

SCANNED

VITAL ENERGI UTILITIES LIMITED

CIVIL ENGINEERING SPECIFICATION FOR PRE-INSULATED STEEL UNDERGROUND DISTRICT HEATING PIPELINES

VE-SPE-0401-v6.0

This document comprises of			
Policy	Procedure	Flow Chart	Quality
x	x	x	✓
Manual	Works Instruction	Specification	Health & Safety
x	x	✓	x
Assessment	Forms	Register	Environmental
x	x	x	x

Authorisation						
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**CIVIL ENGINEERING SPECIFICATION FOR PRE-INSULATED STEEL
UNDERGROUND DISTRICT HEATING DISTRIBUTION PIPELINES**

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1. Civil Works

1.1 General

This section covers the works associated with the laying of the pre-insulated DH pipe system. The Civil Engineering works and associated material specification shall be to the approval of Vital Energi (VE) and / or the Client / Contract Administrator and comply with all relevant Local Authority and / or Statutory Regulations applicable at the time of the works, inc. NRSWA and BS Codes of Practice.

The Contractor is to undertake all Civil Engineering works as required for the installation of the pre-insulated DH pipe system, including, but not limited to the following:

- Take delivery, off-load and store all pre-insulated materials
- Site investigations and trial digs
- Excavate trenches
- Prepare trenches, provide trench support and maintain
- Provide temporary works design as required
- Supply and lay sandbags full width of trench every 4m
- Distribute and lay pre-insulated materials in the trench for welding and jointing by others
- Provide attendance on welders
- Inspect trenches prior to backfill
- Backfill and reinstate

The approximate route of the DH pipe system is as indicated on the tender drawings. The final route shall be determined by the Contractor and approved by VE and / or the Client / Contract Administrator before any work commences on site. As far as practicable, routes shall follow the features of the site such as roadways and building lines. Road crossings shall normally be at right angles to the line of the road.

1.2 Design

VE shall be responsible for the design of the pre-insulated DH pipe system, and will ensure the suitability, compatibility and correct location within the system of components selected by them to meet the specified performance of the installation.

Design shall be based upon good working practice and shall include, but not be limited to, the following:

- The piping system design requirements of this specification
- The particular ground and site conditions relating to the site

- The location of existing services, building structures and other obstructions, and constraints along the route of the pipework system
- The expected ground movement
- A minimum ground cover of 400mm is required below the base of the road layer or the ground level of grassed areas. Where this cover cannot be achieved reinforced concrete flags shall be placed above the initial 150mm of backfill sand in order to limit the ground pressure loading on the pipeline to 50 kN/m².

The trenching design shall be by the Contractor and accommodate the following surcharge loadings:

- Main Roads - a group of 8 wheels arranged as in BS 5400: Part 2 type HB road loading, each wheel having a static force of 90 kN with an impact factor of 1.3, all acting simultaneously
- Light Roads - a group of 2 wheels spaced 0.9 metres apart, each having a static force of 70kN, with an impact factor of 1.5, both wheels acting simultaneously
- Grassed Areas - the same wheel arrangement as for (2nd bullet point) but with a static force of 30kN and an impact factor of 2.0
- Construction Areas - as per item (1st bullet point) using the maximum static force associated with the largest mechanical item of plant to be used on site.

Trenching and bedding material shall be selected by the Contractor with due consideration of prevailing ground conditions, loading requirements, construction requirements, pipe strengths and pipe gradient.

Road areas shall include all verges up to 2m outside the kerb lines.

The design of all anchor blocks (if shown on any tender drawings) shall be by VE and be based on the loading data derived from the piping system calculations taking full account of the ground conditions relating to the site.

1.3 Planning of the Works

The sequence of the site operations shall be planned so that the Work advances steadily and efficiently. Due recognition shall be given to the Work Programme and proximity of other contractors.

VE shall programme the Works so that they proceed with minimum inconvenience and disruption to the site occupants (and other users). The sequence of Civil Engineering operations shall be as follows (where appropriate):

- Site investigations and trial digs
- Setting out
- Breaking up of hard surfaces

- Excavation, trench supports, support of existing services and de-watering of trenches
- Preparation of trench bottoms
- Initial bedding inc. sandbag supports every 4m
- Pipe laying and attendance on welders
- Inspection of trenches
- Completion of sand bedding (including side fill and first 150mm layer of bedding)
- Backfilling of trench and withdrawal of trench supports (inc. laying of warning net)
- Disposal of surplus soil
- Temporary reinstatement of surfaces
- Permanent reinstatement of surfaces
- Takeover and defects liability period

The programme of excavation work shall ensure that the opening of trenches, and installation of the piping system, is only carried out over such lengths as can readily be completed in one continuous operation. The Contractor shall ensure that there is sufficient labour, plant and material to keep the complete excavation ahead of pipe laying with the smallest possible length of trench standing open at any one time. Excavation of new sections of pipelines shall not be commenced until an adequate supply of pipe and components are available. A reserve of appropriate materials and equipment shall be kept on site for immediate support of unexpected ground conditions.

Where work is likely to be suspended for any appreciable length of time, the construction schedule shall be arranged so that lengths of trench are not left open.

1.4 Site Investigation

The Contractor will be deemed to have visited the site and to have taken account of the topographical and other features apparent from a visual inspection of proposed piping routes. The Contractor shall check and verify all information supplied to him, prior to commencing any works. The Contractor shall carry out a site investigation and ground exploration in order to obtain any information deemed necessary.

No responsibility whatsoever will be accepted by VE for any unexpected site conditions subsequently encountered during the course of the works.

1.5 Ground Works Provisions for Pipe Movement

The Contractor shall make the necessary provision within his works to fully account for thermal movement of pipe casings at branches and bends through provision of an extra wide sand layer between the outer casing of the pipes and the trench wall. Please refer to section 2.5.

Systems using underground voids, culverts, lubrication and non-bonded techniques, for expansion control, shall not be accepted.

Concrete anchor blocks and other associated builders work shall be shuttered and cast to details shown on the approved drawings. Anchors to comply fully with the relevant pipework manufacturer's specification.

1.6 Maintenance of Existing Works

Before commencing any site operations, the Contractor shall notify (in writing) all appropriate service and utility authorities of the impending installation works and obtain details, and locations, of all existing installations (whether buried, hidden or visible) in the vicinity of the Works.

Requests by any such third parties to witness any trench opening(s) must be notified to VE and / or the Client / Contract Administrator and strictly adhered to.

Unless otherwise approved by VE and / or the Client / Contract Administrator, excavations within 600mm of existing services shall be by hand digging. All services uncovered, whether expected or not, shall be reported immediately to VE and / or the Client / Contract Administrator. They shall be supported by slings or any other suitable means and be adequately protected. Any damage to services, however minor, shall be reported immediately to VE and / or the Client / Contract Administrator. No repairs or replacement shall be carried out without approval from VE and / or the Client / Contract Administrator.

A photographic and a written record shall be kept by the Contractor of the condition of any drains, manholes or other existing works which may be uncovered. Any defect evident shall be brought to the attention of VE and / or the Client / Contract Administrator.

The Contractor shall not use or interfere with the existing service installations without permission of VE and / or the Client / Contract Administrator, or where appropriate, service and utility authorities.

The Contractor shall take precautions to avoid damage to existing services and draw his operatives attention to the attendant risks and dangers – please refer to HSE Guidance Note HSG47 “Avoiding danger from Underground services”.

If damage to existing installations occurs during the Works, then:

- The Contractor shall immediately notify (in writing) VE and / or the Client / Contract Administrator and, where applicable, service and utility authorities. Details of the damage and proposed action the Contractor will take shall be given.
- The Contractor shall make arrangement for repair to the satisfaction of VE and / or the Client / Contract Administrator and, where applicable, to the satisfaction of the service and utility authorities.
- In the case of urgent repairs, the Contractor shall accept any arrangement made by VE and / or the Client / Contract Administrator. Such arrangements shall not affect the extent of the contractor's liability.

1.7 Trenches / Excavations

All setting-out, excavations to required invert levels and backfill of trenches for the underground mains to be carried out in accordance with approved drawings. All excavations to be in accordance with relevant British Standards, ACOP's and Construction Regulations, including the provision of temporary fencing, scaffolding, bridging, barriers and watching required.

The excavations shall be shored up in compliance with Health and Safety regulation requirements. All shoring shall be positioned to ensure that it does not obstruct the installation works. If this is not possible, attendance shall be given by the Contractor to remove and replace shoring as necessary during pipework installation (only to be carried out if safety regulations are not contravened).

The excavations shall be graded to falls (to ensure the complete removal of air from the newly installed pipework) and the trench floor compacted (without the introduction of sand). If ground conditions require it, a concrete blind should be laid and graded to provide a firm trench bottom. Excavations shall be set out to the required invert levels. VE and / or the Client / Contract Administrator may require the Contractor to prove the set levels via the use an adequate levelling device, e.g. Dumpy, Thompson, Cowley etc. VE and / or the Client / Contract Administrator may request the above checks be made at any stage of the works.

If services are encountered within the excavations that require the pipe to be installed at an increased depth in order to overcome the service and / or maintain minimum cover levels, the depth shall be maintained giving due consideration to removal of air from the system. Contractors will have deemed to have included for this.

The Contractor is to include provision for the excavation of adequately dimensioned welding pits (bell holes), as and when required, to ensure the welder has adequate access within the confines of the trench to make a perfect joint.

The Contractor is to include provision for the supply and laying of sandbags the full width of the trench every 4m.

Excavated spoil is to be taken away from the trench area. If this is not possible / practical, the spoil may be placed on one side of the trench, leaving a minimum of 1m between the soil and the edge of trench. The opposite side of the trench is to be kept clear to allow access for plant and material for the installation of the new pipework.

The excavations shall be kept clear of all water at all times from the commencement of works until the backfill is completed. Pumps are to be provided where necessary to ensure this requirement is met.

Trenches are to be maintained, i.e. removal of materials due to trench collapse etc. This shall be carried out from commencement of the works until backfill is completed.

All open excavations are to be protected with 1.8m high Herras type fencing, c/w double clips (top and bottom) and heavy duty feet to prevent unauthorised access. Where fencing is situated on the highway, reflective strips are to be included to prevent accidents.

1.8 Access / Installation

Access shall be provided along the route of the underground mains installation for distribution of materials by the Contractor and welding / jointing plant by others. When pipes and fittings are transported to the trench site, precautions must be taken to avoid damage to the items (see Appendix 3). Temporary support, if required, should be provided by means of suitably sized wooden sleepers, sand bags or styrene blocks. The supports must be able to carry the load of the pipes without damage to the outer casing or insulation.

1.9 Attendance on Welders

Allowance should be made by the Contractor to provide attendance, as and when required, during the welding process to assist with lifting and positioning of pipe and fittings previously laid in the trench to enable welding to be undertaken.

1.10 Inspection

Inspection & recording of excavations is to be in accordance with current Legislation (refer to HSE Guidance Construction Information Sheet No. 47).

Newly installed pipework is to be closely inspected immediately prior to the sand backfill to ensure that the pipework's outer casing is undamaged in any way. A minimum clearance of 100mm is required to be provided around the outer casing of the pipework throughout the entire length of the new pipework installation. Any section found not to comply with this requirement must be rectified before sand backfill can commence. The Contractor is to advise VE and / or the Client / Contract Administrator of a date and time of inspection to allow joint inspection to be made if so required. Notification to be in writing and an allowance of 48 hours to be provided prior to inspection date.

1.11 Sand for Backfilling

Upon request, the Contractor shall give a sample of the chosen sand material to VE for approval. The sand material to be used must be free from all sharps and grains must not exceed more than 3mm.

1.12 Backfilling

Backfill materials, whether imported to site or derived on-site from excavated materials, shall comply with the requirements of NRSWA. Contractors will have deemed to have included for all imported backfill materials as necessary to complete the works.

Sand backfill should commence immediately following the successful inspection of both the trenches and newly installed pipework. Closures are to be left exposed until a pressure test has been successfully completed. Care should be given to ensure no damage is caused to the trench or installation pipework during the backfill process.

The backfill sand is **manually** compacted down (to prevent voids occurring) in layers of 100mm, ensuring that a 100mm layer of compacted sand is provided around and above the pipework's outer casing. Each layer is to be completely compacted before the next layer is laid. The compacted sand layer shall provide a complete support to the pipes around their entire circumference.

Normally, manual compaction is achieved by hand and watering. Careful and even compaction is essential.

Sand to be placed without any displacement of the underground mains installation.

A warning net shall be supplied free issue to the Contractor by VE and shall be placed 250mm above the crown of the pipeline.

VE and / or the Client / Contract Administrator may request paving slabs to be laid immediately above the finished sand level for added warning / protection. The additional protective measures, if required, are to be covered by a provisional sum included in the tender summary.

Above the sand surround a backfill with selected material not exceeding 75mm in size, free from rubble, half bricks, sharp objects and building rubbish, shall be placed in 150mm layers. Each layer to be hand tamped and compacted to give a minimum cover of 400mm between the crown of the underground mains and the base of the road layer or the ground level of grassed areas.

Where the specified cover cannot be achieved reinforced concrete flags, placed above the initial 150mm of backfill, shall limit the ground pressure loading on the pipeline to 50 kN/m².

1.13 Manhole Chambers

Manhole chambers are to be constructed in accordance with the typical construction detail as shown in Appendix 1.

1.14 Reinstatement of Surfaces

Those parts of the site (and any areas outside the site) disturbed by the Works shall be reinstated to equal the conditions existing before the works commenced. The surface of any road or footpath which has been disturbed by the excavation shall be reinstated to the approval of VE and / or the Client / Contract Administrator. Cultivated areas, top soil and turf shall be permanently reinstated to harmonise with the adjoining surface.

2. INSTALLATION AND HANDLING OF PIPEWORK

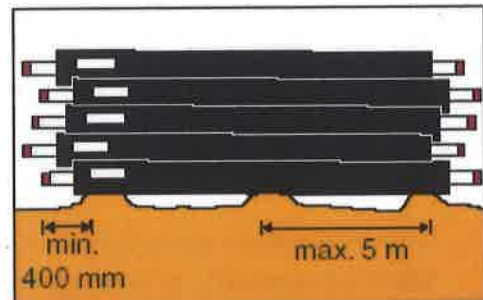
2.1 Storage on Site

Pipes must be stacked in such a way that they are not damaged.

Stack the pipes on a level surface of stone free sand with cushions of sand as it appears from the illustration.

Instead of cushions of sand, sleepers with a min. width of 100mm may be used.

Pipes are to be stored in a secure compound area, protected by 1.8m high Herras type fencing, c/w double clips (top and bottom) and heavy duty feet in order to prevent unauthorised access.



Dimension Outer casing	Max. stacking height, H (m)	
	Cushions of sand	Sleepers
90-160	1,5	1,5
180-355	2,0	1,5
400-1200	3,0	2,0

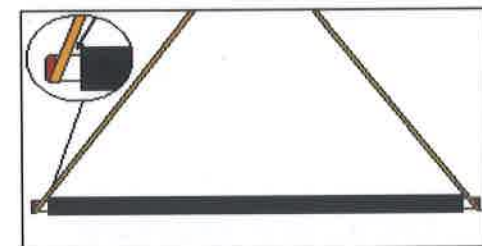
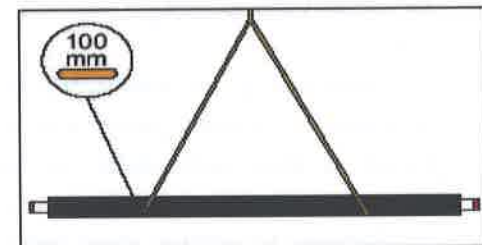
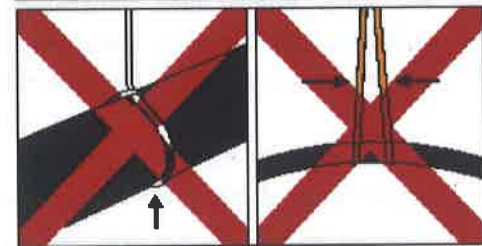
2.2 Handling

Handling - avoid damage to the outer PE- casing and the PUR-foam insulation.

Do not lift the pipes at only one spot and take care when using double straps in wet weather. They may slide together and unbalance the lift.

Only use lifting straps with a width of min. 100mm.

Max. pressure on the outer casing < 300 kPa/ (0.3 N/mm²). Only use fabric or nylon straps when lifting at the steel pipe ends.



2.3 Excavation of Trench

The Contractor’s pipes are installed in trenches in accordance with the minimum dimensions. Note: these dimensions relate to Standard pipe only. See Appendix 2

If VE have specified that Plus pipe is to be used, alternative minimum dimensions are available upon request.

2.3.1 Straight Runs

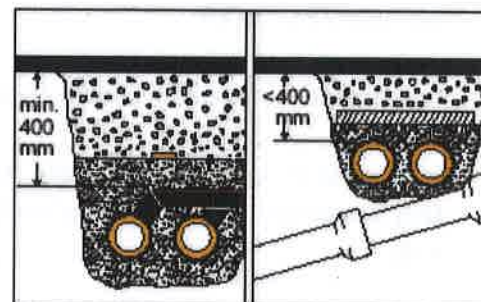
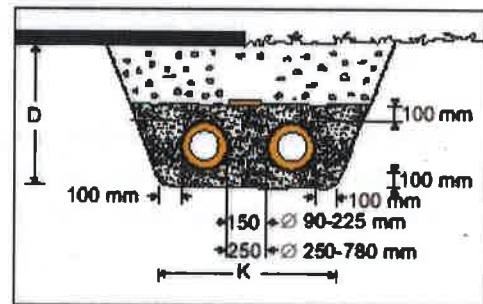
The min. dimensions, stone free sand layer, distance between the outer casings and the cover of the pipes, required for a correct system function, appear from the trench profile. Also see Appendix 2

A cover of 400mm allows a max. surface load of 800-900 kPa (0.8-0.9N/mm²). In areas with heavy traffic 400mm is measured from the top of the pipes to the bottom of the road layer.

In areas with no traffic 400mm is measured to the top of the area. Where pipe dimensions of larger than \varnothing 609.6/780 mm are to be used, the necessary installation depth and pipe distances are determined in each case.

At branches, the 400mm is measured from the top of the branch pipe. If the cover is less than 400mm the pipes must be secured against overloading - e.g. by means of a reinforced concrete plate.

The pipes can be installed in the trench, supported by sandbags or sleepers which are removed before the trench is filled with sand. In case of joints it is recommended to increase the trench width and depth to 250-300mm to ensure good space for welding and installation of the muffs.



2.3.2 Connection Above Trench

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A simple and quick installation is achieved by connecting several pipes above or alongside the trench.

Support the pipes by sleepers, made from square timber e.g. 100 x 100mm, with suitable distance between them.

Sleepers must also be used, if several pipe lengths are installed alongside the edge of the trench.

When installing pipes with built-in surveillance system place the pipes so that there is only one label at each joint.

This is necessary for the surveillance system to function.

When a pipe length has been welded together, the pressure test has been carried out and the muffs installed and insulated, lower the section into the trench with wide straps by means of cranes. The number of straps and cranes depends on the length and dimension of the pipe section.

When utilizing this installation technique, it is important to keep the pressure limitation of max. 300 kPa on the outer casing.

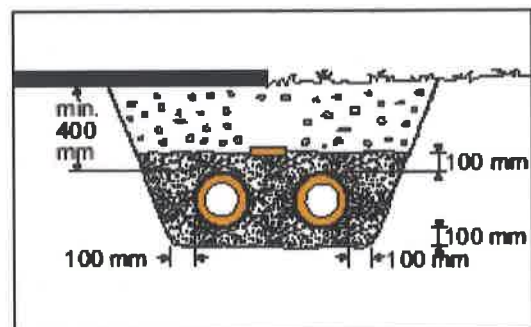
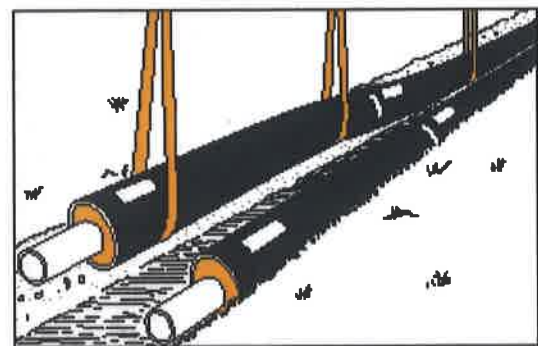
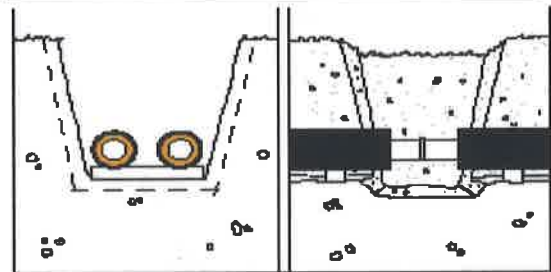
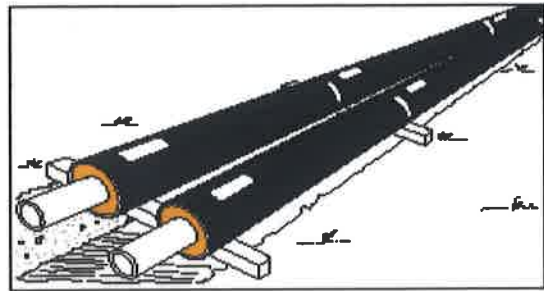
Deflections may not result in tensile stresses > 200 kPa, corresponding to a material strain of approx. 0.1%.

2.4 Backfilling

Level the bottom of the trench with a min. 100mm stone free sand layer which is compacted.

Remove all sleepers after installation of the pipes and cover with 100mm stone free sand.

Place the warning net on the sand surface and make final backfilling with an optional stone free material.



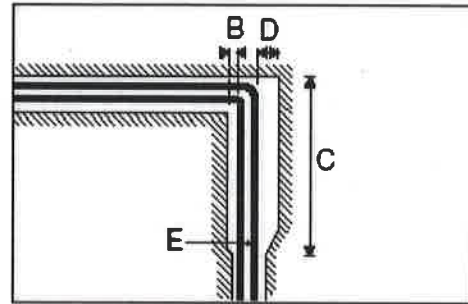
The sand surrounding the pipes is important - not just to protect the pipes, but also to ensure the friction between the outer casings and the sand which restrains the expansion of the pipes as provided in the installation rules.

2.5 Ground Expansion Zones

Sand pads for installation methods II, III, IV

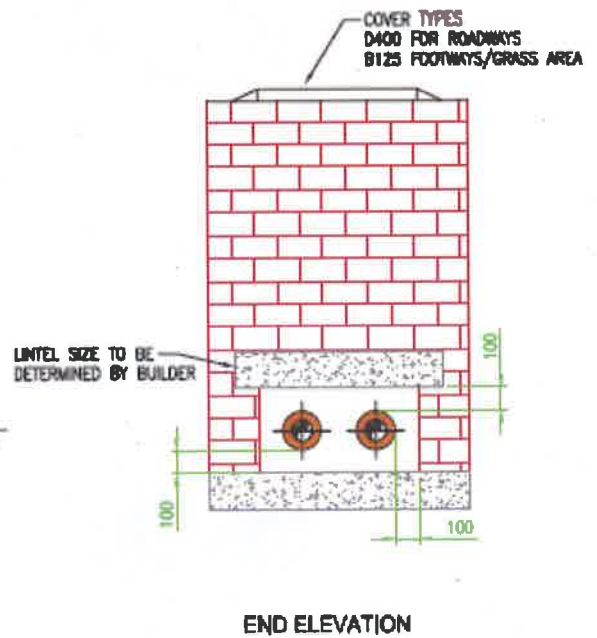
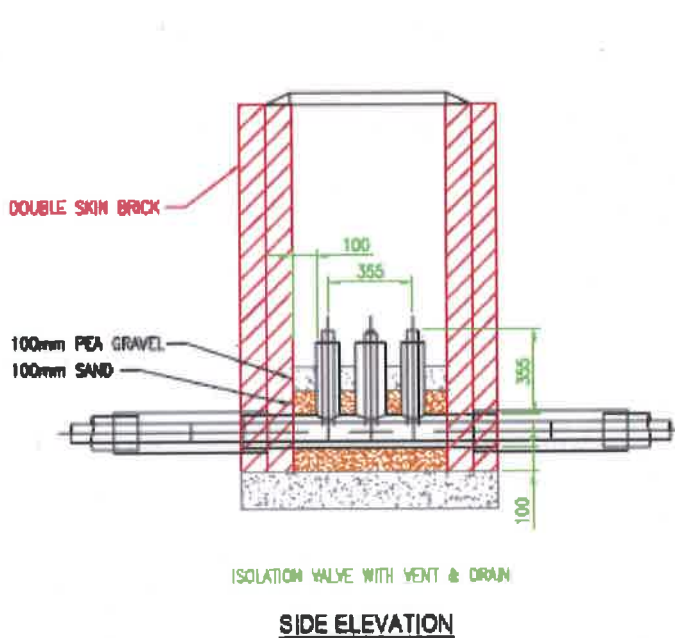
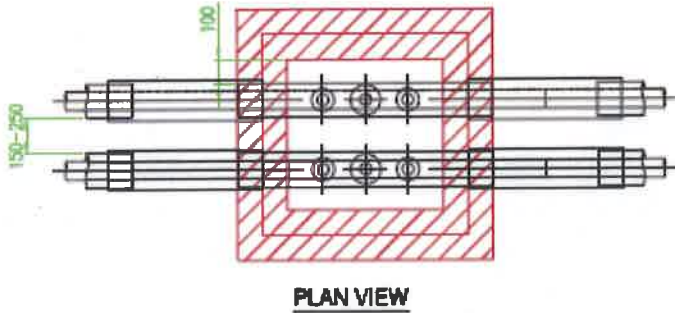
The thickness and length of the sand pad appear in the table.

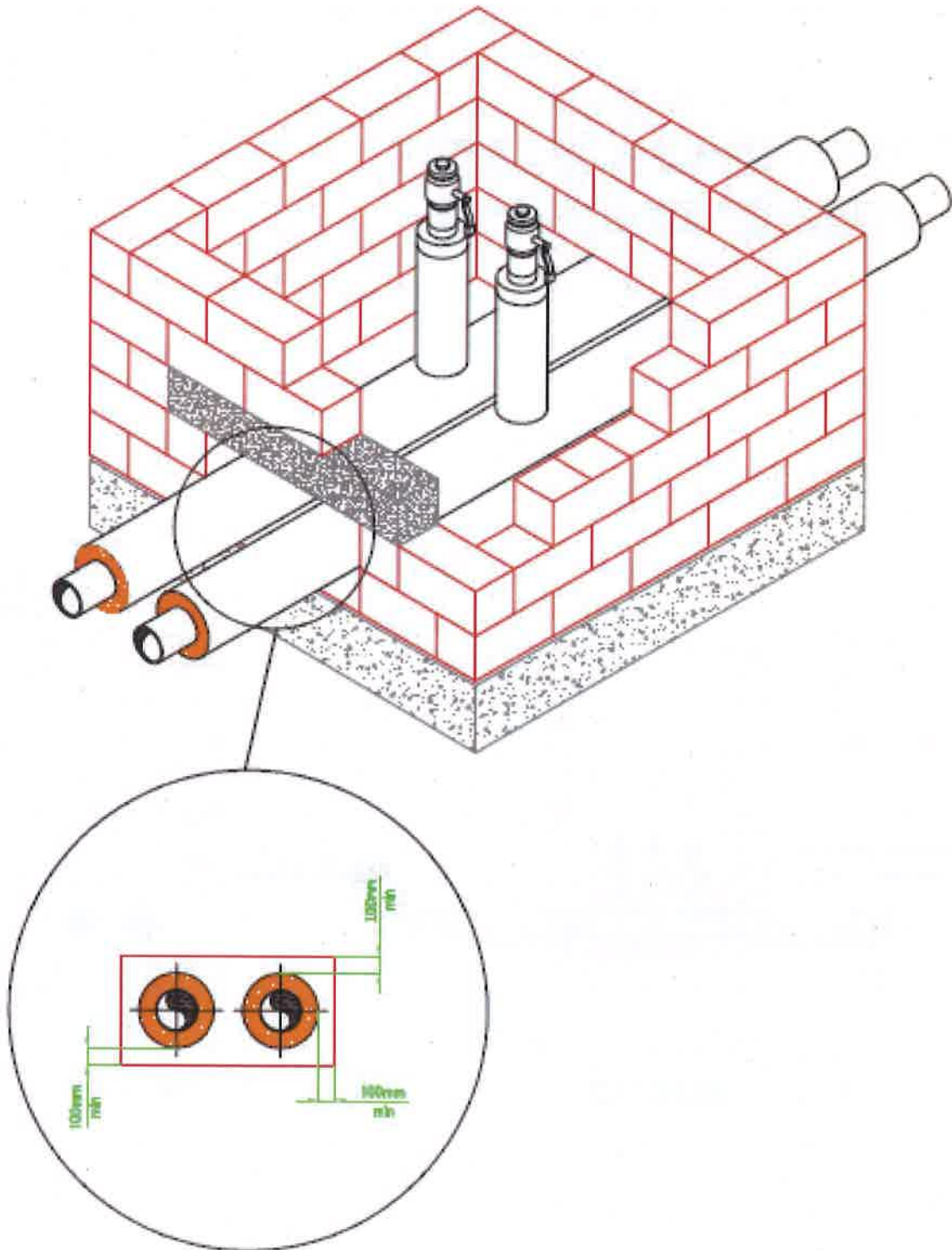
Special measures must be taken in connection with major dimensions and large installation depths.



Service pipe Dim.	Thickness of sand layer			Length expansion zone
	Outer casing/wall	Between outer casing		
ø out. mm	D mm	B mm	E mm	C m
26,9	160	100	160	0,8
33,7	160	100	160	0,8
42,4	160	100	160	1,0
48,3	160	100	160	1,0
60,3	200	160	160	1,2
76,1	200	160	160	1,3
88,9	250	160	160	1,6
114,3	300	160	160	1,8
139,7	350	200	200	2,0
168,3	350	200	200	2,2
219,1	450	260	260	2,7
273	550	300	300	3,1
323,9	600	360	360	3,6
365,6	650	400	360	3,6
406	700	400	400	4,3
467	800	450	450	4,7
508	850	600	600	5,0
569	950	600	600	6,2
610	1050	650	600	6,0

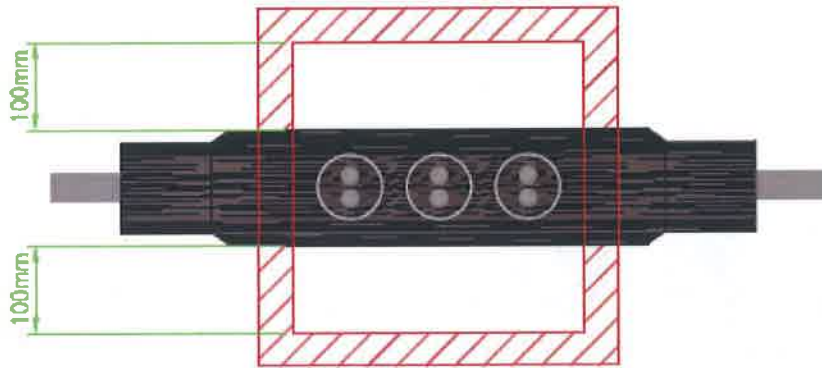
APPENDIX 1 – Typical Manhole Chamber Construction



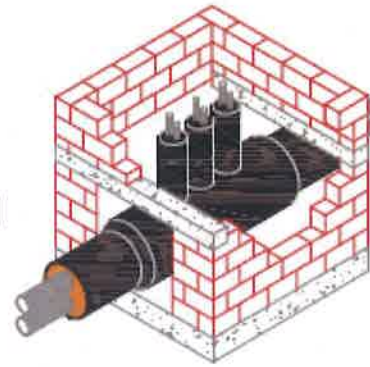


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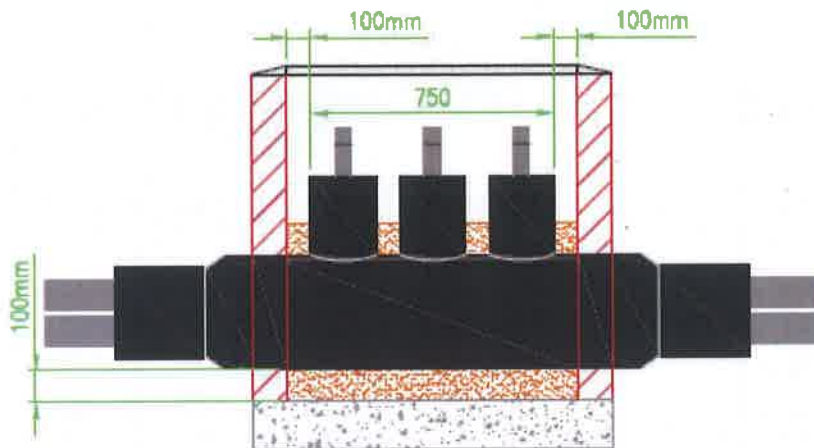
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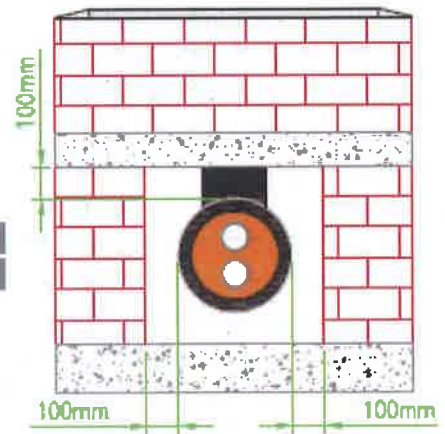
PLAN VIEW



ISOMETRIC VIEW
(N.T.S.)

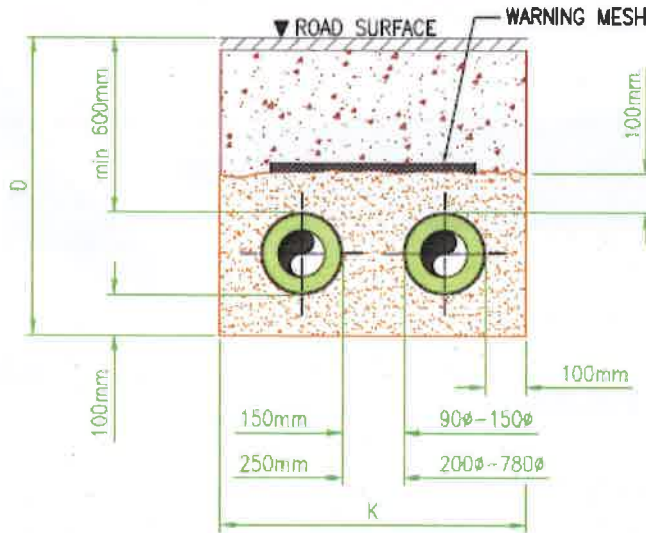


SIDE VIEW



FRONT VIEW

APPENDIX 2 – Standard Trench Detail



**TYPICAL STANDARD TRENCH SECTION
 SERIES 1**

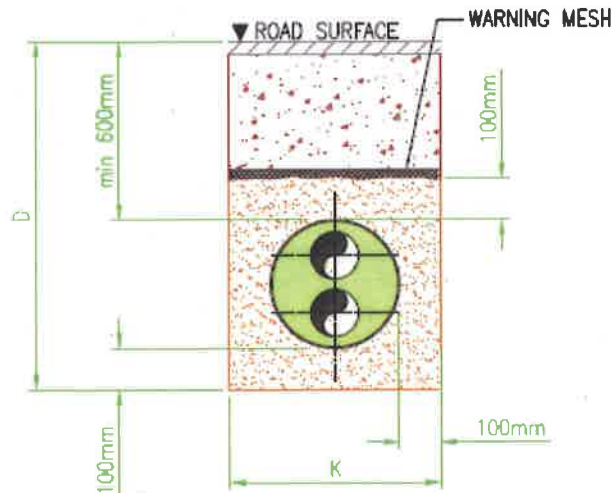
NOMINAL BORE mm	OUTER CASING DIAMETER mm	K MIN METERS	D MIN METERS
25	90	0.53	0.79
32	110	0.57	0.81
40	110	0.57	0.81
50	125	0.60	0.825
65	140	0.63	0.84
80	160	0.67	0.86
100	200	0.75	0.9
125	225	0.80	0.925
150	250	0.85	0.95
200	315	1.08	1.015
250	400	1.25	1.1

**TYPICAL STANDARD TRENCH SECTION
 SERIES 2**

NOMINAL BORE mm	OUTER CASING DIAMETER mm	K MIN METERS	D MIN METERS
25	110	0.57	0.81
32	125	0.60	0.825
40	125	0.60	0.825
50	140	0.63	0.84
65	160	0.67	0.86
80	180	0.71	0.88
100	225	0.80	0.925
125	250	0.85	0.95
150	280	0.91	0.98
200	355	1.16	1.055
250	450	1.35	1.15

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**TYPICAL STANDARD TRENCH SECTION
TWIN SERIES 1**

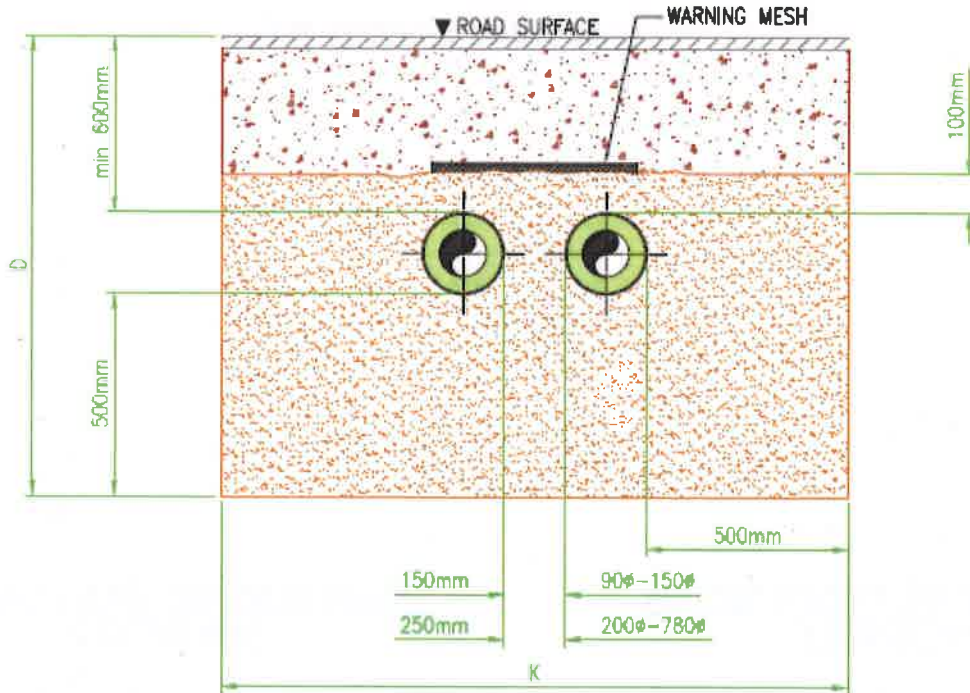
NOMINAL BORE mm	OUTER CASING DIAMETER mm	K MIN METERS	D MIN METERS
25 x 2	140	0.34	0.84
32 x 2	160	0.36	0.86
40 x 2	160	0.36	0.86
50 x 2	200	0.40	0.9
65 x 2	225	0.425	0.925
80 x 2	250	0.45	0.95
100 x 2	315	0.515	1.015
125 x 2	400	0.6	1.1
150 x 2	450	0.65	1.15
200 x 2	560	0.76	1.26

**TYPICAL STANDARD TRENCH SECTION
TWIN SERIES 2**

NOMINAL BORE mm	OUTER CASING DIAMETER mm	K MIN METERS	D MIN METERS
25 x 2	160	0.36	0.86
32 x 2	180	0.38	0.88
40 x 2	180	0.38	0.88
50 x 2	225	0.425	0.925
65 x 2	250	0.45	0.95
80 x 2	280	0.48	0.98
100 x 2	355	0.555	1.055
125 x 2	450	0.65	1.15
150 x 2	500	0.7	1.2
200 x 2	630	0.83	1.33

CE Spec. Pre-Insulated Steel U/Grnd DH Pipelines

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**TYPICAL WELD-PIT TRENCH SECTION
SERIES 1**

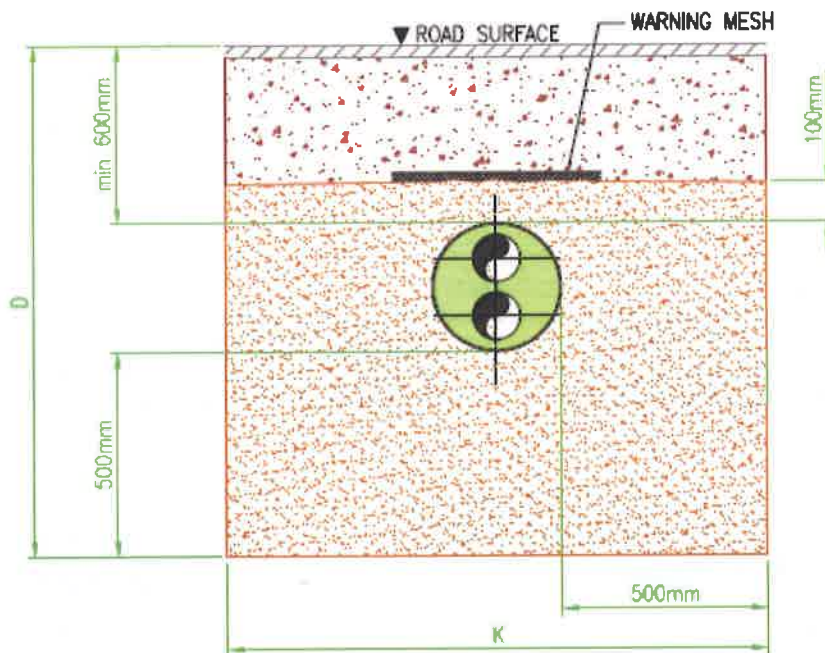
NOMINAL BORE mm	OUTER CASING DIAMETER mm	K MIN METERS	D MIN METERS
25	90	1.33	1.19
32	110	1.37	1.21
40	110	1.37	1.21
50	125	1.40	1.225
65	140	1.43	1.24
80	160	1.47	1.26
100	200	1.55	1.3
125	225	1.60	1.325
150	250	1.65	1.35
200	315	1.88	1.415
250	400	2.05	1.5

**TYPICAL WELD-PIT TRENCH SECTION
SERIES 2**

NOMINAL BORE mm	OUTER CASING DIAMETER mm	K MIN METERS	D MIN METERS
25	110	1.37	1.21
32	125	1.4	1.225
40	125	1.4	1.225
50	140	1.43	1.24
65	160	1.47	1.26
80	180	1.51	1.28
100	225	1.6	1.325
125	250	1.65	1.35
150	280	1.71	1.38
200	355	1.96	1.455
250	450	2.15	1.55

CE Spec. Pre-Insulated Steel U/Grnd DH Pipelines

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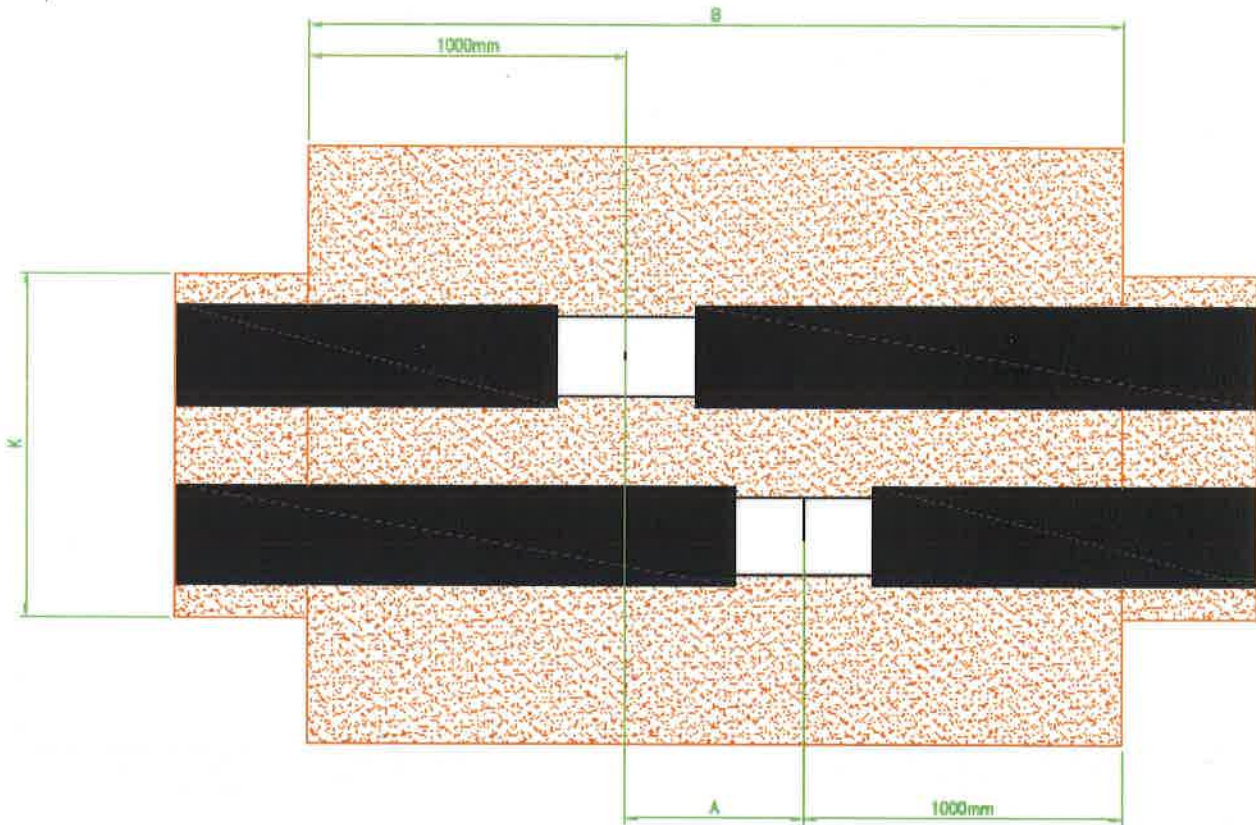


**TYPICAL WELD-PIT TRENCH SECTION
TWIN SERIES 1**

NOMINAL BORE mm	OUTER CASING DIAMETER mm	K MIN METERS	D MIN METERS
25 x 2	140	1.14	1.24
32 x 2	160	1.16	1.26
40 x 2	160	1.16	1.26
50 x 2	200	1.2	1.3
65 x 2	225	1.225	1.325
80 x 2	250	1.25	1.35
100 x 2	315	1.315	1.415
125 x 2	400	1.4	1.5
150 x 2	450	1.45	1.55
200 x 2	560	1.56	1.66

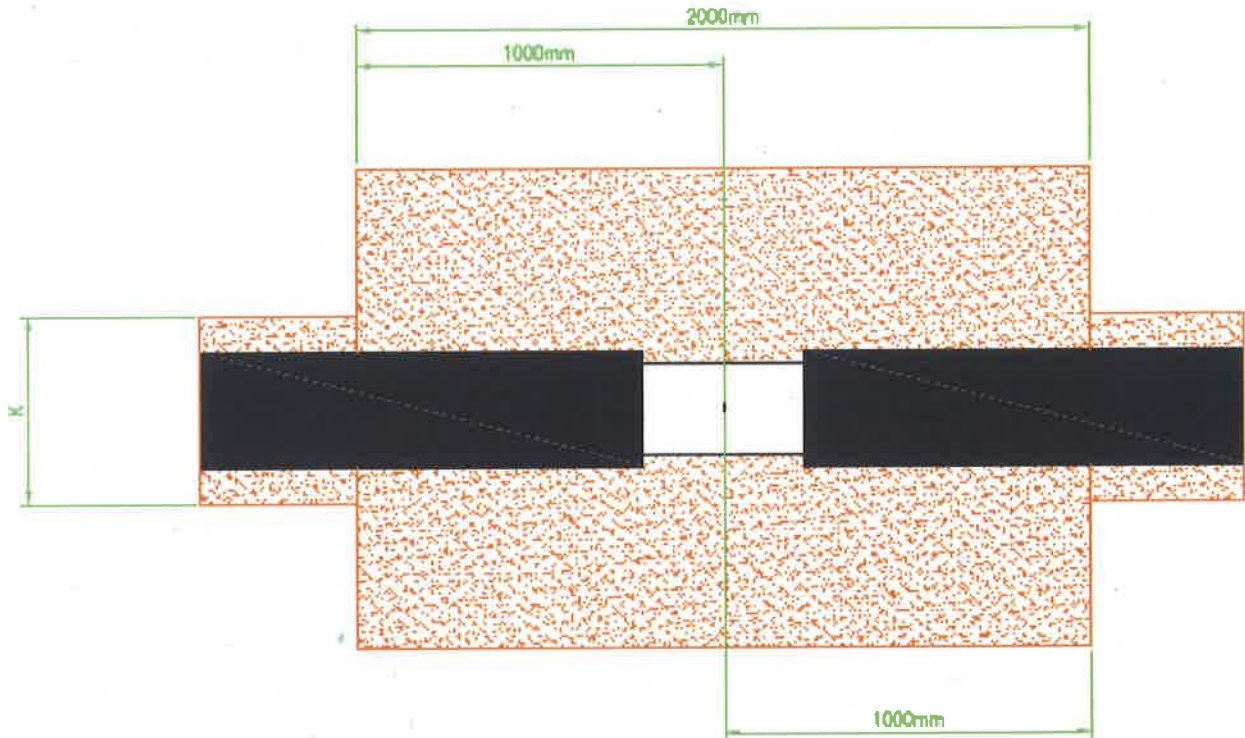
**TYPICAL WELD-PIT TRENCH SECTION
TWIN SERIES 2**

NOMINAL BORE mm	OUTER CASING DIAMETER mm	K MIN METERS	D MIN METERS
25 x 2	160	1.16	1.26
32 x 2	180	1.18	1.28
40 x 2	180	1.18	1.28
50 x 2	225	1.225	1.325
65 x 2	250	1.25	1.35
80 x 2	280	1.28	1.38
100 x 2	355	1.355	1.455
125 x 2	450	1.45	1.55
150 x 2	500	1.5	1.6
200 x 2	630	1.63	1.73



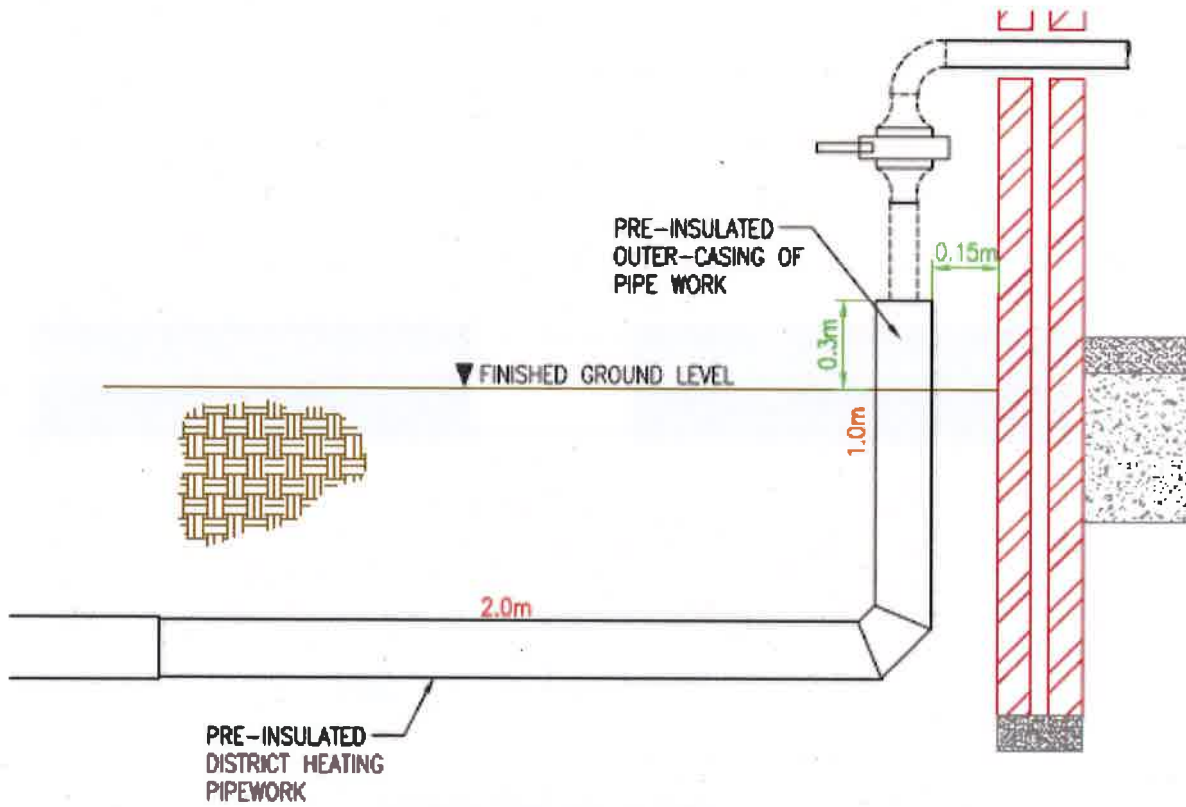
TYPICAL WELD-PIT LENGTH
SINGLE PIPE

NOMINAL BORE mm	OUTER CASING DIAMETER mm	A MIN METERS	B MIN METERS
25	90	0.24	2.24
32	110	0.26	2.26
40	110	0.26	2.26
50	125	0.275	2.275
65	140	0.29	2.29
80	160	0.31	2.31
100	200	0.35	2.35
125	225	0.375	2.375
150	250	0.4	2.4
200	315	0.465	2.465
250	400	0.55	2.55

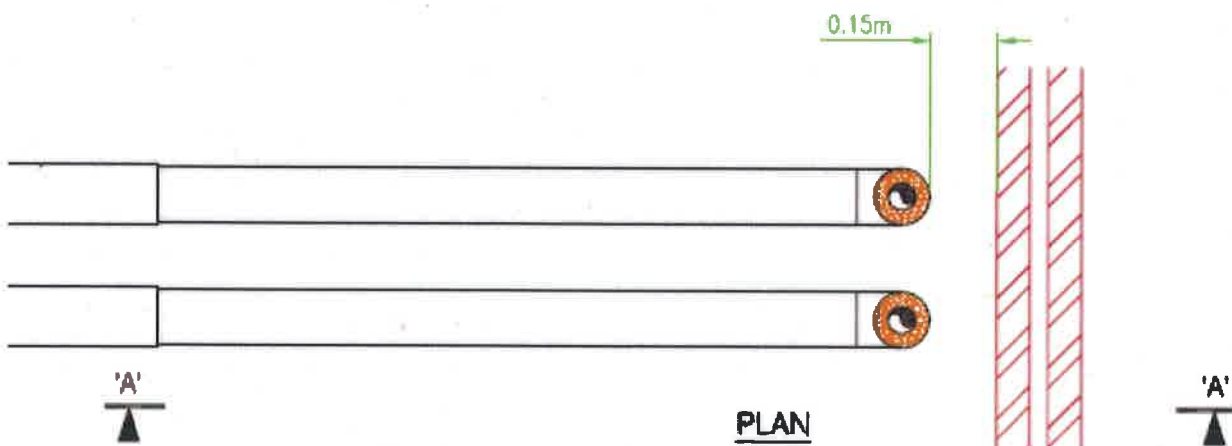


TYPICAL WELD-PIT LENGTH
TWIN PIPE (ALWAYS 2m)

TYPICAL BUILDING ENTRY DETAIL, PRE-INSULATED PIPEWORK (EXTERNAL RISER)



SECTION 'A-A'

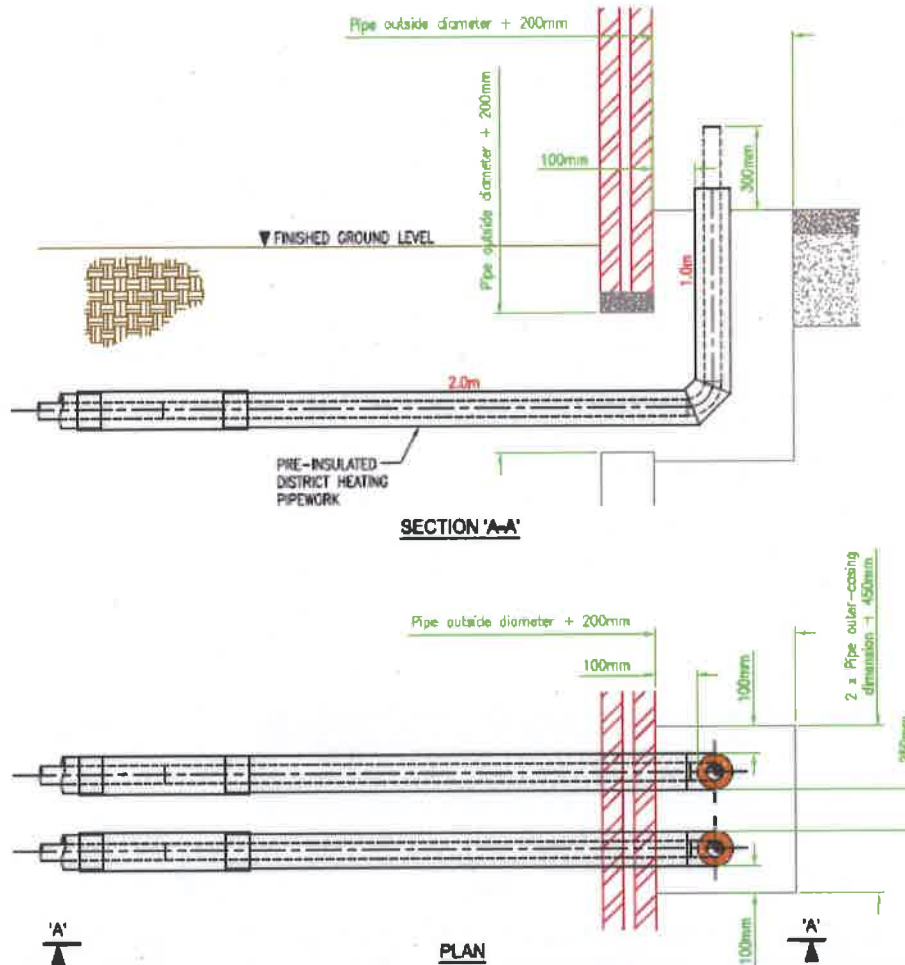


PLAN

CE Spec. Pre-Insulated Steel U/Grnd DH Pipelines

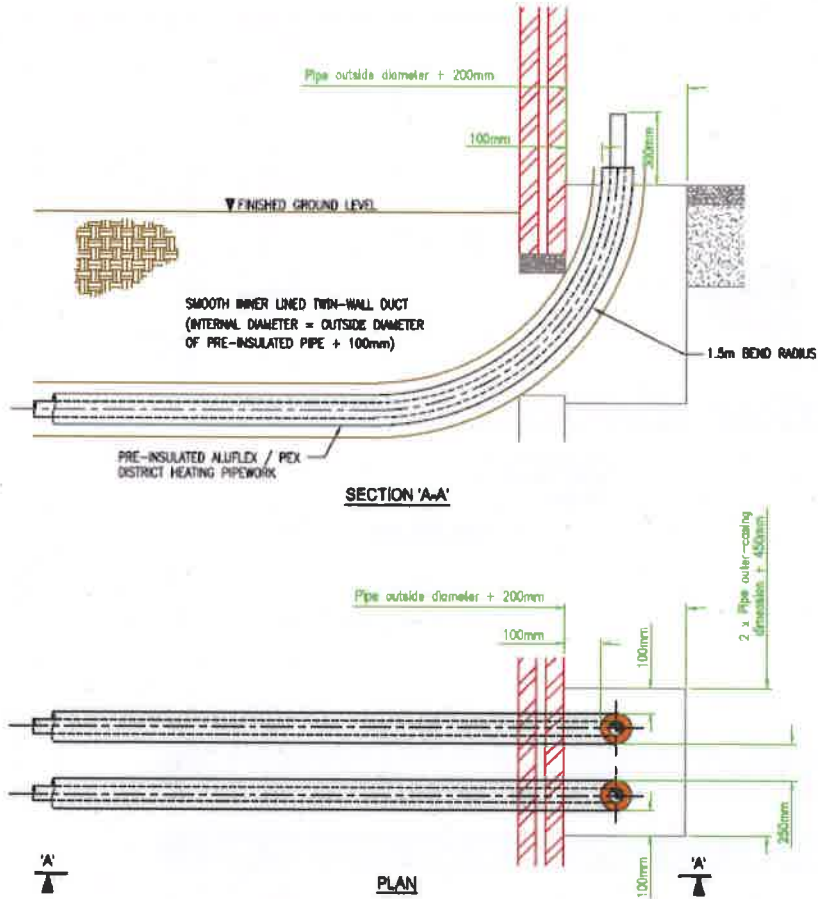
VE-SPE-0401-v6.0

TYPICAL BUILDING ENTRY DETAIL, PRE-INSULATED PIPEWORK (INTERNAL RISER)



TWIN PIPE SCHEDULE (SERIES 1)			TWIN PIPE SCHEDULE (SERIES 2)			PIPE SCHEDULE (SERIES 1)			PIPE SCHEDULE (SERIES 2)		
NOMINAL I.D. mm	O.D. mm	OUTER CASING O.D. mm	NOMINAL I.D. mm	O.D. mm	OUTER CASING O.D. mm	NOMINAL I.D. mm	O.D. mm	OUTER CASING O.D. mm	NOMINAL I.D. mm	O.D. mm	OUTER CASING O.D. mm
20	26.9	125	20	26.9	140	20	26.9	90	20	26.9	110
25	33.7	140	25	33.7	180	25	33.7	90	25	33.7	110
32	42.4	160	32	42.4	180	32	42.4	110	32	42.4	125
40	48.3	180	40	48.3	180	40	48.3	110	40	48.3	125
50	60.3	200	50	60.3	225	50	60.3	125	50	60.3	140
65	76.1	225	65	76.1	250	65	76.1	140	65	76.1	180
80	88.9	250	80	88.9	280	80	88.9	160	80	88.9	200
100	114.3	315	100	114.3	355	100	114.3	200	100	114.3	225
125	139.7	400	125	139.7	450	125	139.7	225	125	139.7	250
150	168.3	450	150	168.3	500	150	168.3	250	150	168.3	280
200	219.1	560	200	219.1	630	200	219.1	315	200	219.1	355
						250	273.0	400	250	273.0	450
						300	323.9	450	300	323.9	500
						350	355.6	500	350	355.6	520

TYPICAL BUILDING ENTRY DETAIL, PRE-INSULATED PIPEWORK (INTERNAL RISER)



ALUPEX TWIN PIPE SCHEDULE (SERIES 1)		
NOMINAL I.D. mm	O.D. mm	OUTER CASING O.D. mm
18/18	18	90
20/20	20	90
25/25	25	110
32/32	32	110

ALUPEX TWIN PIPE SCHEDULE (SERIES 2)		
NOMINAL I.D. mm	O.D. mm	OUTER CASING O.D. mm
18/18	18	110
20/20	20	110
25/25	25	125
32/32	32	125

ALUPEX PIPE SCHEDULE (SERIES 1)		
NOMINAL I.D. mm	O.D. mm	OUTER CASING O.D. mm
18	18	77
20	20	77
25	25	77
32	32	90

ALUPEX PIPE SCHEDULE (SERIES 2)		
NOMINAL I.D. mm	O.D. mm	OUTER CASING O.D. mm
18	18	90
20	20	90
25	25	90

PEX TWIN PIPE SCHEDULE (SERIES 1)		
NOMINAL I.D. mm	O.D. mm	OUTER CASING O.D. mm
16/16	16	90
20/20	20	90
25/25	25	110
32/32	32	110
40/40	40	125
50/50	50	160

PEX TWIN PIPE SCHEDULE (SERIES 2)		
NOMINAL I.D. mm	O.D. mm	OUTER CASING O.D. mm
16/16	16	110
20/20	20	110
25/25	25	125
32/32	32	125
40/40	40	140

PEX PIPE SCHEDULE (SERIES 1)		
NOMINAL I.D. mm	O.D. mm	OUTER CASING O.D. mm
20	20	77
25	25	77
32	32	77
40	40	90
50	50	110
63	63	125
75	75	140
90	90	160
110	110	160

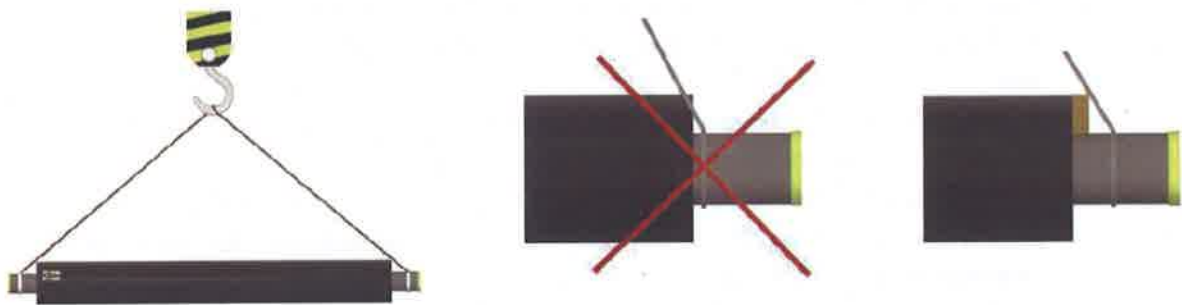
PEX PIPE SCHEDULE (SERIES 2)		
NOMINAL I.D. mm	O.D. mm	OUTER CASING O.D. mm
20	20	77
25	25	77
32	32	77
40	40	90
50	50	110
63	63	125
75	75	140
90	90	160
110	110	160

APPENDIX 3 – Guidance Notes

Off-loading pipe work from an Articulated Lorry:

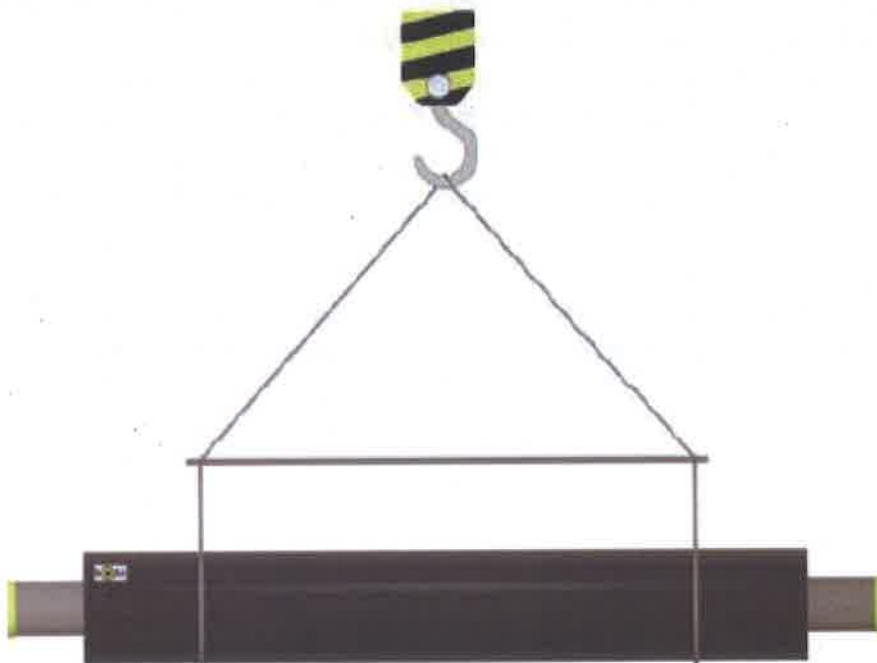
When unloading pipes or components, it is important that the following instructions are observed and that the pipes or components are never thrown or dropped from the lorry. Incorrect handling may seriously damage the pipes and components.

Approved equipment must always be used when unloading pipes and components. When unloading pipes, lifting straps must be positioned in such a way that the carrier pipe ends are not damaged



When unloading large pipe sizes, a lifting yoke is recommended.

Fabric or nylon straps, 100-150 mm in width, should be used in order to prevent the jacket pipe from being damaged (never use steel wires).



- Pipes arriving to site on a flatbed wagon with the 300/450mm pipes loaded no more than 3 pipes high and 5 pipes wide with a min of 100mm plinths between each layer and separating each pipe shall not exceed 1.8m high from the wagon bed
- Smaller pipe sizes may be stacked higher in number however no higher than 1.8m high, with a min of 100mm plinths between each layer and separating each pipe,
- All materials should be stacked in a manner when the straps are removed no material can fall from the side
- Pallets may be stored on top of the pipes providing the overall height does not exceed 1.8m high
- Pallets to be unloaded with the fork truck and unloaded and positioned away from the lorry, any pallets on the wagon should arrive level and the pallet holes accessible from the side
- All straps placed with ratchet at the side to enable release of strap from ground level
- Pipes marked showing centre point
- A fork truck then lifts the pipes from the centre point of the pipes and lays on the sand bags, 1 pipe at a time, care to be taken not to stab the pipes and the centre point is identified to balance the pipes
- Move Crane or JCB towards the side of the lorry, place slings on both ends of the pipe work (this will ensure when lifting the pipe work the plant will have the right balance of the pipes and the pipes will then not tilt or swing from side to side). Once the slings have been securely placed around the pipe work, place the slings onto a lifting eye of the Crane chains or JCB and then proceed to lift the pipe work, once the pipe work has been lifted, track back and position pipe work into the location agreed on site. **Note: Lifting eye should always be used when using a JCB and double slings.**
- Continue operation until all materials / pipes are removed from the lorry.
- All loading operations should be loaded in a manner so that no personnel needs to climb aboard the wagon,
- Any pallets arriving to site tilting or not accessible from the side of the lorry will be deemed unsafe to offload

Flex pipes may be lifted using straps or a fork-lift truck. If a truck is used, the forks must be protected to prevent them from damaging the jacket pipe. If straps are used, they must be of fabric or nylon (never use steel wire).



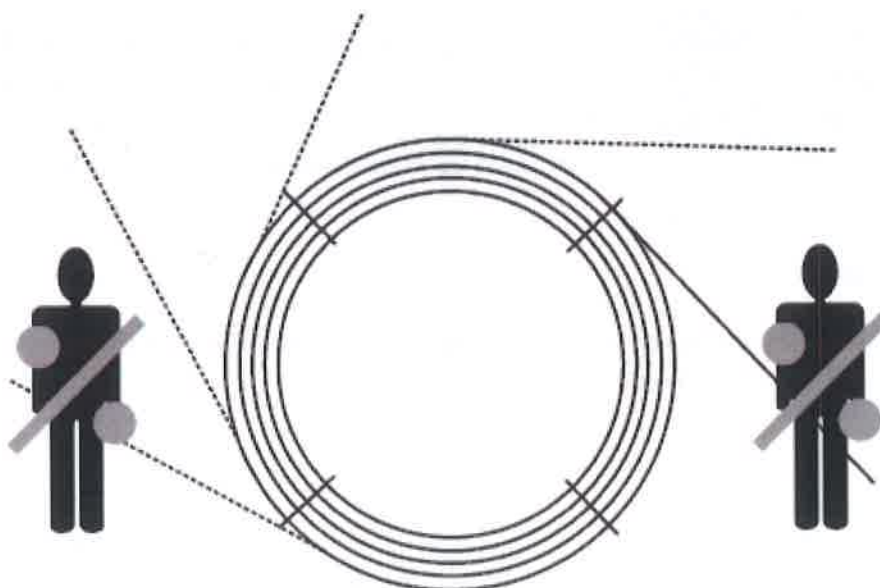
If several rolls of flex pipes are to be unloaded simultaneously, they should be strapped together.

Important:

- Flex pipes must never be rolled direct from the lorry!
- Unless a pipe carrier is used, pipes must only be unrolled onto a stone-free surface. The pipes must never be dragged across sharp edges as these may damage the jacket pipe. Particularly when handling heavy rolls of flex pipe with steel or copper carrier pipes, it is recommended that the forks be brought close together and used for lifting.



WARNING; when the strips holding the roll of PEX piping is removed the pipe will be released with considerable force.



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Storage of pipe work

In general, all pipes and components must be stored on a dry, even surface which is free of stones.

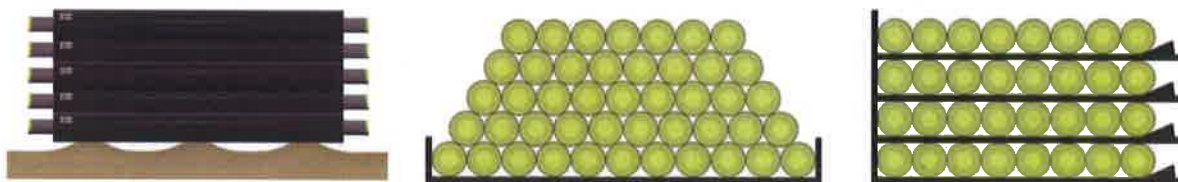
For practical reasons, we recommend that, where possible, components be grouped by size for storage.

Pipes should be stored on either sand cushions or battens which, depending on pipe dimensions, should have a width of between 100 and 250 mm and be spaced not more than 2 metres apart.



Pipes may be stored in either triangular or rectangular stacks, but should, for safety reasons, never be stacked higher than 2.5 metres.

To prevent the stacks from falling, wedges and supports must be used as shown in the illustrations below.



IMPORTANT:

When handling pipes in frosty weather, the jacket pipe cannot withstand knocks and/or falls. Due to inner stresses, such impacts may cause fractures.

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Double Pipes

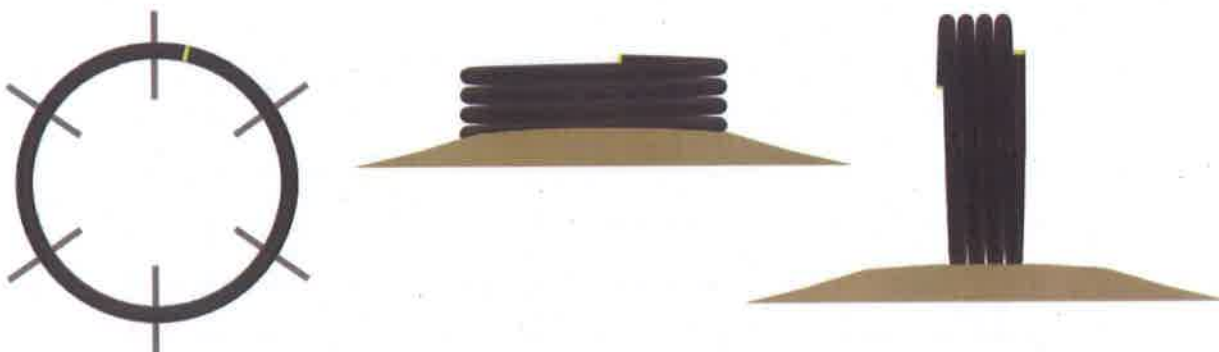
In principle, the same guidelines apply as those for single pipes



Flex Pipes

Flex pipes can be stored either standing or lying down.

Pipes/rolls should be stored on a stone-free surface or on a flex pipe trailer.



To prevent pipe ends from becoming damaged, the protective caps should not be removed before installation.

Fittings

Fittings (supplied in cartons) and joint foam should be stored indoors or in a container until needed for use.

Joint Foam

Under suitable conditions, joint foam can be stored for 12 months from the date of production (the production date is stated on each bag).

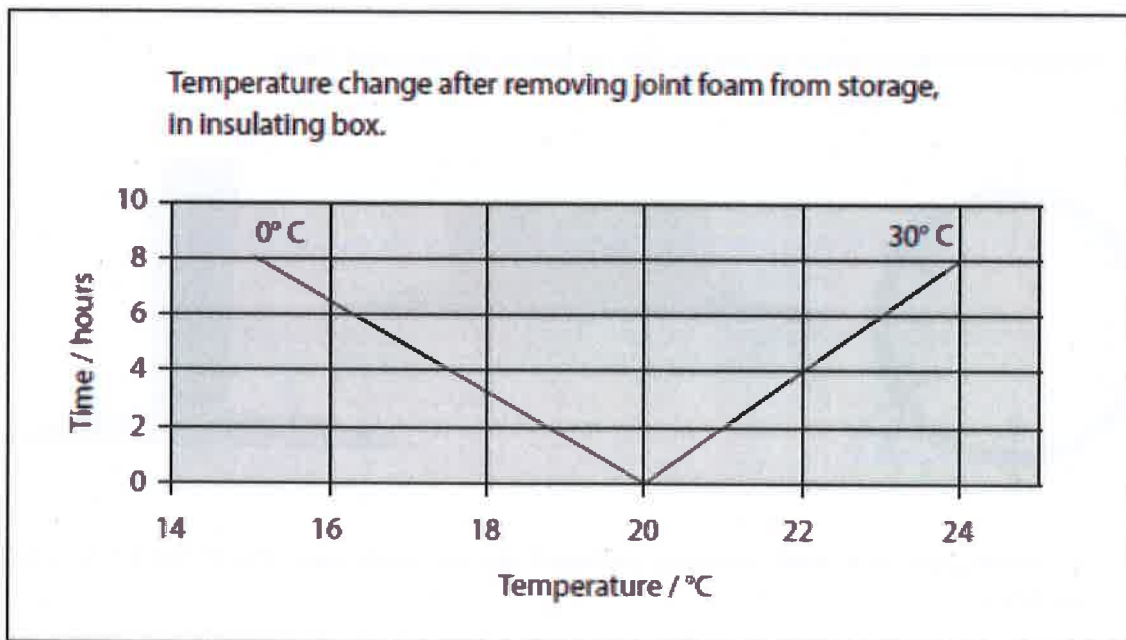
Joint foam should be stored at a temperature of between +16°C and +22°C.

The diagram below illustrates the change in temperature of the foam components when moved from storage at 20°C to outdoor temperatures of 0°C and 30°C respectively.

Foaming should be performed at temperatures between 5°C and 50°C.

IMPORTANT:

Joint foam should be kept for as long as possible in the insulated cartons in which it is supplied and must never be exposed to direct sunlight.



Joints

Delivery

Joints are delivered in white foil to protect against sunlight and dirt.
The white foil is not to be removed until immediately prior to initiating the shrinking process.

Storage temperature

Joints must be stored at a maximum temperature of 40° C and must not be exposed to direct sunlight before installation.

The shrinking process in the joint is initiated once joint temperature rises above 40° C. In direct sunlight with the foil removed, joint temperature can easily exceed 40° C and the shrinking process will start.

Storage

Joints must be stored vertically to prevent oval deformation.
Joints which are stored lying horizontally will gradually become oval in shape.

Pre-installation

Pre-installation in sunlight.

Immediately after the joint has been pre-installed on the pipe, pull the sleeves off the joint. The sleeves can cause the joint to heat up, resulting in unintended initiation of the joint shrinkage process.

Handling - General

As all deliveries of pipes and components are to the building site or storage facility by lorry, it is important to ensure in advance that access roads are either paved or capable of withstanding heavy loads.

If it is necessary to re-load the pipes for transport to or on the building site, correct handling must be ensured and the trucks/trailers used must be suitable for transporting pipes.

To prevent dirt or other foreign matter from entering the pipes and fittings, all components are supplied with protective. These should not be removed until immediately prior to installation.

Distribution of pipe work

The use of excavators to lift and distribute pipework needs careful planning. Consideration must be given to the guidance in CITB GE700 and also guidance from the Construction Plant-Hire Association (CPA) ref; CIG 0801, Rev 2, dated March '09. The management of any excavator used for lifting involves statutory compliance with both PUWER and LOLER Regulations.

- Mobilise to site
- Ensure safe working area is established
- Take Delivery of Pipe Trailer
- Take Delivery of Sandbags
- Place Sandbags into trenches, confirming spacing with Vital Energi
- Place pipe work on to a pipe trailer by means of using either a JCB or Crane ensuring that adequate certified double slings are used from the pipe work to the plant.
- Pipe trailer to be towed to desired location supervised by banks man (this only applies to long distances)
- On shorter distances where the trailer would be un-practical to use the pipe work can be lifted by means of double slings and tracked (slowly) by the JCB or suitable tracked machine to the desired area, ensuring that an operative has a tow sling on one end if not both ends to ensure the stability of the pipe whilst being tracked by the machine i.e. to ensure that the pipe work will not swing from side to side
- Pipe to be loaded into excavation and positioned onto sandbags.
- Repeat operation until sufficient pipe work is loaded out
- Confirm works are satisfactory with Vital Energi, obtain sign off as necessary
- Demobilise from site
- Note: Where possible use pipe trailer at all times.
- **Note: Double slings to be used at all times.**

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Pipes may be handled by fork-lift truck if the following conditions are observed:

- the forks must be clean and have no sharp edges
- the forks must not be "forced" into the stack of pipes



Important:

Pipes and fittings must never be rolled or pulled across the ground, or lifted by means of steel wires, steel straps and/or chains. Incorrect handling may cause irreparable damage to the jacket pipe!

Examples of Safe Offloading



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Examples of Good Storage



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Examples of Good Distribution



End of Document

Plot	Type	DHW kW	Type	Actuator	vPro	Compact	CU&D
228	5B9P	78	Private	-	-	-	1
229	5B9P	78	Private	-	-	-	1
230	5B9P	78	Private	-	-	-	1
231	5B9P	78	Private	-	-	-	1
232	5B9P	78	Private	-	-	-	1
233	5B9P	78	Private	-	-	-	1
234	5B9P	78	Private	-	-	-	1
235	5B9P	78	Private	-	-	-	1
236	2B4P	65	Private	-	-	1	-
237	2B4P	65	Private	-	-	1	-
238	3B5P	78	Private	-	-	-	1
239	3B5P	78	Private	-	-	1	-
240	3B5P	78	Private	-	-	1	-
241	2B4P-crank	65	Private	-	-	1	-
242	3B5P	78	Private	-	-	1	-
243	3B5P	78	Private	-	-	1	-
244	2B4P	65	Private	-	-	1	-
245	2B4P	65	Private	-	-	1	-
246	3B5P	78	Private	-	-	1	-
247	3B5P	78	Private	-	-	-	1
248	2B4P	65	Private	-	-	1	-
249	2B4P	65	Private	-	-	1	-
250	3B5P	78	Private	-	-	-	1
251	3B5P	78	Private	-	-	1	-
252	2B4P-crank	65	Private	-	-	1	-
253	2B4P	65	Private	-	-	1	-
254	3B5P	78	Private	-	-	1	-
255	3B5P	78	Private	-	-	1	-
256	2B4P-crank	65	Private	-	-	1	-
257	3B5P	78	Private	-	-	1	-
258	3B5P	78	Private	-	-	1	-
259	2B4P-crank	65	Private	-	-	1	-
260	2B4P	65	Private	-	-	1	-
261	3B5P	78	Private	-	-	-	1
262	3B5P	78	Private	-	-	1	-
263	2B4P-crank	65	Private	-	-	1	-
264	3B5P	78	Private	-	-	-	1
265	3B5P	78	Private	-	-	1	-
266	2B4P	65	Private	-	-	1	-
267	3B5P	78	Private	-	-	1	-
268	3B5P	78	Private	-	-	1	-
269	5B9P	78	Private	-	-	-	1
270	5B9P	78	Private	-	-	-	1
271	5B9P	78	Private	-	-	-	1
272	5B9P	78	Private	-	-	-	1
273	3B5P	78	Private	-	-	1	-
274	2B4P	65	Private	-	-	1	-
275	3B5P	78	Private	-	-	1	-
276	2B4P-BUNG	65	Affordable [Rent]	1	By SSE	1	-
277	2B4P-BUNG	65	Affordable [Rent]	1	By SSE	1	-
278	3B5P	78	Private	-	-	1	-
279	2B4P	65	Private	-	-	1	-
280	3B5P	78	Private	-	-	1	-
281	3B5P	78	Private	-	-	1	-
282	2B4P	65	Private	-	-	1	-
283	3B5P	78	Private	-	-	1	-

284	3B5P	78	Private	-	-	1	-
285	2B4P	65	Private	-	-	1	-
286	3B5P	78	Private	-	-	1	-
287	3B5P	78	Private	-	-	-	1
288	3B5P-BUNG	78	Affordable [Rent]	1	By SSE	-	1
289	3B5P-BUNG	78	Affordable [Rent]	1	By SSE	-	1
290	3B5P	78	Private	-	-	1	-
291	2B4P	65	Private	-	-	1	-
293	3B5P	78	Private	-	-	1	-
294	2B4P	78	Private	-	-	1	-
295	2B4P	65	Private	-	-	1	-
296	1B2P-F	65	Affordable [Rent]	1	By SSE	1	-
297	1B2P-F	65	Affordable [Rent]	1	By SSE	1	-
298	2B4P-F	65	Affordable [Rent]	1	By SSE	1	-
299	2B4P-F	65	Affordable [Rent]	1	By SSE	1	-
300	5B9P	78	Private	-	-	-	1
72				8	0	51	21

Our Ref: W0062/C1/a

19th April 2017



Caroline Ford (Development Management)
Cherwell District Council
Bodicote House
White Post Rd
Bodicote, Banbury
OX15 4AA

Dear Caroline,

RE: 10/01780/HYBRID, PHASE 2 OF THE NW BICESTER ECO TOWN EXEMPLAR SITE, APPLICATION FOR DISCHARGE OF MATTERS RESERVED BY CONDITION – NUMBERS 5, 6, 12, 22, 29, 30, 35 & 36.

Further to our recent conversation, enclosed is information in regards to the pre-occupation planning conditions on Planning Approval 10/01780/HYBRID. As our first set of handovers are approaching (due June 2017), we would be grateful if you could review this as sufficient to clear the conditions noted below.

Condition No.	Description of Information Submitted
5	Sub-Contract Installation drawings for the PV systems. <i>As you would have observed on your recent site visit, the systems are well underway and will be commissioned and operational at the point of handover. We trust our installer's designs (PHOTON ENERGY & VIRIDIAN SOLAR) are sufficient to clear the condition.</i>
6	Service & Utility Supplier Layout Construction Issue drawings, Technical Manual for the District heating systems, Mechanical Sub-Contractor Installation Drawings and Combined Services Drawing prepared by the Civil Engineer. <i>As designed by VITAL ENERGI, the mains connect to a HIU located in a dedicated services cupboard in each plot. We trust the Supplier's designs in conjunction with the Construction Issue of INFRASTRUCT CS Combined Services drawing and the mechanical installation drawings by R.G.EVANS's are sufficient to clear the condition.</i>
12	Service & Utility Supplier Layout Construction Issue drawings, Technical Manual for the communications systems and Combined Services Drawing prepared by the Civil Engineer. <i>As designed by FIBRE OPTIONS, the communications service runs into a dedicated services cupboard in each plot, providing the home owner Broadband, Telephone & TV. We trust the Supplier's designs in conjunction with the Construction Issue of INFRASTRUCT CS Combined Services drawing are sufficient to clear the condition.</i>
22	Landscape Architect's GA's and Civil Engineer's Layouts. <i>As already submitted for pre-commencement planning conditions, we can confirm that the scheme is being constructed in accordance with these layouts and details. We trust this is sufficient to clear the condition.</i>
29	Landscape Architect's GA's and Civil Engineer's Layouts. <i>As already submitted for pre-commencement planning conditions, we can confirm that the scheme is being constructed in accordance with these layouts and details. We trust this is sufficient to clear the condition.</i>

19th April 2017

Caroline Ford (Development Management)
Cherwell District Council

30	Combined Services Drawing prepared by the Civil Engineer, Mechanical Sub-Contractor Installation Drawings and Data Sheets on the Rainwater system. <i>As specified by GRAFF, each plot is provided with a Rainwater Harvesting system, the data sheets for which are included. We trust the Supplier's information in conjunction with the Construction Issue of INFRASTRUCT CS Combined Services drawing and the mechanical installation drawings by R.G.EVANS's are sufficient to clear the condition.</i>
35	Landscape Architect GA's. <i>As already submitted for pre-commencement planning conditions, we can confirm that the developer and seller A2DOMINION / FABRICA are marketing the plots in accordance with the options noted. We trust this is sufficient to clear the condition.</i>
36	Landscape Architect GA's. <i>As already submitted for pre-commencement planning conditions, we can confirm that the scheme is being constructed in accordance with these layouts and details. The allotment areas will remain in the ownership of the developer A2DOMINION and be managed by them. We trust this is sufficient to clear the condition.</i>

If you should wish to attend site prior to any handovers further to the above conditions, our sectional completion dates are as follows -

- Area 1: due for handover by 14th June 2017
- Area 2: due for handover by 5th July 2017
- Area 3: due for handover by 6th October 2017
- Area 4: due for handover by 9th October 2017
- Area 5: due for handover by 22nd March 2018
- Area 6: due for handover by 19th December 2017
- Area 7: due for handover by 25th May 2018
- Area 8: due for handover by 9th August 2018
- Ancillary Areas & River Corridor: due for handover by 22nd August 2018

If you need anything further in support to close these matters, please do not hesitate to contact the undersigned, otherwise we look forward to receiving your approval notices in due course.

Yours sincerely

NARINDER JHEETA
Technical Co-Ordinator
Hill