



## **SECTION 3.4 TECHNICAL SPECIFICATIONS FOR DRY RISER SYSTEM**

### **1 GENERAL**

The dry riser system includes but not limited to the following:

- (1) 100 mm or 150 mm diameter riser water pipes.
- (2) 65 mm diameter landing valves of pressure reducing hydrant type with instantaneous female coupling and hand-wheel operated screwed down valve.
- (3) Canvas hose, hose cradle, quick coupling and nozzle.
- (4) 2 way or 4 way breeching inlet complete with box.
- (5) Automatic air release valve.

### **2 BREECHING INLET**

The breeching inlet shall be 2-way for 100 mm diameter pipe and 4-way for 150 mm diameter pipe as shown in the tender drawing complying to MS 1210: Part 3 complete with enclosure complying to MS 1210: Part 5 and labelled “DRY RISER INLET” to enable the Jabatan Bomba Dan Penyelamat to pump water into the installation by the use of their own equipment. The drain shall be provided at the bottom of the riser to drain the water from the system after used.

### **3 PIPEWORKS AND FITTINGS**

#### **3.1 General**

The work involved includes but shall not be limited to the supply and installation of all necessary pipe, valves, fittings, anchors, supports, brackets, insulation etc. unless specifically excluded elsewhere in this Specification.

The pipework shall be carried out by competent person in accordance with the best engineering practice to conform the diagrams and layouts shown in the Tender Drawings.

#### **3.2 Regulations**

All pipelines shall be constructed in accordance with the relevant Regulations and Standard.

#### **3.3 General Piping Instruction**

In general, piping has been shown diagrammatically on the drawings. Care shall be taken to install this piping exactly as shown. Should field condition prevent this installation exactly as shown, this section of the work shall be decided by Superintending Officer (S.O.). Where piping is to be furred in or concealed or buried under ground, the Contractor is to coordinate all the works to maintain lines and levels.

As soon as lines have been installed, all openings shall be capped or plugged to prevent



the entrance of the materials that would obstruct the pipe. Caps and plugs shall be left in place until removal is necessary for completion of installation. All piping shall be flushed or blown clean and strainers or line pockets cleared of all foreign materials before putting the lines into service. All piping shall be thoroughly cleaned, free from scale by wire brushing and shall be left in proper condition for painting or insulating.

### **3.4 Material**

All piping shall be galvanised steel to BS EN 10255:2004 Class 'C'.

Square tees and elbows shall not be used. All changes of direction of the pipe run shall be made with standard bends or long turn fittings.

All piping shall be cut with pipe cutters, accurately to dimensions determined on site and worked into position without springing or forcing. Pipe thread shall be cut with threaded dies and ends reamed before assembly. All screwed and socketed pipe joints shall be made using Teflon or an approved propriety jointing compound and fine hemp. Any threaded tubing exposed after jointing shall be painted to prevent corrosion.

A suitable automatic air release valve shall be fitted to each stack of risers or as indicated in the Tender Drawings.

The contractor shall ensure that all joints are tight and drip-proof.

### **3.5 Pipe Joints**

#### **3.5.1 Screwed Joint Connections**

Pipe joints up to and including 50 mm (2") diameter on galvanised steel piping shall be made by means of screwed connections.

For screwed joints, the sealing compound to be used shall be litharge or glycerin. Plumber's rope or paint will not be allowed for such purpose. Standard reducing pieces shall be used throughout the whole installation.

#### **3.5.2 Selection of pipe jointing type for 65 mm (2½") diameter and above to suit the operational requirements of the specific installation shall be as per Schedule of Design Requirements and specification below:**

##### **(1) Welded Connections**

For joints 65 mm (2½") and above, on galvanised steel piping shall be made by means of welded connections.

All welded joints shall comply with BS 2633:1987. Pipe ends shall be prepared by machining, grinding or machine gas cutting or hand flame cutting with subsequent grinding. The portion of galvanised pipe zinc coating damaged during welding process shall be touched up with zinc-rich paint or any appropriate cold galvanizing compounds.

Prior to commencement of welding work, the contractor shall submit a copy of approved Welding Procedure Specification (WPS) and competent welder certificate for approval.



Where welded joints are impractical, or flanges are required for erection purposes, or at connections to fittings and at all flanged valves, flanges shall be fitted and welded onto pipes to approval.

All flanged joints shall be flushed and aligned and shall be made with corrugated joining rings, coated on both sides with the recommended joining compound. All bolts and nuts shall be of galvanised steel of approved manufacturer.

## **(2) Mechanical Joint Coupling**

For joints 65 mm (2½") and above, on galvanised steel piping shall be made by means of mechanical joint coupling.

All joint couplings, fittings, valves, and accessories shall be the products of a single manufacturer.

All castings used for coupling housings, fittings, valve bodies, etc., shall be traceable for quality assurance.

Detail of mechanical joint couplings and fittings shall be shown as per drawing.

All mechanical joint couplings shall conform to ASTM A-536 Grade 65-45-12.

Installation of mechanical joint coupling shall be in accordance with the manufacturer's installation instructions. The Contractor shall remove and replace any joints deemed improperly installed.

Where mechanical joints coupling are impractical, or flanges are required for erection purposes, or at connections to fittings and at all flanged valves, flanges shall be fitted and welded onto pipes to approval.

All flanged joints shall be flushed and aligned and shall be made with corrugated joining rings, coated on both sides with the recommended joining compound. All bolts and nuts shall be of galvanised steel of approved manufacturer.

All welded joints shall comply with BS 2633:1987. Pipe ends shall be prepared by machining, grinding or machine gas cutting or hand flame cutting with subsequent grinding.

Prior to commencement of welding work, the contractor shall submit a copy of a competent welder certificate for approval.

## **3.4 Pipe Supports**

All vertical runs of pipe shall be adequately supported with suitable steel clamps. All horizontal runs of pipe shall be hung from ceiling slab or walls with suitable steel hangers. At the lowest point of a vertical riser pipe, proper additional support shall be used to support from the floor level.

All pipe hangers below the roof shall be fixed to steel bar provided by the Main Contractor.



In the case of pipe support is allowed to be hang at roof structural steel, drilling and punching of hole are not allowed for roof structural steel. Steel bracket/ clamps or proper fixing shall be provided.

All pipes shall be adequately supported by approved type steel hangers. The spacing of these supports shall be as follows:-

#### **SCHEDULE 1: Pipe Spacing**

Nominal pipe diameter	Maximum spacing	
	Horizontal spacing	Vertical spacing
Up to and including 50 mm (2" diameter) bore	3 m	3.5 m
65 mm (2½") bore up to and including 150 mm (6") bore	4 m	4 m

#### **SCHEDULE 2: Anchoring**

Pipe sizes (Diameter)	Anchor & Rod Size	Hole Diameter	Anchor Length	Hole Depth
25 mm – 50 mm	6 mm	8 mm	25 mm	25 mm
65 mm – 150 mm	9 mm	12 mm	40 mm	40 mm

### **3.7 Pipe Sleeves**

Pipe sleeves shall be fitted for pipes passing through concrete floors and walls (concrete/brick). Pipe sleeves shall be one (1) nominal diameter larger than the service pipe concerned.

Sleeves for galvanised steel pipe shall be of galvanised pipe off-cuts, and sleeves for copper pipe shall be similar but of brass or copper. Pipe sleeves of 100 mm diameter and above maybe constructed from not less than 3 mm galvanised sheet steel.

Pipe sleeves fitted in floors shall generally end 25 mm above the finished floor level, except in plant rooms and other areas where "wet floors" are expected in these cases, the sleeves shall end 50 mm above the finished floor level.

#### **3.7.1 Fire Resistance Sealant or Non-Combustible Fire Stop Material**

Any opening or clearances on floor, wall or partition through which pipe and pipe sleeves passes through shall be tightly caulked with fire resistance sealant or non-combustible fire stop material compliance to BS 476 Part 20 with minimum 2 hours fire protection to form acoustic and fire barrier.

The method of installation for the fire resistance sealant or non-combustible fire stop material through any floors, walls or partitions shall in accordance with manufacturer's instruction.

### **3.8 Fittings**

All pipe fittings up to and including 50 mm (2") diameter, shall be of malleable cast iron



conforming to BS143, BS1256 and BS EN 10241:2000.

All pipe fittings having 65 mm (2½") diameter and above, shall be of galvanised steel type conforming to JIS B2311:2117, BS EN 10241:2000 or equivalent approved standard within the specifications of the relevant piping circuit and shall be of best quality manufactured. Each pipe fittings shall have appropriate identification mark embossed or engraved on it and approved by S.O prior to installation.

The Contractor will not be permitted to fabricate any non-standard fittings without prior approval of the S.O.

All flange fittings shall be factory welded. All flange connections shall have their mating faces machined to a true surface square with the centre line pipe axis  $\pm 3^\circ$  deflection from the cross-sectional axis of the pipe. Suitable gaskets shall be provided for leak proof connections.

On-site welding operations should be avoided as far as possible, but if unavoidable they shall be carried out in accordance with BS 2971:1991 and should be carried out by qualified welders.

All bends used shall have radius of not less than five (5) times the diameter. If radius is not obtainable, alternative bends of approved type may be used.

Tees in pipes shall be slipped on or other approved leveled end. All tees shall be of approved manufacturer.

Reduction in diameter for through flow pipes shall be made by means of reducing sockets. Eccentric reducing sockets shall be used on horizontal pipes and concentric reducing sockets for vertical pipes only.

Unions 50 mm and under shall be screwed with ground brass seats. Unions 65 mm and above shall be standard galvanised steel companion flanges. Where the pipe is galvanised, the union and flanges shall be galvanised. Unions of flanged connections shall be provided where necessary, to permit dismantling of piping or removal of valves and equipment.

### **3.9 Pipe Arrangement**

Typical arrangement of pipe shall be as per drawing.

## **4 VALVES**

### **4.1 Landing valves**

Landing valve shall comply with MS 1210: Part 1 and BS 5041-2:1987. The landing valves should be boxed up complying with MS 1210: Part 4.

The valve shall also be supplied with a 65 mm (2½") bore renewable valve washer for screw down and 22 mm (7/8") diameter spindle with a 165 mm (6½") diameter hand wheel.

The valve should be marked with a manufacturer's name and its maximum test pressure of more than 14 bars.



The landing valve shall generally be installed at a height of not more than 0.75 metre from the floor with ample clearance to facilitate the connection of canvas hose.

## 5 FIRE HOSE ASSEMBLY

The fire hose supplied shall be 65 mm diameter and of a minimum length of 30 metre complete with 65 mm diameter quick coupling jet and spray nozzle. It shall be able to withstand a testing pressure of more than 14 bars.

Each fire hose shall also be neatly stacked on a swing-type hose cradle fixed adjacent to the landing valve.

## 6 CLEANING, PAINTING AND IDENTIFICATION

The painting works shall include all equipment, piping, fittings, valves, hangers, conduits, framework, switchboard, etc. and all other works exposed to view.

All paints used shall be of approved brand of best quality, low Volatile Organic Compound (VOC) content and ready mixed paint brought to site in unopened containers.

No painting shall be done in unsuitable weather. Each coat of painting shall only be applied when the previous coat is completely dry.

The Contractor shall provide all tarpaulins, sheets and covering to protect the floors, walls and other works belonging to other trades.

All equipment and piping shall be thoroughly cleaned and degreased upon completion on his work before any painting is carried out.

All metal works shall be cleaned and scale shall be free from grease. The surface shall then be prepared with an approved rust inhibitive primer and two (2) high gloss-finishing coats to approved colors and to the approval of the S.O.

All pipelines shall be painted to approved colors in general to match the surroundings. In addition, lettering and the direction of flow must be indicated by painting a black/white arrow on to the pipelines at appropriate intervals. These arrows shall be 3" long on pipes up to 50 mm (2") diameter, 150 mm (6") long for pipes over 50 mm (2") diameter. All items to be painted shall be first cleaned and prime coated. Over this the final colour shall be applied in two coats. The paint shall be gloss-finish type.

The Schedule of Colours shall be as follows unless otherwise decided by the Superintending Officer.

ITEM	COLOUR
Pipes	Red
Landing Valves	Red
Inlet Connections	Red
All Valves	Red
Items exposed to weather	Two coats of aluminium paint



Directional arrows	White
--------------------	-------

All Fire Protection System equipment should be as per UBBL clause 248 or as other colors approved by Jabatan Bomba dan Penyelamat Malaysia.

## 7 TESTING

After each section of the piping system has been installed it shall be blown clear by suitable means, pressure tested to 14 bar and any leaks repaired.

After the complete piping system has been installed, the whole system shall be subjected to a hydrostatic pressure test in the presence of the Superintending Officer or his representative, to withstand not less than 14bar (200 psi) for 2 hours & 1 ½ times working pressure for 24 hours.

The contractor shall be responsible to arrange, set out and pay all fees in connection these testing.

## 8 SAMPLE OF MATERIAL FOR SUBMISSION AND APPROVAL

The Contractor shall prepare sample board of typical material proposed to use in the work and/or samples of workmanship (mock up) to the approval of the S.O, prior to commencement of the installation work. The sample board and/or samples of workmanship (mock up) shall comprise of but not limited to the pipes, pipe fittings, pipe hanger and support system, cables and etc.

The cost of the sample board or samples of workmanship (mock up) is deemed to be included in the Contract.

----- **END OF SECTION 3.4** -----

-