# Air Conditioning Installation

# Seahorse and Orchid Wards at Cork University Hospital

## General Mechanical Specification, Materials & Workmanship Specification Section 3

26048-ZZ-XX-XX-SP-DCCE-ME-10001

# Document Revision Sheet

| Document Action | Name | Position | Date |
|---|---|---|---|
| Authored By: | Raghul kalidhas | Jr. Mechanical Engineer DCCE | 05/10/2026 |
| Reviewed by: | Danish Akbar | Snr. Mechanical Engineer DCCE | 05/10/2026 |
| Approved by | Ted Carroll | Director, DCCE | 05/10/2026 |

| Rev | Issue Date | Description | Prepared by | Reviewed by | Approved by |
|---|---|---|---|---|---|
| **0** | **05/10/2026** | | **RK** | **DA** | **TC** |

## Table Of Context


**1 MATERIAL ..... 1**

2 PIPEWORK: ..... 1

3 PIPE JOINTING ..... 2

4 PIPE SUPPORTS: ..... 5

5 PIPE SLEEVES: ..... 7

6 VALVES AND COCKS: ..... 8

7 UNIONS: ..... 12

8 AUTOMATIC AIR VENTS: ..... 12

9 CLEANING PIPEWORK: ..... 12

10 PAINTING AND IDENTIFICATION: ..... 12

11 THERMAL INSULATION: ..... 15

12 SOILS & WASTES ..... 22

13 MATERIALS: ..... 26

14 PIPEWORK ..... 28


TABLES:


Table 1: MINIMUM THICKNESS OF INSULATION OF CHILLED WATER PIPEWORK ..... 18

Table 2: MINIMUM THICKNESS OF INSULATION OF COLD WATER SERVICE PIPEWORK ..... 19

Table 3: MINIMUM THICKNESS OF INSULATION FOR H.W.S. PIPEWORK ..... 19

Table 4: MINIMUM THICKNESS OF INSULATION FOR L.T.H.W. PIPEWORK (1) 20

Table 5: MINIMUM THICKNESS OF INSULATION FOR M.T.H.W. PIPEWORK (1) AND CONDENSATE RETURN SYSTEMS ..... 20

# 1 MATERIAL

Where materials, appliances or fittings, patented or otherwise, are prescribed, or the names of the manufacturers or agents are given, it is to be clearly understood that such references are inserted only for the guidance of the intending contractors, with respect to the nature and quality of the articles or services required, that all material is to be of equal quality and workmanship to that prescribed and to meet the approval of the Engineers.

Unless specifically stated otherwise, or approved by the Engineers, all materials and equipment used in the Sub-Contract works must be in accordance with the current editions of the relevant British Standards, and Irish Standards where appropriate.

# 2 PIPEWORK:

The arrangement and sizing of all internal and external heating, hot and cold water, gas, waste and all other pipework shown on the drawings shall be agreed with the Engineers on site. All work shall conform with the regulations and bye-laws of the Local Government and Municipal Authorities.

Care shall be taken in grading the pipes to ensure that no air locking shall occur.

All tubes and fittings shall be stored clear of the ground and shall be suitably protected from the weather. Tubes corroded beyond normal "stock rust" will not be accepted by the Engineers.

Screwed ends of tubes shall be protected with a socket or plastic thimble.

Malleable iron caps, plugs or plastic thimbles shall be used during the course of the Contract to prevent dirt getting into the pipes. The Contractor shall be responsible for ensuring that the pipework systems, installed under the Contract, shall be maintained free of dirt and foreign matter. Should a stoppage occur due to this cause the trouble shall be rectified at the Contractors own expense.

## 2.1 SECONDARY DOMESTIC HOT, COLD, RISING MAIN AND CONDENSATE PIPEWORK:

Up to and including 50 mm all secondary domestic hot water and condense and cold water pipework inside the buildings shall be fabricated from half-hard copper tube manufactured in accordance with the requirements of IS 238 1980 with current amendments. Over 50 mm pipework shall be manufactured in accordance with EN 12449:2023 Copper and copper alloys - Seamless, round tubes for general purposes with current amendments.

All pipework carried in floor or wall ducts or chases or in the roof space shall be jointed by means of bronze welding.

All pipework which is run on the surface shall be jointed by means of 'Instantor' compression fittings, as manufactured by Sanbra Fyffe.

For welding joints a flux having a borax base shall be used in a paste form which shall be evenly and thoroughly distributed over the surfaces to be jointed. A powder flux if used, must be wetted to form a paste before jointing.

All compression fittings used shall be free from mould markings and pittings and extreme care shall be exercised by the Contractor during installation to ensure that all such fittings are not scored or disfigured in any way.

The Contractor shall connect up directly to all sanitary and other fixtures, as shown on the drawings.

On condensate systems in which the boiler pressure exceeds 350 kPa, the pipework shall be bronze welded throughout except for the final connections to plant items, valves or other pipework accessories.

# 3 PIPE JOINTING

## 3.1 FLANGED STEEL PIPING:

All flanges shall be manufactured from mild steel shall be I.S. EN 1092-1:2018 Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 1: Steel flanges and current amendments and the Table of that specification appropriate to the pressure involved.

Flanges shall be machine faced, trimmed at the edges and spot faced for nuts. Bolt holes shall be drilled and not punched. Flanges on screwed work shall be screwed and subsequently expanded.

Flanges for welding shall be slip on type. The tube shall finish 3 mm inside the bore and a sealing run shall be applied.

All flanged joints shall be flush and truly aligned and shall employ brass full faced Taylor's corrugated rings coated on both sides with an approved jointing compound. Alternatively approved composition jointings may be used. Nuts, bolts and washers shall be black mild steel for low pressure hot water and team up to 350 kPa. Bright mild steel bolts shall be used on steam above 350 kPa and on high temperature hot water. All bolts shall be of the correct length. Taylor's

rings must be properly aligned, damaged rings shall not be fitted. Where galvanised flanges are used bolts, nuts and washers shall be galvanised.

## 3.2 FLANGED COPPER PIPING:

All flanges shall be manufactured from bronze or gun-metal to BS 10 : 1962 and current amendments and the Table of that specification appropriate to the pressure involved.

Flanges shall be machine faced, trimmed at the edges and spot faced for nuts. Bolts holes shall be drilled and not punched. Flanges on screwed work shall be screwed and subsequently expanded.

Flanges for welding shall be slip on type, the tube end shall finish 3 mm inside the bore and a sealing run shall be applied.

All flanged joints shall be flush and truly aligned and shall employ brass full faced Taylor's corrugated rings coated on both sides with an approved jointing compound. Nuts, Bolts, and washers shall be brass and the bolts shall be of the correct length. Taylor's rings must be properly aligned, damaged rings shall not be fitted.

Alternatively, if specified copper piping may be flanged with Q.A. Pegler Louden Steel Flanges for use with copper tube. Yorcalloy composite flanges may also be used. Such flanges shall be fitted strictly in accordance with the manufacturer's instructions. Otherwise the flanges shall be fitted as described above. Bolts, nuts and washers shall be bright mild steel and the bolts shall be of the correct length.

## 3.3 WELDED STEEL PIPING:

All welding on L.P.H.W. and M.P.H.W. pipework shall be Class 2 welding carried out by Oxy-Acetylene Welding to BS 2640 : 1982 and current amendments or by Arc-Welding to BS 2971 : 1977 ISO 15614-1:2017 Specification and qualification of welding procedures for metallic materials and current amendments.

Welding on the high temperature hot water pipework (H.P.H.W.) shall be Class 1 welding carried out by Arc Welding to BS 2633 : 1987 with current amendments, or by Oxy-Acetylene Welding to BS 1821 : 1982 with current amendments. Welders shall be approval tested in accordance with ISO 9606-1:2012 Qualification testing of welders. All joints shall be stamped by the welder making the joint. A schedule of the names of the welders together with their stamp numbers shall be submitted to the Engineers with sufficient copies for other interested parties.

The Contractor shall allow in his Tender Price for cutting out and testing 2% of all welds at positions chosen by the Engineers for their inspection during the course of the Contract.

Should any of these welds prove to be defective the Contractor will be required to cut out and renew a portion or all the completed welds as directed by and to the satisfaction of the Engineers.

# 4 PIPE SUPPORTS:

## 4.1 GENERAL

Supply and install all pipe work supports necessary to carry out the installation. Arrange supports and accessories for equipment, appliances or ancillary fitments in pipe runs, so that no undue strain is imposed upon pipes. Ensure that materials used for supports are compatible with pipeline materials.

All pipework shall be supported by means of clips, supports or hangers at the following centres:

| Nominal Bore of Pipe (mm) | Interval (Metres) | | | |
|---|---|---|---|---|
| | Steel | | Copper | |
| | Vertical | Horizontal | Vertical | Horizontal |
| 15 | 2.4 | 2.1 | 1.8 | 1.2 |
| 20 | 2.4 | 2.4 | 2.4 | 1.8 |
| 25 | 3.0 | 2.0 | 2.4 | 1.8 |
| 32 | 3.0 | 3.0 | 3.0 | 2.4 |
| 40 | 4.5 | 3.6 | 3.0 | 2.4 |
| 50 | 4.5 | 4.5 | 3.6 | 3.0 |
| 80 | 6.0 | 4.5 | 3.6 | 3.0 |
| 100 | 6.0 | 6.0 | 3.6 | 3.0 |
| 125 | 6.0 | 6.0 | 3.6 | 3.0 |
| 150 | 6.0 | 6.0 | 4.0 | 4.0 |
| 200 | 6.0 | 6.0 | 4.5 | 4.5 |

Where copper or steel piping is installed at low level 15 mm and 20 mm diameter shall be supported at 1200 mm intervals and all other sizes up to 75 mm diameter at 1800 mm centres.

All supports for mild steel pipes and fittings shall be ferrous.

All supports for copper pipes shall be of polished brass were exposed and rough finish elsewhere. Ferrous supports will not be permitted on non-ferrous pipes.

It shall be the responsibility of the Contractor to ensure that all supports are adequate, firmly and truly fixed, and that they do not promote vibration.

Services laid in the ground shall be installed with care and in such a manner that pipework and fittings shall not be damaged due to movement of the ground. Where pipes pass under roadways carrying vehicles they shall be fitted inside sleeves or conduits prepared by the Builder.

Where piping is to be supported under concrete construction, inserts for this purpose shall be provided and shall be placed in the formwork before concrete is poured. Inserts shall be of cast iron or mild steel of the type to receive bolt heads or nuts after installations and shall permit adjustment of the bolt in an horizontal direction.

Brackets or supports shall be set out so that they do not obstruct the access to valves, flange or other fittings requiring maintenance.

All uPVC & Polyethylene pipework shall be supported by means of clips, supports or hangers at the following centres:-

| Nominal Bore of Pipe (mm) | Interval (m) | | | |
|---|---|---|---|---|
| | uPVC | | Polyethylene | |
| | Horizontal (m) | Vertical (m) | Horizontal (m) | Vertical (m) |
| 15 | - | 0.60 | 0.40 | 0.60 |
| 20 | - | 0.65 | 0.40 | 0.60 |
| 25 | - | 0.75 | 0.40 | 0.60 |
| 32 | - | 0.80 | 0.45 | 0.70 |
| 40 | - | 0.90 | 0.45 | 0.70 |
| 50 | 1.10 | 1.20 | 0.55 | 0.85 |
| 65 | 1.20 | 1.40 | 0.55 | 0.85 |
| 80 | 1.40 | 1.50 | 0.60 | 0.90 |
| 100 | 1.60 | 1.70 | 0.70 | 1.10 |

### 4.1 SPACING OF VERTICAL SUPPORTS TO UPVC & POLYETHYLENE PIPES

Check total self-weight and pressure loading against manufacturer's recommendations when using mechanical joints or end load capable flexible couplings. Ensure adequate pipe support when using non-end load capable flexible couplings.

Where multiple pipe runs of differing bores are supported from a common point, use support spacing of pipe requiring closest spacing.

## 5 PIPE SLEEVES:

Where pipes pass through walls, floors footings and waterproofed membranes, the Contractor shall provide sleeves. Sleeves shall be built in by the Building Contractor, under the direction of this Contractor who shall be responsible for the correct building in. Sleeves shall be provided for building in at the time required by the Builder.

The inside diameter of sleeves shall be not less than 15 mm larger that the outside diameter of the pipe, except where pipes pass through bearing walls or footings where sleeves shall be 100 mm larger than the outside diameter of the pipe.

Sleeves in bearing walls or footings shall be cast iron pipe.

Sleeves in walls, floors, ceilings and partitions shall be of the same metal as the pipe.

Sleeves of other materials will be permitted provided that they are inert and approved by the Engineer.

Sleeves shall protrude not less than 1 mm and not more than 3 mm proud of the finished surface.

Flashing sleeves shall be provided where pipes pass through waterproofing membranes. Flashing sleeves shall be provided with integral flanges to which a flashing shield can be clamped or welded. The shields shall be in zinc and shall extend not less than 200 mm from the sleeve in all directions. The builder shall make the shield into the membrane and shall fill the space between the sleeve and pipe with waterproof material and mastic compound.

Where pipes pass through wall, floors and ceilings they shall be fitted with chromium plated wall and floor plates,

Pipe sleeves to comply with BS EN 1057

Pipe sleeves shall not be used as pipe supports

Pipe Sleeves Through Fire Barriers

Pack annular space between pipe and sleeve or insulation and sleeve with non-flammable and fire resistant material to form a fire/smoke stop of required rating. Apply 12mm deep cold mastic seal at both ends within sleeve.

### 5.1 PIPE SLEEVES & PIPE INSULATION

Where pipe insulation is not carried through pipe sleeve, cut sleeves from material same as pipe one or two sizes larger than pipe to allow clearance. Install sleeves flush with building finish. In areas where floors are washed down, install with a 100mm protrusion above floor finish.

### 5.2 EXPANSION:

Wherever possible, advantage is to be taken of changes in direction of the pipework, to absorb expansion.

Where expansion loops are shown they are to be of the 'U' type fabricated from welding bends in the case of steel pipes and fire set brazed bends in the case of copper pipes. Loops shall be cold sprung before fixing, by at least 25 mm.

Loops shall be fitted with loose sliding saddles at their centres to prevent lifting under expansion.

Anchors shall be fitted where shown. They shall be generally fabricated from 100 mm x 50 mm channel iron solidly built into duct walls, on either side. The steel pipe shall be fitted to these anchors by 40 mm x 6 mm steel saddles, shaped to the pipe circumference and bolted to the channels. Saddles to copper pipes shall be fabricated from 25 mm bore copper pipe flattened, bolted to the channels and brazed to the pipe.

For details of any special expansion joints or bellows and anchors, see the relevant Clause in the Particular Specification (Part 4).

## 6 VALVES AND COCKS:

### 6.1 GENERAL:

The Contractor shall supply and fit, where shown on the drawings or elsewhere specified or detailed, all necessary valves, stopcocks and drain cocks.

All valves with the exception of radiator valves shall be clearly labelled to indicate their function, the label material, size and nomenclature shall be approved.

The Contractor shall ensure that the design and installation of any valves, fittings and components provided complies with the relevant parts of the following standards (or updated documents if relevant):

**Reference Standards for Gauges, Valves, Water Meters, unions & other Accessories**

N.B: For both dated and undated reference standards, the latest edition of the referenced document (including any amendments) applies.

1. BS EN 14454 'Devices to prevent pollution by backflow of potable water. Hose union backflow preventer DN 15 to DN 32 inclusive. Family H, type A'
2. BS EN 10253-1 – 'Butt-welding pipe fittings. Wrought carbon steel for general use and without specific inspection requirements'
3. BS EN 10253-2 – 'Butt-welding pipe fittings. Non alloy and ferritic alloy steels with specific inspection requirements'
4. BS EN 10266-1 – 'Pipe threads where pressure tight joints are made on the threads. Taper external threads and parallel internal threads'
5. BS EN 10226-2 – 'Pipe threads where pressure tight joints are made on the threads. Taper external threads and taper internal threads'
6. BS EN 10226-3 – 'Pipes threads where pressure-tight joints are made on the threads. Verification by means of limit gauges'
7. BS 4504 – 'Circular flanges for pipes, valves and fittings'
8. BS EN 1092 – 'Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories'

## 6.2 VALVES ON CHILLED WATER, LTHW, LPHW, MPHW AND HWS PRIMARY PIPEWORK:

The Contractor shall ensure that in any system, the valves, fittings and components provided, will meet the following requirements:

a) Provision for expansion/contraction of water within the system and coldwater feed is provided either by a packaged pressurisation unit with heating system quick fill facility or a feed and expansion tank

b)

c) Quick fill units and expansion tanks are located and insulated so that they cannot easily freeze

d) Expansion vessels are adequately sized for the full water content of the circuit

e)

f) Heating circuit design enables flow balancing under all load conditions

g) Differential pressure control valves are provided on the heating supplies to groups of radiators in order to provide system stability and flow control

h) Isolating valves, check valves, expansion valves and double regulating valves are installed appropriately to aid commissioning, giving consideration for access and maintenance

i) Test points, temperature and pressure relief valves, temperature and pressure gauges and draining devices are provided to aid commissioning and balancing

j) Automatic air vents are provided to aid balancing in the system

k) Pipework and supports take account of axial expansion

l) In addition, the contractor shall ensure that:-

- All isolating valves 50 mm dia. and under shall be of the screwed gunmetal pattern. Three keys for lock shield valves are to be supplied.
- All isolating valves 65 mm dia. and over shall be of the cast iron flanged gate type. Flanges shall conform to BS 10:2009, Table 'D' and current amendments.
- All radiator valves shall be angle type, cast gunmetal, of the chromium plated easy clean type. Flow valves are to be fitted with composition handwheel, return valves are to be of the lock shield type. Three keys for lock shield valves are to be supplied.

## 6.3 VALVES ON DOMESTIC HOT AND COLD WATER AND CONDENSATE SERVICES:

The contractor shall ensure that:-

- All valves shall be full way pattern having cast gunmetal bodies fitted female sockets for bronze welding or approved compression type unions for use with light gauge copper pipe as applicable.
- Valves on underground copper shall be as specified for the hot and cold-water services pipework; either type of valve is to be housed in a cast iron valve box with cast iron lid.

Valves on Potable (Mains) Water Supplies only

The contractor shall ensure that all valves on the Potable (Mains) Water supply are:-

- Fully compatible with the piping system
- WRAS approved
- Physically unaffected by the chemical composition of the water used in the system sterilisation process.

## 6.4 VALVES AND COCKS ON GAS PIPEWORK:

The contractor shall ensure that:-

- All gas cocks of 20 mm to 50 mm bore inclusive shall be M. & F. main cocks, of heavy brass construction with loose level handles.
- All cocks on gas services of 15 mm bore shall be union cocks with drop level and device to prevent the rotation of the plug and shall be of brass construction.
- All valves on gas services of 65 mm bore and over shall be of cast iron construction as manufactured. Valves of 65 mm bore and over shall have flanged connections.

## 6.5 DRAIN COCKS:

All drain cocks on low temperature water services shall be 20 mm bore gunmetal type, complete with loose key and hose union, or by other equal and approved manufacture.

All drain cocks on high temperature and steam services shall be 15 mm bore and of the compound gland, asbestos packed type, of gunmetal construction; suitable for a working pressure of 1650 kPa with flanged connection and hose

union. All cocks shall be fitted with a blank plug on the outlet connection. Each cock shall have a loose key.

## 7 UNIONS:

Best quality gunmetal, cone seated unions shall be used for connecting pipes where necessary and for ease of dismantling, and in all positions where screwed couplings are necessary.

No screwed couplings will be permitted to be installed in locations where access is not readily available after the building is completed.

All valves with screwed connections shall have a union coupling fitted adjacent

## 8 AUTOMATIC AIR VENTS:

The contractor shall ensure that:-

- Pipework is laid to fall wherever possible to minimise the number of high points. Automatic air vents are provided at the top of all risers and on high points within the system.
- The outlets from all air vents are piped to the nearest gully with copper pipe.
- All automatic/manual air vents are fully commissioned.

## 9 CLEANING PIPEWORK:

The contractor shall ensure that:-

- On completion of the appropriate tests, to the approval of the Engineers, all equipment, insulated pipework, valves, brackets etc. shall be cleaned and wire brushed of all grease, dirt metal cuttings, sludge etc. which may have accumulated.

## 10 PAINTING AND IDENTIFICATION:

The contractor shall ensure that:-

- All metal work such as boiler fronts and smoke boxes, flue piping, calorifier chests and other items subject to heat shall be painted two

coats of silicone heat resisting grey paint, for all surfaces at temperatures > 70oC

- All pipe hangers support and anchor brackets, etc. which do not have a galvanised or other protective coating, shall be painted one coat of red lead paint.
- All welds shall be painted with one coat of rust primer on the day the weld is carried out. No weld shall be left un-painted over night or longer. Should this occur the weld shall be wire brushed and cleaned down prior to painting.
- All pipelines throughout shall be identified by means of self-adhesive coloured bands. The identification shall be in accordance with BS EN 10241:2000 and current amendments. The specific requirements for general building services shall be followed.

## 10.1 PAINTING WORKMANSHIP

Ensure paints are applied as per the manufacturer's instructions and to BS 6150.

## 10.2 PIPEWORK IDENTIFICATION

All Pipe work to be clearly label using colour bands to BS 381C, BS 4800, and BS 1710. Apply colour bands, 300mm wide, to each pipe at least;

- Once in every room or enclosed area.
- At intervals not exceeding fifteen metres.
- At every junction.
- At every valve.
- At every inspection and access position into service shafts, false ceilings,
- bulkheads etc.

## 10.3 HANGERS AND SUPPORTS:

Comply with IS EN 12236. Ventilation for buildings. Ductwork hangers and supports.

Provide hangers and supports throughout in accordance with DW 144 Part 6 Section 19; DW 154 Part 5; or DW 191 Section 7 as appropriate.

# 11 THERMAL INSULATION:

## 11.1 GENERAL:

The contractor shall ensure that:-

- The insulating materials used have a Global Warming Potential (GWP) of <5.
- Where an insulant is manufactured using a blowing agent, then that blowing agent shall have zero Ozone Depletion Potential (ODP).
- Insulating products shall be third party – BBA/IAB - certified.
- Insulant Fire Performance: All insulation shall comply with Euroclass A1
- The following insulants are not used:
  - Expanded Polystyrene
  - Extruded Polystyrene.
  -

Thermal Conductivity: Ensure values are in accordance with IS EN 12664, IS EN 12667, IS EN 12939 or IS EN ISO 8990.

Thermal Performance of Insulation: Life Expectancy

- Provide manufacturer's details which define the life expectancy of the insulation material.
- Ensure the insulation will maintain its thermal performance for a minimum of the plant design life.
- Phenolic pipe section insulation is installed in line with BS 3958-4 and BS 5422. Loadbearing pipeline supports are insulated. Insulation within plant rooms is protected with aluminium sheet

Pipework distributing the following Services shall be completely insulated in accordance with the requirements of the specified design temperature:

- Medium Pressure hot water - 121°C
- Low Pressure hot water - 82°C Pipes specified as heating surface or exposed at skirting level or dropping to skirting level shall not be insulated.
- Hot water service pipework - 65°C drops to fixtures or dead legs not be insulated.
- Cold water service pipework - 10°C - drops to fixtures and final connections to fixtures shall not be insulated.
- Chilled water pipework - 5°C
- Steam - temperature stated in particular specification.

- Refrigerant liquid and gas - temperature stated in particular specification.

All hot and cold pipework with the exception of those carrying chilled water as follows:

All hot and cold pipework with the exception of those carrying chilled water as follows:

### 11.2 CONCEALED PIPEWORK NOT SUBJECT TO DAMPNESS:

The pipework shall be insulated with preformed rigid glass fibre sections of density 80 kg/m$^3$ Class "O" finish, close butted with all overlaps secured in accordance with the manufacturer's directions.

### 11.3 FLANGES AND VALVES:

Insulated flanges and valves where specified in table 8.1., shall be fully wrapped with glass fibre insulation and encased in an 1.2 mm thick aluminium valve box constructed in two halves, hinged with an approved locking device.

### 11.4 BENDS, TEES AND BRANCHES:

All bends, tees and branches shall be insulated as specified for the main duct. All necessary mitred sections, transition pieces and tee pieces to be cut on site and neatly fitted to take the shape of the duct. Approved adhesive or lacing wire shall be used for fixing. Finished as for the main duct.

## 11.5 PIPE INSULATION CARRYING THROUGH PIPE SUPPORTS

- Where insulation carries through pipe supports, provide phenolic foam pipe supports and ensure that vapour barriers are maintained.

## 11.6 INSTALLATION OF INSULATION: GENERAL

- Install insulation in accordance with BS 5970.
- Carry out thermal insulation work using firms employing skilled craftsmen con- versant with class of work.
- Do not apply thermal insulation until installation has been fully tested & all joints proved sound.
- Ensure all materials are kept dry.
- Ensure all pipework surfaces are dry before the installation of thermal insulation.
- Insulate each unit separately. Do not enclose adjacent units together.
- Ensure there is clearance between insulated pipes.

Application

- Apply insulants, facings, coatings and protection strictly in accordance with manufacturer's instructions.

Finish

- Neatly finish joints, corners, edges and overlaps and, where possible, arrange overlaps to fall on blind side.
- Ensure overlaps are neat and even and parallel to circumferential and longitudinal joints.

**Table 1: MINIMUM THICKNESS OF INSULATION OF CHILLED WATER PIPEWORK**

| Nominal Internal Dia. (mm) | Thermal Conductivity W/m°K 0.025 Thickness of Insulation (mm) |
|---|---|
| 15 | 38 |
| 20 | 38 |
| 25 | 38 |
| 32 | 50 |
| 40 | 50 |
| 50 | 50 |
| 65 | 50 |
| 80 | 50 |
| 100 | 63 |
| 150 | 63 |
| 200 | 63 |
| 250 | 63 |
| 300 and greater and flat surfaces | 75 |

Reference: (1) Thermal conductivity measured at 10°C.

Note: (1) All valves and flanges shall be provided with insulated metal boxes.
(2) Insulation to all internal pipework to be finished with Isogenopak with all joints sealed with approved type adhesive and all bends covered with preformed Isogenopak sections.
(3) Insulation to all external pipework to be clad with Stucco embossed aluminium with all joints weather sealed.

**Table 2: MINIMUM THICKNESS OF INSULATION OF COLD WATER SERVICE PIPEWORK**

| | Thermal Conductivity W/m°K |
|---|---|
| Nominal Internal Pipe Dia. | 0.025 |
| (mm) | Thickness of Insulation (mm) |
| 13 | 25 |
| 19 | 25 |
| 25 | 25 |
| 32 | 25 |
| 38 | 32 |
| 51 | 32 |
| 63 | 32 |
| 76 | 32 |
| 102 | 38 |
| 152 | 38 |
| 200 | 38 |
| 250 and greater and flat surfaces | 38 |

Reference: (1) Thermal conductivity measured at 10°C.

Note: (1) All valves for pipes of nominal dia. 80mm and greater shall be provided with insulated valve boxes.

(2) All flanges shall be provided with insulated flange boxes.

**Table 3: MINIMUM THICKNESS OF INSULATION FOR M.T.H.W. PIPEWORK (1) AND CONDENSATE RETURN SYSTEMS**

| Nominal Internal Dia. (mm) | Thermal Conductivity W/m°K 0.025 Thickness of Insulation (mm) |
|---|---|
| 15 | 25 |
| 20 | 25 |
| 25 | 32 |
| 32 | 32 |
| 40 | 32 |
| 50 | 32 |
| 65 | 38 |
| 80 | 38 |
| 100 | 50 |
| 150 | 50 |
| 200 | 63 |
| 250 | 63 |
| 300 and greater and flat surface | 63 |
| Reference: (1) Flow temperature must not exceeding 121°C. | |

2. Thermal conductivity to be measured at 75°C.

Note: (1) All valves to be provided with insulated valve boxes.

(2) All flanges and unions to be provided with insulated boxes.

# 12 SOILS & WASTES

## 12.1 SCOPE OF WORK:

The contractor shall:-

Provide, install, test & commission the soil & waste systems, including final connections to sanitary ware, other types of appliances and equipment, together with all connections between the above ground & below ground systems. The installation of the above ground sanitation pipework shall comply with the requirements of BS EN 12056-2:2000.

## 12.2 PLASTIC PIPE & FITTINGS:

uPVC pipework shall be manufactured to BS EN 1329-1:2020.

Vent pipework passing through roof areas shall be UPVC to BS EN 1329-1:2020.

All UPVC pipes and fittings are to be manufactured by the injection moulding process.

Fitting and joints for jointing shall not be fabricated by means of " the cut and shut", or hot air method unless otherwise specified.

PVC plastic pipes and fittings shall be by the solvent weld method or ring seal method at traps and expansion couplings.

Spigot ends are to be squarely cut, ensuring continuity of the internal pipe bore. Excess jointing material shall be removed and not allowed to accumulate on the internal surface of the pipes.

Accommodation of thermal movement shall have joints formed using the jointing system, with the spigot end of the pipe fitting in the direction of flow. All items forming the joint shall be clean before assembly.

In jointing pipe and fittings, the correct solvent or lubrication shall be used and installed to the manufacturers correct technical information.

Install thermal movement joints on straight lengths in excess of 3 metres long in accordance with the manufacturer's recommendations.

Provide one-piece clip-on plastic covers to pipework in exposed locations.

## 12.3 FOUL DRAINAGE ABOVE GROUND:

### 12.3.1 PERFORMANCE CRITERIA

The contractor shall ensure that:-

- Sanitary appliances drain quickly, quietly and completely at all times without nuisance or risk to health.

- Foul discharges are conveyed without crossflow, back fall or leakage.
- Air from the discharge pipes or drainage system is prevented from entering the building.
- Pressure fluctuations in pipework do not vary by more than + 38mm water gauge and traps retain a water seal of not less than 25m.
- The system can be adequately tested, cleaned and maintained.

The above ground foul drainage pipework is designed in accordance with BS EN 12056-2:2000.

### 12.3.2 INSTALLATION:

The contractor shall install pipework, fittings and accessories to ensure that:

- Branch connections shall sweep in the direction of the flow.
- Branches in horizontal pipelines shall be at an acute angle of 45°
- Bends in main pipework runs and long branch connections shall be long radius type; short radius bends shall only be used on W.C. branch connections located in service ducts.
- All long pipework runs shall accommodate thermal movement.
- All joints shall be made using the correct fluxes, gaskets, cleaning fluids and solvents. Surplus materials shall be cleaned off after completion of work.
- The discharge pipework shall convey without the risk of blockage.
- The discharge pipework shall be installed so that defective parts can be replaced without undue difficulty.
- The discharge pipework including materials, joints, supports and fixing shall be durable under operation conditions.

## 12.4 QUALITY OF WORK:

Handle, store and securely fix pipes, fittings and accessories and accordance with manufacturers recommendations, ensuring compliance with design and performance requirements and BS EN 12056-2:2000to give a watertight pipework installation.

All work to be carried out by qualified tradesmen under the control of qualified site supervisory staff.

### 12.5 PIPE ROUTES:

To be the shortest practical route with a few bends as possible and no bends in wet portion of soil stacks, unless specified otherwise. Pipe routes not shown on drawings to be approved before commencing work.

### 12.6 SUPPORTS FOR PLASTIC UPVC PIPEWORK:

To be fixed securely and true to line not more than centres indicated at section 4.9. of this document.

Provide additional supports as necessary at junctions, thermal joints and changes in direction.

### 12.7 FIRE STOPPING:

Where not specified shall be a proprietary material. All applications shall be carried out by the Main Contractor.

### 12.8 GENERALLY:

Inform Engineer sufficiently in advance to give him a reasonable opportunity to observe tests.

Check that all sections of installation are securely fixed and free from obstruction and debris.

Ensure all traps are filled with clean water.

### 12.9 PIPEWORK TEST:

- Temporarily seal open ends of pipework with plugs
- Allow a period for temperature stabilisation, after which the pressure of 50mm is to be maintained without loss for not less than 5 minutes.

### 12.10 ALL PIPEWORK:

- BS 1710 – ‘Specification for identification of pipelines and services’
- BS 3958-4 – ‘Thermal insulating materials. Bonded preformed man-made mineral fibre pipe sections’

- BS 5422 – 'Method for specifying thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range -40°C to +700°C'
- BS 8558 – 'Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages'. Complementary guidance to BS EN 806
- BS EN 806 – 'Specifications for installations inside buildings conveying water for human consumption. Installation'
- BSRIA BG 2/2010 – 'Commissioning water systems'
- CIBSE Commissioning Code W – 'Water distribution systems'
- HSE GS 4 – 'Safety in pressure testing'
- BS EN 1057 – 'Copper and copper alloys - seamless, round copper tubes for water and gas in sanitary and heating applications' (+A1:2010)

## 12.11 LTHW PIPEWORK

- BSRIA BG 50/2013 – 'Water treatment for closed heating and cooling systems'
- BS 6880-3 – 'Code of practice for low temperature hot water heating systems of output greater than 45 kW: Part 3 Installation'
- BS EN 14336 – 'Heating systems in buildings. Installation and commissioning of water-based heating systems'

## 12.12 DOMESTIC HOT AND COLD-WATER PIPEWORK:

- HSE publication, L8 – 'Legionnaires' disease, the control of legionella bacteria in water systems approved code of practice and guidance'
- BS EN 806-3 – 'Specifications for installations inside buildings conveying water for human consumption. Pipe sizing. Simplified method'
- WRAS approved fittings from the WRAS Products and Materials Directory available online at WRAS https://www.wras.co.uk/search/products/

# 13 MATERIALS:

## 13.1 HANDLING & STORAGE

Unless specifically stated otherwise, or approved by the Engineers, all materials and equipment used in the Contract works must be in accordance with the current editions of the relevant Irish/ EU/British Standards, where appropriate.

## 13.2 HANDLING

Check delivery tickets and certificates against specification; examine marks and labels and condition of materials and components. If necessary, refer to supplier immediately.

In particular check that materials and components are clean, undamaged and dry as appropriate.

If there is doubt regarding acceptability with regard to Water hygiene, seek and obtain instructions.

Handle all materials and components with appropriate care to prevent damage, soiling or contamination.

## 13.3 STORAGE

Store materials and components:

a) in a secure hut or compound under cover and on bases or racking prepared in advance of
b) deliveries;
c) in accordance with manufacturer's sitework instructions; in particular protect blue medium
d) density polyethylene (MDPE) tube and pipe from direct sunlight;
e) in the protective wrappings or cartons in which they are delivered.
f) Preparation of work, materials and components

## 13.4 LIAISON

Liaise to establish and agree the positions of pipework and fittings in relation to other services,

building fabric and appliances, and any requirements for first and subsequent fixing stages.

Ensure that any necessary builder's work is or will be sufficiently complete and not delay continuity.

## 13.5 INSPECTION OF MATERIALS & COMPONENTS

Inspect all components immediately before assembly. Discard and clearly label any components that are damaged, and any that will have parts in contact with water and which have been contaminated by site debris.

# 14 PIPEWORK

## 14.1 INSTALLATION – GENERAL

### 14.1.1 EARTHING & BONDING

Ensure that all metal water pipes are bonded to the electrical installation main earth terminal as near as possible to their point of entry into the building, in accordance with the requirements of IS:10101

### 14.1.2 PRESERVATION OF WATER QUALITY

Ensure that every aspect of workmanship in the installation of any part of the hot and cold-water supply services preserves the quality of the water, and that any temporary connections or design modifications made on site comply with the relevant standards & statutory requirements.

### 14.1.3 HOT WATER SYSTEMS

Ensure that all appliances and their associated pipework and fittings, assembled as an installation.

for the distribution and supply of hot water, operate and/or fail safely in the event of an operating failure.

### 14.1.4 PIPEWORK

Do not damage pipework either before or after fixing. Cover all exposed pipe ends, branches and

access points with a purpose-made fitting or with a protective cover or cap to guard against entry of tools or building material.

### 14.1.5 JOINTING, CUTTING & BENDING PIPES

Take care to establish satisfactory jointing techniques for all water service pipework.

When making joints by welding, brazing or soldering, take precautions to avoid the risk of fire.

Remove all burrs from the ends of pipes and prevent any jointing materials used from entering the waterways.

Clean all piping and fittings internally and ensure that they are free from particles of sand, soil, metal filings and chips, etc.

### 14.1.6 BENDING PIPES

Take care in forming bends in pipes. Avoid crimping and restricting the diameter of tubes when forming bends.

Observe any other requirements outlined elsewhere in this specification.

Connections between different materials – Above & Below Ground

### 14.1.7 ABOVE GROUND PIPEWORK

Avoid the use of different pipe materials as far as practicable. When parts of an existing service are to be replaced, or an existing service extended or lead pipe is to be partially replaced, and joints have to be made between pipes of different materials, use adaptor couplings.

Where suitable adaptor couplings are not available for the particular joint required, adapt both materials to BSP threaded ends and screw together, if male and female, or connect by a nipple, socket or union.

### 14.1.8 BELOW GROUND PIPEWORK

Keep joints in buried pipework to the absolute minimum and restrict joints between pipes of different materials to connections between large supply pipes, similar to supplier's mains and pipes serving individual buildings.

### 14.1.9 PIPEWORK FALLS

Generally lay pipes to falls to avoid trapped air at the high point and to facilitate the draining of the complete system.

### 14.1.10 SPACINGS FOR PIPE FIXINGS

Space fixings for internally located piping in accordance with requirements set out elsewhere in this specification.

### 14.1.11 ALLOWANCE FOR THERMAL MOVEMENT

In installations with long straight runs and few ends and offsets, make allowance for expansion and contraction of the pipes by forming expansion loops, by introducing changes of direction to avoid long straight runs or by fitting proprietary expansion joints.

### 14.1.12 CONCEALED PIPING

House piping in properly constructed builders' work ducts or wall chases. Ensure that there is provision for access for maintenance and inspection.

### 14.1.13 PIPING PASSING THROUGH STRUCTURAL TIMBERS

Avoid notching or boring structural timbers.

### 14.1.14 CLEARANCE OF STRUCTURAL MEMBERS

Ensure that piping laid through notches, holes, cut-outs or chases is not subjected to external pressure and is free to expand or contract. Sleeve piping through walls and floors.

### 14.1.15 PENETRATION OF FIRE WALLS AND FLOORS

Provide a fire stop to penetration of compartment walls and floors, and fire barriers to prevent the passage of smoke and flame.

### 14.1.16 PIPES THROUGH WALLS AND FLOORS

Do not install pipes in the cavity of an external cavity wall. Where a pipe passes through any wall or floor, allow adequate provision for movement of the pipe relative to the wall or floor, by the use of a sleeve properly bonded into the wall or floor or by other less suitable means.

Where fire regulations and other considerations require the ends of sleeves to be sealed, use sealing of a permanently flexible form to allow movement of the pipe.

Where a pipe passes into a building arrange it so as to accommodate differential movement and so that it is accessible for withdrawal and replacement. Ensure that sleeves used for this purpose are capable of resisting external loading and are sealed as required.

Ensure that the diameter of the sleeve and the radius of any of its bends are such as to permit the ready insertion and withdrawal of the pipe

Do not allow any sleeve intended for carrying a water pipe to contain within it any other pipe or cable.

### 14.1.17 PIPES IN WALLS, FLOORS AND CEILINGS

Do not embed any pipe or pipe joint in or under a building in any wall or solid floor or in any material below a solid floor at ground level except under the following circumstances and as instructed.

a) the embedding of any pipe and associated pipe joints forming part of a closed-circuit system of underfloor space heating or above floor central heating in a properly formed chase in a wall or solid floor that is subsequently plastered or screeded, provided that the pipes or pipe joints can be exposed for repair or replacement by cutting or chipping away the surface layers of the plaster or screed;

b) the enclosing of any pipe and associated pipe joints in a purpose-made chase in a solid wall (but not within the cavity of a hollow wall) in such a way that the pipe and pipe joints can either be capped off and isolated or be exposed for purposes of examination, repair or replacement without endangering the structural integrity of the building;

c) the enclosing of any pipe and associated pipe joints in any internal wall that is not a solid wall;

d) the enclosing of any pipe, but not joints, within a purpose-made pipe sleeve or duct in or under any solid floor in such a way that the pipe may be removed and replaced, and where an inspection access point is provided at each joint.

#### 14.1.18 ACCESSIBILITY OF ABOVE GROUND VALVES

Locate every valve so that it is readily accessible for examination, maintenance and operation by the means by which it is designed to be operated. Fix any covers by removable fastenings.

#### 14.1.19 BACKFLOW PREVENTION DEVICES

Install every backflow prevention device so that it is accessible for examination, repair or replacement.

#### 14.1.20 LEAKAGE TESTING

After satisfactory visual inspections have been completed, carry out hydraulic pressure testing on the installation.

### 14.2 TESTING OF INSTALLATIONS WITHIN BUILDINGS

#### 14.2.1 INSPECTIONS

Inspect completed sections during the course of installation and correct any defects. When warranted by the size of the installation or when any section will be rendered inaccessible at a later stage, test completed work in sections.

Carry out final testing, making good and recording results in accordance with the project specification and any statutory requirements, including the period of notice for inspection.

When the installation is complete slowly fill it with water, with the highest draw-off point open to allow air to be expelled from the system.

Then inspect the installation, including all cisterns, tanks, cylinders and water heaters, for leaks.

Check each draw-off point, tap, shower fitting and float-operated valve for rate of flow against the specified requirements. Carry out performance tests on any connected specialist items to check that they meet the requirements detailed in the specification.

### 14.2.2 FLUSHING

Thoroughly flush every new domestic water service and any extension or modification to such a service immediately before it is taken into use. Use fresh water drawn direct from the water supplier's mains.

### 14.2.3 DISINFECTION

See IS EN806 for guidance.

## 14.3 SPACING OF PIPEWORK

Space pipe runs in relation to one another, other services runs and building structure, allow for specified thickness of thermal insulation and ensure adequate space for access to pipe joints, etc.

Use the following minimum clearances in spacing of pipe runs:

| **Between** | **and** | **Clearance (mm)** |
|---|---|---|
| Pipeline - | Wall finish | 25 |
| insulated or | Ceiling finish or soffit | 50 |
| un-insulated | Floor Finish | 150 |
| Insulated pipeline | adjacent service runs | 25 |
| Un-insulated pipeline | adjacent service runs | 50 |
| Adjacent pipelines | both un-insulated | 150 |
| | one un-insulated | 75 |
| | both insulated | 25 |

- The arrangement and sizing of all internal and external heating, hot and cold water, gas, waste and all other pipework are as indicated on the drawings shall be agreed with the Engineers on site. All work shall conform with the regulations and byelaws of the Local Government and Municipal Authorities.
- Care shall be taken in grading the pipes to ensure that no air locking can occur.
- All tubes and fittings shall be stored clear of the ground and shall be suitably protected from the weather. Tubes corroded beyond normal "stock rust" will not be accepted by the Engineers.
- Screwed ends of tubes shall be protected with a socket or plastic thimble.
- Malleable iron caps, plugs or plastic thimbles shall be used during the course of the Contract to prevent dirt getting into the pipes. The Contractor shall be responsible for ensuring that the pipework systems, installed under the Contract, shall be maintained free of dirt and foreign matter. Should a stoppage occur due to this cause the trouble shall be rectified at the Contractors own expense.

## 14.4 SECONDARY DOMESTIC HOT, COLD, RISING MAIN AND CONDENSATE PIPEWORK:

- All underground mains pipework 75 mm bore and over shall be carried out in Class 'C' BS EN 969:2009 with current amendments centrifugally spun cast iron, coated inside and outside with a heavy layer of suitable composition having a tar or other approved base, in accordance with BS EN 969:2009 with current amendments.
- All joints and all specials shall be manufactured in accordance with ISO 2531:2009 with current amendments.
- All underground water pipework less than 75 mm bore shall be carried out in underground class copper piping to BS EN 1057: 2006 with current amendments. All joints shall be brazed as previously specified.

## 14.5 PLASTIC PIPEWORK

uPVC Pipe – Soils & Wastes

The contractor shall be responsible for the design and installation of a system of uPVC soils and wastes pipework

uPVC pipework shall comply with the relevant requirements of BS EN ISO 1452, parts 1-5 inclusive.

### 14.5.1 UPVC PIPE FITTINGS

Fittings shall be manufactured from the same material as the pipe in which they are contained. Use only formed fittings with approval, if manufacturer's standard fittings are not available.

For changes in direction use centreline radius/nominal bore of not less than 1.5 unless otherwise directed. For reductions and enlargements, use easy transition type with inclined angle not exceeding 30 degrees. Joint shall be socket and spigot for solvent cement with the exception of traps.

### 14.5.2 PIPE TESTING

uPVC pipework shall be tested in accordance with the relevant section of BS EN 805

Reference Standards uPVC Pipes:

- IS EN 806-1:2000. Specifications for installations inside buildings conveying water for human consumption. General (Amd 1)

- IS EN 806-2:2005. Specifications for installations inside buildings conveying water for human consumption. Design
- IS EN 806-3:2006. Specifications for installations inside buildings conveying water for human consumption. Pipe sizing - Simplified method
- IS EN 806-4:2010. Specifications for installations inside buildings conveying water for human consumption. Installation
- IS EN 1717:2000. Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow (+NA:2011)
- BS 8680:2020. Water quality - water safety plans - code of practice
- PD 855468:2015. Guide to the flushing and disinfection of services supplying water for domestic use within buildings and their curtilages
- BS 8558:20. 15Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages - complementary guidance to BS EN 806
- BS EN ISO 1452-3:2010 Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure. Un-plasticized poly (vinyl chloride) (PVC-U). Fittings

### 14.5.3 SOLVENT WELDED JOINTS, UPVC PIPES

Use solvent welded joints generally, ring seal joints at expansion joints and elsewhere as necessary. Preparation - Ensure that plain ends are cut square. Reamer out bore at plain ends. Clean plain ends with solvent cleaner. Making and Sealing - in accordance with fitting manufacturer's instructions.

### 14.5.4 INSTALLATION

Erect stacks plumb. Fix branch pipes with uniform and adequate gradients according to design so that they will drain efficiently.

Ensure that there is a sufficient clearance between pipework and other services and parts of the building fabric for maintenance, e.g. cleaning at access points and painting.

### 14.5.5 PLASTICS PIPES.

Joint plastics pipes as specified and in accordance with manufacturers' sitework instructions. Use methods of jointing appropriate to the material of the pipe.

### 14.5.6 FIXING APPLIANCES

Securely fix all appliances, following the manufacturer's sitework instructions.

### 14.5.7 SEALANTS

Seal between all appliances except, normally, cisterns, and the building structure as follows:

a) ensure that the correct specified type of sealant is used;
b) ensure that the finishes to backgrounds are complete and the surfaces to receive the sealant are clean and dry;
c) remove the minimum necessary of any protective covering to give access for the application of the sealant;
d) apply sealant in accordance with the manufacturer's sitework instructions and leave a neat smooth surface and watertight joint.

### 14.5.8 INSTALLATION PERFORMANCE

Check generally that all appliances drain speedily, quietly and completely through the installation.

Test as required to ensure a minimum water seal of 25 mm will be retained in every trap during peak working conditions.

## 14.6 MULTI-LAYER PRESS FIT PIPING

### 14.6.1 GENERAL

The Potable (mains) water piping system shall be a proprietary multilayer composite pipe with compatible press-fit fittings system suitable for the conveyance potable water in buildings.

The system shall be WRAS approved.

### 14.6.2 APPLICATIONS

The multilayer composite pipe and press-fit fittings system can be installed in the following fields of application:

- Potable (Mains) water

### 14.6.3 DESCRIPTION

The Potable (mains) water piping system shall comprise of an inner layer pipe made of cross-linked polyethylene (PEX-c), an outer layer made of High-Density Polyethylene (HDPE) and a middle layer of butt welded aluminium, WRAS certified. The system shall be manufactured in accordance with quality management system ISO 9001 and environmental management system ISO 14001. All products must be installed in accordance with instructions issued by piping system manufacturer.

## 14.7 PIPES AND FITTINGS CHARACTERISTICS

### 14.7.1 PIPE

Colour: White

Material PEXc (inner layer) Aluminium (middle layer) HDPE (outer layer)

Diameters

The piping system shall be supplied in a range of diameters up to 63mm and shall generally be as indicated on the drawings.

| Diameter (mm) | 14 | 16 | 20 | 25 | 32 | 40 | 50 | 63 |
|---|---|---|---|---|---|---|---|---|
| Wall Thickness (mm) | 2.0 | 2.0 | 2.3 | 2.5 | 3.0 | 4.0 | 4.5 | 6.0 |

### 14.7.2 PROPRIETARY PRESS FIT FITTINGS

The proprietary press-fit fittings shall be manufactured from High performance plastic polyphenylsulphone (PPSU) or equal & shall be resistance to high temperatures and corrosion. The fittings shall also have high notch impact strength and resistance to stress cracking

The jointing technique shall require no soldering, welding or thread cutting.

Material: Polyphenylsulphone (PPSU), Stainless Steel, EPDM

Colour: Blue

Diameter: 14 / 16 / 20 / 25 / 32 / 40 / 50 / 63

## 14.8 OPERATING TEMPERATURE AND RESISTANCE

The piping system & its fittings shall have the following physical characteristics, as tabulated below

**Proprietary Pipe system – Physical Properties**

| **Parameter** | **Threshold Value** |
|---|---|
| Oxygen-barrier | 100% |
| Maximum operating pressures (according to ISO10508) | |
| | Class 1 (Sanitary / 60°C) 10 bar |
| | Class 2 (Sanitary / 70°C) 10 bar |
| Max. permanent operating temperature | 85°C at a max. pressure of 6 bar) |
| Max. short-term operating temperature | 100°C for a maximum of 100 h in 50 years |
| Max. permanent operating pressure | 10 bar at a max. temperature of 70°C |
| Thermal expansion coefficient | 0,025 – 0,030 mm/mK |
| Thermal conduction | 0,4 W/mK |
| Roughness | 0,007 mm |

**Proprietary Press fix Fittings – Physical Properties**

| Parameter | Threshold Value |
|---|---|
| Maximum operating pressures (according to ISO10508) | |
| | Class 1 (Sanitary / 60°C) 10 bar |
| | Class 2 (Sanitary / 70°C) 10 bar |
| Max. permanent operating temperature | 85°C at a max. pressure of 6 bar |
| Max. short-term operating temperature years | 100°C for a maximum of 100 h in 50 |
| Max. permanent operating pressure | 10 bar at a max. temperature of 70°C |

## 14.9 INSTALLATION

The proprietary multilayer composite pipe with compatible press-fit fittings system shall be installed all in accordance with the manufacturers installation recommendations and be compliant with current Building Regulations.

### 14.9.1 BRACKETING FIXING INSTRUCTIONS

Pipes shall be clipped and bracketed at regular intervals. As indicated by the system manufacturer.

At least two fastening mechanisms (in front and behind the elbows) should be used where pipes change direction.

### 14.9.2 CONTROL OF THERMAL MOVEMENT

Control of thermal expansion will be as recommended by the piping system manufacturer.

### 14.9.3 BENDING

The minimum bending radii for the piping system using hand &/or spiral spring shall be as specified by the piping system manufacturer.

### 14.9.4 INSULATION

Comply with the insulation requirements as laid out in the British Standards. As applicable, pipes shall be lagged and labelled in accordance with the colour-code standard to indicate their application.

## 14.10 STANDARDS

ISO 21003-2:2008 Multilayer piping systems for hot and cold-water installations inside buildings — Part 2: Pipes

### 14.10.1 APPROVALS

The proprietary piping System shall be WRAS approved.

### 14.10.2 GUARANTEE

The proprietary piping system & its fittings shall be guaranteed for a period of 10 years after the date of practical completion, when the system has been professionally installed in compliance with the manufacturers technical regulations and installation instructions, current at the date practical completion was achieved.

The 10-year guarantee shall cover not just product replacement, but the costs incurred during the process of repairing any damages, plus personal injury and any third-party damages.

## 14.11 TESTING

The pipe and fitting system shall fulfil all drinking water requirements, mandated by external bodies & standards including: -

WRAS

ISO 21003-2:2008 specifies the characteristics of pipes for multilayer piping systems intended to be used for hot and cold water installations inside buildings for the conveyance of water — whether or not the water is intended for human consumption (domestic systems) or heating systems — under specified design pressures and temperatures appropriate to the class of application.

The manufacturer of system components shall be subject to permanent internal quality controls and a continuous regime of external quality monitoring.

## 14.12 STORAGE

When storing the pipes & associated fittings the following points should be observed:

- The optimal temperature range for storage and use of such pipes and fittings and other components is from 5ºC to 25ºC
- Pipes and fittings shall not be stored or used below -10ºC
- Press-fit tools shall not be stored or used in temperatures below freezing or above 40ºC
- Pipes and fittings shall be stored in the original packaging
- Pipes shall be protected from direct, intense sunlight and stress through UV radiation in storage and when installed.

Douglas Carroll Consulting Engineers

Suite 7, 3rd Floor

Station House, Railway Square

Waterford.

Tel 051 306670