directed by S.O.				
D.1	50mm steam socket.	Nos	1		
D.2	25mm steam socket.	Nos	100		
	Communication Pipe (Polyethylene Aluminium Composite) Rate to include supply, loading and unloading, transportation, handling, fixing of Polyethylene Aluminium Composite communication pipes, including all necessary fittings, joints, accessories and ancillary works required to complete the connection from tapping points to existing communication pipes, as specified. All materials shall be obtained from SPAN approved sources and installed as directed by S.O. Note:- Rate to include excavation works and reinstatement and fixing of Polyethylene Aluminium Composite pipe with :- a. Minimum depth of:- i. 300mm under side table ii. 450mm under metalled road				
D.3	25mm OD Polyethylene Aluminium Composite pipe.	M	1000		
D.4	Extra over items D.3 for laying in metalled road.	M	500		
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PART D - TAPPING WORKS

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	Communication Pipe (HDPE Pipe) Rate to include supply, loading and unloading, transportation, handling, installation and fixing of HDPE pipes, including all fittings, joints and accessories, for making connection from tapping points to existing communication pipes, complete as specified. All materials shall be obtained from SPAN-approved sources and installed as directed by S.O. Note:- Rate to include excavation works and reinstatement and fixing of HDPE pipe with :- a. Minimum depth of:- i. 300mm under side table ii. 450mm under metalled road				
D.5	50mm HDPE pipe PN 16	M	10		
D.6	25mm HDPE pipe PN 16	M	500		
	Stainless Steel Meter Stand Supply, deliver, transport, handle, place in position and install a complete meter stand including all fittings, accessories, and all necessary works for proper installation and operation.				
D.7	Complete installation one (1) 20mm dia. Class 304 stainless steel meter stand including male and female socket /elbow, brass press fitting, long screw, stainless steel short piece, brass socket, poly adaptor, poly socket, stop cock, nipple, stainless steel pipe, and all other necessary fittings and accessories. The rate shall include removal and reinstallation of the existing water meter, hacking of wall, concrete, floor apron, tiles, and any other affected structures, and making good all disturbed surfaces to original condition after completion of works including construction of cover slab, complete as specified. All materials shall be obtained from SPAN-approved sources and installed as directed by S.O.	Nos	100		
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PART D - TAPPING WORKS

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
D.8	Relocation of existing meter stand from private compound to outside boundary. The rate shall include removal, relocation, reinstallation of the complete existing meter, hacking of wall, concrete and any other necessary works, including making good all affected areas, complete as specified.	Nos	5		
	Stainless Steel Pipes				
D.9	Supply, laying, cutting and fixing 25mm dia. Class 304 stainless steel pipe for drain crossing and as per S.O instruction.	M	150		
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SYARIKAT AIR MELAKA BERHAD

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PART D - TAPPING WORKS

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PART E - SUPPLY PIPE AND FITTINGS

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	All Quantities In BQ For All Items Are Provisional Quantities **Mild Steel Pipes And Specials** Supply and deliver to contractor's store or pipe dumps on Site pipes, specials, joint , fitting and etc. in accordance with SPAN TS 21827: Part 1:2013. **Pipe and Fitting** a. All pipes fittings and specials shall be approved by the S.O from approved manufactures. b. All ductile iron fitting/specials shall comply to BS EN545 : 2002 with fusion bonded epoxy coated internally and externally. Rate including EPDM rubber ring, self-locking gland, L-shape hot dip galvanised ductile iron bolts & nuts, PP washers and lock ring. c. All steel pipes and specials shall be concrete lined internally and bitumen coated externally. d. All flanges shall be suitable to a rating of 16 bars in accordance with BS 4504. e. All spigot and socket ended mild steel pipes with 650mm ND and below shall be suitable for externally welded slips joints. f. The thickness of the collar shall be 1.5mm more than the thickness of the two adjoining pipes or specials. g. All plain ended pipes and specials with 650mm ND and below shall be suitable for externally welded collar joints mechanical coupling and flange joints. h.Rate to include supply of jointing materials such as nuts, bolts, washers, gaskets, etc. i. All rubber ring/gasket shall be EPDM material. j. Mechanical couplings, stepped couplings and flange adaptors supplied shall be in conformation with the Specification which include:-				
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PART E - SUPPLY PIPE AND FITTINGS

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	i. end rings and center sleeve shall be ductile iron and internally and externally coated with fusion bonded epoxy powder coating. k. All bolts, nuts and washers shall be hot dipped galvanised / Stainless steel. l. Rate for installation shall include pipe cutting/ chamfering/ welding. m. For laying underground straight pipes, for the purpose of payments, the length of standard length pipes or cut length pipes shall be the "effective length as laid" measured along the crown of the pipes of each line. Steel Pipes				
E.1	For 200mm nominal diameter spigot and socket wrapped (SSW) mild steel pipes in standard and cut length.	M	1500		
E.2	For 150mm nominal diameter spigot and socket wrapped (SSW) mild steel pipes in standard and cut length .	M	800		
E.3	200mm nominal diameter straight pipes in standard and cut length uncoated but painted.	M	60		
E.4	150mm nominal diameter straight pipes in standard and cut length uncoated but painted.	M	72		
E.5	For 200mm nominal diameter plain ended mild steel pipes.	M	12		
E.6	For 150mm nominal diameter plain ended mild steel pipes.	M	60		
E.7	For 100mm nominal diameter plain ended mild steel pipes.	M	12		
	SPECIALS AND FITTINGS Steel bends				
E.8	200mm nominal diameter x over than 45 degrees and up to 90 degrees plain ended bend.	Nos	5		
E.9	200mm nominal diameter x over than 30 degrees and up to 45 degrees plain ended bend.	Nos	50		
	Page Total To Bill Summary				

PART E - SUPPLY PIPE AND FITTINGS

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
E.10	200mm nominal diameter x over than 30 degrees and up to 45 degrees plain ended steel bend uncoated but painted.	Nos	10		
E.11	150mm nominal diameter x over than 45 degrees and up to 90 degrees plain ended bend.	Nos	12		
E.12	150mm nominal diameter x over than 30 degrees and up to 45 degrees plain ended bend.	Nos	82		
E.13	150mm nominal diameter x over than 30 degrees and up to 45 degrees plain ended steel bend uncoated but painted.	Nos	18		
E.14	100mm nominal diameter x over than 45 degrees and up to 90 degrees plain ended bend.	Nos	8		
E.15	100mm nominal diameter x over than 30 degrees and up to 45 degrees plain ended bend.	Nos	3		
	Steel Tees				
E.16	200mm nominal diameter plain ended barrel x 200mm nominal diameter plain ended barrel flange branch.	Nos	6		
E.17	200mm nominal diameter plain ended barrel x 150mm nominal diameter plain ended barrel flange branch.	Nos	11		
E.18	200mm nominal diameter plain ended barrel x 100mm nominal diameter plain ended barrel flange branch.	Nos	2		
E.19	150mm nominal diameter plain ended barrel x 150mm nominal diameter plain ended barrel flange branch.	Nos	11		
E.20	100mm nominal diameter plain ended barrel x 100mm nominal diameter plain ended barrel flange branch.	Nos	1		
	Air Valve Tee				
E.21	200mm nominal diameter plain ended barrel x 50mm nominal diameter plain ended barrel flange branch.	Nos	1		
E.22	200mm nominal diameter plain ended barrel x 50mm nominal diameter plain ended barrel flange branch uncoated but painted.	Nos	5		
	Page Total To Bill Summary				

PART E - SUPPLY PIPE AND FITTINGS

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	Washout Tee				
E.23	200mm nominal diameter x 100mm nominal diameter level invert flanged branch.	Nos	5		
E.24	150mm nominal diameter x 100mm nominal diameter level invert flanged branch.	Nos	3		
	Fire Hydrant And Mild Steel Short Pipes				
E.25	100mm nominal diameter double outlet Pillar Hydrant with yellow paint of high reflection intensity.	Nos	2		
E.26	100mm nominal diameter x 0.5m long with flange ended straight steel pipes.	Nos	2		
E.27	100mm nominal diameter x 90 deg double flange duckfoot bend.	Nos	2		
	Taper				
E.28	200mm nominal diameter x 150mm nominal diameter.	Nos	2		
E.29	150mm nominal diameter x 100mm nominal diameter.	Nos	1		
	Collar				
E.30	200mm nominal diameter.	Nos	160		
E.31	150mm nominal diameter.	Nos	190		
E.32	100mm nominal diameter.	Nos	10		
	Flange Adaptor				
E.33	200mm nominal diameter.	Nos	12		
E.34	150mm nominal diameter.	Nos	40		
E.35	100mm nominal diameter.	Nos	10		
	Mechanical Coupling Joints				
E.36	200mm nominal diameter.	Nos	12		
	Page Total To Bill Summary				

PART E - SUPPLY PIPE AND FITTINGS

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
E.37	150mm nominal diameter.	Nos	40		
E.38	100mm nominal diameter.	Nos	10		
	Hdpe Joint				
B.39	180mm/160mm nominal diameter	Nos	2		
	Loose Flange				
E.40	200mm nominal diameter.	Nos	12		
E.41	150mm nominal diameter.	Nos	40		
E.42	100mm nominal diameter.	Nos	10		
	Blank Flange				
E.43	200mm nominal diameter.	Nos	2		
E.44	150mm nominal diameter.	Nos	11		
E.45	100mm nominal diameter.	Nos	1		
	VALVES AND FITTINGS				
	Supply and delivery of valves and fittings shall means supply and deliver to Contractor's store/valve dumps on site valves and fittings. a. All valves shall be suitable for a pressure rating of 16 bars. b. All valves flanges shall be drilled to suit connection to adjacent flanged pipes, specials or flange adaptors.				
E.46	200mm nominal diameter double flange sluice valve.	Nos	6		
E.47	150mm nominal diameter double flange sluice valve.	Nos	13		
E.48	100mm nominal diameter double flange sluice valve.	Nos	10		
E.49	50mm nominal diameter double orifice air valve complete with 50mm diameter isolating sluice valve.	Nos	6		
E.50	25mm nominal diameter air valve. (Rate to include supply of Cast Iron Saddle)	Nos	9		
	Page Total To Bill Summary				

SYARIKAT AIR MELAKA BERHAD

CADANGAN MEMBEKAL DAN MEMASANG PAIP 200MM, 150MM DIAMETER KELULI LEMBUT DARI IKS DUYONG HINGGA KE JAMBATAN DUYONG SERTA LAIN-LAIN KERJA YANG BERKAITAN DI DAERAH MELAKA TENGAH, MELAKA

PART E - SUPPLY PIPE AND FITTINGS

	PAGE NO	AMOUNT (RM)
	BILL SUMMARY Page 1 Page 2 Page 3 Page 4 Page 5	
	Page Total To Bill Summary	

CADANGAN MEMBEKAL DAN MEMASANG PAIP 200MM, 150MM DIAMETER KELULI LEMBUT DARI IKS DUYONG HINGGA KE JAMBATAN DUYONG SERTA LAIN-LAIN KERJA YANG BERKAITAN DI DAERAH MELAKA TENGAH, MELAKA

PART F - PROVISIONAL SUM

ITEM	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
F.1	Provide the Provisional Sum to be expended at the S.O's direction for contigencies.	Sum			40,000.00
	Total For Bill 5 Carried To Grand Summary				40,000.00

BAHAGIAN I

PREAMBLES TO THE BILL OF QUANTITIES

A. PREAMBLE TO THE BILLS OF QUANTITIES

1. The Conditions of Contracts, the Specification and the Drawings shall be read in conjunction with the Bills of Quantities. The prices entered into the Bills of Quantities shall provide for full compliance with all the provision of the documents.

2. The rates and prices in the Bills of Quantities (comprehensively referred to as the Contract Rates) Shall except in so far as it is otherwise provided be deemed to cover all the Contractor's obligations under the Contract and all matters and things necessary for the proper completion and maintenance of the Works.

3. No payment shall be made in respect of anything described in the Contract for which apparently no corresponding item in the Bills of Quantities and the cost thereof shall be deemed to be included in and covered by the Contract Rates as aforesaid. Overhead, profit, insurance, etc., shall all be deemed to have been included in the Contract Rates.

4. The rate and/or price is to be entered against each item in the Bills of Quantities whether quantities are stated or not. The cost of any items against which a Contract Rate has not been entered shall be deemed to be covered by other Contract Rates. No claims for payment in respect of unpriced items will be admitted.

5. The rates set down by the Tenderer against each item in Bills of Quantities, unless expressly provided to the contrary, shall be held to include for the supply of materials including cutting and waste unloading, storage, packing, carriage and cartage, hoisting, all labour for fabricating, setting, fitting and fixing in position, use of plant, supervision, establishment charges, duty, profit and any other expense and everything so necessary for the due and proper completion of each item.

6. The description of the items is necessarily brief, and fuller description of them required is given in the Specifications, Schedule of Particulars and/or Drawings and the rates and prices entered against each item shall be deemed to cover the costs of complying with all requirements.

7. Payment against all Lump Sum items will be paid in proportion to the extent of which at the end of the period in question in the opinion of the S.O. the relevant services have been provided.

8. All quantities in the Bills of Quantities are provisional and shall be subject to re-measurement.

9. The quantities of the various item are approximate only and shall not be considered as limiting or extending the amount of works to be provided by the Contractor under the Contract. The basis of payment shall be the actual quantities ordered and carried out as measured by the S.O. and valued at the rates of prices quoted in the Bills of Quantities where applicable, ot otherwise at such rates of prices which may be fixed within the terms of the Contract.

10. All items are to be prices in Ringgit Malaysia (RM) to two decimal places.

11. The rates inserted in the Dayworks Schedule shall be deemed to be rates used by the Contractor in making up rates for works items in the Bills of Quantities.

12. Where items are referred to as ‘Extra-over’ a previous item then the rate to be inserted against the extra over is the additional cost of carrying out the work required by this item over and above the rate inserted against the previous item.

13. i) The total given in the Form of Tender, subject to any agreed adjustment prior to award shall be the Contract Sum for the Works represented by the quantities and provisional sums at the time of Tender, subject to variation order or variations of quantities.

    ii) Provisional Sum shall be expended only on specific instructions of th S.O., who will certify in respect thereof accounts based on appropriate rates and prices in the Bills of Quantities, or where no appropriate rate or price exists, on agreed rates or day works rates.

14. Except where an item in the Bills of Quantities clearly indicates to the contrary, the measurement of the Works shall be as described in the Specifications.

15. Notwithstanding any provision made in the Specifications or Bills of Quantities, no separate measurement and payment shall be made for forming holes and/or building in pipes, conduits, etc., of sizes 200mm diameter/square and less, the cost of which shall be deemed to be included in the Contract Rates.

B. PREAMBLE TO THE GENERAL AND PRELIMINARIES

1. All direction and instructions in this bill Preliminaries and General Conditions are directed in the Contractor which term should also include all his Sub-Contractors. These requirements are to form part of the Contractor's obligation and responsibility under this contract.

2. These preliminaries are to be read and applied in conjunction with Conditions of Contract and in any conflict of meaning, the contents to the said Conditions of Contract shall take precedence. Where, however, clearly defined additional requirements and amendments or modification to those of the Conditions of Contract are set down, then these Preliminaries shall take precedence.

3. All items contained in the Preliminaries as set out hereafter are deemed to apply to the Works and as shown on the Drawings and/or described in this specification and the Contractor shall be deemed to have allowed against each item or in his rates for the cost of complying with all the requirements of these Preliminaries.

4. All items shall be at the cost of the Contractor, except where specifically stated.

5. The preliminary items as set out herein shall apply to the whole of the Works contained under the contract and Contractor shall allow for complying with the same and for any cost incurred in connection therewith.

6. All preliminary items/clauses shall be individually priced. Unrealistic, hidden, strategic and/or bulk pricing for sections, trades, grouts of pages of preliminary item/clauses shall be made at the Contractor's own risk. The Contractor is advised against the adoption of such basis of pricing as it may result in such priced items of preliminaries being omitted or caused variation of prices to be created and issued at the expense of the Contractor.

7. Where any preliminary items/clauses is left unpriced, it shall be deemed that cost of such preliminary items/clauses have been allowed for elsewhere within the Tender. No subsequent claims arising for loss of expenses and/or profit incurred against such preliminary items/clauses shall be entertained for failure to comply with the above.

8. Syarikat Air Melaka Berhad (SAMB) / S.O reserve the right to request from Contractor the detail breakdown of the pricing for preliminary items/clauses for verification and approval. Should the Contractor fail to submit the above within fourteen (14) days upon request by the 8. Syarikat Air Melaka Berhad (SAMB) / S.O reserve the right to determine an amount which in his own opinion is a fair amount. The approved detailed breakdown of the pricing shall then be used as a basis for the preparation of monthly interim valuations.

9. Where preliminaries items/clauses as appeared in this General and Preliminaries are not required or have not been carried out on Site by the Contractor, such shall be deducted accordingly from the Contract Sum. Where applicable or found necessary by the S.O, the preliminary items/clauses should apply equally to existing and new works.

10. **ABBREVIATIONS**

Throughout the Tender Documents, the following abbreviations have been used :-

Nos	-	Numbers
No. or nr.	-	Number
M3	-	Cubic metre
M2	-	Square metre
M	-	Linear metre
mm	-	Millimetres
Dia	-	Diameter
L.S.	-	Lump sum
Av.	-	Average
D.I.	-	Ductile Iron
C.I.	-	Cast Iron
P.A	-	Polyethylene Aluminium Pipe
VSP	-	Vitrified Clay Pipe
RCP	-	Reinforced Concrete Pipe
c/w	-	Complete with
E	-	Exceeding
NE	-	Not exceeding
P.C.	-	Precast Concrete
P.S.	-	Provisional Sum
ACB	-	Air Circuit Breaker
MCB	-	Miniature Circuit Breaker
MCCB	-	Molded Case Circuit Breaker
ELSB	-	Earth Leakage Circuit Breaker
HPSV	-	High Pressure Sodium Vapor
L.V.	-	Low Voltage
G.I.	-	Galvanized Iron
TPN	-	Three Pole Nature
XLPE/SWA/PVC Cross	-	linked Polyethylene/ Steel Wire Armored/ Polyvinyl Chloride Cable
PE-AL-PE	-	Polyethylene Aluminium Composite Pipes
HDPE	-	High Density Polyethylene
Nom.dia	-	Nominal Diameter
p/e	-	Plain Ended
D/F	-	Double Flange
EPDM	-	Ethylene Propylene Diene Monomer
GRP	-	Glass-Reinforced Plastic

10. **ABBREVIATIONS (CONT'D)**

Throughout the Tender Documents, the following abbreviations have been used (cont'd) :-

DN	-	Diameter Nominal
OD	-	Outer Diameter
KG	-	Kilogram
S.O	-	Superintending Officer
BRC	-	British Retail Consortium
M.S	-	Mild Steel
BQ	-	Bill Of Quantities
SAMB	-	Syarikat Air Melaka Berhad
Mupvc	-	Multi-Layer Unplasticized Polyvinyl Chloride
KM	-	Kilometer
JKR	-	Jabatan Kerja Raya

BAHAGIAN J

LATAR BELAKANG PETENDER DAN DATA TEKNIKAL

LATAR BELAKANG PETENDER

Borang A -	Surat Pengakuan Kebenaran Maklumat dan Kesahihan Dokumen Yang Dikemukakan oleh Petender	}
Borang B -	Maklumat Am Latar Belakang Petender	}
Borang C -	Data-Data Kewangan	}BORANG
Borang D -	Rekod Pengalaman Kerja	}BORANG
Borang E -	Kakitangan Teknikal	}MAKLUMAT
Borang F -	Keempunyaan Loji Dan Peralatan Pembinaan Utama	}
Borang G -	Senarai Kerja Kontrak Semasa	}
Borang CA -	Laporan Bank/Institusi Kewangan Mengenai Kedudukan Kewangan Petender	} DOKUMEN } DOKUMEN
Borang GA -	Laporan Penyelia Projek Atas Prestasi Kerja (Bukan Projek SAMB) Semasa Petender	} SOKONGAN
Borang GA 1-	Laporan Jurutera Projek Atas Prestasi Kerja Semasa Petender	}
Borang H -	Jadual Perancangan kerja	}

BORANG A

SURAT PENGAKUAN KEBENARAN MAKLUMAT DAN KESAHIHAN DOKUMEN YANG DIKEMUKAKAN OLEH PETENDER.

Nama Kontraktor :.....

Alamat :.....

.....

.....

Kepada,

Ketua Pegawai Eksekutif,
Syarikat Air Melaka Berhad.
(Pihak yang akan menilai tender)

Tuan,

MAKLUMAT LATAR BELAKANG, KEWANGAN DAN TEKNIKAL PETENDER

1. Kami telah membaca dan teliti semua arahan-arahan yang terkandung dalam Arahan Kepada Petender termasuk arahan yang menghendakkan kami mengemukakan maklumat-maklumat dan dokumen-dokumen mengenai perkara di atas bersama-sama dokumen tender kami semasa mengemukakan Tender ini untuk membolehkan SAMB menilai keupayaan kami untuk melaksanakan kerja yang ditender, semasa penilaian Tender.

2. Kami faham dan mengambil maklum bahawa penilaian Tender ini akan mengambil kira dan mementingkan keupayaan kami melaksanakan kerja yang ditender. Justeru itu tender kami akan hanya dipertimbang untuk diperakukan kepada Lembaga Tender untuk disetuju terima sekiranya kami didapati berkeupayaan untuk melaksanakan projek yang ditender, mengikut penilaian SAMB berasaskan maklumat-maklumat dan dokumen-dokumen yang kami kemukakan.

3. Kami juga mengambil maklum bahawa kami dikehendaki mengemukakan semua maklumat dan dokumen-dokumen yang diminta bersama-sama tender kami sebelum Tender ditutup dan maklumat-maklumat atau dokumen-dokumen yang dikemukakan kemudian daripada itu tidak akan diterima untuk diambil kira dalam penilaian keupayaan kami.

4. Kami mengaku bahawa maklumat-maklumat dan data-data yang kami berikan bersama-sama ini di Borang B, C, CA, D, E, F,G & GA, H dan dokumen-dokumen yang kami sertakan bersamanya setahu kami adalah semuanya benar dan sah pada semua segi dan kami telah mengambil makluman dan sedar akan tindakan yang boleh diambil oleh SAMB terhadap kami dan/atau tender kami, sekiranya mana-mana maklumat, data-data dan dokumen yang kami berikan itu didapati tidak benar atau palsu.

5. Kami juga mengambil maklum dan sedar bahawa Tender kami akan ditolak (disqualified) dan tidak akan dipertimbangkan sekiranya maklumat-maklumat yang kami berikan tidak mencukupi atau sekiranya kami gagal untuk memberikan bersama-sama ini mana-mana maklumat dan/atau menyertakan mana-mana dokumen penting yang sangat diperlukan untuk membolehkan SAMB menilai keupayaan kami, terutamanya dokumen-dokumen berhubung dengan kedudukan kewangan dan prestasi kerja semasa kami seperti berikut:-

(1) Salinan Akaun Syarikat yang telah disahkan dan diaudit oleh Juru Audit yang bertauliah, bagi dua (2) tahun kewangan terakhir.
(2) Salinan Penyata Bulanan Akaun Bank mengenai Wang Dalam tangan petender bagi (3) bulan terakhir sebelum tarikh tutup Tender;
(3) Laporan Penyelia Projek atas prestasi kerja semasa yang bukan projek SAMB atas Borang GA dalam satu sampul berlakri bagi setiap kerja semasa yang sedang dilaksanakan.

6. Kami dengan ini memberi kuasa kepada mana-mana pegawai kerajaan, jurutera-jurutera projek, bank dan institusi kewangan lain dan lain-lain atau mana-mana orang atau firma yang berkenaan untuk memberikan maklumat-maklumat yang dianggap perlu dan diminta oleh SAMB untuk menyemak maklumat-maklumat yang kami berikan atau untuk mendapatkan maklumat tambahan. Kami mengambil maklum bahawa pihak SAMB juga boleh merujuk apa-apa maklumat yang kami kemukakan dengan mana-mana pihak termasuk Jabatan Hasil Dalam Negeri. Walau bagaimanapun kami tetap bertanggungjawab di atas maklumat-maklumat dan dokumen-dokumen yang kami berikan bersama-sama ini.

Yang Benar,

..... Tarikh:.....
(Tandatangan Petender)

Nama Penuh:.....
No. Kad Pengenalan:.....
Atas Sifat:.....
Yang diberi kuasa dengan sempurnanya untuk mendatangani Tender ini untuk dan bagi pihak:

.....
(Meteri atas Cap Petender)

Saksi:..... Tarikh:.....

Nama Penuh:.....
No. Kad Pengenalan:.....
Pekerjaan:.....
Alamat:.....

BORANG B

MAKLUMAT AM LATAR BELAKANG PETENDER

1. Nama: _____
2. Alamat: _____

   _____

   _____

   No. Telefon: _____ No.Fax: _____

3. Pendaftaran dengan Lembaga Pembangunan Industri Pembinaan Malaysia (CIDB) / Kementerian Kewangan Malaysia (Sertakan Salinan Pendaftaran)
   (i) No. Pendaftaran: _____
   (ii) Tarikh Daftar: _____ Sah hingga _____
   (iii) Gred, Pengkhususan / Kod Bidang : _____

   _____
   (iv) Taraf (Bumiputera / Bukan Bumiputera): _____
   (v) Jika Bumiputera, tempoh sah taraf: Dari :_____ Hingga _____

4. Pendaftaran dengan pihak Kastam DiRaja Malaysia untuk Akta Cukai Barang dan Perkhidmatan 2014 (Akta GST 2014).
   (i) No. Pendaftaran GST : _____

5. Bagi Syarikat Sdn. Bhd. Nyatakan:
   (i) Modal dibenarkan : RM _____
   (ii) Modal dibayar : RM _____

6. Perniagaan Utama lain, jika ada:
   (a) _____sejak tahun _____
   (b) _____sejak tahun _____

7. Ahli-ahli Syarikat
   (i) Ahli-ahli Lembaga Pengarah

Nama	Jawatan	Saham Modal Dipegang

(i) Ahli-ahli Lembaga Pengarah (Samb)

Nama	Jawatan	Saham Modal Dipegang

(ii) Ahli-ahli Pengurusan

Nama	Jawatan	Kelulusan Akademik/Iktias

BORANG C

DATA-DATA KEWANGAN

A. Ringkasan harta dan liabiliti seperti yang ditunjukkan dalam Lembaran Imbangan (Balance Sheet)* yang diaudit bagi tahun kewangan terakhir:-

Asset* (A)	Liabiliti * (B)	Nilai Kewangan (Werth) (A-B)
Semasa : RM Tetap : RM	Semasa: RM Tetap : RM	Model Pusingan: RM Model Tetap : RM
Jumlah : RM	Jumlah : RM	'Nett Worth' : RM

B. Akaun Wang Di Tangan (Cash in Hand)**

1. Nama dan Alamat Bank di mana akaun di buka:

   _____

   _____

2. Nombor Akaun: _____

C Kemudahan Kredit (jika ada) +

1. Nama dan Alamat Bank/Insitusi Kewangan yang memberi Kemudahan Kredit:

   _____

   _____

2. Bentuk dan baki amaun yang boleh digunakan untuk projek pembinaan

(i)	Overdraf atau Talian Kredit	RM
(ii)	Overdraf bercagar	RM
(iii)	Pinjaman Tetap yang akan/layak Diperolehi untuk Projek	RM
(iv)	_____	RM _____
	Jumlah	RM _____

PERINGKATAN PENTING

* Sila sertakan salinan Akaun Syarikat bagi dua (2) tahun kewangan terakhir, yang disahkan dan diaudit oleh Juru Audit bertauliah (certified Accountant) atau sekiranya tiada, bagi tahun kewangan setahun sebelumnya bagi menyokong data-data yang diberi. Tender yang tidak disertakan dengan Akaun ini akan ditolak.

** Sila sertakan salinan Penyata Bulanan Bank bagi tiga (3) bulan terakhir sebelum tarikh tutup Tender. Tender yang tidak disertakan dengan penyata ini akan ditolak.

\+ Sila dapat dan sertakan Laporan sulit daripa Pihak Bank/Institusi Kewangan atas format seperti Borang CA, dalam satu sampul berlakri.

BORANG D – REKOD PENGALAMAN KERJA

(Senarai semua kerja yang disiapkan dalam 5 tahun lepas)

Bil	Nama Kontrak/Projek dan Skop Kerja +	Nilai Kontrak (RM)	Nilai Petender Bertanggungjawab	Tempoh Kontrak**	Tarikh Milik Tapak	Tarikh Siap		Nama dan Alamat Pegawai Penguasa/ Jurutera Perunding		Nama dan Alamat Majikan
						Kontrak	Sebenar			

\+ Salinan Perakuan/Pengesahan Siap Kerja bagi setiap kerja yang disenaraikan hendaklah disertakan.

* Hanya perlu diisi sekiranya petender melaksanakan kerja sebagai ahli syarikat gabungan.

** Tempoh Kontrak hendaklah termasuk lanjutan masa yang diluluskan

BORANG E - KAKITANGAN TEKNIKAL

(Butir-butir Kakitangan Teknikal Yang Ada Dalam Pengajian Petender Masa Kini)

Nama dan No.K/P	Umur	Kelulusan Professional/Pendidikan**	Tahun Kelulusan	Tarikh diambil Bekerja	Jawatan yang Disandang/Tugas-tugas semasa	Pengalaman Lepas (Jawatan disandang, nama projek dan majikan dan tempoh bekerja dan sebagainya)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

* Salinan Borang KWSP 'A' setiap pekerja bagi bulan caruman terakhir dan salinan perjanjian perkhidmatan ahli professional yang diambil khidmat secara kontrak hendaklah disertakan.

** Sila sertakan salinan sijil kelulusan atau sijil keahlian Badan-badan Professional.

BORANG F - KEUPAYAAN LOJI DAN PERALATAN PEMBINAAN UTAMA

(Senarai Loji dan Peralatan Pembinaan Utama Keupayaan Petender Yang Sesuai Yang Boleh Digunakan Untuk Projek).

Bil	Butiran (Jenis, Model, Buatan dan Keupayaan/Saiz)	Dimiliki, disewabeli atau disewapajak*	Bilangan Setiap Satu	Nilai Semasa (RM)	Umur (dari tarikh belian asal)	Tempat simpanan/digunakan sekarang	Catatan
A.	Loji dan Peralatan Asas** (a) Treatment Plant Equipments (b) Pumping and Mechanical Plants (c) Electrical Equipments (all as per Specification)						
B	Loji dan Peralatan Lain						

* Salinan kad pendaftaran dan/atau dokumen-dokumen lain bukti keempunyaan hak milik petender atau perjanjian sewabeli-sewapajak atas setiap Loji dan Peralatan yang disenaraikan hendaklah disertakan.

** Pegawai yang menyediakan Dokumen Tender hendaklah menyenaraikan butir-butir Loji dan Peralatan Asas bagi projek berkenaan (tanpa bilangan AKM)

BORANG G - SENARAI KERJA KONTRAK SEMASA

(Senarai semua kerja di dalam tangan/sedang berjalan dan belum siap termasuk kontrak yang baru dilantik)

Bil	Nama Kontraktor/Projek+	Nilai Kontrak (RM)	Nilai Petender* Bertanggungjawab	Tempoh Kontrak**	Tarikh Milik Tapak	Tarikh Siap Kontrak	Kemajuan Kerja +		Nama dan Alamat Jurutera Projek	Nama dan Alamat Majikan
							Ikut Jadual (%)	Sebenar Dicapai (%)		

* Hanya perlu diisi sekirnya petender melaksanakan kerja sebagai ahli syarikat gabungan.

** Tempoh Kontrak hendaklah termasuk lanjutan masa yang diluluskan.

\+ Peringatan Penting
Bagi setiap kerja semasa yang bukan projek SAMB, sertakan (wajib) Laporan Peyelia Projek atas format seperti Borang GA, dalam satu sampul berlakri. Tender yang tidak disertakan dengan Laporan ini bagi setiap kerja yang disenaraikan, akan ditolak.

SULIT BORANG CA

LAPORAN BANK/INSTITUSI KEWANGAN MENGENAI KEDUDUKAN KEWANGAN PETENDER

(Borang ini hendaklah dilengkapkan oleh pihak bank atau institusi kewangan lain dan diserahkan kepada petender dalam satu sampul berlakri untuk disertakan bersama-sama tendernya sekiranya petender mempunyai kemudahan kredit dengan Bank/Institusi Kewangan yang berkenaan.

Kepada

(Ketua Pegawai Eksekutif, SAMB)

Nama Petender:

Projek:

_____

_____

(A) – Kemudahan Kredit – yang boleh digunakan untuk perlaksanaan Projek: Kemudahan Kredit yang telah dilulus dan kemudahan kredit tambahan minimum yang layak diperelohi oleh petender adalah seperti berikut:-

Bentuk Kemudahan Kredit	Baki drp yang Telah diluluskan	Tambahan Minima Yang akan Diluluskan*	Jumlah
(i) Overdraf	RM	RM	RM
(ii) Overdraf bercagar	RM	RM	RM
(iii) Talian Kredit	RM	RM	RM
(iv) Pinjaman Tetap yang akan/layak Diperolehi untuk projek	RM	RM	RM
(v)	RM	RM	RM
Jumlah:	RM	RM	RM

(B) – Ulasan-ulasan mengenai kedudukan kewangan dan akuan petender:-

Tandatangan untuk dan bagi pihak bank:

Nama Bank:

Materi Bank:

Nama Pegawai : _____

Jawatan : _____

Tarikh : _____

SULIT BORANG GA

LAPORAN PENYELIA PROJEK ATAS PRESTASI KERJA (BUKAN PROJEK SAMB)

SEMASA PETENDER

(Borang ini hendaklah dilengkapkan oleh Penyelia Projek atau Pembantu Kanannya yang mengawasi projek dan diserahkan kepada Kontraktor dalam satu sampul berlakri untuk disertakan bersama-sama tendernya).

Kepada:

Ketua Pegawai Eksekutif,
Syarikat Air Melaka Berhad.

Nama Kontraktor: .....

Nama Projek Yang Dilaksanakan: .....

.....

No.Kontrak: .....

Harga Kontrak (termasuk anggaran nilai kerja perubahan) : RM
Wang Pos Prima dan Peruntukan Sementara : RM
Nilai Kerja Pembina : RM

Tarikh Milik Tapak :
Tarikh Penyiapan Asal :

Tempoh Kontrak: ..... minggu

Lanjutan Masa Yang Telah Diluluskan: ..... hari

Lanjutan Masa seterusnya:
Yang difikir/dijangka layak diperakukan: ..... hari
Atas sebab-sebab

(i)

(ii)

Kemajuan kerja (berdasaran nilaian kerja yang telah dilaksanakan):
Pencapaian sebenar:.....% Mengikut Jadual
Tarikh Kerja dijangka akan dapat disiapkan: .....

Nilai Bahagian Kerja Yang Telah Siap : RM
Nilai Baki Kerja Yang Belum Siap : RM

Ulasan-ulasan mengenai Prestasi Kontraktor;
(Nyatakan apa-apa kepujian dan/atau kelemahan kontraktor dan juga apa-apa tindakan/perakuan yang diambil/dipertimbang berhubung dengan prestasi Kontraktor melaksanakan Kontrak).

Tandatangan Penyelia Projek : .....

Nama : .....

Jawatan : .....

Tarikh : .....

SULIT BORANG GA 1

LAPORAN JURUTERA PROJEK ATAS PRESTASI KERJA SEMASA PETENDER

(Borang ini hendaklah dilengkapkan oleh Jurutera Projek atau Pembantu Kanannya yang mengawasi projek apabila diminta berbuat demikian oleh Pegawai Penilaian dan hendaklah dihantar segera dengan menggunakan mesin fax).

Kepada:

Ketua Pegawai Eksekutif,
Syarikat Air Melaka Berhad.

Nama Kontraktor .....

Nama Projek Yang Dilaksanakan .....

.....

No. Kontrak .....

Harga Kontrak (termasuk anggaran nilai kerja perubahan) :RM
Wang Kos Prima dan Peruntukan Sementara :RM
Nilai Kerja Pembina :RM

Tarikh Milik Tapak:..... Tempoh Kontrak:..... minggu
Tarikh Penyiapan Asal:.....

Lanjutan Masa Yang Telah Diluluskan:..... hari

Lanjutan Masa Seterusnya:
Yang difikir/dijangka layak diperakukan:..... hari

Atas Sebab-sebab:

(i)

(ii)

Kemajuan Kerja (berdasarkan nilaian kerja yang telah dilaksanakan):

Pencapaian sebenar: .....% Mengikut Jadual: .....

Tarikh Kerja dijangka akan dapat disiapkan:.....

Nilai Bahagian Kerja Yang Telah Siap : RM
Nilai Baki Kerja Yang Belum Siap : RM

Ulasan-Ulasan mengenai Prestasi Kontraktor;

(Nyatakan apa-apa kepujian dan/atau kelemahan kontraktor dan juga apa-apa tindakan/perakuan yang diambil/dipertimbang berhubung dengan prestasi Kontraktor melaksanakan Kontrak)

Tandatangan Pegawai Penguasa/

Jurutera Projek/Wakil :.....

Nama :.....

Jawatan :.....

Tarikh :.....

BORANG H - JADUAL PERANCANGAN KERJA

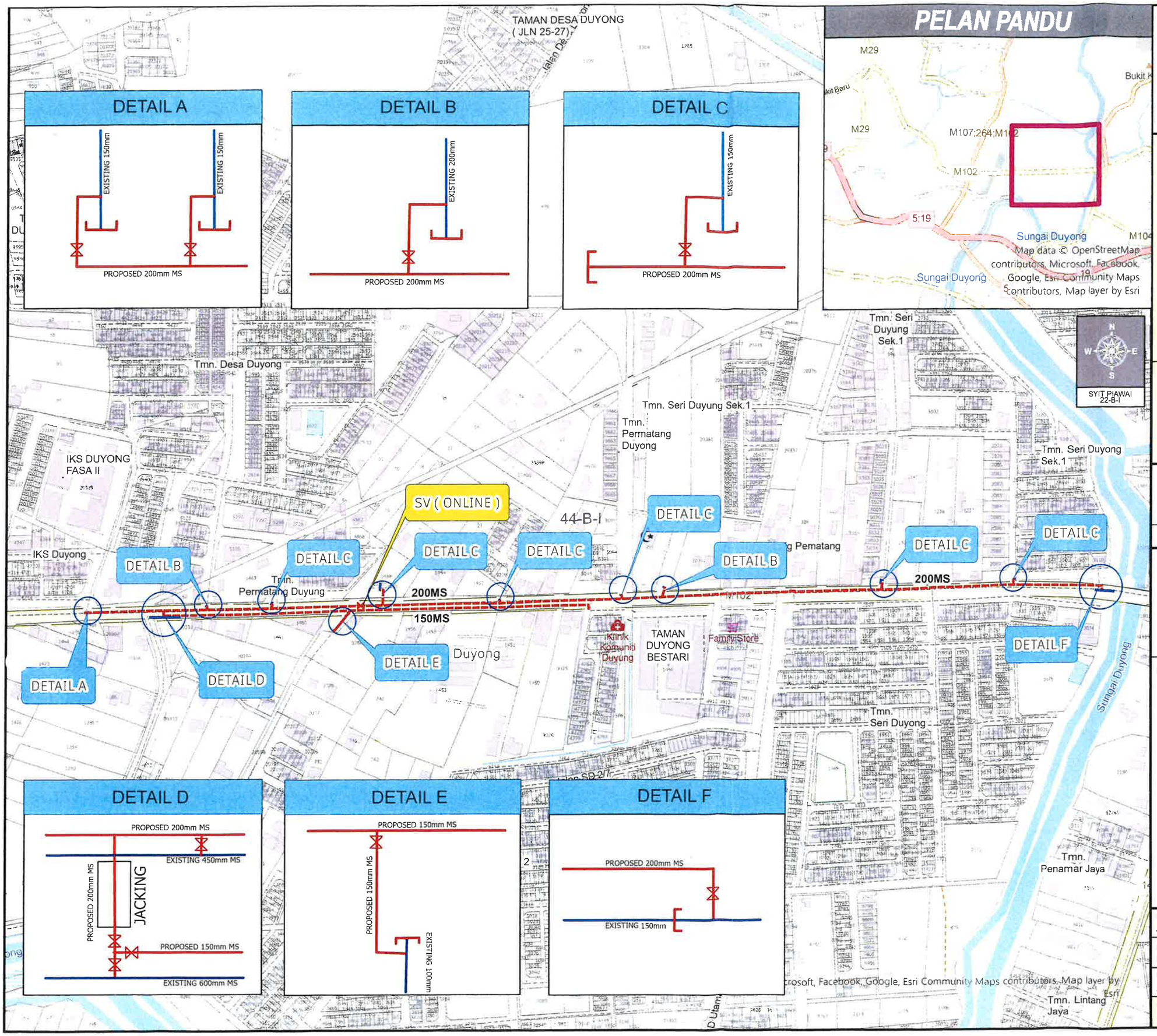
KETERANGAN KERJA	TEMPOH KERJA DALAM MINGGU												
	1	2	3	4	5	6	7	8	9	10	11	12	13

Nota:
Petender hendaklah menyenarai skop kerja yang dijalankan dalam tender ini.

.....
Tandatangan & Cop Rasmi Petender

BAHAGIAN K

SENARAI LUKISAN



DETAIL A

DETAIL B

DETAIL C

DETAIL D

DETAIL E

DETAIL F

PELAN PANDU

SAMB
SYARIKAT AIR MELAKA BERHAD
شيركت اير ملاك برهد

SYARIKAT AIR MELAKA BERHAD
Lot 897, Wisma Air, Jalan Hang Tuah 75300 Melaka
Tel. 06-292 1758 Fax. : 06-2836749

TAJUK PROJEK :

CADANGAN PROJEK :
Cadangan Membekal Dan Memasang Paip 200mm, 150mm Diameter Keluli Lembut Dari IKS Duyong Hingga Ke Jambatan Duyong Serta Lain-lain Kerja Yang Berkaitan.

PARLIMEN :
KOTA MELAKA

DUN :
DUYONG

DAERAH :
MELAKA TENGAH, MELAKA

TAJUK LUKISAN :

- PLAN TAPAK
- PELAN PANDU

TANDATANGAN :

Ir. SHAHIRWAN BIN AMAN SHAH
KETUA PEGAWAI OPERASI

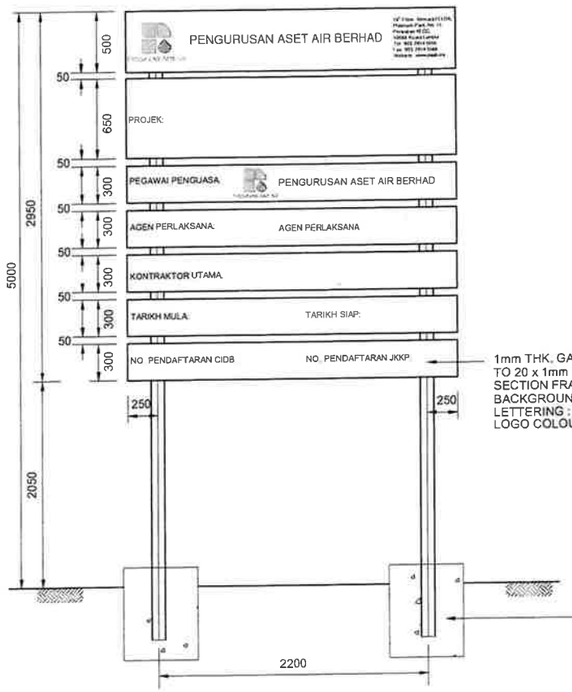
INFORMATION			
PIPE SIZE	150 / 200 mm	S-BEND	4 nos
PIPE TYPE	MS	BIL HYDRANT	2 nos
SLUICE VALVE	NIL	PIPE LENGTH	1340/646 m
WASH OUT	NIL	BIL PENGGUNA	NIL
TAP OFF	NIL		

PETUNJUK :

PETUNJUK

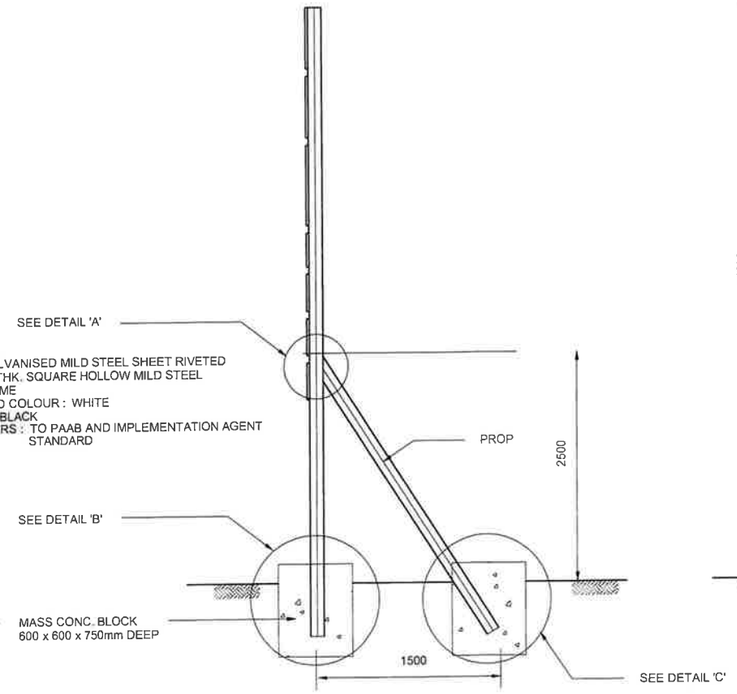
- Proposed Pipe
- Existing Pipe
- Proposed Sluice Valve
- Proposed Wash Out
- Existing Sluice Valve
- Proposed Endcap
- Reducer
- Sbend / Air Valve
- Proposed Hydrant
- Existing Hydrant
- House

DIUKUR OLEH : JT. MOHD ZULKEFLY BIN AZIS	SKALA : 1:5,000
DILUKIS OLEH : MOHAMAD ADZAHARI B. MOHD ALI	TARIKH : 01 APRIL 2026
DISEMAK OLEH : ABD. RAZAK BIN ABU BAKAR	NO. RUJUKAN : -
NO. LUKISAN SAMB/P.C/25/P10	REVISION 00



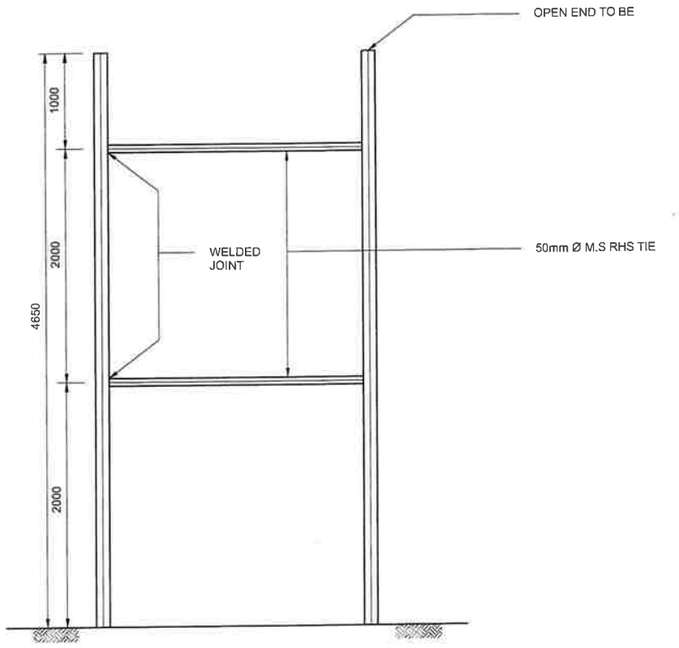
FRONT VIEW

SCALE: 1 : 50



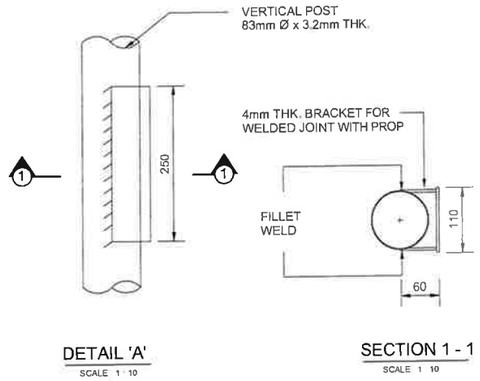
SIDE VIEW

SCALE: 1 : 50



REAR VIEW

SCALE: 1 : 50



DETAIL 'A'

SCALE: 1 : 10

SECTION 1 - 1

SCALE: 1 : 10

PANTONE CODE COLOUR SCHEME

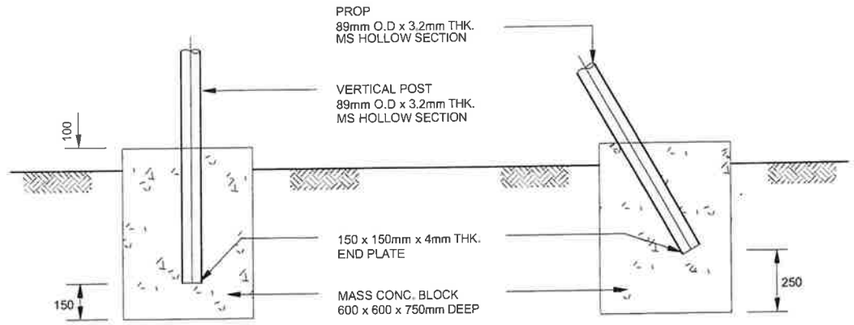
- PURPLE : 271C
- BLUE : 2925C
- GREY (WORDING) : COOL GREY 6C

PANTONE CODE COLOUR SCHEME FOR PAAB CORPORATE LOGO

SCALE: NTS

NOTES:

1. UNLESS OTHERWISE SPECIFIED THE GENERAL NOTES, ABBREVIATIONS AND STANDARD DETAILS SHOWN IN THE RELEVANT DRAWINGS HERE IN SHALL BE APPLICABLE TO THE WORKS SHOWN IN THIS DRAWING.
2. ALL DIMENSIONS ARE IN MILLIMETRES.
3. ALL STEEL STRUCTURAL MEMBERS AND PANEL FRAMES TO BE PAINTED WITH ONE COAT LEAD OXIDE PRIMER AND TWO COAT GLOSS (ENAMEL) PAINT.
4. PANEL BOARDS TO BE GALVANISED AND PAINTED WITH COMPATIBLE PAINTS, WITH DETAILS TO BE ISSUED.
5. TEXT SIZE FOR STANDARD LOGOS AND COLOUR SCHEME TO FOLLOW THE REQUIREMENT.
6. PROJECT TITLE WILL BE GIVEN TO SUIT.



DETAIL 'B'

SCALE: 1 : 25

DETAIL 'C'

SCALE: 1 : 25

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

SAMB

Syarikat Air Melaka Berhad
LOT 897,G,1,5-9
WISMA AIR, JALAN HANG TUAH,
75300 MELAKA
Tel. 06-2921758
No. Fax: 06-2879758
WEBSITE http://www.samb.com.my

REVISION

REV.	DATE	DESCRIPTION	APR

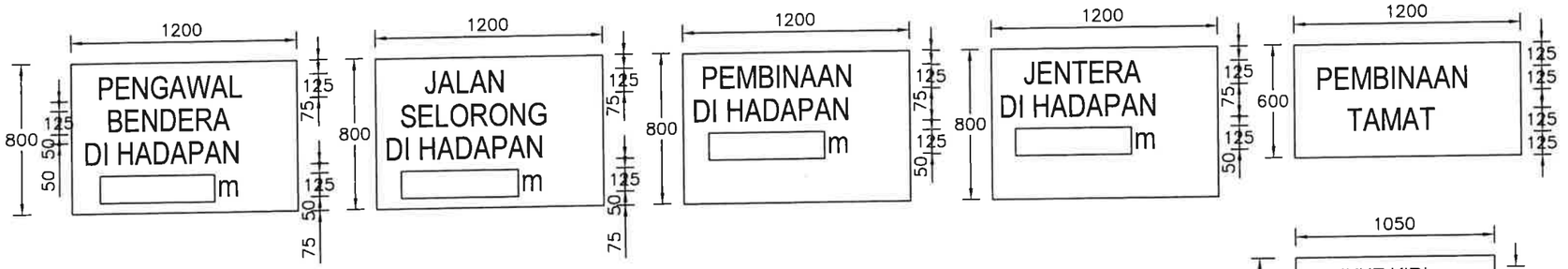
DRAWING TITLE:

TYPICAL DETAILS OF MINOR PROJECT SIGN BOARD

DATE : JANUARI 2026	SCALE : AS SHOWN (A1/A3)
DRAWN : ADZAHARI ALI	CHECKED : Ir. JULIANA ASHRAM
DESIGNED : ABDUL RAZAK	APPROVED : Ir. SHAHIRWAN

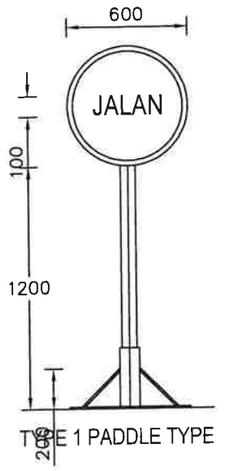
DRAWING NO : SAMB/PRC/STD/001/2026

REVISION 01

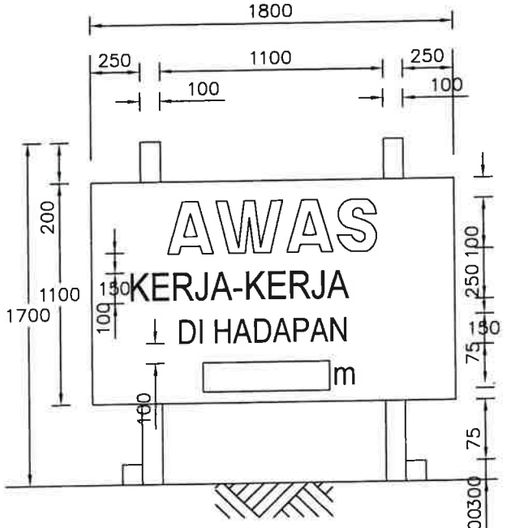


COLOUR : ORANGE BACKGROUND, BLACK .. BLACK

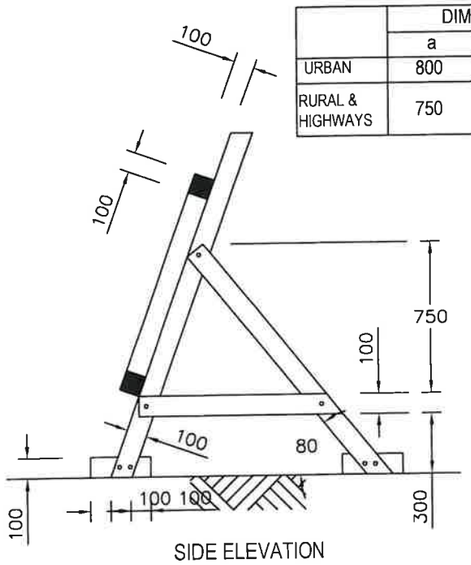
COLOUR : ORANGE BACKGROUND, BLACK BOADER AND BLACK LETTERING



TYPE 1 PADDLE TYPE

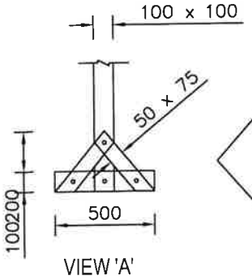


FRONT ELEVATION

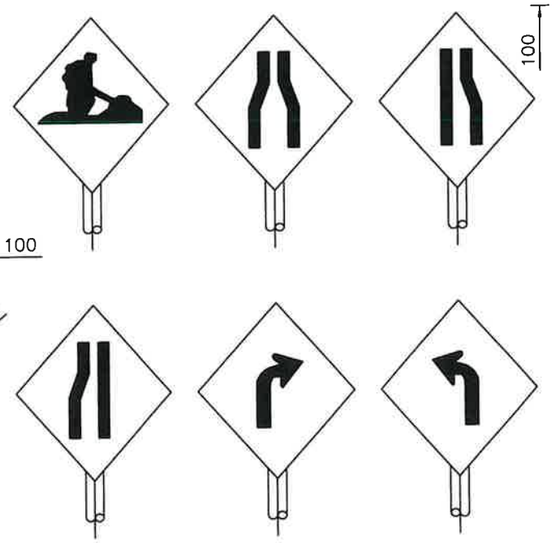


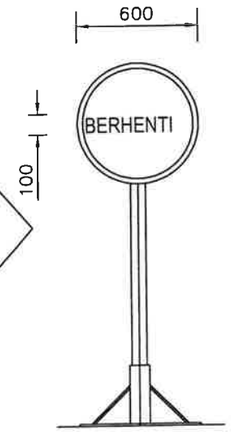
SIDE ELEVATION

	DIMENSION IN mm		
	a	b	c
URBAN	800	10	15
RURAL & HIGHWAYS	750	15	20

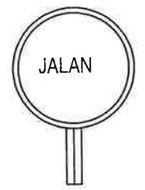


VIEW 'A'

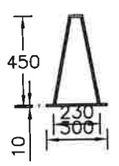




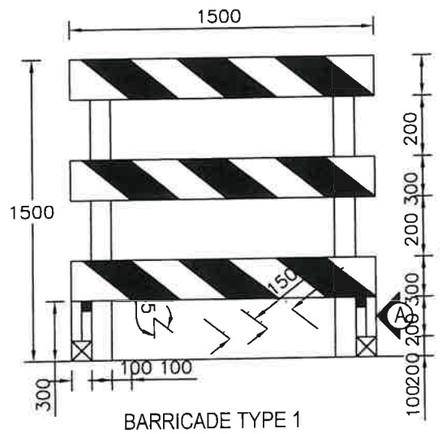
TYPE 1
PADDLE TYPE



TYPE 2
HAND DICS
STOP/GO
CONTROL SIGN

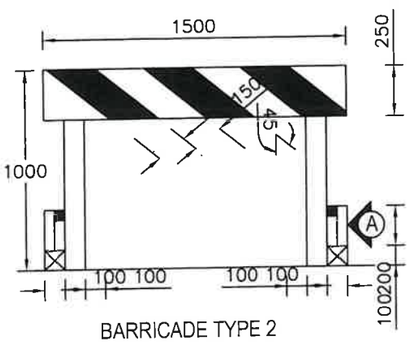


TYPICAL TRAFFIC
GUIDANCE CONE

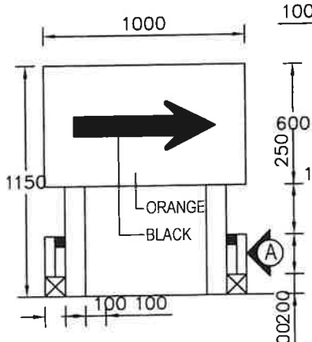


BARRICADE TYPE 1

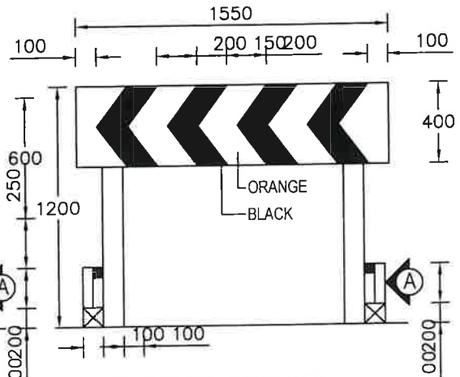
1. FOR BARRAGE USE ORNAGE AND WHITE COLOUR



BARRICADE TYPE 2



DETOUR SIGN



SHARP DEVIATION SIGN

STRIPES SHALL POINT TOWARDS
THE DIRECTION OF TRAFFIC

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

SAMB

Syarikat Air Melaka Berhad
LOT 897,G,1,5-9
WISMA AIR, JALAN HANG TUAH,
75300 MELAKA
Tel: 06-2921758
No. Fax: 06-2836744
WEBSITE http://www.samb.com.my

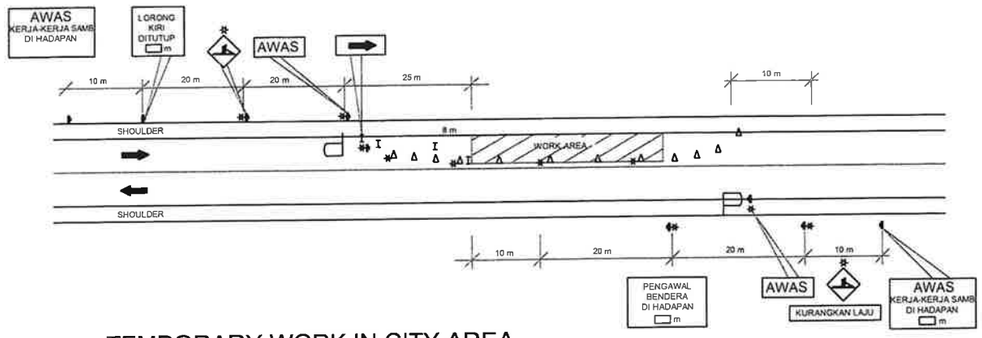
REVISION

REV.	DATE	DESCRIPTION	APR

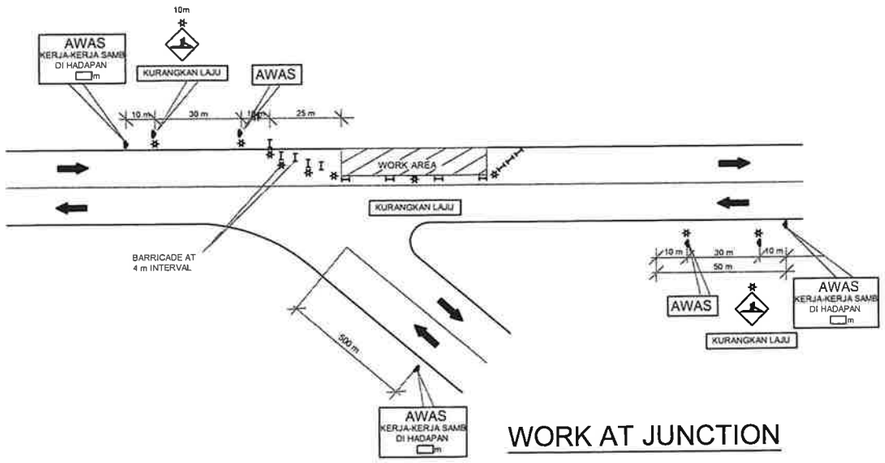
DRAWING TITLE:

TEMPORARY ROAD SIGNS 1

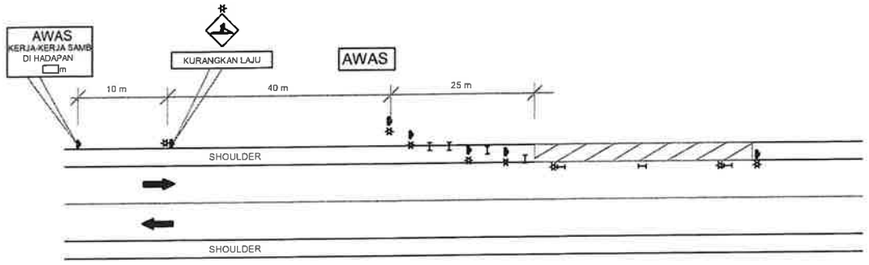
DATE : JANUARI 2026	SCALE : AS SHOWN (A1/A3)
DRAWN : ADZAHARI ALI	CHECKED : Ir. JULIANA ASHRAM
DESIGNED : ABDUL RAZAK	APPROVED : Ir. SHAHIRWAN
DRAWING NO : SAMB/PRC/STD/002/2026	REVISION 01



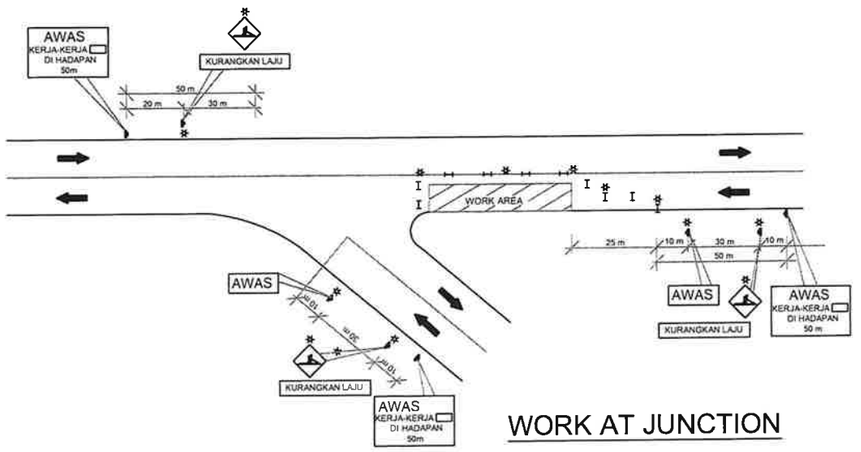
TEMPORARY WORK IN CITY AREA
ON 2 LANE ROADWAY



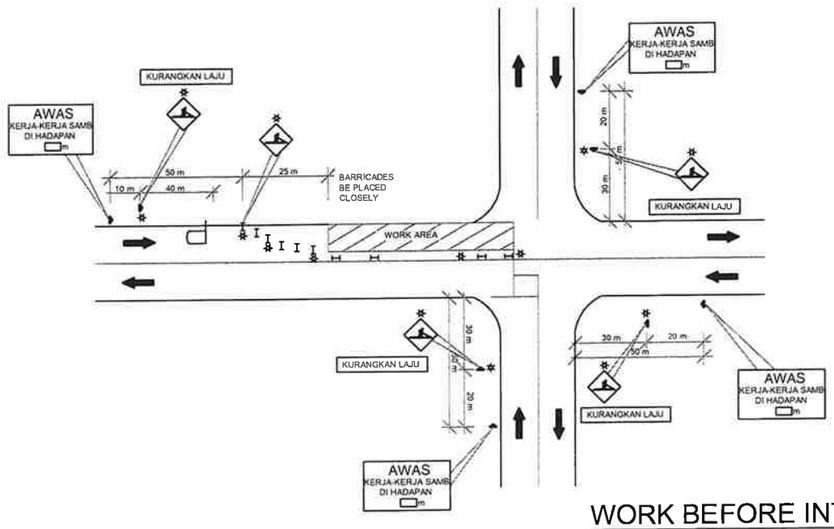
WORK AT JUNCTION



SHOULDER ON ONE SIDE CLOSED



WORK AT JUNCTION



WORK BEFORE INTERSECTION

NOTES :

1. FOR NIGHT YSE,ALL SIGN TO BE REFLECTORISED.

2. ALL BARRICADES OR CONES ARE 4 M APART.

3. ALL DIMENSIONS ARE IN METER UNLESS OTHERWISE MENTIONED.

4. PLACED BARRICADES AT WORK AREA CLOSELY

5. IF THE LENGHT OF WORK IS MORE THAN 20M , USE PORTABLE AUTOMATIC LIGHT SIGNAL AT NIGHT.

LEGENDS :

- WARNING SIGN
- I BARRICADE
- Δ CONE
- FLAGMAN
- WARNING FLASHER
- o DELINEATOR

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

SAMB

Syarikat Air Melaka Berhad
LOT 897,G,1,5-9
WISMA AIR, JALAN HANG TUAH,
75300 MELAKA
Tel. 06-2921758
No. Fax: 06-2839748
WEBSITE http://www.samb.com.my

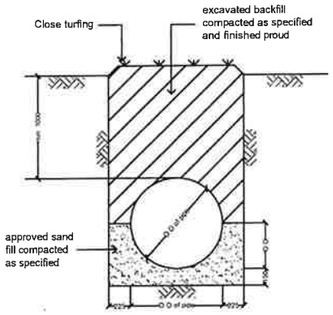
REVISION

REV.	DATE	DESCRIPTION	APR

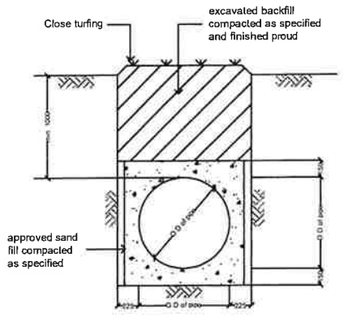
DRAWING TITLE:

TEMPORARY ROAD SIGNS 2

DATE : JANUARI 2026	SCALE : AS SHOWN (A1/A3)
DRAWN : ADZAHARI ALI	CHECKED : Ir. JULIANA ASHRAM
DESIGNED : ABDUL RAZAK	APPROVED : Ir. SHAHIRWAN
DRAWING NO : SAMB/PRC/STD/003/2026	REVISION 01



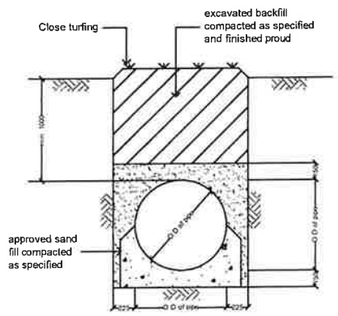
NORMAL TRENCH
NOTE TO SCALE



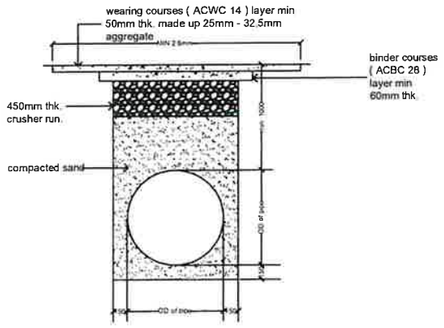
CONCRETE SURROUND
NOTE TO SCALE

NOTES:

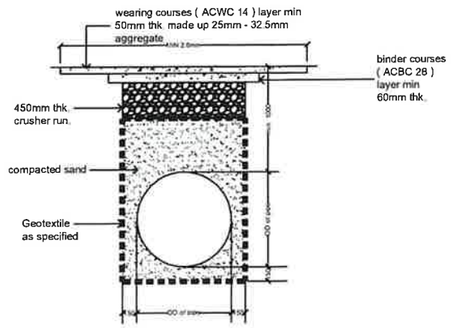
1. PIPE TO BE SURROUND IN CONCRETE FOR COVER LESS THAN ONE METRE.
2. PIPE TO BE HAUNCH IF PIPE MAKE-UP GROUND OR COVER MORE THAN TWO METRE.
3. PRECAST CONCRETE GRADE 25/20.
4. MASS CONCRETE GRADE 20/25.



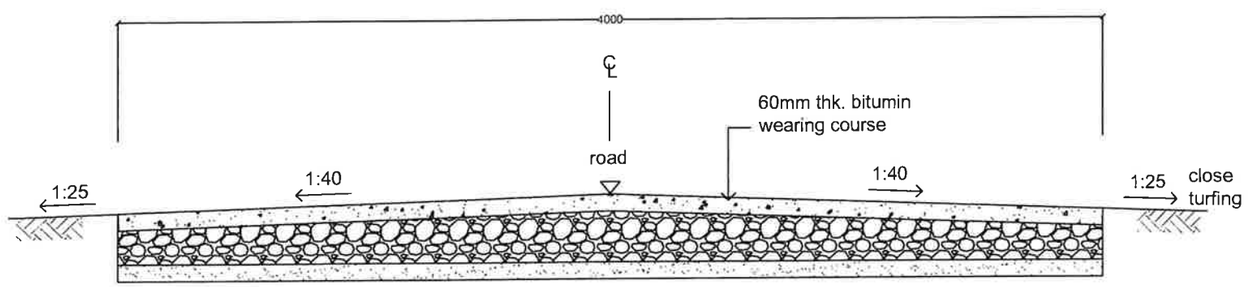
CONCRETE HAUNCH
NOT TO SCALE



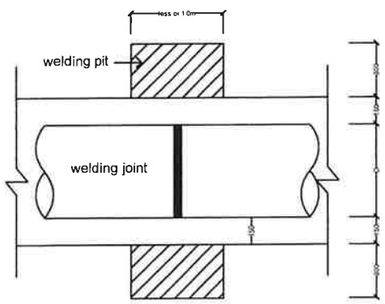
DETAIL FOR PIPE CROSSING UNDER ROAD
NOT TO SCALE



DETAIL FOR PIPE CROSSING UNDER ROAD AND GEOTEXTILE AS SPECIFIED
NOT TO SCALE



TYPICAL SECTION OF ACCESS ROAD
NOT TO SCALE



DETAIL AT WELDING PIT
NOTE TO SCALE

NOTES :-

1. ALL DIMENSIONS ARE IN MILIMITRE AND LEVELS ARE IN METRE UNLESS OTHERWISE STATED
2. ALL DIAMETER OF MS PIPE REFER TO NOMINAL DIAMETER UNLESS OTHERWISE SPECIFIED

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

SAMB
Syarikat Air Melaka Berhad
LOT 897,G,1,5-9
WISMA AIR, JALAN HANG TUAH,
75300 MELAKA
Tel. 06-2921758
No. Fax: 06-2837648
WEBSITE http://www.samb.com.my

APPROVED:

Ir. SHAHIRWAN BIN AMAN SHAH
Ketua Pegawai Operasi
Syarikat Air Melaka Berhad

REVISION

REV.	DATE	DESCRIPTION	APR

DRAWING TITLE:

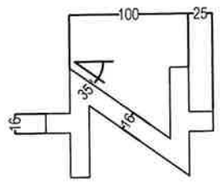
DETAILS OF PIPE TRENCHING & BEDDING, AND ROAD

DATE :	JANUARI 2026	SCALE :	AS SHOWN (A1/A3)
DRAWN :	ADZAHARI ALI	CHECKED :	Ir. JULIANA ASHRAM
DESIGNED :	ABDUL RAZAK	APPROVED :	Ir. SHAHIRWAN
DRAWING NO :	SAMB/PRC/STD/004/2026	REVISION	01

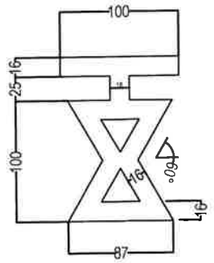
LEGEND.
M.S - MILD STEEL
D.I - DUCTILE IRON
C.I - CAST IRON

NOTES

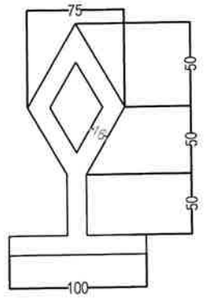
1. ALL DIMENSIONS ARE IN MILIMITRE AND LEVELS ARE IN METRE UNLESS OTHERWISE STATED.
2. ALL REINFORCED CONCRETE SHALL BE GRADE 25/20
3. ALL REINFORCED TO BE MILD STEEL (R fy=250N/mm2) SHALL COMPLY WITH BS 4449.
4. ALL MARKER POST SHALL BE PAINT WITH 2 COATS OF CEMENT BASED PAINT WHITE IN COLOUR AND BLUE COLOUR LETTERING.
5. MARKER POST SHALL BE PROVIDED AT EVERY LOCATION OF VALVE,BEND AND TEE CHAMBER.



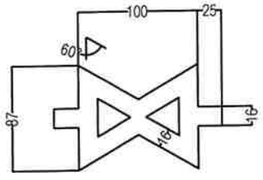
SYMBOL FOR BUTTERFLY VALVE



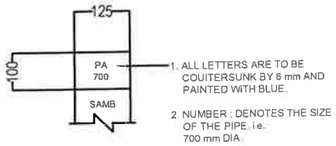
SYMBOL FOR SCOUR VALVE



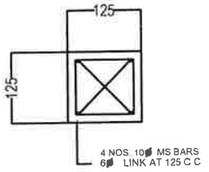
SYMBOL FOR AIR VALVE
STANDARD DETAILS OF MARKERS



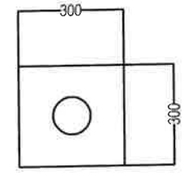
SYMBOL FOR SLUICE VALVE



DETAIL 'A'



SECTION A-A



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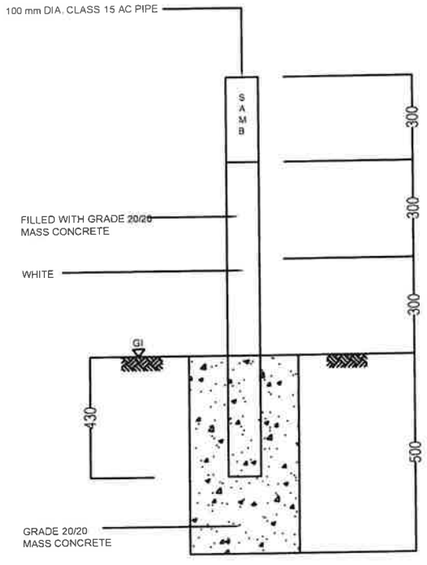
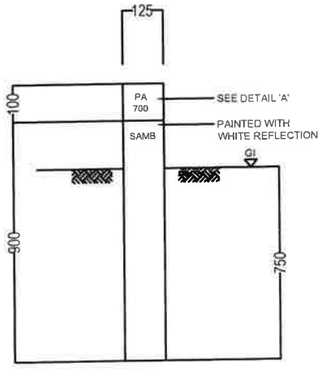
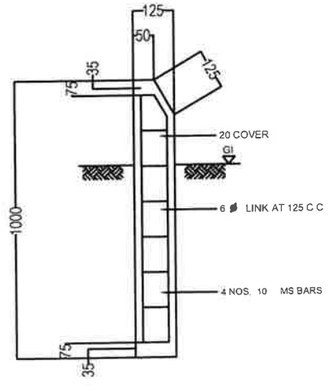


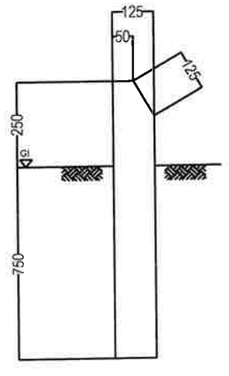
ELEVATION



PIPELINE MARKER POST



SECTION SHOWING REINFORCEMENT



SIDE ELEVATION

DETAIL OF BOUNDRY MARKER

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

SAMB
Syarikat Air Melaka Berhad
LOT 897,C,1,5-9
WISMA AIR, JALAN HANG TUAH,
75300 MELAKA
Tel: 06-2921758
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WEBSITE: http://www.samb.com.my

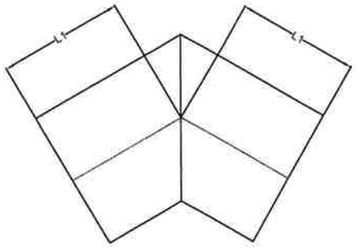
REVISION

REV.	DATE	DESCRIPTION	APR

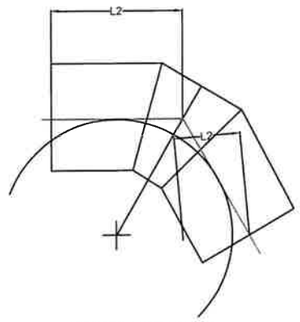
DRAWING TITLE:

DETAILS INSTALLATION OF METER CABINET

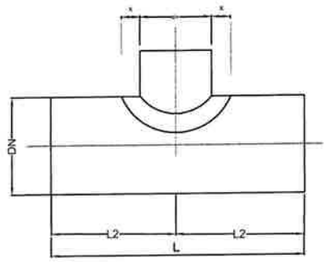
DATE : JANUARI 2026	SCALE : AS SHOWN (A1/A3)
DRAWN : ADZAHARI ALI	CHECKED : Ir. JULIANA ASHRAM
DESIGNED : ABDUL RAZAK	APPROVED : Ir. SHAHIRWAN
DRAWING NO : SAMB/PRC/STD/005/2026	REVISION 01

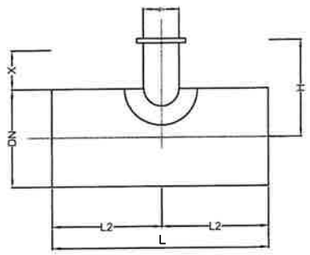


GUSSETED BEND TYPE 1
NOT MORE THAN 30°
(SEE TABLE 1)

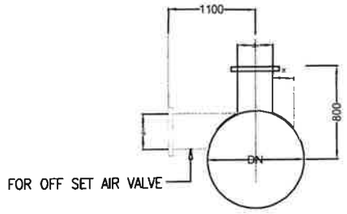


GUSSETED BEND TYPE 2
OVER 30° UP TO 60°
(SEE TABLE 1)

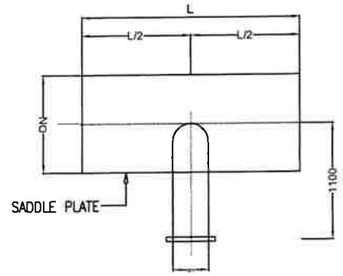




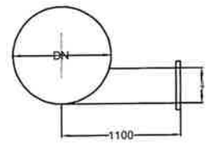
PLAN



SECTION



PLAN



SECTION

TABLE 1 :DIMENSIONS OF GUSSETED BENDS

PIPE OUTSIDE DIAMETER	TYPE 1	TYPE 2				TYPE 3	
	NOT MORE THAN 30°	OVER 30° TO 45°		OVER 45° TO 60°		OVER 60° TO 90°	
(mm)	L1 (mm)	R (mm)	L2 (mm)	R (mm)	L2 (mm)	R (mm)	L2 (mm)
100	175	150	150	150	250	150	300
150	225	225	225	225	300	225	400
200	300	300	300	300	400	300	500
250	375	375	375	375	500	375	650
300	375	450	450	450	500	450	700
350	450	525	525	525	600	525	800
400	450	600	600	600	600	600	850
450	450	675	675	450	600	450	850
500	450	825	825	550	600	550	850
600	550	975	975	650	750	650	1000
700	550	1050	1050	700	750	700	1100
750	600	1125	1125	750	850	750	1100
800	600	1200	1200	800	850	800	1200
900	600	1350	1350	900	900	900	1300
1000	750	1500	1500	1000	1100	1000	1500
1100	750	1500	1500	1000	1100	1000	1500
1200	750	1800	1800	1200	1200	1200	1700

PLAIN ENDED TEE

SCHEDULE OF PLAIN ENDED TEE

NOMINAL SIZE (mm)	BARREEL O.D DN (mm)	BRANCH O.D dn (mm)	L (mm)	H (mm)	SADDLE PLATE	
					X (mm)	THICKNESS (mm)
600 X 600	667.0	667.0	2000	650	220	4.1
600 X 450	667.0	507	1550	650	180	4.1
600 X 200	667.0	232.2	700	600	100	4.1
600 X 150	667.0	177.3	700	550	75	4.1
450 X 450	507.0	1550	550			
450 X 300	507.0	345.4	1050	500		
450 X250	507.0	286	850	500		
450 X 200	507.0	232.2	700	500		
450 X 150	507.0	177.3	550	450		
400 X 400	453.1	453.1	1350	550		
400 X 150	453.1	177.3	550	450		
250 X 250	286.0	286.00	850	400		
250 X 200	286.0	232.2	700	400		
250 X 150	286.0	177.3	550	350		
200 X 200	232.2	232.2	700	400		
200 X 150	232.2	177.3	550	350		
200 X 100	232.2	121.9	400	350		
150 X 150	177.3	177.3	550	300		
150 X 100	177.3	121.9	400	300		

NOTE: LARGER SIZED TO BE DESIGNED BY THE CONSULTANT TO SERVICE LICENSEE/WATER DISTRIBUTION LICENSEE APPROVAL

STEEL AIR VALVE TEE

SCHEDULE OF P/E STEEL AIR VALVES TEES WITH FLANGED BRANCH

TEE	BARREEL O.D (mm)	BRANCH O.D (mm)	L (mm)	H (mm)	SADDLE PLATE	
					X (mm)	THICKNESS (mm)
100 X 25	121.9	44.2	550	150	220	
150 X 25	177.3	44.2	600	180		
200 X 50	232.2	69.2	750	210		
250 X 50	286.0	69.2	850	230		
300 X 50	345.4	69.2	900	260		
350 X 50	399.3	69.2	1200	290		
375 X 50	426.0	69.2	1200	290		
400 X 75	453.1	94.2	950	310		
450 X 75	507.0	94.2	1000	340		
500 X 75	560.3	94.2	1050	370		
600 X 100	667.0	121.9	1150	450	50	4.1
700 X 600	754.0	667.00	2000	760	220	4.1
750 X 600	804.0	667	2000	980	220	4.1
900 X 600	954.0	667	2000	800	300	4.1

NOTE: LARGER SIZED TO BE DESIGNED BY THE CONSULTANT TO SERVICE LICENSEE/WATER DISTRIBUTION LICENSEE APPROVAL

STEEL SCOUR TEE

SCHEDULE OF P/E TANGENTIAL SCOUR TEES

TEE	BARREEL O.D (mm)	BRANCH O.D (mm)	L (mm)	H (mm)	SADDLE PLATE	
					X (mm)	THICKNESS (mm)
100 X 100	121.9	121.9	550	750		
150 X 100	177.3	121.9	600	800		
200 X 100	232.2	121.9	750	825		
250 X 100	286.0	121.9	850	850		
300 X 100	345.4	121.9	900	875		
350 X 100	399.3	121.9	1200	900		
375 X 100	426.0	121.9	1200	900		
400 X 150	453.1	177.3	950	925		
450 X 150	507.0	177.3	1000	950		
500 X 150	560.3	177.3	1050	975		
600 X 150	667.0	177.3	1150	1000	75	4.1
700 X 200	754.0	232.20	1450	1050	100	4.1
750 X 200	804.0	232.2	1500	1100	100	4.1
900 X 200	954.0	232.2	1800	1100	125	4.1

NOTE: LARGER SIZED TO BE DESIGNED BY THE CONSULTANT TO SERVICE LICENSEE/WATER DISTRIBUTION LICENSEE APPROVAL

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

SAMB

Syarikat Air Melaka Berhad
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75300 MELAKA
Tel, 06-2921758
No. Fax: 06-2883748
WEBSITE

REVISION

REV.	DATE	DESCRIPTION	APR

DRAWING TITLE:

DETAIL OF
GUSSETED BEND & TEE

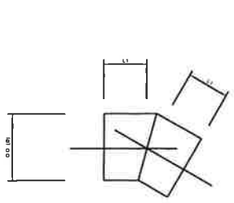
DATE : JANUARI 2026	SCALE : AS SHOWN (A1/A3)
DRAWN : ADZAHARI ALI	CHECKED : Ir. JULIANA ASHRAM
DESIGNED : ABDUL RAZAK	APPROVED : Ir. SHAHIRWAN
DRAWING NO : SAMB/PRC/STD/006/2026	REVISION 01

TABLE FOR MILD STEEL TAPER			
DESCRIPTION	OUTER DIA. Ø (mm)	OUTER DIA. Ø (mm)	L2 (mm)
900mm X 800mm	954	854	1200
900mm X 700mm	954	754	1200
900mm X 600mm	954	667	1200
900mm X 500mm	954	560.3	1200
900mm X 450mm	954	507	1200
900mm X 400mm	954	453.1	1200
900mm X 350mm	954	399.3	1200
900mm X 300mm	954	345.4	1200
800mm X 700mm	854	754	1200
800mm X 600mm	854	667	1200
800mm X 500mm	854	560.3	1200
800mm X 450mm	854	507	1200
800mm X 400mm	854	453.1	1200
800mm X 350mm	854	399.3	1200
800mm X 300mm	854	345.4	1200
700mm X 600mm	754	667	1200
700mm X 500mm	754	560.3	1200
700mm X 450mm	754	507	1200
700mm X 400mm	754	433.1	1200
700mm X 350mm	754	399.3	1200
700mm X 300mm	754	345.3	1200
700mm X 250mm	754	286	1200
700mm X 200mm	754	332.2	1200
700mm X 150mm	754	177.3	1200
600mm X 500mm	667	560.3	1200
600mm X 450mm	667	507	1200
600mm X 400mm	667	433.1	1200
600mm X 350mm	667	399.3	1200
600mm X 300mm	667	345.3	1200
600mm X 250mm	667	286	1200
600mm X 200mm	667	332.2	1200
600mm X 150mm	667	177.3	1200
500mm X 450mm	560.3	507	1000
500mm X 400mm	560.3	433.1	1000
500mm X 350mm	560.3	399.3	1000
500mm X 300mm	560.3	345.3	1000
500mm X 250mm	560.3	286	1000
500mm X 200mm	560.3	332.2	1000
500mm X 150mm	560.3	177.3	1000

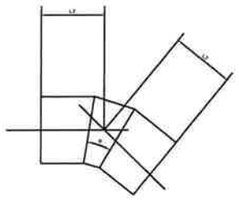
△ NOT MORE THAN 30° MILD STEEL BEND			
M.S. BENDS (NOMINAL DIA.)	OUTER DIA. Ø (mm)	R (mm)	L1 (mm)
1200	1219.0	"	750
900	914.0	"	600
850	864.0	"	600
800	813.0	"	600
750	762.0	"	600
700	711.0	"	550
650	660.0	"	550
600	610.0	"	550
500	559.0	"	450
450	457.0	"	450

△ OVER 31° TO 45° MILD STEEL BEND			
M.S. BENDS (NOMINAL DIA.)	OUTER DIA. Ø (mm)	R (mm)	L2 (mm)
1200	1219.0	1800	1200
900	914.0	1350	900
850	864.0	1275	850
800	813.0	1200	850
750	762.0	1125	850
700	711.0	1050	800
650	660.0	975	750
600	610.0	975	750
500	559.0	825	650
450	457.0	675	600

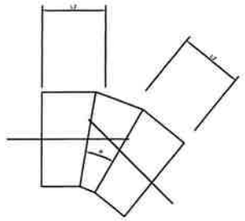
△ OVER 46° TO 60° MILD STEEL BEND			
M.S. BENDS (NOMINAL DIA.)	OUTER DIA. Ø (mm)	R (mm)	L2 (mm)
1200	1219.0	1200	1200
900	914.0	900	900
850	864.0	850	850
800	813.0	800	850
750	762.0	750	850
700	711.0	700	750
650	660.0	650	750
600	610.0	650	750
500	559.0	550	600
450	457.0	450	600



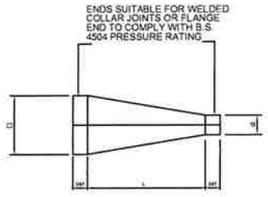
NOT MORE THAN 30° BEND



OVER 30° UP TO 45°



OVER 45° UP TO 60° BEND



CONCENTRIC TAPER

$L = \frac{D-d}{2} \times 12$ OR

$L = \frac{D-d}{2} \times 10$ FOR L GREATER THAN 10d

WHERE D AND d ARE THE NORMAL SIZES OF THE PIPES AT THE TWO ENDS OF THE TAPER

△ OVER 61° TO 90° MILD STEEL BEND			
M.S. BENDS (NOMINAL DIA.)	OUTER DIA. Ø (mm)	R (mm)	L3 (mm)
1200	1219.0	1200	1700
900	914.0	900	1300
850	864.0	850	1200
800	813.0	800	1200
750	762.0	750	1100
700	711.0	700	1100
650	660.0	650	1000
600	610.0	650	1000
500	559.0	550	850
450	457.0	450	850

TABLE FOR MILD STEEL TAPER			
DESCRIPTION	OUTER DIA. Ø (mm)	OUTER DIA. Ø (mm)	L2 (mm)
500 mm X 450 mm	560.3	507	1000
500 mm X 400 mm	560.3	433.1	1000
500 mm X 350 mm	560.3	399.3	1000
500 mm X 300 mm	560.3	345.3	1000
500 mm X 250 mm	560.3	286	1000
500 mm X 200 mm	560.3	332.2	1000
500 mm X 150 mm	560.3	177.3	1000
450 mm X 400 mm	507	453.1	1000
450 mm X 350 mm	507	399.3	1000
450 mm X 300 mm	507	345.3	1000
450 mm X 250 mm	507	286	1000
450 mm X 200 mm	507	332.2	1000
450 mm X 150 mm	507	177.3	1000
450 mm X 100 mm	507	121.9	1000
400 mm X 350 mm	453.1	399.3	900
400 mm X 300 mm	453.1	345.3	900
400 mm X 250 mm	453.1	286	900
400 mm X 200 mm	453.1	332.2	900
400 mm X 150 mm	453.1	177.3	900
400 mm X 100 mm	453.1	121.9	900
350 mm X 300 mm	399.3	345.3	900
350 mm X 250 mm	399.3	286	900
350 mm X 200 mm	399.3	332.2	900
350 mm X 150 mm	399.3	177.3	900
350 mm X 100 mm	399.3	121.9	900

NOTES :-

1. ALL DIMENSIONS ARE IN MILIMITRE AND LEVELS ARE IN METRE UNLESS OTHERWISE STATED
2. ALL DIAMETER OF MS PIPE REFER TO NOMINAL DIAMETER UNLESS OTHERWISE SPECIFIED

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

SAMB

Syarikat Air Melaka Berhad
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75300 MELAKA
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No. Fax: 06-2839242
E-mail: [illegible]@samb.com.my
WEBSITE

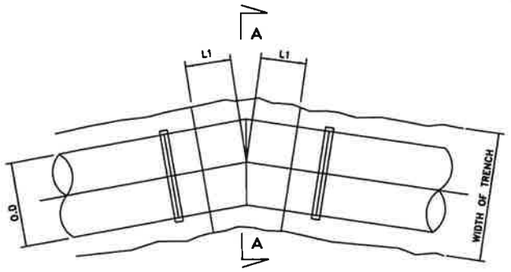
REVISION

REV.	DATE	DESCRIPTION	APR

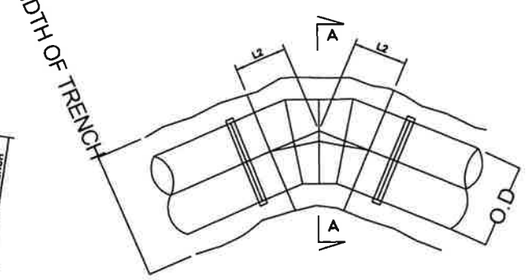
DRAWING TITLE:

DETAIL OF MILD STEEL GUSSETED BENDS AND TAPERS

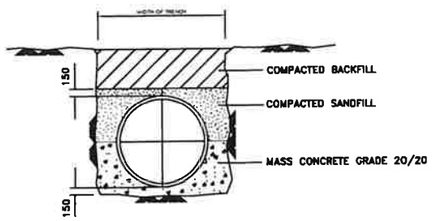
DATE : JANUARI 2026	SCALE : AS SHOWN (A1/A3)
DRAWN : ADZAHARI ALI	CHECKED : Ir. JULIANA ASHRAM
DESIGNED : ABDUL RAZAK	APPROVED : Ir. SHAHIRWAN
DRAWING NO : SAMB/PRC/STD/007/2026	REVISION 01



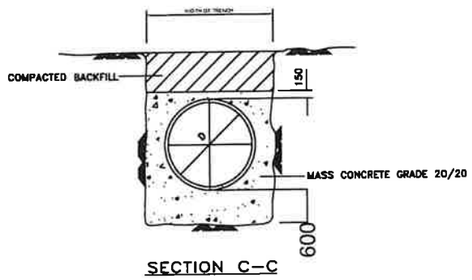
HORIZONTAL BENDS NOT MORE THAN 30°
N.T.S



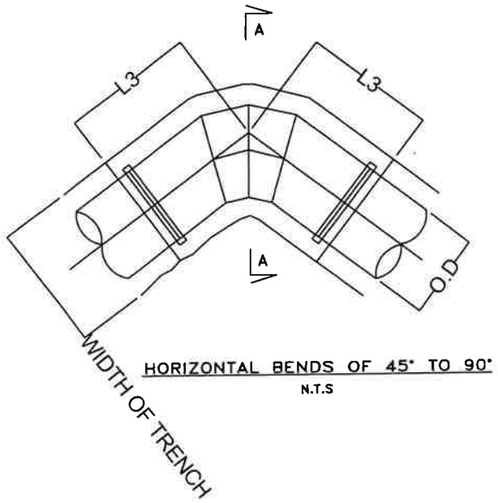
HORIZONTAL BENDS 30° TO 45°
N.T.S



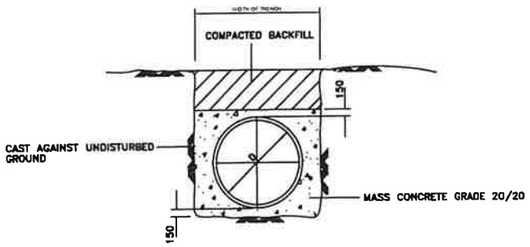
SECTION B–B
N.T.S



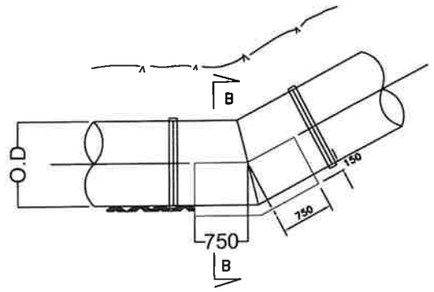
SECTION C–C
N.T.S



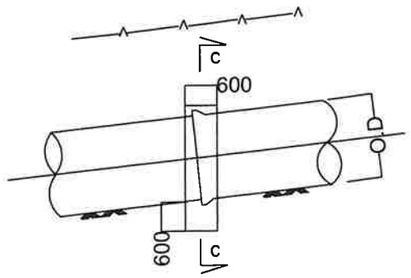
HORIZONTAL BENDS OF 45° TO 90°
N.T.S



SECTION A–A
N.T.S

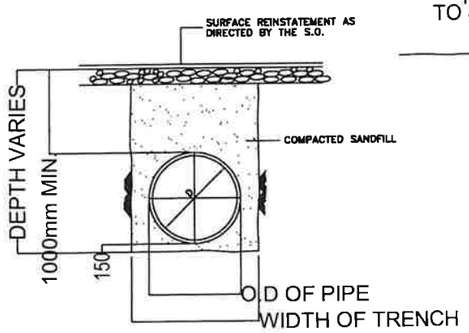


TYPICAL THRUST BLOCK FOR VERTICAL BENDS *
N.T.S

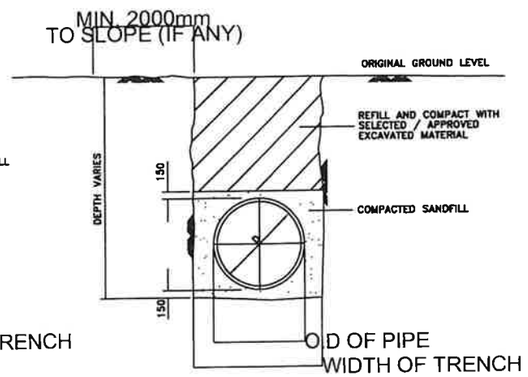


TYPICAL ANCHOR BLOCK *
N.T.S

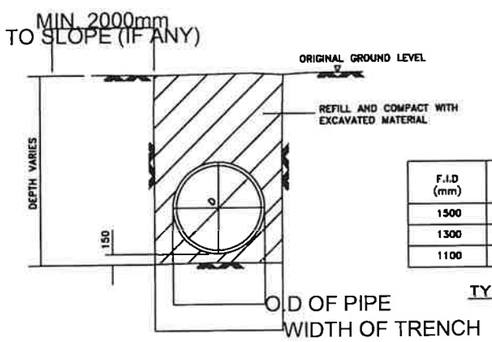
GRADIENT EXCEEDING	ANCHOR BLOCK
1 IN 12	EVERY THIRD PIPE
1 IN 8	EVERY SECOND PIPE
1 IN 3	EVERY PIPE



TYPICAL DETAIL FOR PIPE CROSSING UNDER ROADS
N.T.S



TYPICAL DETAIL FOR PIPE TRENCH
WHERE EXCAVATED MATERIAL IS UNSUITABLE FOR BEDDING
N.T.S



TYPICAL DETAIL OF PIPE TRENCH
WHERE EXCAVATED MATERIAL IS SUITABLE FOR BEDDING
N.T.S

F.I.D (mm)	O.D (mm)	L1		L2		L3
		NOT MORE THAN 15°	16° TO 30°	31° TO 45°	46° TO 60°	60° TO 90°
1500	1572	NO THRUST BLOCK	900	1400	1400	1900
1300	1367.8	NO THRUST BLOCK	850	1200	1200	1700
1100	1154	NO THRUST BLOCK	850	1200	1200	1700

TYPICAL THRUST BLOCK FOR HORIZONTAL BENDS *

NOTES

1. ALL DIMENSIONS SHOWN ARE IN MILIMETERS UNLESS OTHERWISE INDICATED.
2. ASSUMED HORIZONTAL BEARING CAPACITY OF SOIL IS 150 KN/m
3. * WHERE DIRECTED BY S.O. REPRESENTATIVE ON SITE

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

SAMB
Syarikat Air Melaka Berhad
LOT 897,G,1,5-9
WISMA AIR, JALAN HANG TUAH,
75300 MELAKA
Tel: 06-2921758
No. Fax: 06-2823749
WEBSITE: http://www.samb.com.my

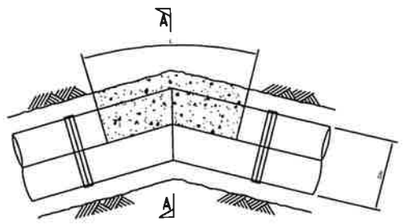
REVISION

REV.	DATE	DESCRIPTION	APR

DRAWING TITLE:

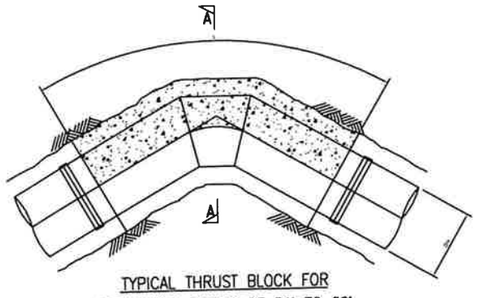
DETAILS OF CONCRETE THRUST BLOCK

DATE :	JANUARI 2026	SCALE :	AS SHOWN (A1/A3)
DRAWN :	ADZAHARI ALI	CHECKED :	Ir. JULIANA ASHRAM
DESIGNED :	ABDUL RAZAK	APPROVED :	Ir. SHAHIRWAN
DRAWING NO :	SAMB/PRC/STD/008/2026	REVISION	01



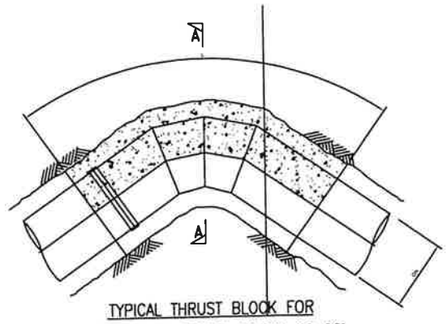
TYPICAL THRUST BLOCK FOR
HORIZONTAL BENDS OF NOT MORE THAN 30°

DN	L (mm)
450	1000
600	1500
900	3000
1200	4000



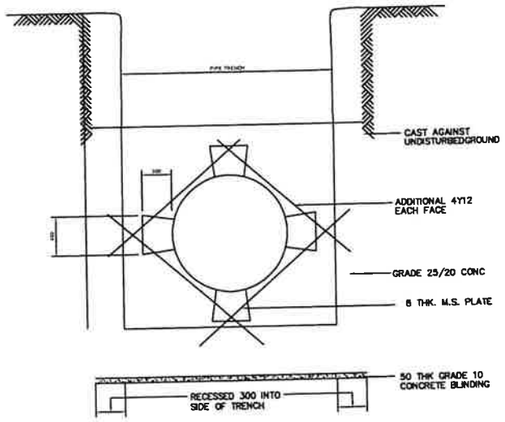
TYPICAL THRUST BLOCK FOR
HORIZONTAL BENDS OF 31° TO 60°

DN	L (mm)
450	1800
600	2600
900	4400
1200	5600



TYPICAL THRUST BLOCK FOR
HORIZONTAL BENDS OF 61° TO 90°

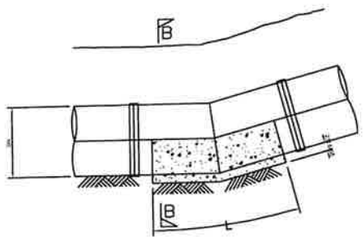
DN	L (mm)
450	2500
600	3600
900	5600
1200	7500



SECTION E – E

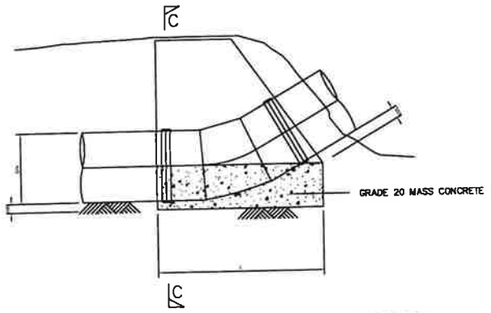
NOTE

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
2. MASS CONCRETE SHALL BE GRADE 20 UNLESS OTHERWISE SPECIFIED
3. ASSUMED SOIL BEARING CAPACITY = 75 KN/m2
4. TEST PRESSURE FOR THRUST BLOCKS IS BASED ON 140 m HEAD OF WATER
5. DIMENSIONS OF THRUST BLOCKS TO BE INCREASED IF ACTUAL BEARING CAPACITY IS FOUND TO BE LESS THAN 75 KN/m2



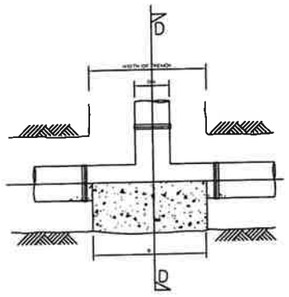
TYPICAL THRUST BLOCK FOR VERTICAL BENDS

DN	L (mm)
450	1100
600	1600
900	1750
1200	2300



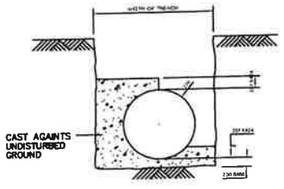
TYPICAL THRUST BLOCK FOR OVERCROSSINGS

DN	L (mm)
450	1200
600	1200
900	1600
1200	2300

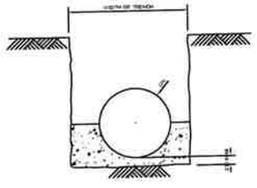


TYPICAL THRUST BLOCK FOR TEES

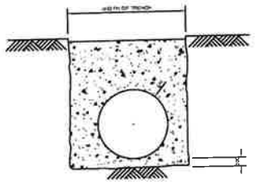
NOMINAL DIA. OF BRANCH	THRUST TON	B (m)
300	3.3	0.7
400	5.8	1.2
500	9.1	1.5
600	13	1.9
700	18	2.4
800	23	2.8
900	29	3.2
1000	36	3.6
1100	45	4
1200	50	4.4



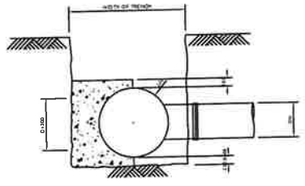
SECTION A – A



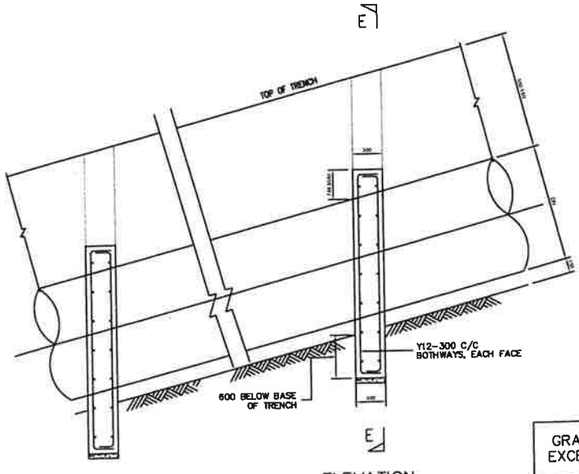
SECTION B – B



SECTION C – C



SECTION D – D



ELEVATION
DIAPHRAGM BLOCK
SCALE : 1=30

GRADIENT EXCEEDING	POSITION OF DIAPHRAGM BLOCK
8.3 %	EVERY 3rd PIPE
12.5 %	EVERY 2nd PIPE
33.3 %	EVERY PIPE

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

SAMB

Syarikat Air Melaka Berhad
LOT 897,C,1,5-9
WISMA AIR, JALAN HANG TUAH,
75300 MELAKA
Tel. 06-2921758
No. Fax: 06-2837242
WEBSITE : www.samb.com.my

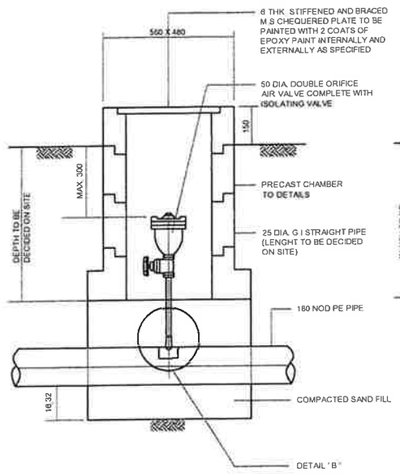
REVISION

REV.	DATE	DESCRIPTION	APR

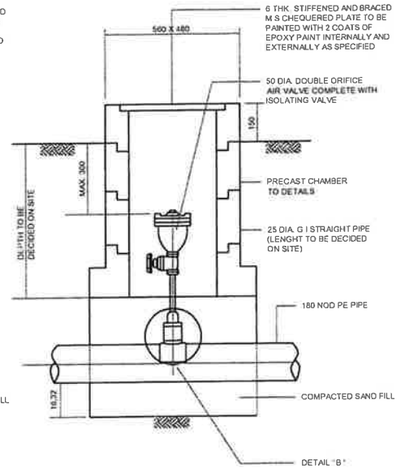
DRAWING TITLE:

DETAILS OF THRUST BLOCK

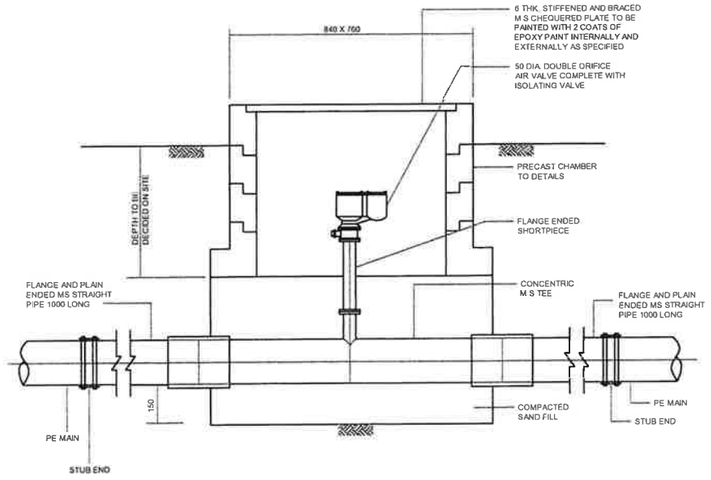
DATE : JANUARI 2026	SCALE : AS SHOWN (A1/A3)
DRAWN : ADZAHARI ALI	CHECKED : Ir. JULIANA ASHRAM
DESIGNED : ABDUL RAZAK	APPROVED : Ir. SHAHIRWAN
DRAWING NO : SAMB/PRC/STD/009/2026	REVISION 01



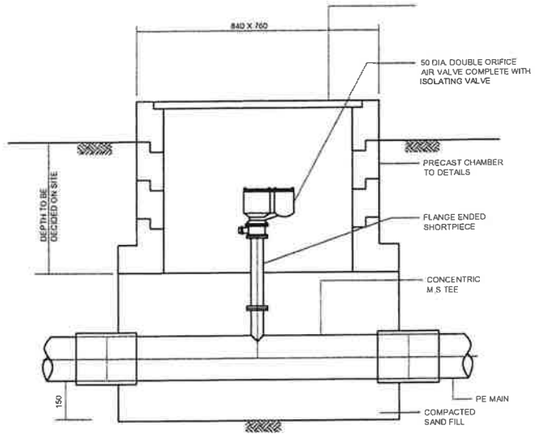
SECTION A - A



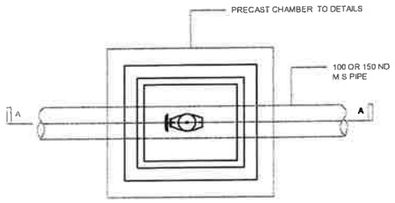
SECTION B - B



SECTION C-C

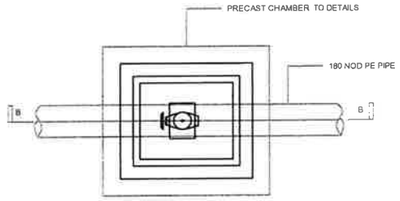


SECTION D-D



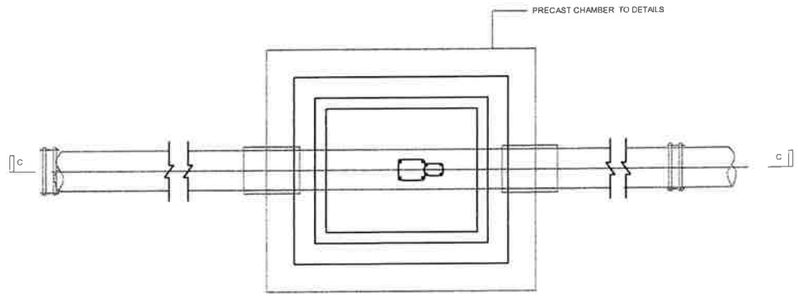
PLAN

SINGLE ORIFICE VALVE WITH
PRECAST CHAMBER FOR MS MAINS



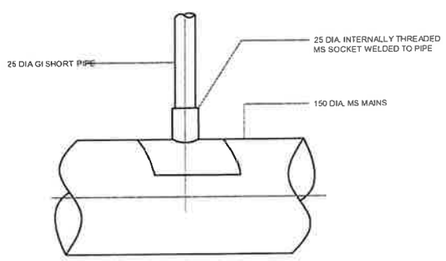
PLAN

SINGLE ORIFICE VALVE WITH
PRECAST CHAMBER FOR PE MAINS

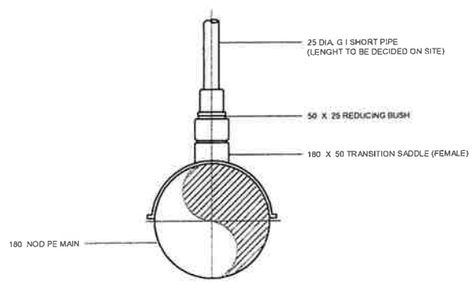


PLAN

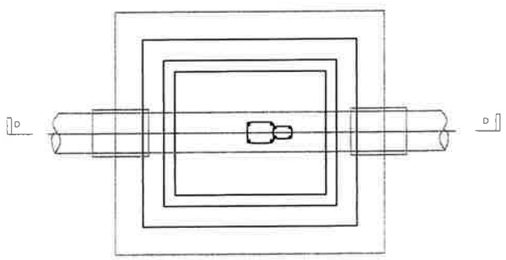
DOUBLE ORIFICE VALVE WITH
PRECAST CHAMBER FOR PE MAIN



DETAIL ' A '



DETAIL ' B '



PLAN

DOUBLE ORIFICE VALVE WITH
PRECAST CHAMBER FOR MS MAIN

NOTES :-

1. ALL DIMENSIONS ARE IN MILIMITRE AND LEVELS ARE IN METRE UNLESS OTHERWISE STATED
2. ALL DIAMETER OF MS PIPE REFER TO NOMINAL DIAMETER UNLESS OTHERWISE SPECIFIED

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

SAMB

Syarikat Air Melaka Berhad
LOT 897,C,1,5-9
WISMA AIR, JALAN HANG TUAH,
75300 MELAKA
Tel: 06-2921758
No. Fax: 06-2837218
WEBSITE http://www.samb.com.my

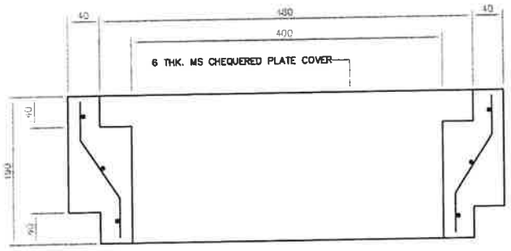
REVISION

REV.	DATE	DESCRIPTION	APR

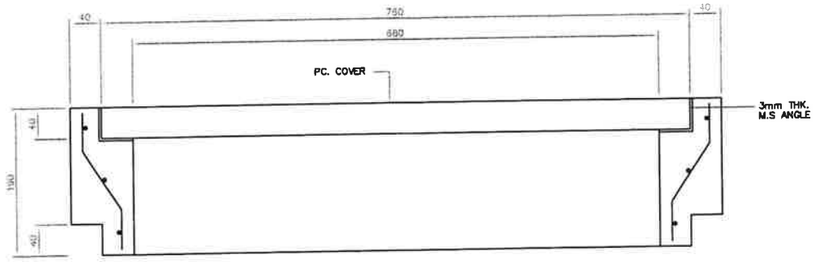
DRAWING TITLE:

DETAILS INSTALLATION OF METER CABINET

DATE : JANUARI 2026	SCALE : AS SHOWN (A1/A3)
DRAWN : ADZAHARI ALI	CHECKED : Ir. JULIANA ASHRAM
DESIGNED : ABDUL RAZAK	APPROVED : Ir. SHAHIRWAN
DRAWING NO : SAMB/PRC/STD/010/2026	REVISION 01

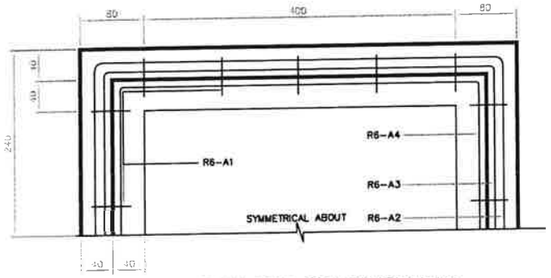


SECTION OF TOP UNIT
(UNIT 1a)
SCALE 1:4

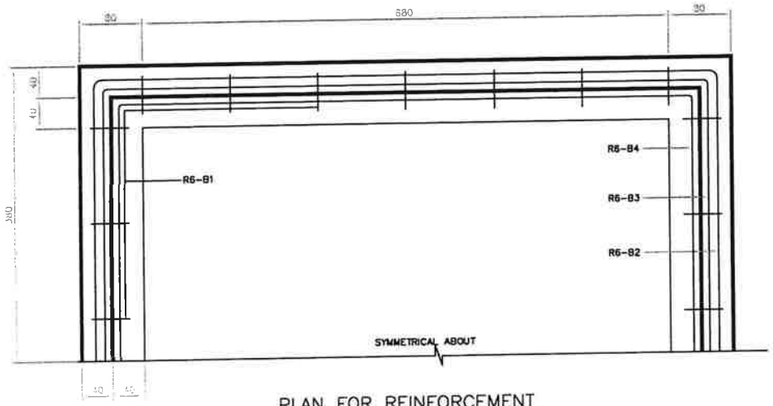


SECTION OF TOP UNIT
(UNIT 1b)
SCALE 1:4

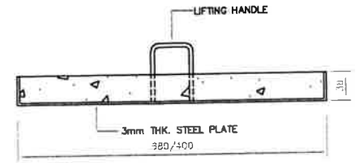
TYPE OF CHAMBER	SIZE OF CHAMBER	TYPE	BAR REF. NO.	NO. REQ.	SIZE (mm)	LENGTH	BENDING DIAGRAM	REMARKS
A	SMALL 560 x 480	1a, 2a AND 3a	A1	18	6	170	30 75 50	1.) PLAN AND SECTION OF TYPES 2a AND 3a ARE TO THOSE TYPE 2 AND 3 2.) CONCRETE COVER TO REINFORCEMENT 10mm DIA.
			A2	1	6	2080	445 320 150	
			A3	1	6	1930	AS FOR A2 ABOVE BUT SIDE LENGTHS 410 AND 480	
			A4	1	6	1780	AS FOR A2 ABOVE BUT SIDE LENGTHS 370 AND 445	
B	LARGE 840 x 760	1b, 2b AND 3b	B1	24	6	170	30 75 30	1.) CONCRETE COVER TO REINFORCEMENT 10mm DIA.
			B2	1	6	3200	725 300 150	
			B3	1	6	3040	AS FOR B2 ABOVE BUT SIDE LENGTHS 760 AND 685	
			B4	1	6	2870	AS FOR B2 ABOVE BUT SIDE LENGTHS 710 AND 650	



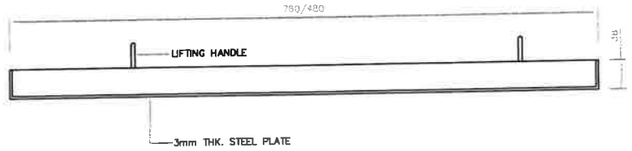
PLAN FOR REINFORCEMENT
(UNIT 1a, 2a, AND 3a)
SCALE 1:4



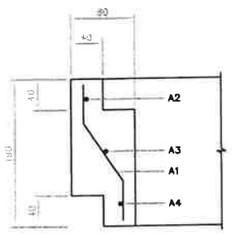
PLAN FOR REINFORCEMENT
(UNIT 1b, 2b, AND 3b)
SCALE 1:4



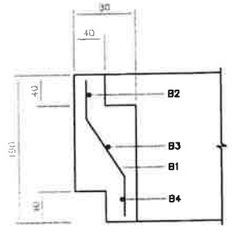
SECTION C-C
SCALE 1:4



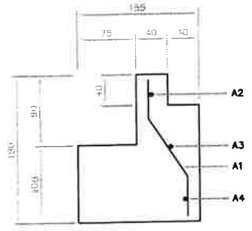
FRONT VIEW
SCALE 1:4



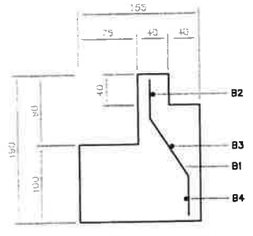
SECTION OF INTERMEDIATE UNIT
(UNIT 2a)
SCALE 1:4



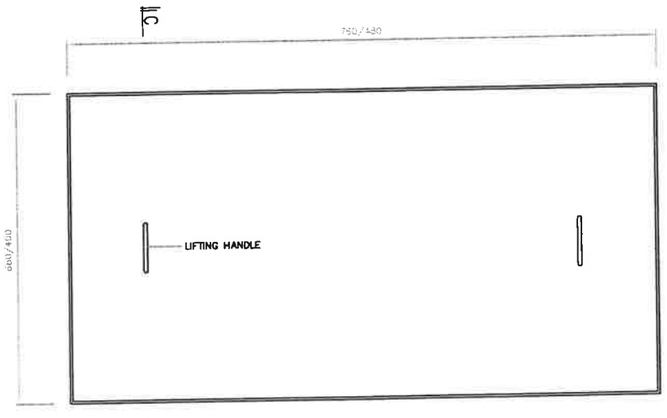
SECTION OF INTERMEDIATE UNIT
(UNIT 2b)
SCALE 1:4



SECTION OF BOTTOM UNIT
(UNIT 3a)
SCALE 1:4



SECTION OF BOTTOM UNIT
(UNIT 3b)
SCALE 1:4



TOP VIEW
SCALE 1:4

PRECAST CONCRETE COVER

STANDARD DRAWING

NOTES :
1.) ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.

NOTES:

IMPLEMENTING AGENT:

SAMB

Syarikat Air Melaka Berhad
LOT 897,G,1,5-9
WISMA AIR, JALAN HANG TUAH,
75300 MELAKA
Tel. 06-2921758
No. Fax: 06-2827448
WEBSITE

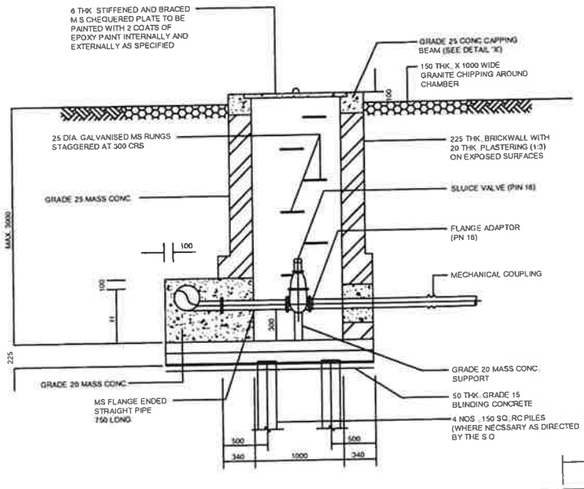
REVISION

REV.	DATE	DESCRIPTION	APR

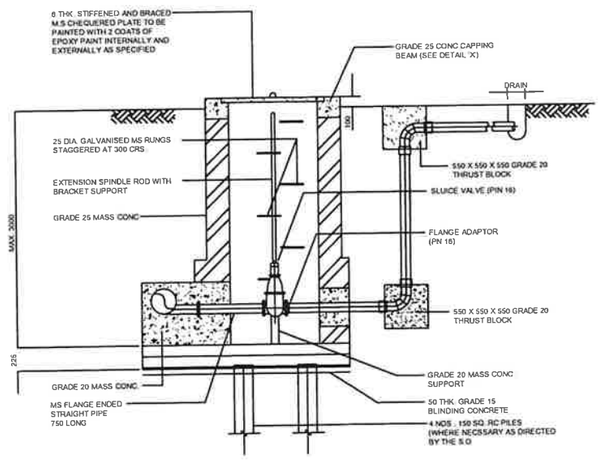
DRAWING TITLE:

HEAVY DUTY PRECAST
CHAMBER

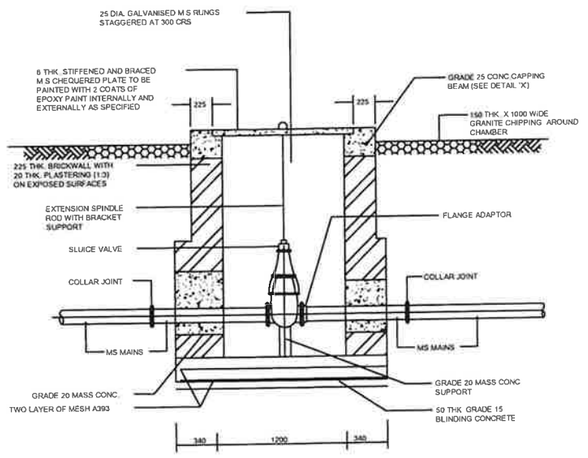
DATE : JANUARI 2026	SCALE : AS SHOWN (A1/A3)
DRAWN : ADZAHARI ALI	CHECKED : Ir. JULIANA ASHRAM
DESIGNED : ABDUL RAZAK	APPROVED : Ir. SHAHIRWAN
DRAWING NO : SAMB/PRC/STD/011/2026	REVISION 01



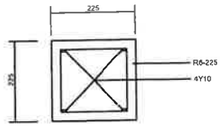
SECTION A - A



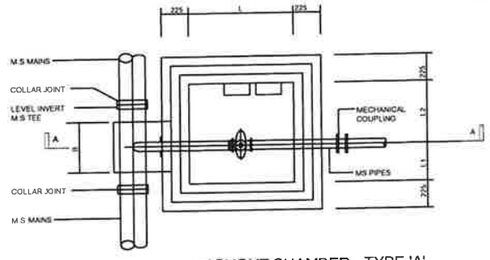
SECTION B - B



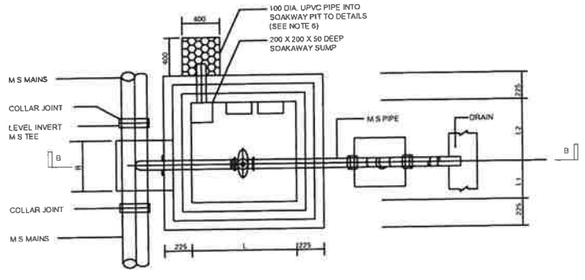
SECTION C - C



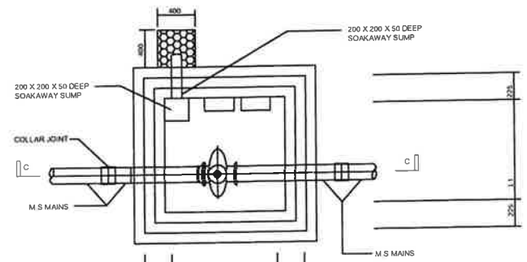
DETAIL 'X'



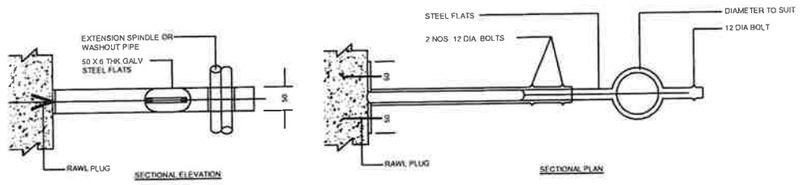
WASHOUT CHAMBER - TYPE 'A'



WASHOUT CHAMBER - TYPE 'B'



SLUICE VALVE CHAMBER



DETAIL OF BRACKET FOR EXTENSION SPINDLE

THRUST BLOCK FOR WASHOUT TEE (CHAMBER TYPE 'A' AND 'B')		
MS PIPE ND (mm)	B	H
100	300	530
150	300	580
200	400	640
250	400	690
300	400	750
350	400	800
400	450	850
450	450	910
500	450	970
600	450	1070

SLUICE VALVE CHAMBER SCHEDULE			
MS PIPE ND (mm)	L (mm)	L1 (mm)	L2 (mm)
600	1500	700	900
450	1200	600	800
350	1200	600	700
300	1200	500	700
250	1200	500	700
200	1000	400	600
150	1000	400	600

WASHOUT CHAMBER SCHEDULE				
MS PIPE SIZE	WASHOUT SIZE	L (mm)	L1 (mm)	L2 (mm)
600	150	1200	300	700
450	150	1200	300	700
350	100	1000	400	600
300	100	1000	400	600
250	100	1000	400	600
200	100	1000	400	600
150	100	1000	400	600

NOTES :-

1. ALL DIMENSIONS ARE IN MILIMETRE AND LEVELS ARE IN METRE UNLESS OTHERWISE STATED
2. ALL CONCRETE TO BE GRADE 20/25 UNLESS OTHERWISE STATED.
3. THRUST BLOCK TO BE PROVIDED AT PIPE SPECIALS SUCH AS TEE, BENDS AND ETC. AS DIRECTED BY THE ENGINEER. (1 : 2 : 4 MIX)
4. ALL DIAMETRE OF MS PIPE MUST BE TO NOMINAL DIAMETER UNLESS OTHERWISE SPECIFIED.
5. ALL GRAVEL SOAKAWAY TO BE WRAPPED WITH TWO LAYERS OF APPROVED FILTER CLOTH.
6. THE UPVC DRAIN PIPE AND SOAKAWAY SHALL ONLY BE PROVIDED IF THE GROUND WATER TABLE IS LOWER THEN THE INVERT LEVEL OF THE CHAMBER AS DIRECTED BY THE ENGINEER.
7. DETAIL OF ACCESS OPENING FOR SLUICE VALVE AND WASHOUT REFER DRG.NO. RWS/DET/JMS/IW/C/C01/2006.

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

SAMB

Syarikat Air Melaka Berhad
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75300 MELAKA
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WEBSITE http://www.samb.com.my

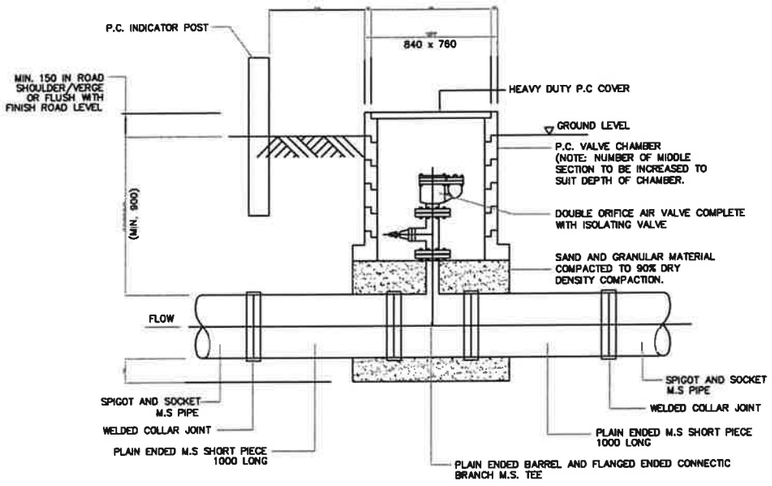
REVISION

REV.	DATE	DESCRIPTION	APR

DRAWING TITLE:

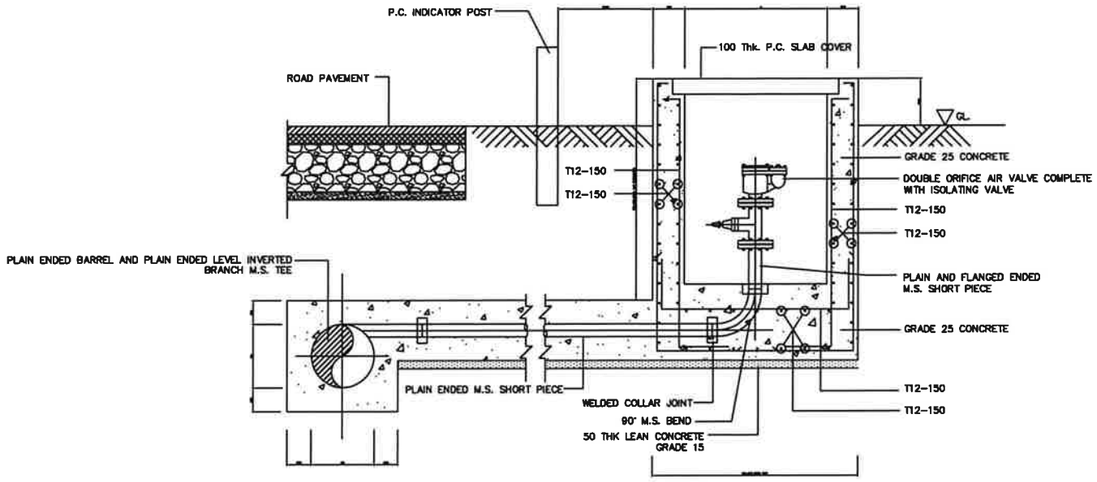
SLUICE VALVE PRECAST CHAMBER DETAILS

DATE : JANUARI 2026	SCALE : AS SHOWN (A1/A3)
DRAWN : ADZAHARI ALI	CHECKED : Ir. JULIANA ASHRAM
DESIGNED : ABDUL RAZAK	APPROVED : Ir. SHAHIRWAN
DRAWING NO : SAMB/PRC/STD/012/2026	REVISION 01



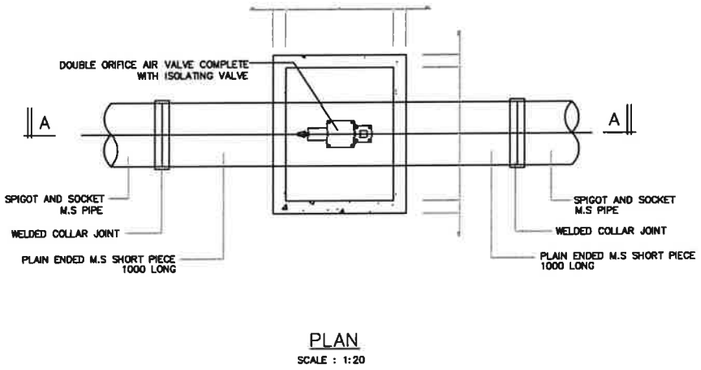
SECTION A–A

SCALE : 1:20



SECTION B–B

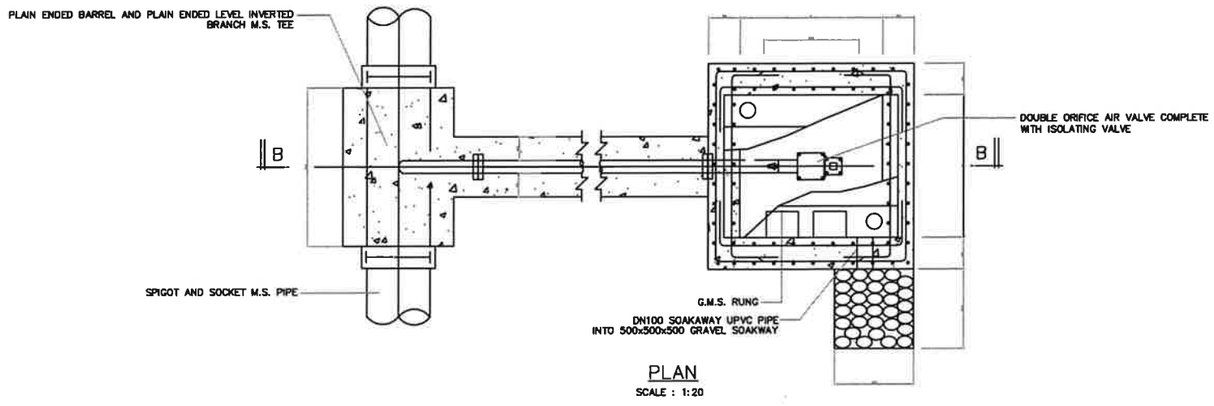
SCALE : 1:20



PLAN

SCALE : 1:20

AIR VALVE CHAMBER



PLAN

SCALE : 1:20

OFFSET AIR VALVE CHAMBER

SCHEDULE FOR SIZE OF AIR VALVE CHAMBER				
NOMINAL DIA. OF PIPE (mm)	L (mm)	W (mm)	A	B
200	900	900	1000	200
300	900	900	1000	200
400	900	900	1000	200
450	900	900	1000	200
600	1200	1200	1300	200
700	1200	1200	1300	200
900	1600	1600	1700	200
1200	2000	2000	2100	200

SCHEDULE FOR SIZE OF AIR VALVE	
NOMINAL DIA. OF PIPE (mm)	AIR VALVE SIZE (mm)
200	50 DIA. DOUBLE ORIFICE AIR VALVE WITH ISOLATING VALVE
300	50 DIA. DOUBLE ORIFICE AIR VALVE WITH ISOLATING VALVE
400	80 DIA. DOUBLE ORIFICE AIR VALVE WITH ISOLATING VALVE
450	80 DIA. DOUBLE ORIFICE AIR VALVE WITH ISOLATING VALVE
600	100 DIA. DOUBLE ORIFICE AIR VALVE WITH ISOLATING VALVE
700	100 DIA. DOUBLE ORIFICE AIR VALVE WITH ISOLATING VALVE
900	150 DIA. DOUBLE ORIFICE AIR VALVE WITH ISOLATING VALVE
1200	150 DIA. DOUBLE ORIFICE AIR VALVE WITH ISOLATING VALVE

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

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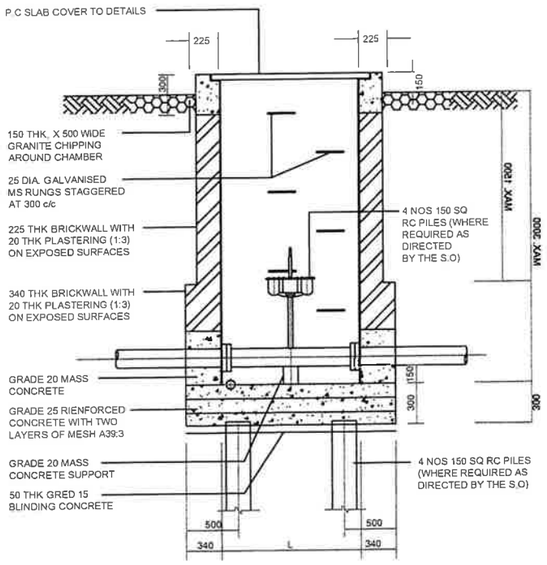
REVISION

REV.	DATE	DESCRIPTION	APR

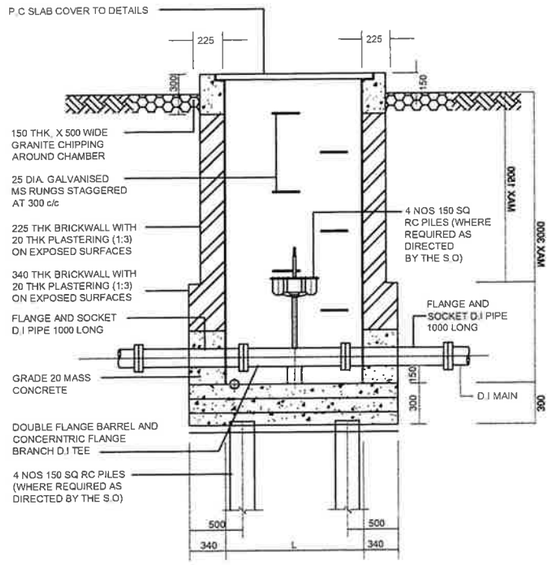
DRAWING TITLE:

TYPICAL DETAILS OF DOUBLE AIR VALVE PRECAST CHAMBER

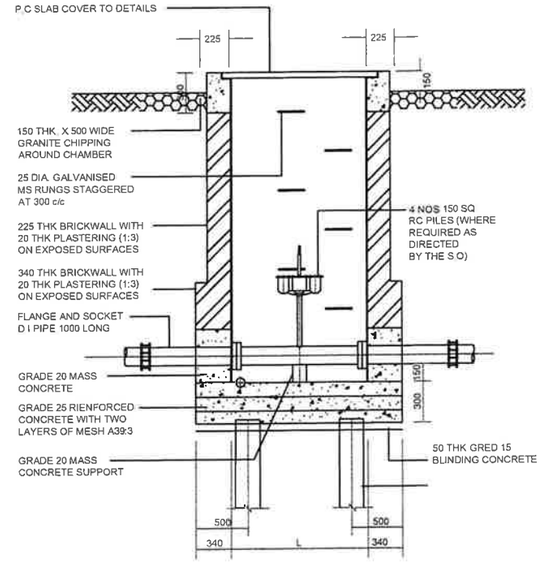
DATE : JANUARI 2026	SCALE : AS SHOWN (A1/A3)
DRAWN : ADZAHARI ALI	CHECKED : Ir. JULIANA ASHRAM
DESIGNED : ABDUL RAZAK	APPROVED : Ir. SHAHIRWAN
DRAWING NO : SAMB/PRC/STD/013/2026	REVISION 01



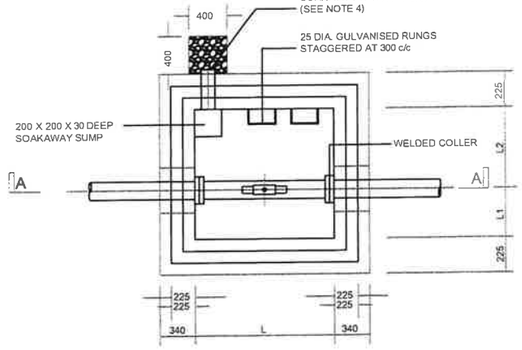
SECTION A - A



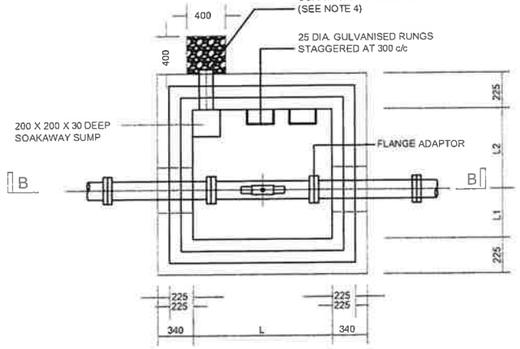
SECTION B-B



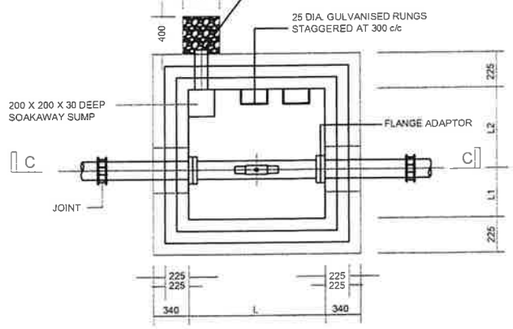
SECTION C-C



PLAN
DOUBLE ORIFICE AIR VALVE
BRICKWALL CHAMBER WITH
MS PIPE ARRANGMENT



PLAN
DOUBLE ORIFICE AIR VALVE
BRICKWALL CHAMBER WITH
D.I PIPE ARRANGMENT



PLAN
DOUBLE ORIFICE AIR VALVE
BRICKWALL CHAMBER WITH
uPVC & AB-3P PIPE ARRANGMENT

NOTES :-

1. ALL DIMENSIONS ARE IN MILIMETRE AND LEVELS ARE IN METRE UNLESS OTHERWISE STATED
2. ALL CONCRETE TO BE GRADE 25 UNLESS OTHERWISE STATED.
3. ALL GRAVEL SOAKAWAY TO BE WRAPPED WITH TWO LAYERS OF APPROVED FILTER CLOTH.
4. THE UPVC DRAIN PIPE AND SOAKAWAY SHALL ONLY BE PROVIDED IF THE GROUND WATER TABLE IS LOWER THAN THE INVERT LEVEL OF THE CHAMBER AS DIRECTED BY THE S.O
5. BRICKWALL CHAMBER TO BE USED IN LOCATIONS NOT SUITABLE FOR PRECAST CHAMBERS AS DECIDED BY S.O
6. FOR DETAILS OF PC SLAB COVER AND CAPPING BEAM REFER DRG. NO.

AIR VALVE BRICKWALL CHAMBER SCHEDULE

MS/DI DI PIPE -D(mm)	uPVC PIPE -D(mm)	L (mm)	L1 (mm)	L2 (mm)	DIA. OF DOUBLE XXX AIR VALVE (mm)
-	100-200	800	600	400	50
100-300	-	900	600	400	50
400-500	-	1000	600	400	80
600	-	1000	600	500	100

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

SAMB

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REVISION

REV.	DATE	DESCRIPTION	APR

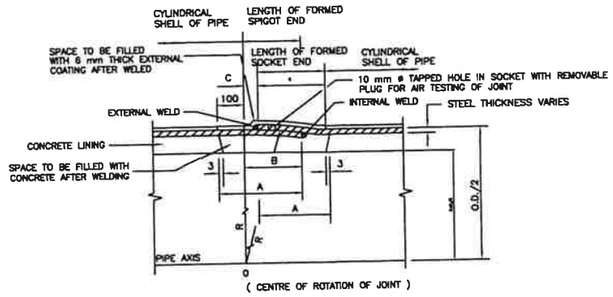
DRAWING TITLE:

DETAILS OF AIR VALVE
BRICKWALL CHAMBER

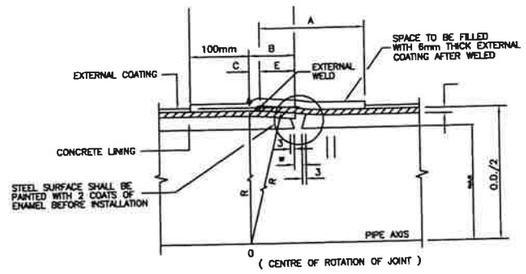
DATE : JANUARI 2026	SCALE : AS SHOWN (A1/A3)
DRAWN : ADZAHARI ALI	CHECKED : Ir. JULIANA ASHRAM
DESIGNED : ABDUL RAZAK	APPROVED : Ir. SHAHIRWAN
DRAWING NO : SAMB/PRC/STD/014/2026	REVISION 01

HEMI – SPHERICAL SLEEVE JOINT

Pipe F.I.D (mm)	Pipe O.D (mm)	Radius R (mm)	Steel/ Thickness t (mm)	Engagement, E		A (mm) B+100	B (mm) 4t+2c	C (mm) πR/90	Max. W (mm)
				Normal 4t+c(mm)	Minimum 4t(mm)				
149.1	177.3	89	4.1	25	20	130	30	5	10
204.0	232.2	116	4.1	25	20	130	30	5	10
257.8	286.0	143	4.1	25	20	130	30	5	10
313.8	345.4	173	5.8	35	25	145	45	10	20
388.4	426.0	213	5.8	35	25	145	45	10	20
415.5	453.1	227	5.8	35	25	145	45	10	20
469.4	507.0	254	5.8	35	25	145	45	10	20
522.7	560.3	280	5.8	35	25	145	45	10	20
628.0	667.0	334	6.5	45	30	160	60	15	20
701.2	754.0	377	7.4	45	30	160	60	15	–
751.2	804	402	7.4	45	30	160	60	15	–
1050.0	1107.0	554	9.5	60	40	180	80	20	–
1200.0	1270.0	635	10.0	65	40	190	90	25	–



HEMI–SPHERICAL SLEEVE JOINT/SLIP JOINTS
(FOR PIPES DN700mm AND ABOVE)



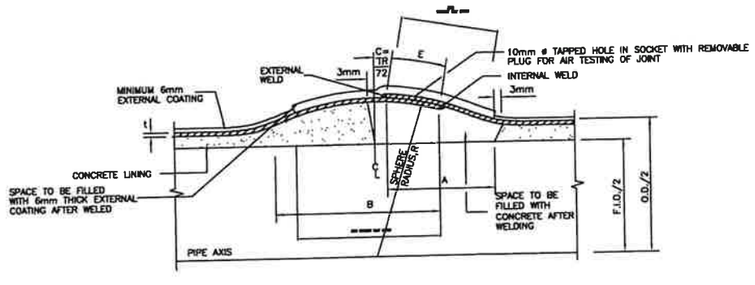
HEMI–SPHERICAL SLEEVE JOINT/SLIP JOINTS
(FOR PIPES BELOW DN700mm)

SPHERICAL SLEEVE JOINT DETAIL

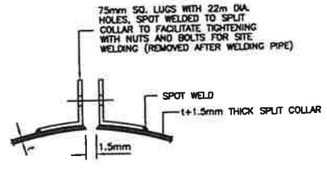
Pipe F.I.D (mm)	Pipe O.D (mm)	Radius R (mm)	Steel Thickness (mm)	Engagement, E		A (mm)	B (mm)	C (mm)
				Normal $4t+\frac{\pi R}{36}$ (mm)	Minimum 4t (mm)			
2200.0	2290.0	1190	15	164	60	335	538	50
2050.0	2138.0	1111	14	153	56	301	503	47
1800.0	1876.0	977	13	137	52	274	451	41
1400.0	1472.0	769	11	112	44	223	368	33

DETAILS OF WELDED COLLAR JOINT
(FOR PIPE/FITTING DN700mm AND ABOVE)

DETAILS OF WELDED COLLAR JOINT
(FOR PIPE/FITTING BELOW DN700 mm)



SPHERICAL SLEEVE JOINT
(FOR PIPES DN1400 mm AND ABOVE)



SECTION A – A

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED
2. THE OUTSIDE DIAMETER OF PIPE SHALL MEAN THE EXTERNAL DIAMETER OF STEEL PIPE BEFORE COATING.

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

SAMB

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WEBSITE

REVISION

REV.	DATE	DESCRIPTION	APR

DRAWING TITLE:

DETAIL OF JOINT 1

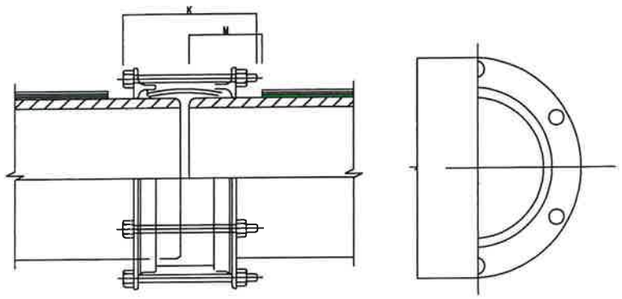
DATE : JANUARI 2026	SCALE : AS SHOWN (A1/A3)
DRAWN : ADZAHARI ALI	CHECKED : Ir. JULIANA ASHRAM
DESIGNED : ABDUL RAZAK	APPROVED : Ir. SHAHIRWAN
DRAWING NO : SAMB/PRC/STD/015/2026	REVISION 01

SCHEDULE OF MECHANICAL COUPLING									
NOMINAL DIA. OF PIPE (mm)	FINISHED INTERNAL DIA. OF PIPE (mm)	OUTER DIA. OF PIPE (mm)	J (mm)	K (mm)	SLEEVE L x THICKNESS (mm)	BOLTS			M (mm)
						NO.	DIA. (mm)	LENGTH (mm)	
700	701.2	754.0	858	228	150 x 8	12	16	215	150
600	628.0	667.0	760	228	150 x 8	12	16	215	150
525	522.7	560.3	664	228	150 x 8	10	16	215	150
450	469.4	507.0	612	228	150 x 8	8	16	215	150
400	415.5	453.1	562	228	150 x 8	8	16	215	150
375	388.4	426.0	530	228	150 x 8	8	16	215	150
300	313.8	345.4	460	228	150 x 8	6	16	215	125
250	257.8	286.0	377	175	100 x 8	6	12	165	100
200	204.0	232.2	324	175	100 x 8	5	12	165	100
150	149.1	177.3	270	175	100 x 7	4	12	165	100
100	93.7	121.9	218	175	100 x 6	4	12	165	100

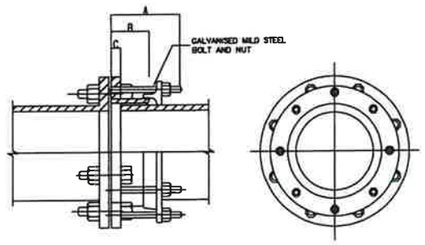
NOTE : LARGER SIZED TO BE DESIGNED BY THE CONSULTANT TO PAAB APPROVAL.

SCHEDULE OF FLANGE ADAPTOR					
NOMINAL DIA. OF PIPE (mm)	FINISHED INTERNAL DIA. OF PIPE (mm)	OUTER DIA. OF PIPE (mm)	A (mm)	B (mm)	C (mm)
1200	1200	1270	180	125	38
1000	1000	1054	155	115	25
700	701.2	754.0	155	105	25
600	628.0	667.0	155	105	25
525	522.7	560.3	155	105	25
450	469.4	507.0	155	105	25
400	415.5	453.1	155	105	25
375	388.4	426.0	155	105	25
300	313.8	345.4	136	90	25
250	257.8	286.0	136	90	25
200	204.0	232.2	118	75	24
150	149.1	177.3	118	75	22
100	93.7	121.9	118	75	20

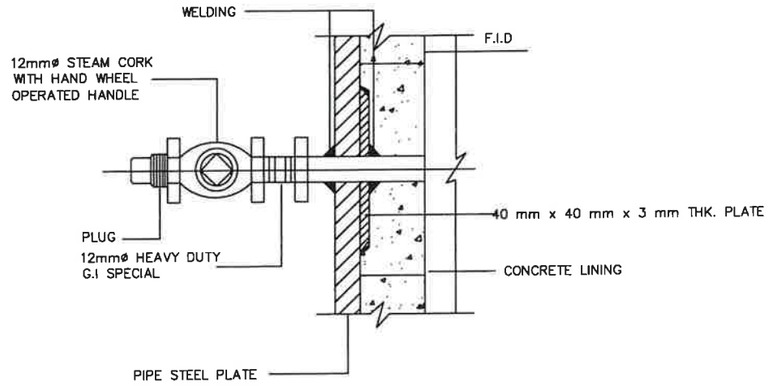
NOTE : LARGER SIZED TO BE DESIGNED BY THE CONSULTANT TO PAAB APPROVAL.



DETAILS OF MECHANICAL COUPLING



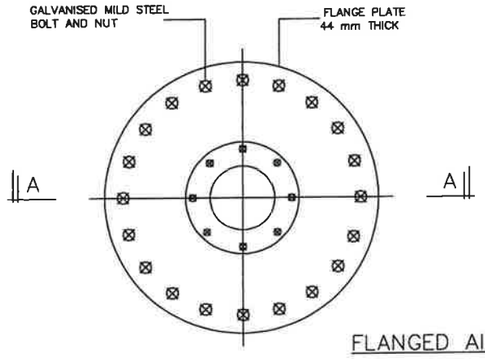
DETAILS OF FLANGE ADAPTOR

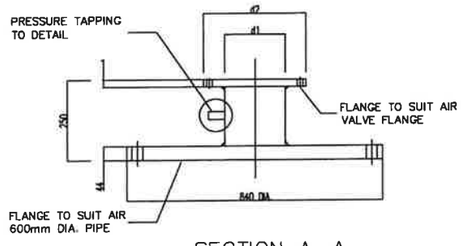


PRESSURE TAPPING

d1 (mm)	d2 (mm)	t (mm)
100	220	20
150	280	22
200	340	24
250	406	26

DOUBLE FLANGE VALVE ADAPTOR





SECTION A–A

FLANGED AIR VALVE ADAPTORS

PUDDLE FLANGE DETAILS			
PIPE SIZE	F.I.D (mm)		NOMINAL DIAMETER 450 mm & BELOW
	2200 TO 750	710 TO 500	
THICKNESS OF PUDDLE FLANGE	20 mm	12 mm	10 mm
DIAMETER OF PUDDLE FLANGE	O.D OF PIPE + 125 mm	O.D OF PIPE + 100 mm	O.D OF PIPE + 75 mm

NOTE:

1. ALL DEMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2. THE OUTSIDE DIAMETER OF PIPE SHALL MEAN THE EXTERNAL DIAMETER OF STEEL PIPE BEFORE COATING.

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

SAMB

Syarikat Air Melaka Berhad
LOT 897,G,1,5-9
WISMA AIR, JALAN HANG TUAH,
75300 MELAKA
Tel. 06-2921758
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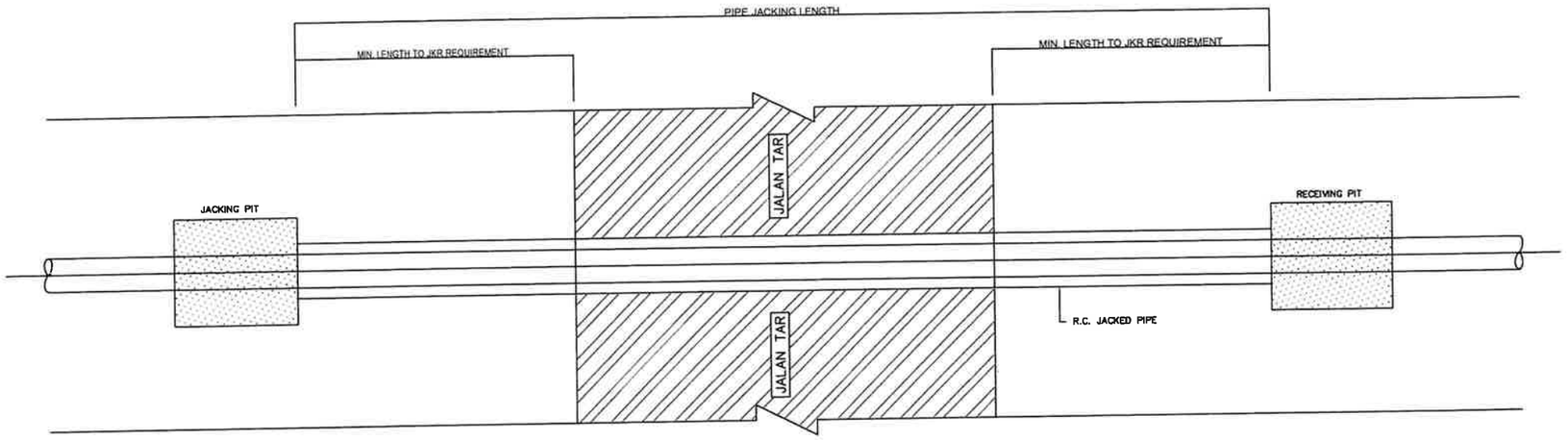
REVISION			
REV.	DATE	DESCRIPTION	APR

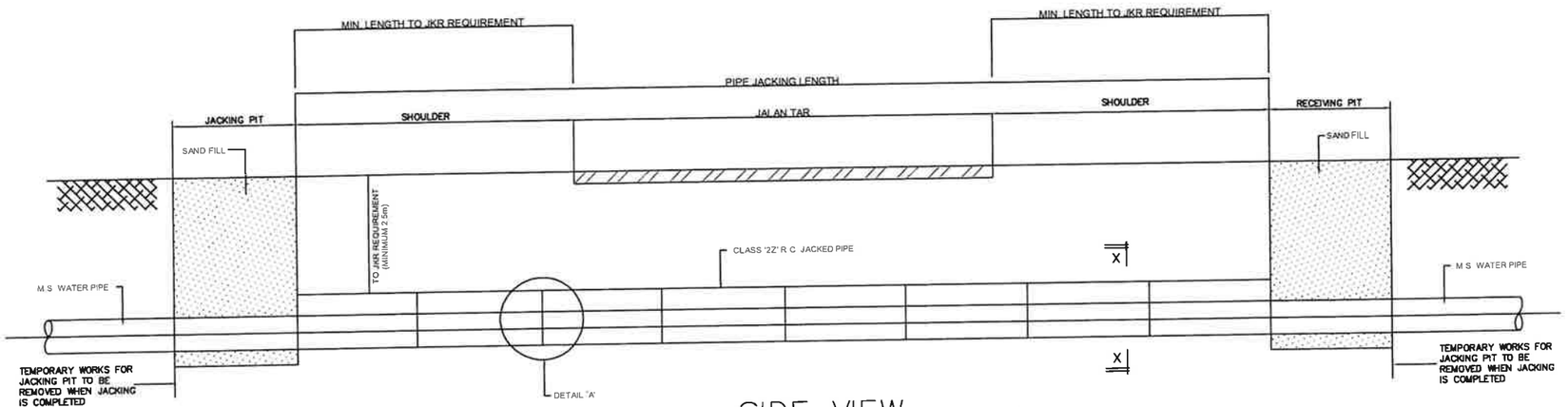
DRAWING TITLE:

DETAIL OF JOINT 2

DATE :	JANUARI 2026	SCALE :	AS SHOWN (A1/A3)
DRAWN :	ADZAHARI ALI	CHECKED :	Ir. JULIANA ASHRAM
DESIGNED :	ABDUL RAZAK	APPROVED :	Ir. SHAHIRWAN
DRAWING NO :	SAMB/PRC/STD/016/2026	REVISION	01

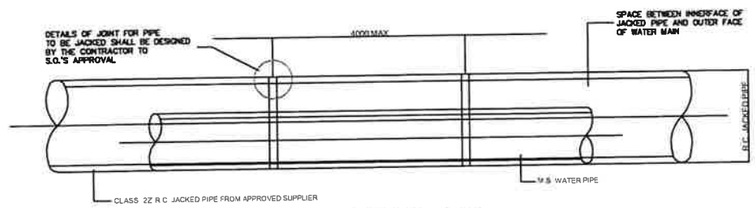


PLAN VIEW

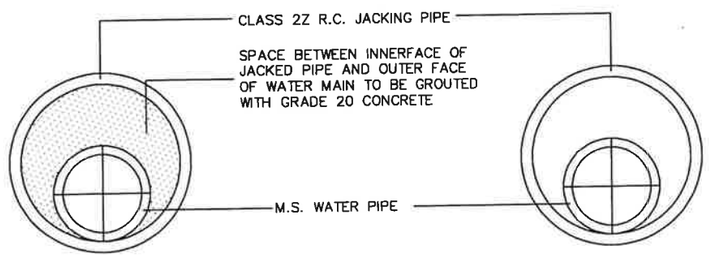


SIDE VIEW

WATER PIPELINE DN (mm)	R.C. JACKING PIPE DN (mm)
150	300
200	450
250	450
300	450
350	500
400	600
450	650
500	750
600	900
900	1200
1200	1800



DETAIL 'A'



SECTION X–X

NOTES:

1) PIPE JACKING WORKS SHOULD BE CARRIED OUT USING THE SLURRY METHOD

2) ALL JACKING AND RECEIVING PITS SHOULD BE FILLED AND COMPACTED WITH SAND UPON THE COMPLETIONOF THE WORKS

3) CONTRACTOR IS TO ENSURE THAT THERE IS NO CAVITY BETWEEN THE CONDUIT PIPE AND THE EXISTING GROUND. ALL CAVITIES SHOULD BE GROUTED WITH THE CEMENT GROUT

4) ALL EXCAVATED PITS SHOULD BE FREE FROM WATER PONDING, CONTRACTOR TO FILL OUT ANY WATER PONDING DUE TO THEIR EXCAVATION WORKS

5) ALL EXISTING DRAINS AFFECTED BY THE WORKS SHOULD BE RECTIFIED TO ITS ORIGINAL CONDITIONS WITHOUT ANY EXTRA COST TO THE EMPLOYER

6) ALL CONSTRUCTION DEBRIS SHOULD CLEARED OFF FROM THE SITE AND THE WORKS SITE IS TO BE REINSTATED TO ITS ORIGINAL CONDITION UPON COMPLETITION OF THE WORKS

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

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REVISION

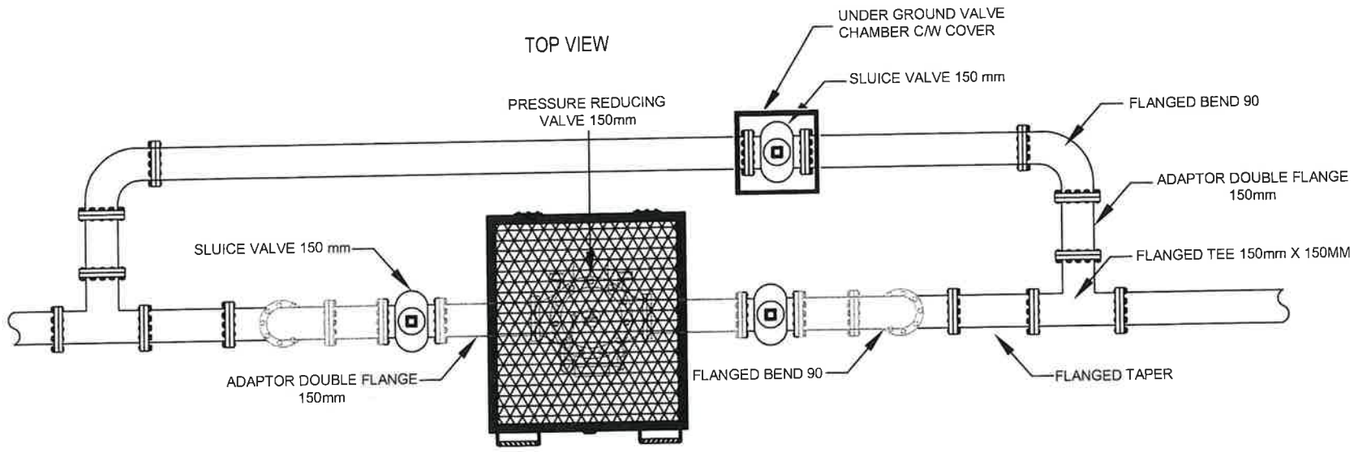
REV.	DATE	DESCRIPTION	APR

DRAWING TITLE:

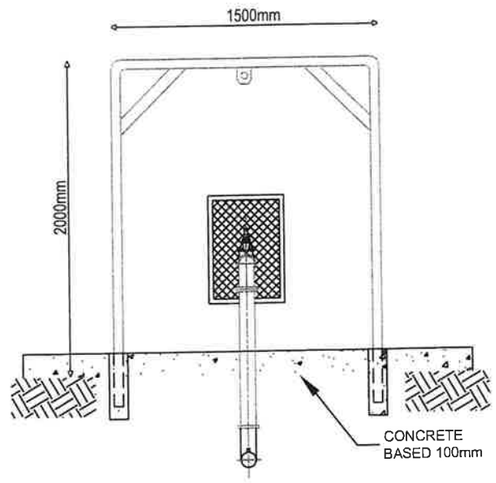
TYPICAL DETAILS OF PIPE CROSSING

DATE : JANUARI 2026	SCALE : AS SHOWN (A1/A3)
DRAWN : ADZAHARI ALI	CHECKED : Ir. JULIANA ASHRAM
DESIGNED : ABDUL RAZAK	APPROVED : Ir. SHAHIRWAN
DRAWING NO : SAMB/PRC/STD/017/2026	REVISION 01

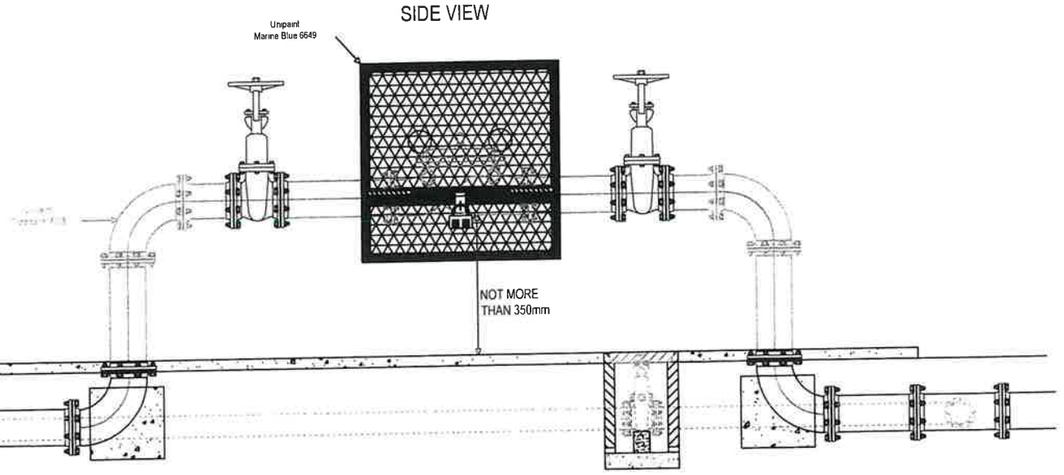
TOP VIEW



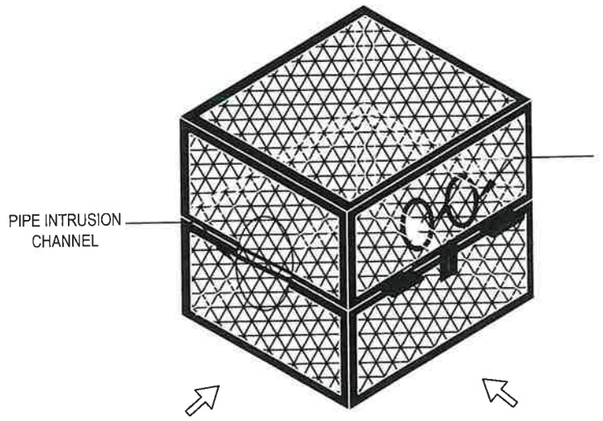
LIFTING DAVIT
(for chain block)



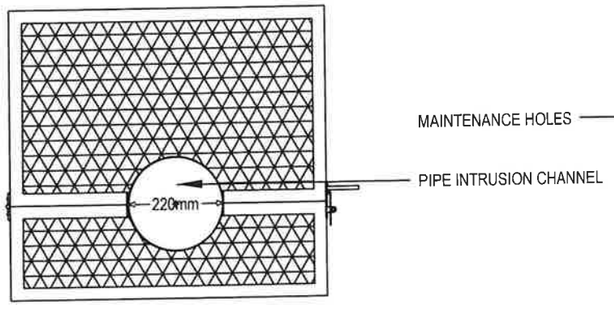
SIDE VIEW



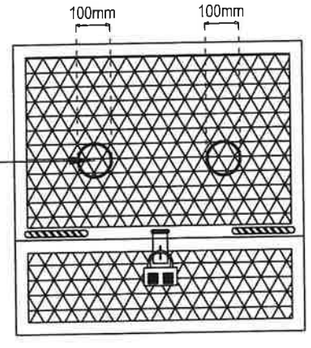
TOP VIEW



SIDE VIEW FRONT VIEW

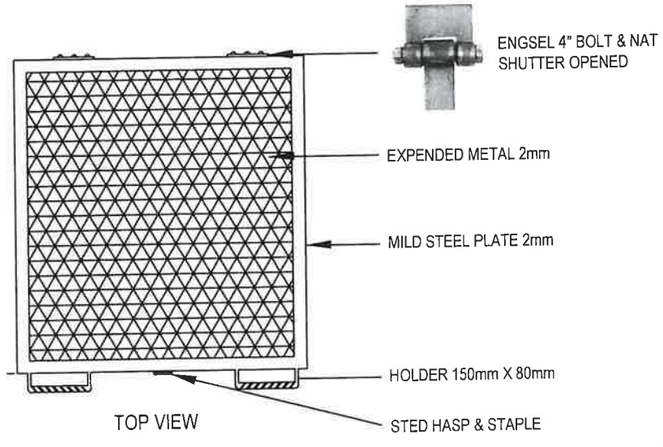


SIDE VIEW



FRONT VIEW

NOMINAL DIA. OF PIPE (mm)	BY PASS DIA. OF PIPE (mm)



TOP VIEW

THIS CAGE SIZE IS BASED ON 6" PIPE SIZE SCALE
HOWEVER, THE ACTUAL SIZE OF THE CAGE SHOULD BE ADJUSTED
ACCORDING TO THE SIZE OF THE PIPE TO BE USED DURING INSTALLATION.

LIFTING DAVIT IS INSTALLED FOR SIZE 10" AND ABOVE ONLY.

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

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REVISION

REV.	DATE	DESCRIPTION	APR

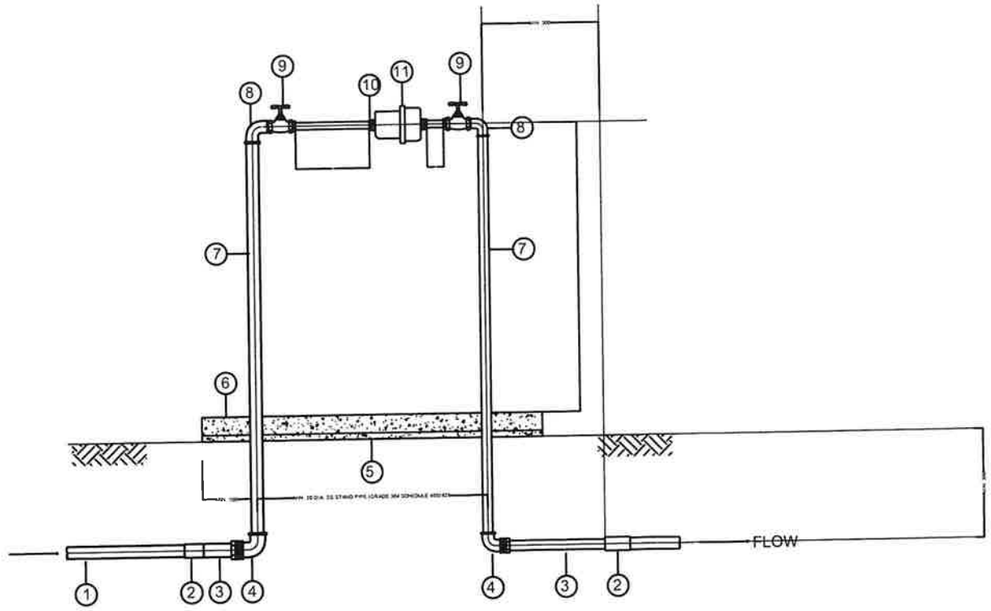
DRAWING TITLE:

TYPICAL DETAILS OF
PRESSURE REDUCING VALVE
AND SECURITY COVER

DATE : JANUARI 2026	SCALE : AS SHOWN (A1/A3)
DRAWN : ADZAHARI ALI	CHECKED : Ir. JULIANA ASHRAM
DESIGNED : ABDUL RAZAK	APPROVED : Ir. SHAHIRWAN
DRAWING NO : SAMB/PRC/STD/018/2026	REVISION 01

SPECIFICATION

1. POLYSTEEL PIPE 900 LONG (GRADE 304 SCHEDULE 40S)
2. POLYSTEEL PIPE 900 LONG (GRADE 304 SCHEDULE 40S)
3. JOINTING TO SUIT
4. SS ELBOW
5. WELL COMPACTED GROUND
6. 300 WIDTH X 75 THK. GRADE 25 CONCRETE SLAB WITH ONE LAYER OF BRC A10
7. STAINLESS STEEL
8. REDUCER ELBOW
9. STOPCOCK
10. METER COUPLING
11. WATER METER
12. METER COUPLING



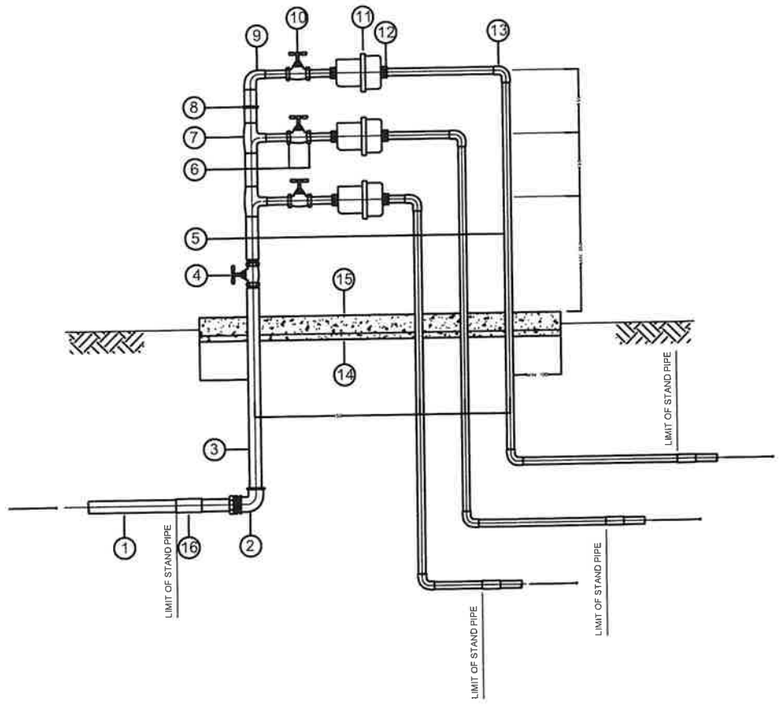
TYPICAL DETAILS OF STAINLESS STEEL METER STAND INSTALLATION FOR SINGLE METER SIZE 15-50 DIA. - TYPE A

SPECIFICATION

1. STAINLESS STEEL PIPE 900 LONG
2. STAINLESS STEEL ELBOW
3. STAINLESS STEEL STAND PIPE (SEE NOTE BELOW)
4. BRASS GATE VALVE / BALL VALVE (FULL BORE) (OR LOCKABLE 40S)
5. 20 DIA. SATINLESS STEEL PIPE
6. 20 DIA. SATINLESS STEEL NIPPLE
7. STAINLESS STEEL TEE
8. SATINLESS STEEL NIPPLE
9. REDUCER ELBOW
10. STOPCOCK
11. WATER METER
12. METER COUPLING
13. STAINLESS STEEL ELBOW
14. WELL COMPACTED GROUND
15. 300 WIDTH X 75 THK. GRADE 25 CONCRETE SLAB WITH ONE LAYER OF BRC A10
16. SS COMMUNICATION PIPE (GRADE 304 SCHEDULE 40S)

NOTE:-

1. Stainless steel stand pipe shall be:
   a) 25mm for 2 nos. meter or
   b) 50mm for 3 more nos. of meter



TYPICAL DETAILS OF STAINLESS STEEL METER STAND INSTALLATION FOR MULTY METER CONNECTION

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

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REVISION

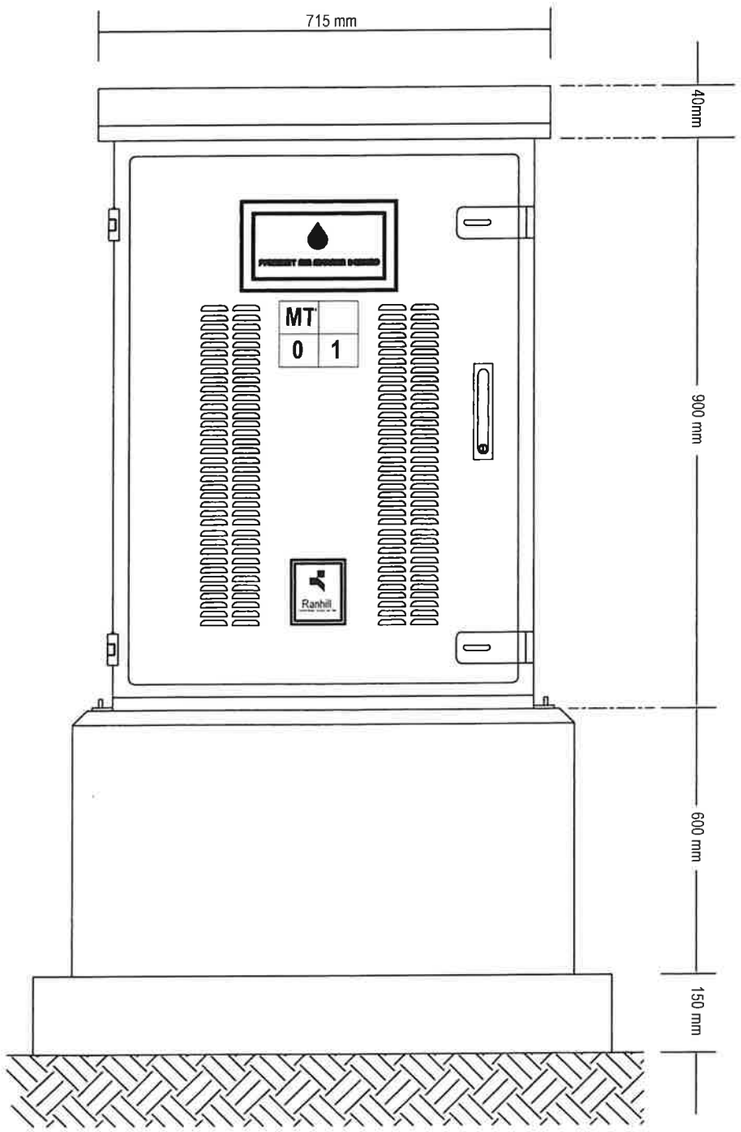
REV.	DATE	DESCRIPTION	APR

DRAWING TITLE:

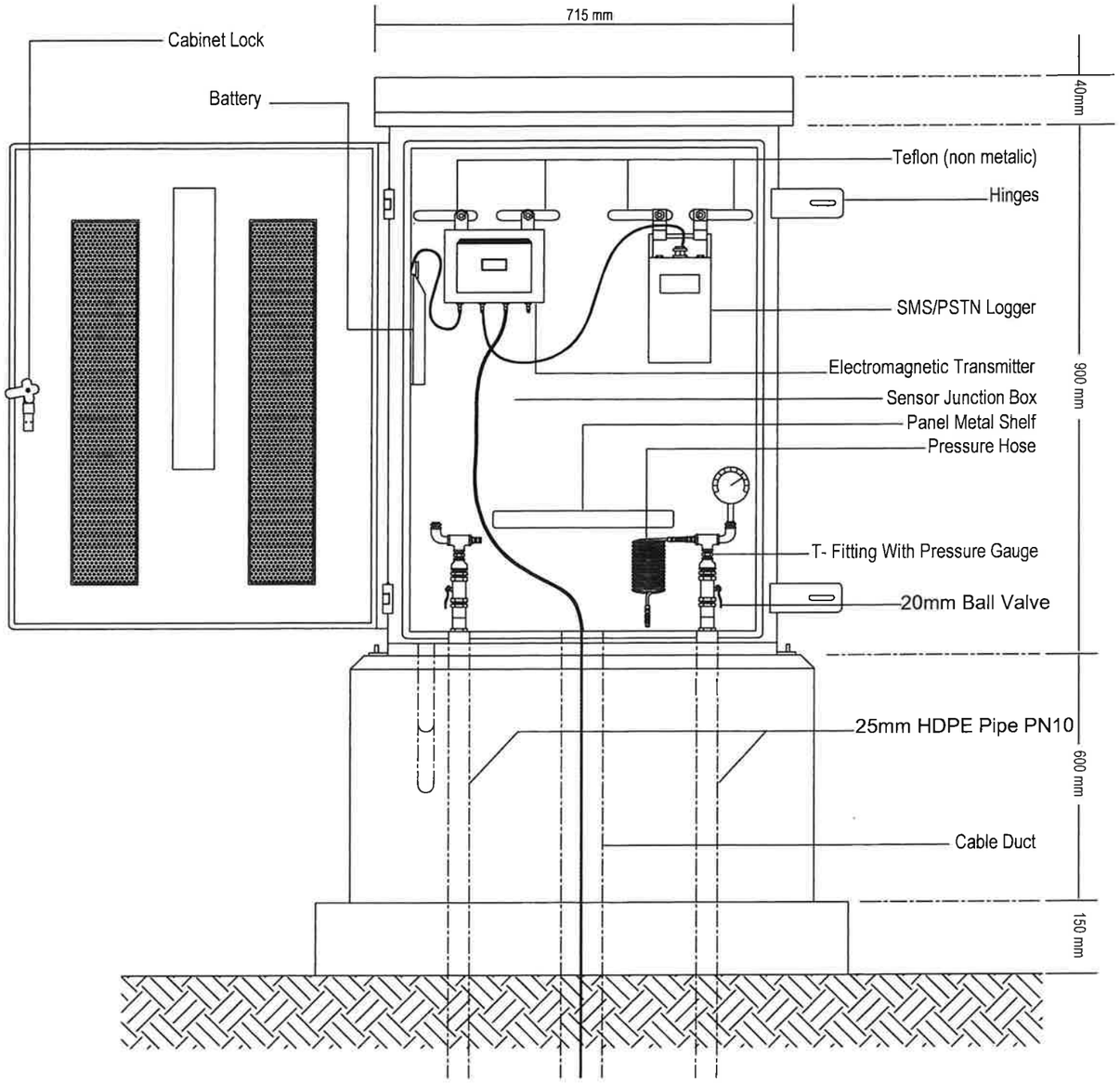
TYPICAL DETAILS OF METER STAND

DATE : JANUARI 2026	SCALE : AS SHOWN (A1/A3)
DRAWN : ADZAHARI ALI	CHECKED : Ir. JULIANA ASHRAM
DESIGNED : ABDUL RAZAK	APPROVED : Ir. SHAHIRWAN
DRAWING NO : SAMB/PRC/STD/019/2026	REVISION 01

DMZ CABINET TRANSMITER



EXTERIOR FRONT ELEVATION



INTERIOR FRONT ELEVATION

STANDARD DRAWING

NOTES:

IMPLEMENTING AGENT:

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REVISION

REV.	DATE	DESCRIPTION	APR

DRAWING TITLE:

DETAILS INSTALLATION OF METER CABINET

DATE : JANUARI 2026	SCALE : AS SHOWN (A1/A3)
DRAWN : ADZAHARI ALI	CHECKED : Ir. JULIANA ASHRAM
DESIGNED : ABDUL RAZAK	APPROVED : Ir. SHAHIRWAN
DRAWING NO : SAMB/PRC/STD/020/2026	REVISION 01