भारतीय मानक

Indian Standard

IS 14106 : 2024

डायरेक्ट एक्शन हैंडपंप — विशिष्टि

(दूसरा पुनरीक्षण)

Direct Action Handpumps — Specification

(Second Revision)

ICS 23.100

भारतीय मानक ब्यूरो
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Hand Pumps Sectional Committee, MED 27

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Handpumps Sectional Committee had been approved by the Mechanical Engineering Division Council.

Direct action hand pumps (DAHP) are installed on boreholes for water table depth up to 15 m. A plunger is attached to the lower end of a pump rod, beneath the groundwater level and the user moves the pump rod in an up-and-down motion, using a T-bar handle. On the up-stroke, the plunger lifts water into the rising main, and replacement water is drawn into the cylinder through the foot valve. On the down-stroke, the foot valve closes, and water passes through a one-way valve in the plunger and is lifted on the next up-stroke. Direct action pumps operate without the help of leverage, linkages and bearings, and depend on the strength of the operator pumping to lift the column of water as such pumps can only be used to depths from which an individual can physically lift the column of water (about 12 m). However, the mechanical simplicity, low cost and lightweight construction make these pumps well equipped to meet operation and maintenance (O and M) objectives at the village level.

This standard was first published in 1996 and subsequently revised in 2018. The present revision has been taken up with a view to incorporate the modification found necessary as a result of experience gained in the use of this standard. Also, in this revision, the standard has been brought into the latest style and format of Indian Standards, and references to Indian Standards, wherever applicable have been updated. BIS certification marking clause has been modified to align with the revised *Bureau of Indian Standards Act*, 2016. The following major modifications have been incorporated in this revision of the standard:

a) Requirements for mechanical and chemical properties of carbon steel bolts and nuts has been added in **4.14**; and
b) Requirements for steel tubes has been changed.

The composition of the Committee responsible for the formulation of this standard is given in Annex E.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

DIRECT ACTION HANDPUMPS — SPECIFICATION

(Second Revision)

1 SCOPE

This standard covers direct action handpumps suitable for lifting water from borewells with static water level not exceeding 15 m.

2 REFERENCES

The standards listed in Annex A contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of these standards.

3 TERMINOLOGY

3.1 Combination Spanner — This is the spanner required for the maintenance of the pump.

3.2 Cylinder Assembly — The cylinder assembly consists of a cylinder pipe, piston, piston rod, foot valve, and foot valve receiver. It provides necessary pumping action and lifts water upward through rising main.

3.3 Pump Head Assembly — The above ground structure, consisting of pump body, handle and stand supports the whole system. Up and down movement of the handle operates the piston in the cylinder.

3.4 Pump Rod Assembly — The pump rod assembly provides a linkage between pump handle and piston in cylinder. With its light weight and high displacement capacity, these rods are buoyant and help in reducing the effort required during upward stroke.

3.5 Retrieving Rod Assembly — The retrieving rod assembly helps in extracting the foot valve assembly from cylinder for maintenance.

3.6 Rising Main — The rising main carries water from the cylinder to the pump head.

3.7 Tubewell Assembly — The tubewell assembly consists of:

a) Upper casing;
b) Lower casing; and
c) Well-screen assembly.

NOTE — Bell length is not included in upper casing and lower casing pipe length.

4 GENERAL REQUIREMENTS

4.1 The material, dimensional details and tolerances shall be as given in Fig. 1 to 38. For all linear and angular dimensions where tolerances are not specified, the tolerances as per Class C of IS 2102 (Part 1) shall be applicable. All sharp corners and edges shall be rounded off.

4.2 The dimensions for un-plasticized polyvinyl chloride (uPVC) pipes for different components shall be as given in Table 1. The material and test requirements for uPVC pipes shall conform to IS 12818.

4.3 The number of lengths of uPVC pipe for different components for a particular installation shall depend on the tube well parameters mentioned below:

a) Lower casing : Depth of aquifer;
b) Well screen : Nature of aquifer (minimum 2 m);
c) Upper casing : Static water level;
d) Rising main : Seasonal fluctuations; and
e) Pump rod

4.4 The bell dimensions for upper lower casing and sand trap shall be as given in Table 2.

4.5 PVC injection moulded fittings shall conform to IS 7834 (Part 1) except for hydraulic test mentioned at **6.4** of IS 7834 (Part 1).

4.6 The high-density polyethylene (HDPE) parts shall be moulded from materials conforming to IS 7328.

4.7 Polyacetal components are shown in Fig. 22A and Fig. 22B and properties of polyacetal, for guidance only, are given in Annex B.

Table 1 Dimensions for Un-plasticized PVC Pipes for Different Components

(*Clause* 4.2)

All dimensions in millimetres.

Sl No.	Item	Nominal Diameter	Mean Outside Diameter		Wall Thickness		Length
			Min	*Max*	*Min*	*Max*	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Upper casing	80	88.0	88.3	4.0	4.6	$3\,000^{+1}\ 0^{0}$
ii)	Rising main	50	60.0	60.2	2.5	3.0	$3\,000^{+1}\ 0^{0}$
iii)	Lower casing	40	48.0	48.2	3.5	4.0	$3\,000^{+1}\ 0^{0}$
iv)	Top pump rod	32	42.0	42.2	2.2	2.7	$1\,000^{+1}\ 0^{0}$
v)	Pump rod	32	42.0	42.2	2.2	2.7	$3\,000^{+1}\ 0^{0}$
vi)	Sand trap	40	48.0	48.2	3.5	4.0	$1\,000^{+1}\ 0^{0}$
vii)	Piston rod	32	42.0	42.2	2.2	2.7	$1\,000^{+1}\ 0^{0}$
viii)	Cylinder pipe	50	60.0	60.2	2.5	3.0	$3\,000^{+1}\ 0^{0}$

Table 2 Bell Dimensions for Upper and Lower Casing Pipes and Sand Trap

(*Clause* 4.4)

All dimensions in millimetres.

Sl No.	Pipe References	Nominal Diameter	Socket Depth	Mean Socket at Mouth		Internal Diameter at Root	
			Min	*Min*	*Max*	*Min*	*Max*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Upper casing	80	60	88.3	88.5	87.8	88.0
ii)	Lower casing	40	40	48.2	48.4	47.8	48.0
iii)	Sand trap	40	40	48.2	48.4	47.8	48.0

4.8 The solvent cement used shall conform to IS 14182. The cement solution shall not contain any material which imparts taste or colour to water or has any toxic effect or faster bacterial growth. Before cementing the joint, the mating surfaces shall be made rough by rubbing with emery paper and cleaned with suitable cleaning fluid.

4.9 The nitrile rubber components shall conform to specifications given in Annex C.

4.10 The steel plate/sheets and round bar shall conform to Quality A of Grade E 250 of IS 2062.

4.11 The spring steel wire shall conform to IS 4454 (Part 1).

4.12 The stainless steel components shall conform to grade 'X04Cr19Ni9' of IS 6603 with following mechanical properties:

a) Tensile strength: 800 MPa, *Min*; and

b) Elongation: 15 percent, *Min*.

4.13 The welding of the mild steel components shall be done in accordance with IS 9595. Welding for stainless steel components shall conform to IS 2811. Alternatively, stainless steel components may be welded by manual arc welding using suitable electrodes confirming to IS 5206. Unless otherwise specified, the minimum specified thickness of the member to be welded shall be the guiding factor for deciding the weld fillet size. It shall normally be not less than the minimum specified thickness of the members to be welded.

4.14 The stainless steel bolts and nuts shall conform to Grade A2 of IS 1367 (Part 14/Sec 1) and IS 1367 (Part 14/Sec 2) respectively. The dimensions of carbon steel bolts and nuts shall conform to IS 1363 (Part 1) and IS 1363 (Part 3) respectively. The mechanical and chemical properties of carbon steel bolts and nuts shall

conform to IS 1367 (Part 3) and IS 1367 (Part 6) respectively.

4.15 The washers shall conform to Type A of IS 2016.

4.16 The steel tubes shall conform to medium class of IS 1239 (Part 1).

4.17 The cast iron castings shall conform to Grade FG 150 of IS 210.

4.18 Some of the dimensions of the components may undergo minor changes after welding. In such cases the dimensions shall be checked before welding.

4.19 Till such time adequate gauging practices are available for knuckle threads, interchangeability between mating components shall be ensured.

5 ANTI-CORROSIVE TREATMENT

The handpumps shall be given following anti-corrosive treatment.

5.1 Electro Galvanizing

All carbon steel bolts, and nuts shall be electro-galvanized and zinc passivated conforming to service Grade no. 2 of IS 1573. The handle retainer, retrieving rod, and combination spanner shall be electro-galvanized and zinc passivated conforming to service Grade no. 4 of IS 1573.

5.2 Galvanizing

The following carbon steel assemblies shall be hot dip galvanized according to IS 4759 and given chromate conversion coating according to **5.9** of IS 2629.

a) Head;
b) Handle;
c) Stand; and
d) Intermediate flange.

6 TESTING

6.1 Visual Tests

All the pumps in the lot shall be examined for workmanship, finish and visual defects.

6.2 Dimensional and Other Tests

6.2.1 *Sampling*

Unless otherwise specified in the contract or order, the procedure given in IS 2500 (Part 1) shall be followed for sampling inspection. For the characteristics given under 6.2.2, the single sampling plan with general inspection Level I and AQL of one percent as given in Table 1 and Table 2A of IS 2500 (Part 1) shall be followed.

Sample shall be drawn from the pumps conforming to the requirements given in 6.1.

6.2.2 All the samples selected as per 6.2.1 shall be checked for the following:

a) Alignment of groove in the top guide bush with respect to the nuts welded on pump body;
b) Alignment of handle nut with pipe for concentricity;
c) Interchangeability of the components;
d) Location of the holes in the pump head-flange with respect to the direction of the spout;
e) Reasonable flatness of the flanges to provide proper matching of the holes to ensure unrestricted insertion of the bolts;
f) Machining of faces indicated in respective figures of piston plate, follower plate and foot valve body;
g) Concentricity of the two internal diameter of the reducing socket;
h) Concentricity of the connectors and adopters in relation to the PVC pipe after solvent cementing the joint; and
j) Hardness of rubber components.

6.2.3 Two complete pumps out of the pumps selected according to 6.2.1 shall be checked for the critical dimensions of its assemblies and individual components.

6.3 Routine Tests

6.3.1 Two cylinders out of the samples selected shall be fitted with foot valve assemblies, kept in vertical positions, filled with water and subjected to internal hydraulic pressure of 0.1 MPa for 30 min. No leakage shall be observed.

6.3.2 Two pumps shall be separately tested for discharge test. The test shall start only after getting continuous flow of water through the spout. The quantity of water thus collected for 30 continuous strokes of 300 mm length, completed in one minute, shall not be less than 21 litres.

6.3.3 All PVC pipes in the selected samples shall be subjected to acceptance tests as given in IS 12818.

6.4 Test for Joints

6.4.1 One joint each made from randomly selected pump rod, riser pipe, upper casing and lower casing in the manner described below, shall withstand an internal hydraulic pressure of 0.9 MPa for 30 min without showing any sign of leakage:

a) *Pump rod* — Two pieces, each of 250 mm length, shall be taken from both the ends of the pump rod so that one has male adapter while the other has female adapter at one end with other ends open. The test pressure shall be applied to each piece separately, from their respective open ends;

b) *Riser pipe* — Two pieces, each of 500 mm length, shall be taken from both the ends of the riser pipe, so that one has male adapter while the other has female adapter at one end with other ends open. Both the pieces shall be screwed together, with 'O' ring in position to form one specimen to be subjected to hydraulic test; and

c) *Upper casing and lower casing* — The bell and spigot joint one each for upper and lower casing shall be solvent cemented and shall be allowed to cure for at least two hours before testing. The test pieces shall have a total length of one meter with joint at the middle.

6.4.2 *Load Test*

Two pieces of pump rod taken in the manner and of the same length as described in 6.4.1 **(a)** shall be screwed together. The same pieces tested for leakage of joint may be used. The specimen, when tested, shall be able to withstand minimum tensile proof load of 2.5 kN (250 kg) for 15 min without slippage or breakage of joint at the thread or cementing.

6.5 Criteria for Conformity

The lot shall be considered conforming to the requirements of specification, if the pumps selected according to 6.2.1 satisfy the following conditions:

a) The number of pumps not meeting the requirements of a characteristics inspected under 6.2.2 and critical dimensions given in 6.2.3 shall not exceed the corresponding acceptance number; and

b) All the pumps inspected according to 6.3 and 6.4 shall meet the requirements specified there in.

7 GUARANTEE

The pump and accessories shall be guaranteed against bad workmanship/material for 12 months from the date of installation, or 18 months from the date of supply whichever is earlier.

8 MARKING

8.1 The hand pumps complying with this standard shall be durable and legibly marked in service with:

a) The pump head shall have a name plate with name of manufacturer and serial number of the pump;

b) The head flange, the intermediate flange and the stand flange shall have steel punch impression of manufacturer's identification mark deep enough to be visible after galvanizing; and

c) All uPVC pipes including cylinder pipe shall be clearly and indelibly marked (preferably screen printed) with following:

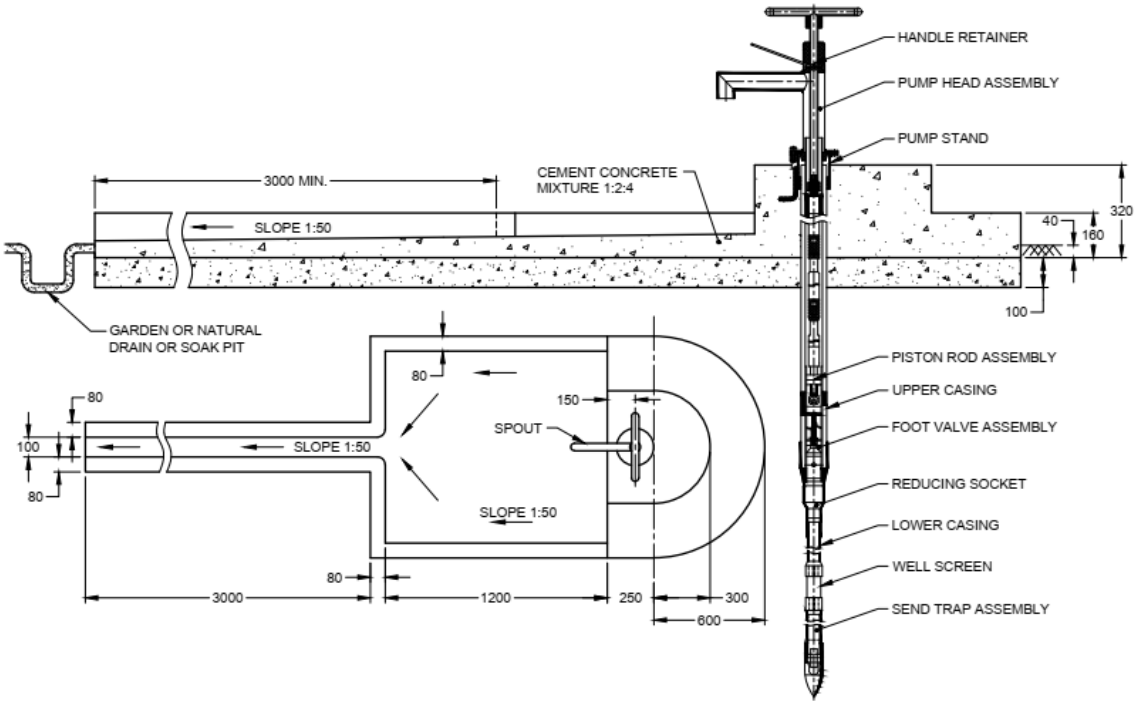
1) Manufacturer's identification mark;
2) Name of the component; and
3) Batch number which can be co-related with production/internal quality control records.

8.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

9 PACKING

Unless otherwise specified in the contract or order, the packing shall be as per details given in Annex D.



All dimensions in millimetres.

FIG. 1 TYPICAL SET UP FOR DIRECT ACTION HAND PUMP

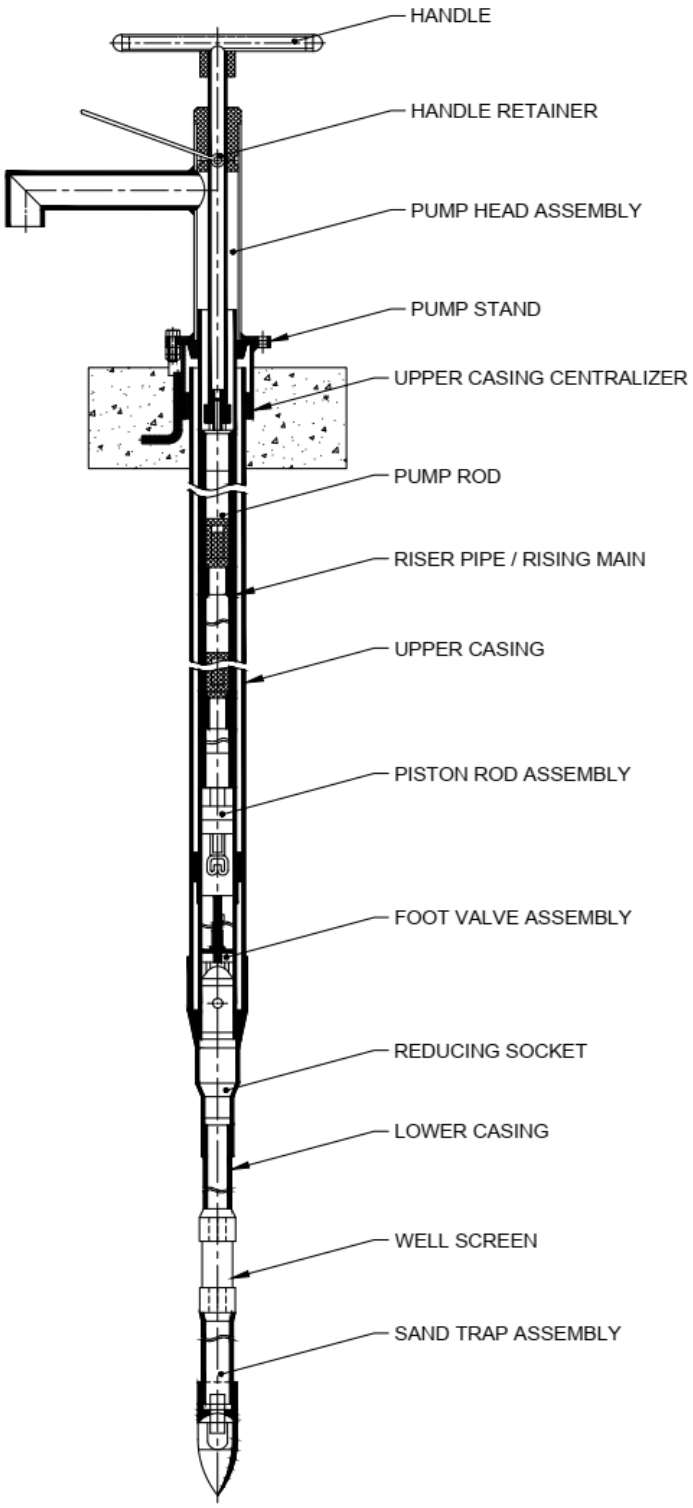
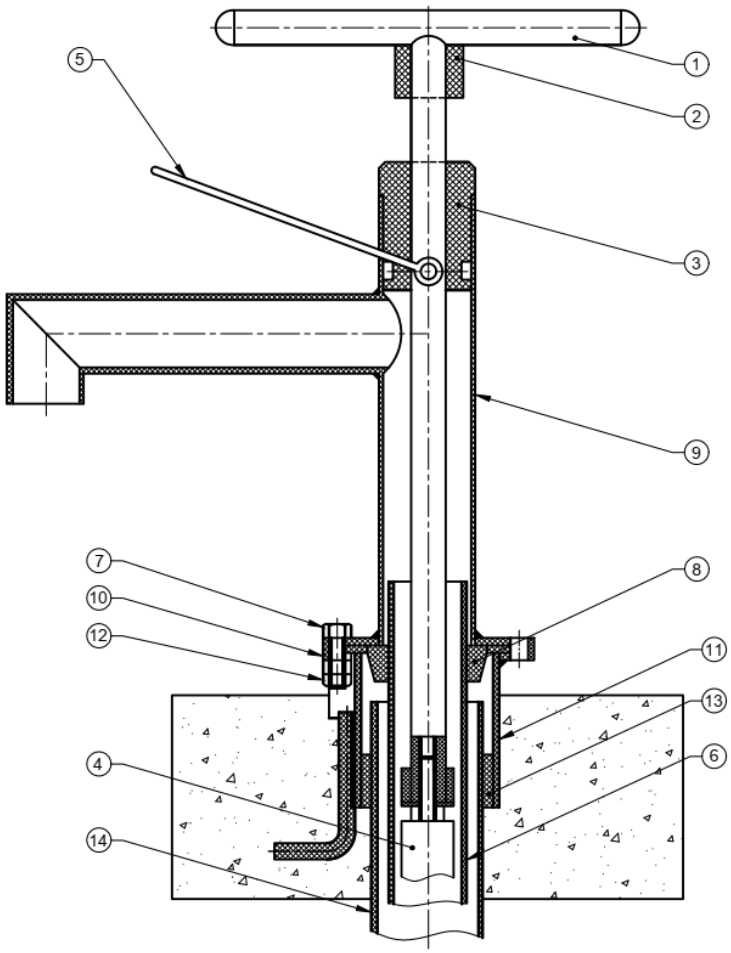
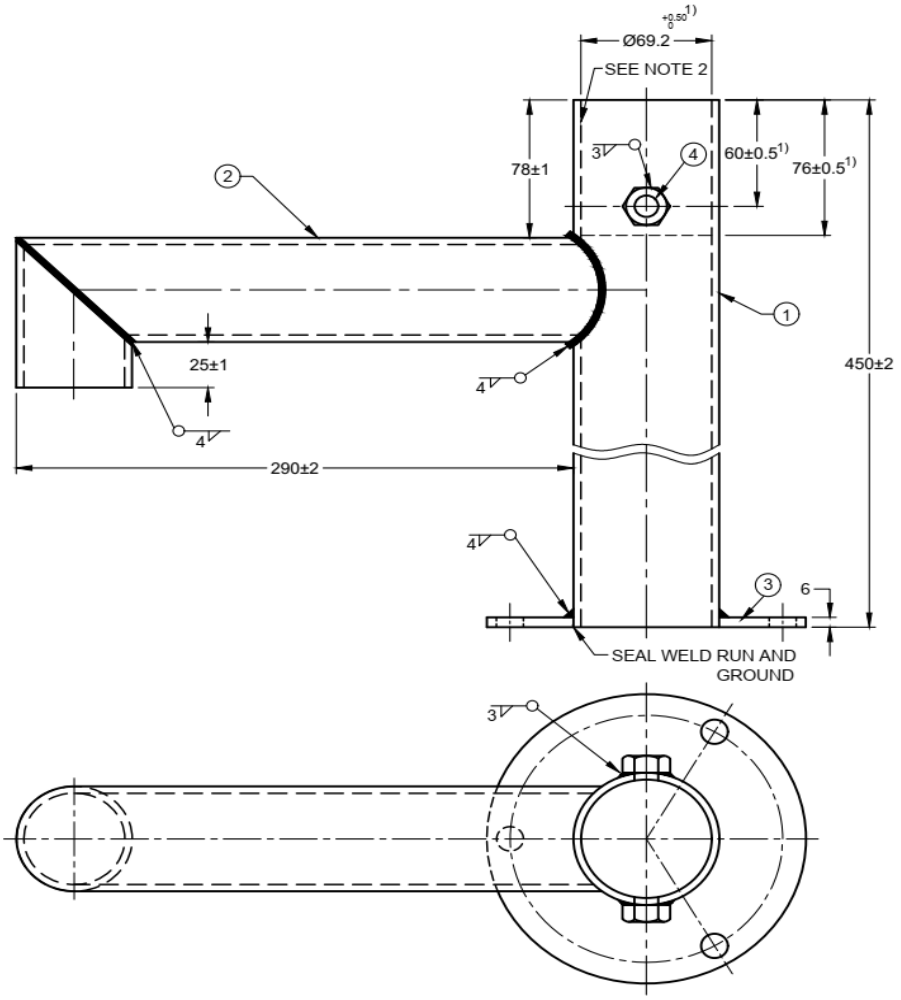


FIG. 1A HANDPUMP ASSEMBLY



Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	1	Handle	IS 1239 (Part 1)
ii)	2	1	Handle cushion top	Nitrile rubber
iii)	3	1	Top guide bush	HDPE
iv)	4	1	Pump rod top	uPVC
v)	5	1	Handle retainer	IS 4454 (Part 1)
vi)	6	–	Rising main	uPVC
vii)	7	3	(Hex. bolt M12) 40	IS 1363 (Part 1)
viii)	8	1	Grommet	Nitrile rubber
ix)	9	1	Pump stand	Quality A of grade E 250 of IS 2062
x)	10	1	Intermediate flange	Quality A of grade E 250 of IS 2062
xi)	11	1	Pump stand	Quality A of grade E 250 of IS 2062
xii)	12	6	(Hex. nut M12)	IS 1363 (Part 3)
xiii)	13	1	Upper well casing centralizer	Nitrile rubber
xiv)	14	–	Upper well casing pipe	uPVC

FIG. 2 PUMP HEAD ASSEMBLY



Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	1	Body	IS 1239 (Part 1)
ii)	2	1	Spout	IS 1239 (Part 1)
iii)	3	1	Pump head flange	Quality A of Grade E 250 of IS 2062
iv)	4	2	Hex. nut 1/12	IS 1363 (Part 3)

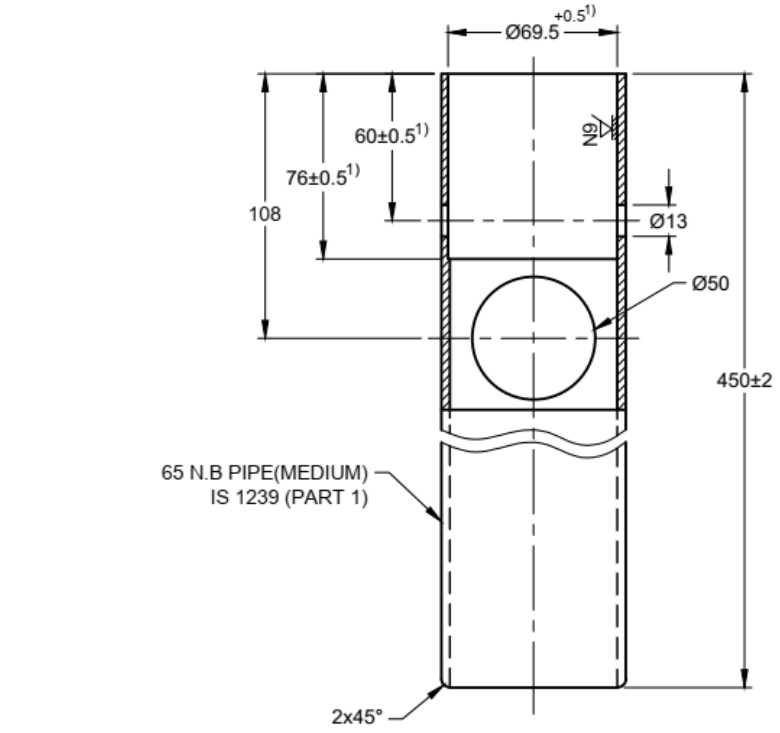
NOTES

1 Dimensions indicated are galvanizing.
2 Ovality of machined portion to be removed after galvanizing.

All dimensions in millimetres.

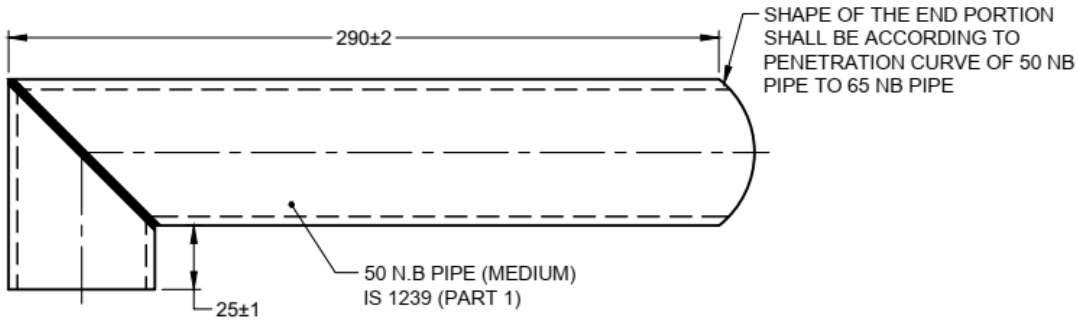
FIG. 3 PUMP HEAD

[1)] Indicates critical dimensions



1) INDICATES CRITICAL DIMENSIONS

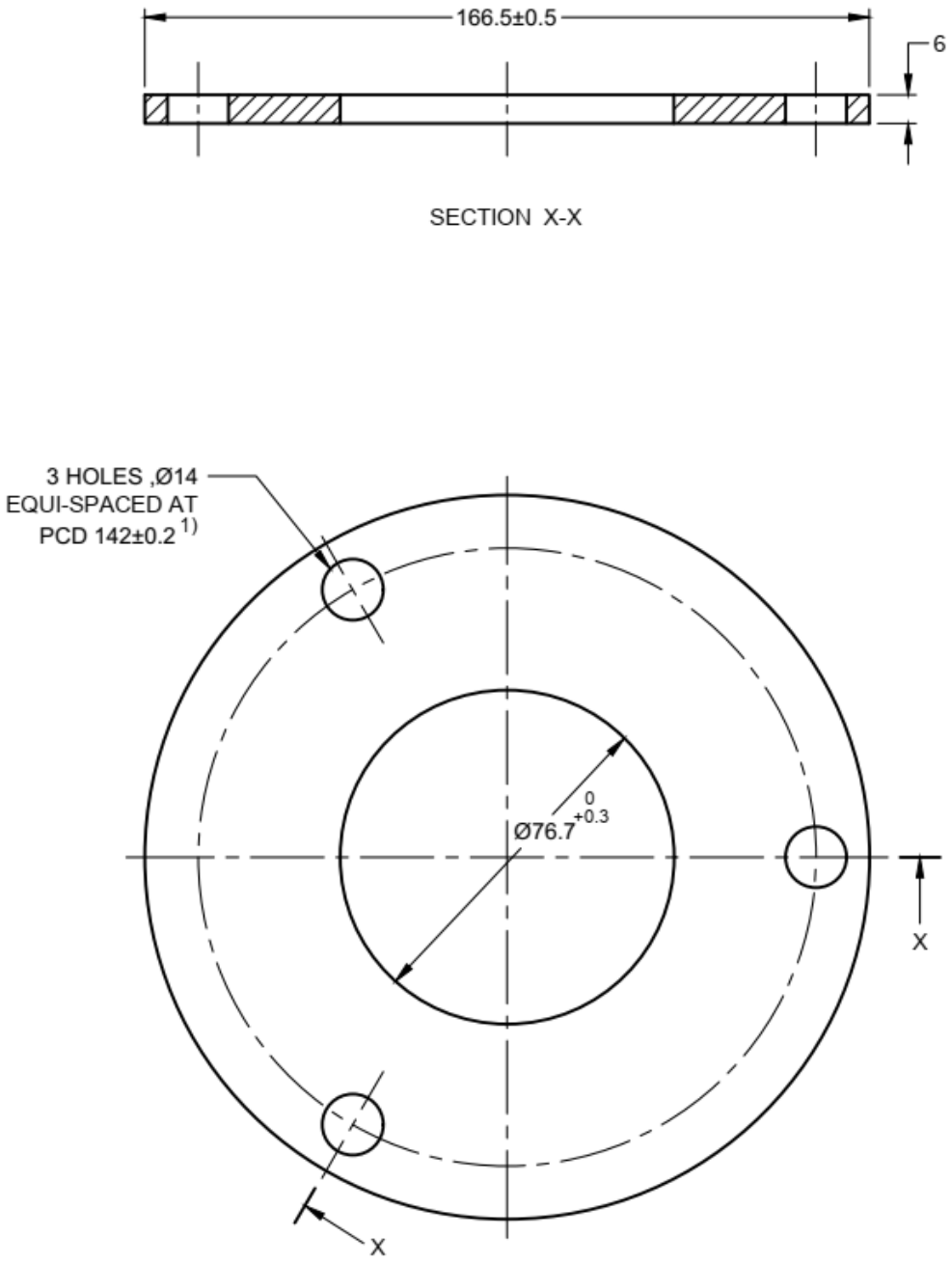
4A BODY



4B SPOUT

All dimensions in millimetres.

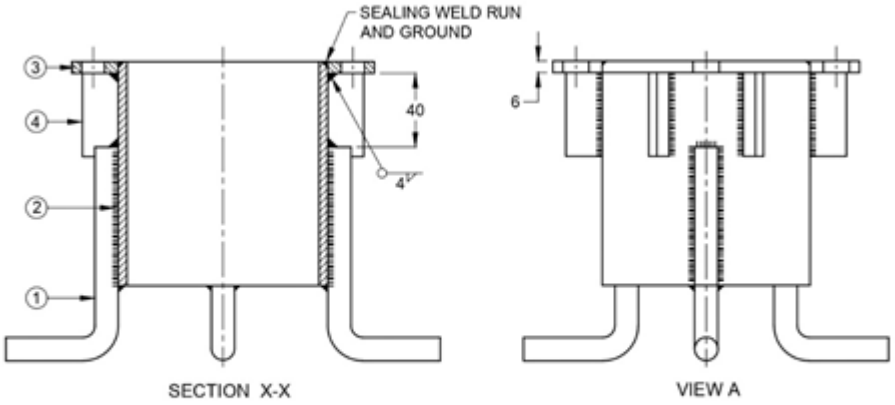
FIG. 4 PUMP HEAD PARTS (CONTINUED)

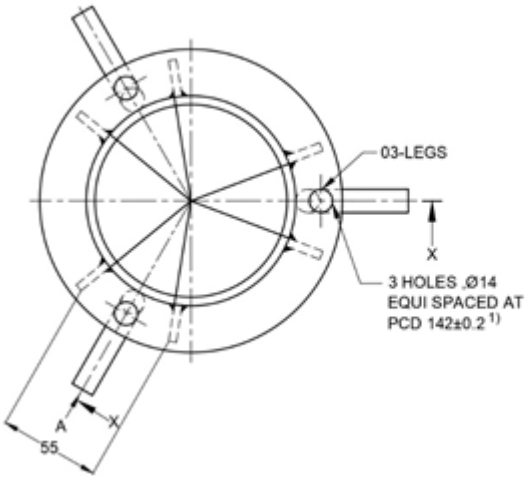


All dimensions in millimetres.

FIG. 4 PUMP HEAD PARTS

[1] Indicates critical dimensions



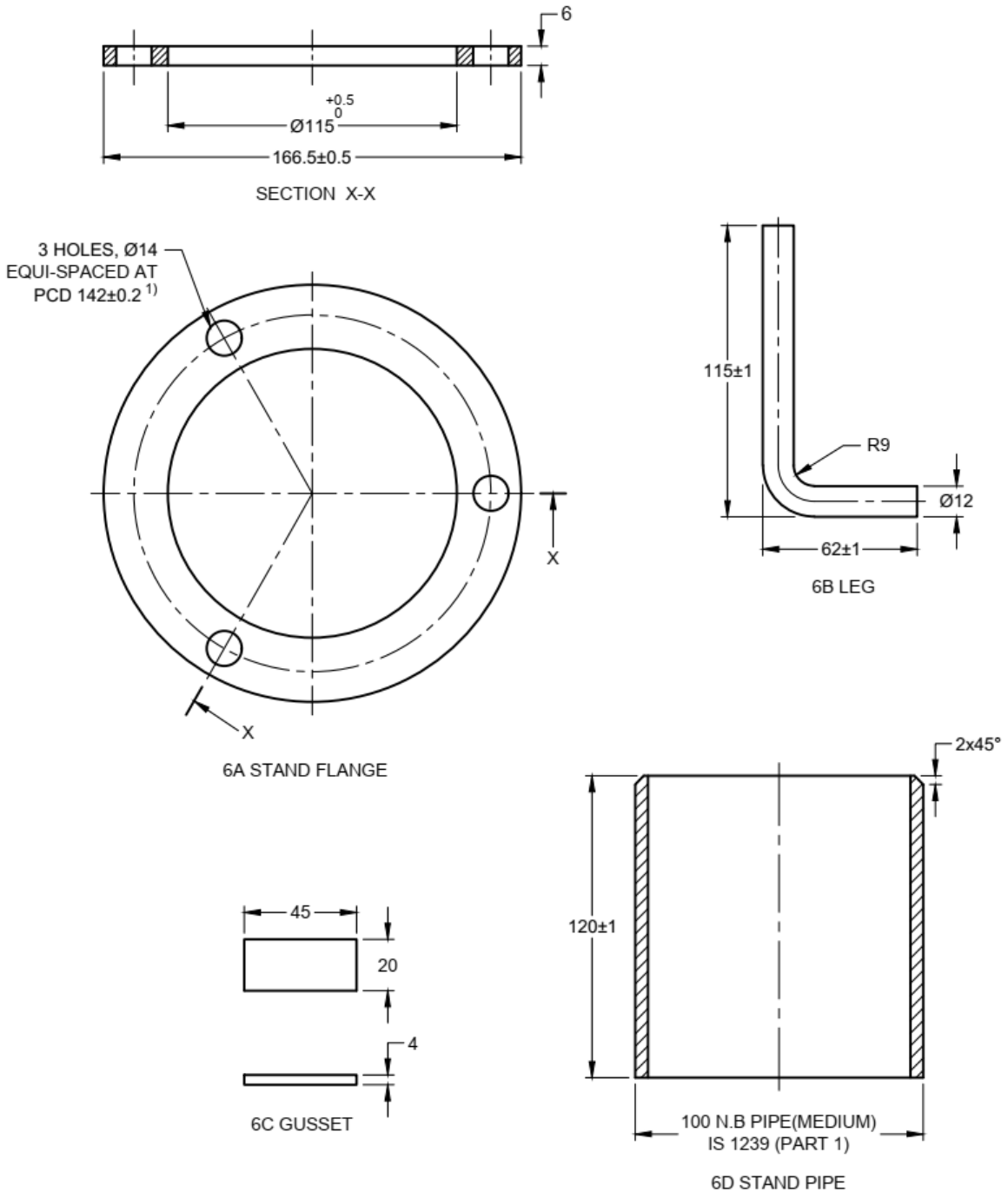


Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	3	Stand flange	Quality A of Grade E 250 of IS 2062
ii)	2	1	Stand pipe	IS 1239 (Part 1)
iii)	3	1	Stand flange	Quality A of Grade E 250 of IS 2062
iv)	4	6	Gusset	Quality A of Grade E 250 of IS 2062

All dimensions in millimetres.

FIG. 5 PUMP STAND

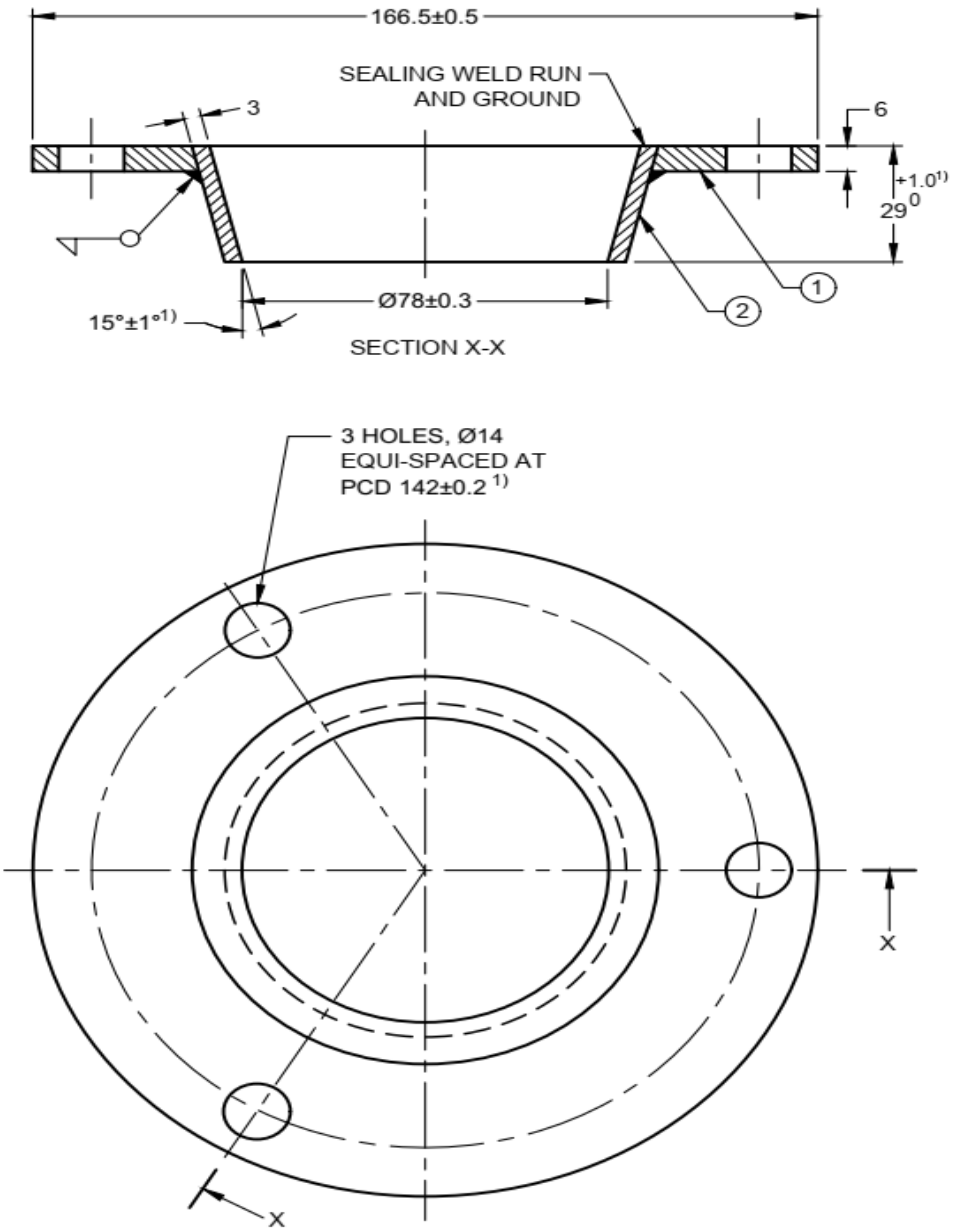
[1)] Indicates critical dimensions



All dimensions in millimetres.

FIG. 6 PUMP STAND PARTS

[1] Indicates critical dimensions

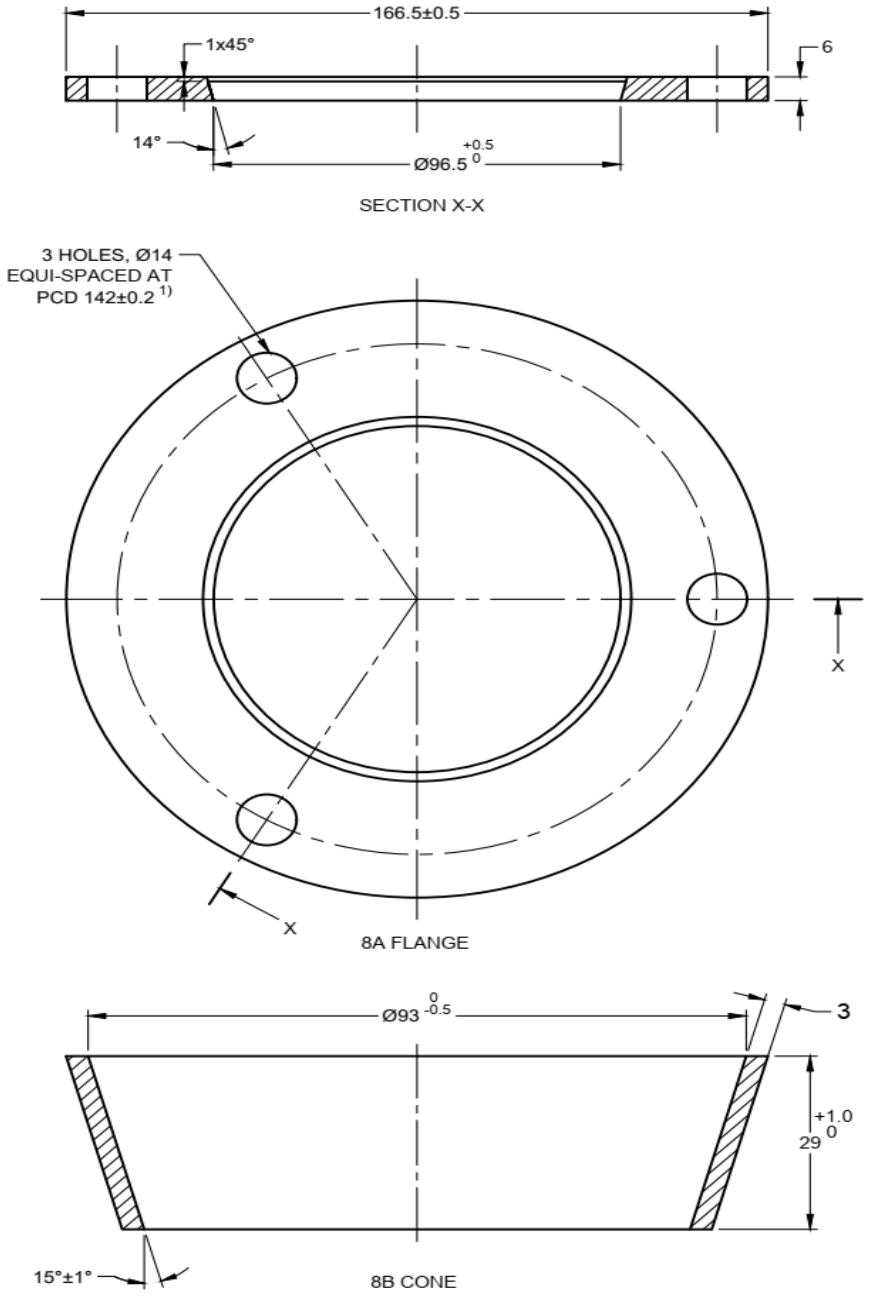


Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	1	Flange	Quality A of Grade E 250 of IS 2062
ii)	2	1	Cone	Quality A of Grade E 250 of IS 2062

All dimensions in millimetres.

FIG. 7 INTERMEDIATE FLANGE

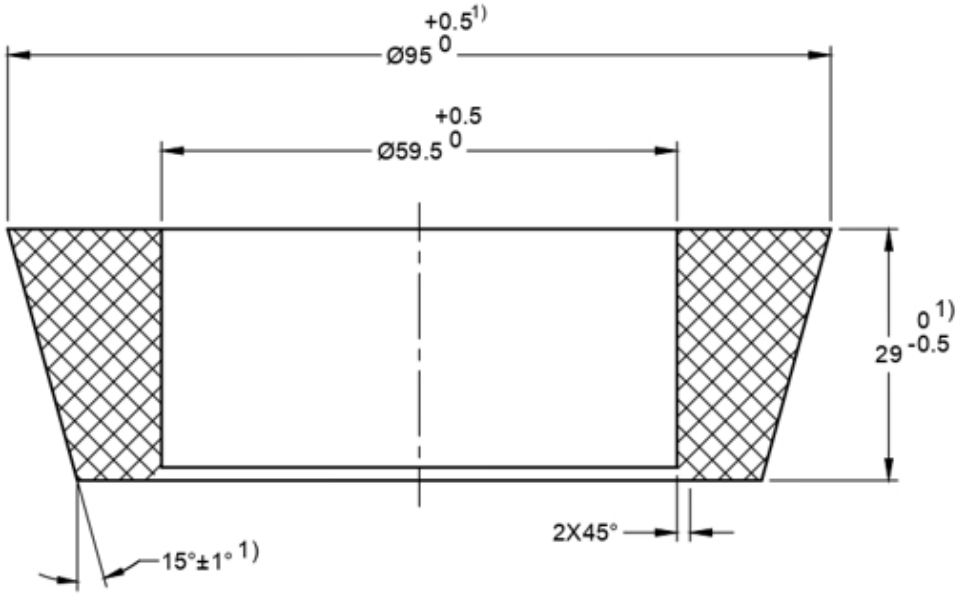
[1)] Indicates critical dimensions



All dimensions in millimetres.

FIG. 8 INTERMEDIATE FLANGE PARTS

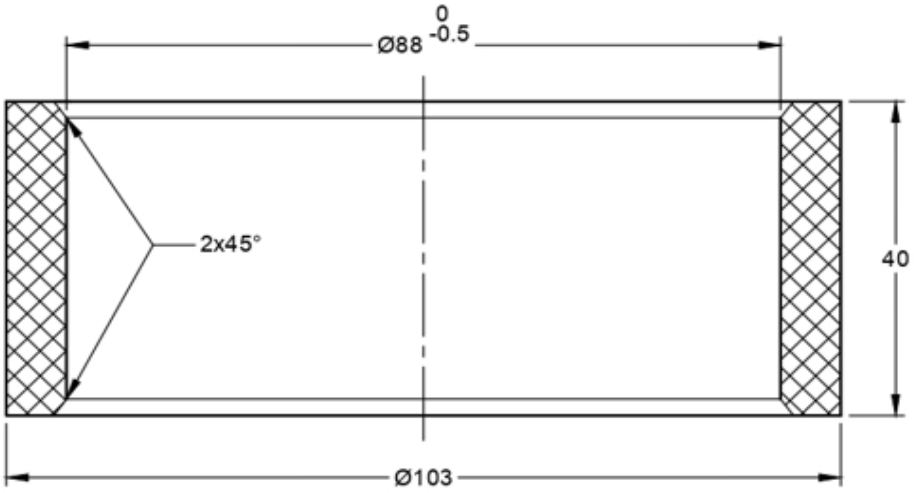
[1] Indicates critical dimensions



Shore hardness 65 to 75 on scale A

All dimensions in millimetres.

FIG. 9 GROMMET

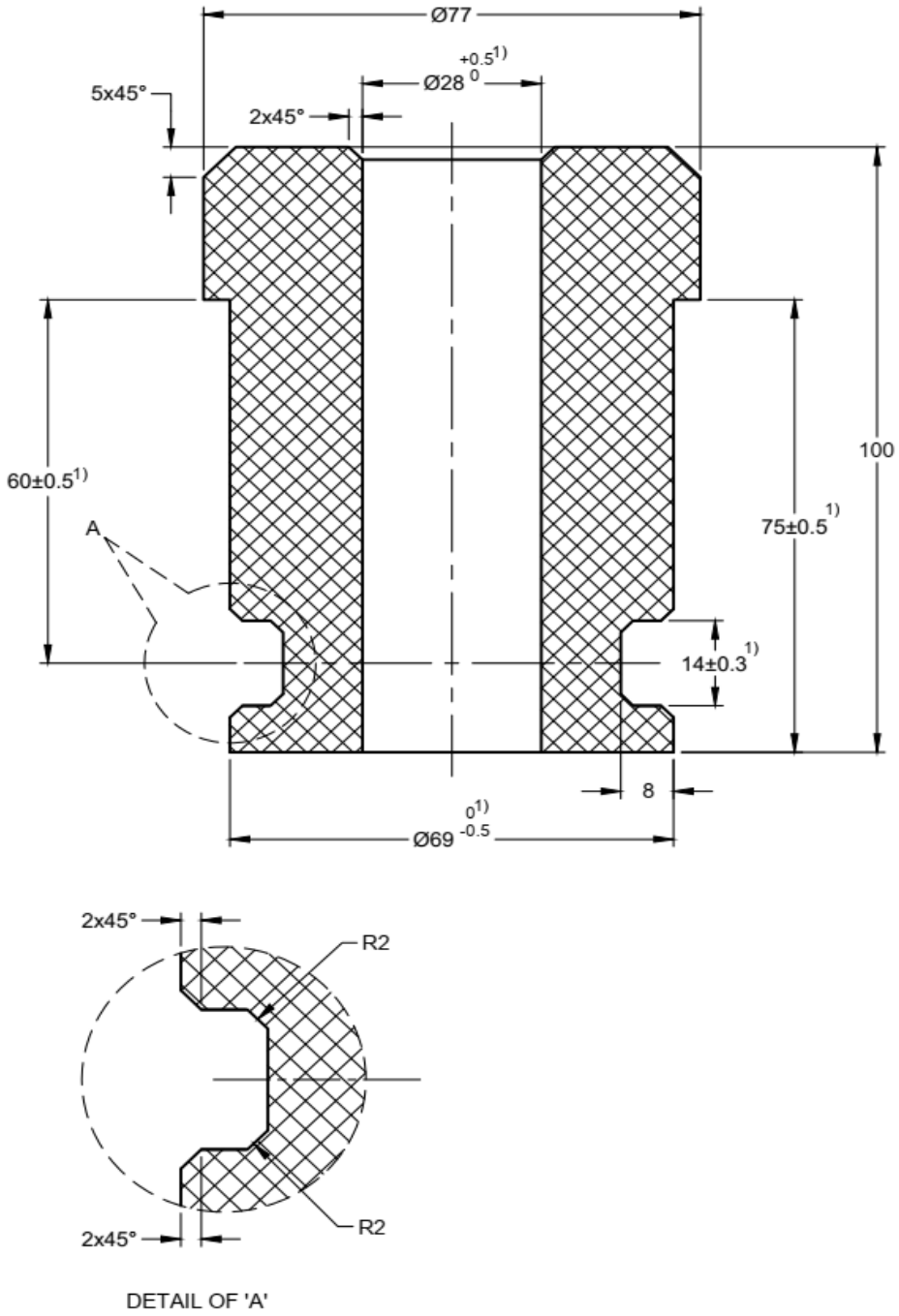


Shore hardness 65 to 75 on scale A

All dimensions in millimetres.

FIG. 10 UPPER WELL CASING PIPE CENTRALIZER

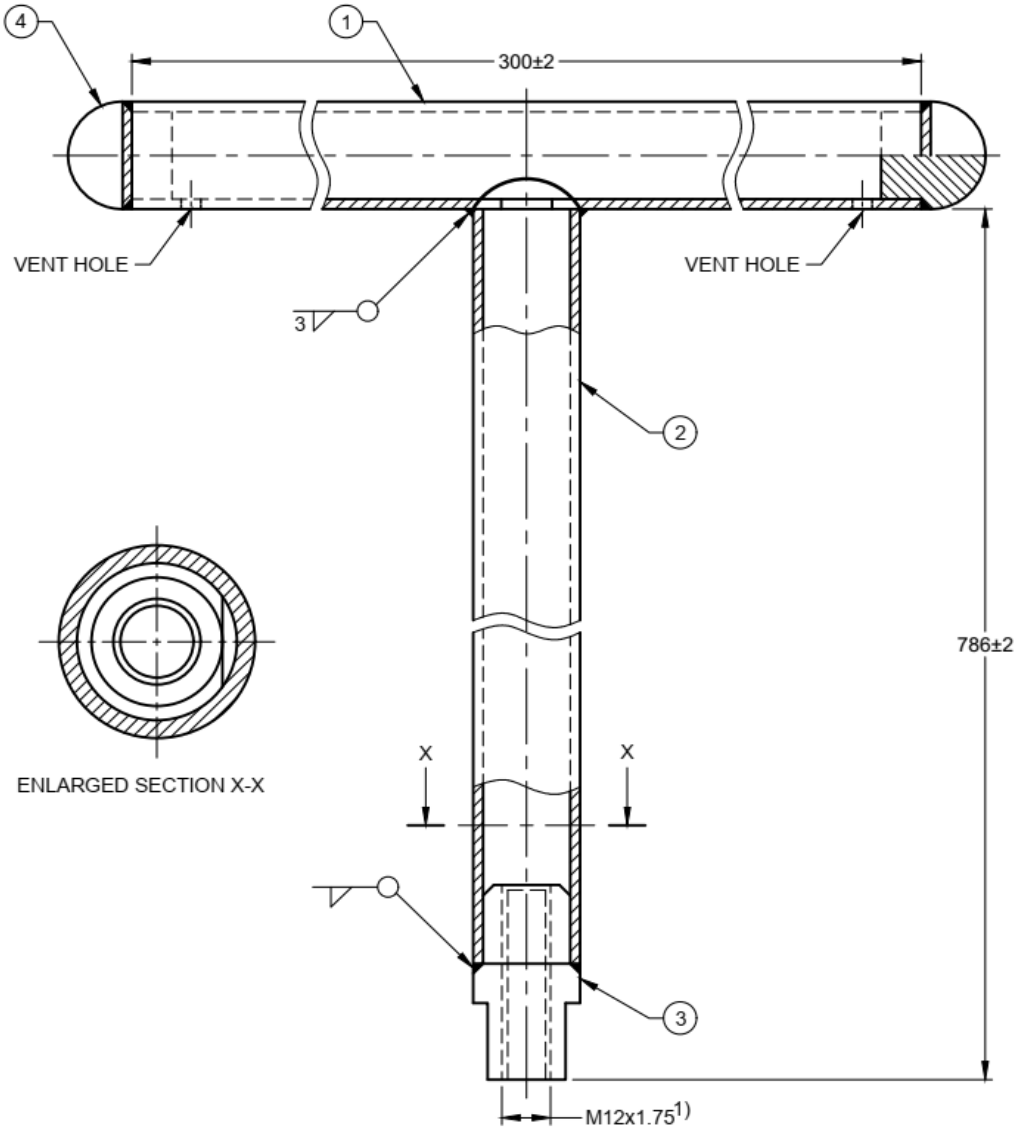
[1] Indicates critical dimensions



All dimensions in millimetres.

FIG. 11 TOP GUIDE BUSH

[1)] Indicates critical dimensions



NOTES

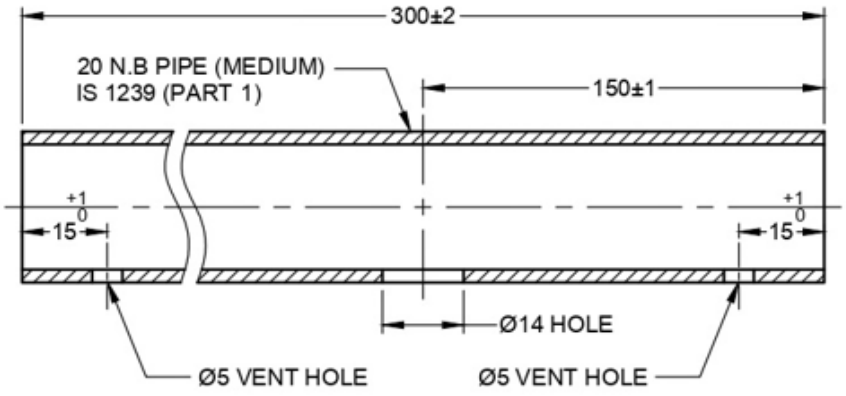
1 Align flat on handle nut with seam in pipe before assembly.
2 Welding of handle nut and end plug to pipe shall be machined to match pipe outer diameter.

Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	1	Handle	IS 1239 (Part 1)
ii)	2	1	Pipe	IS 1239 (Part 1)
iii)	3	1	Handle nut	Quality A of Grade E 250 of IS 2062
iv)	4	2	End plug	Quality A of Grade E 250 of IS 2062

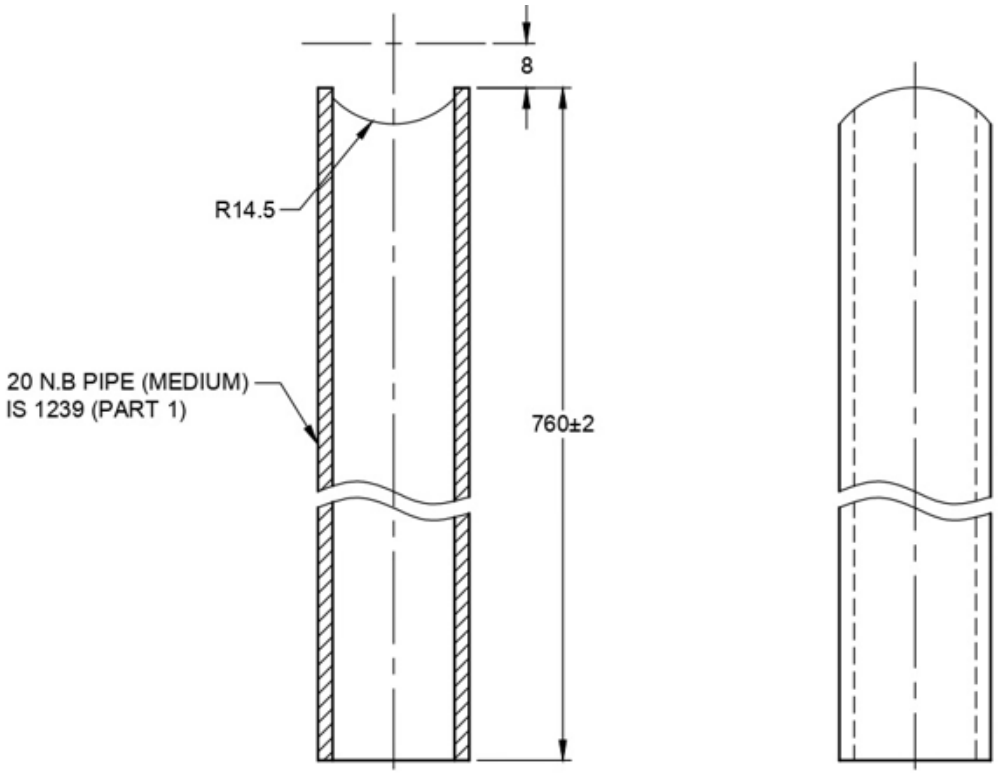
All dimensions in millimetres.

FIG. 12 HANDLE

[1)] Indicates critical dimensions



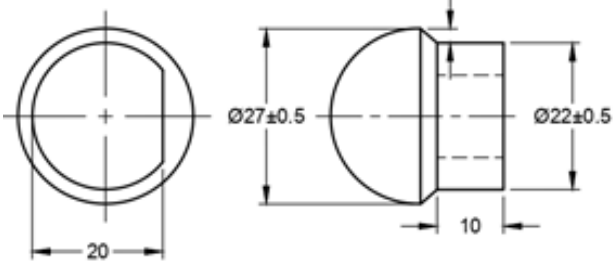
13A HANDLE

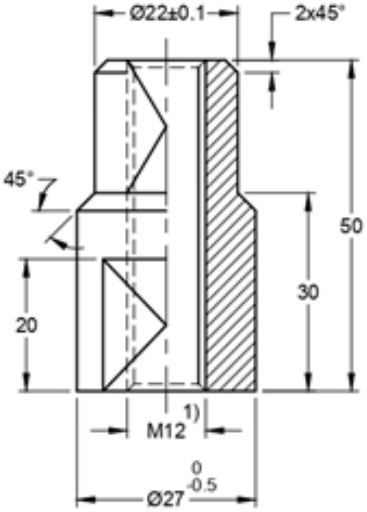


Remove all shape corners
13B PIPE

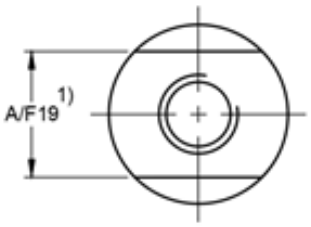
All dimensions in millimetres.

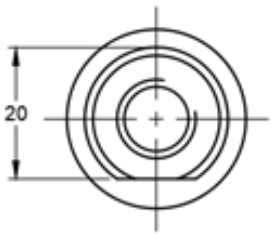
FIG. 13 HANDLE PARTS (CONTINUED)





13C END PLUG



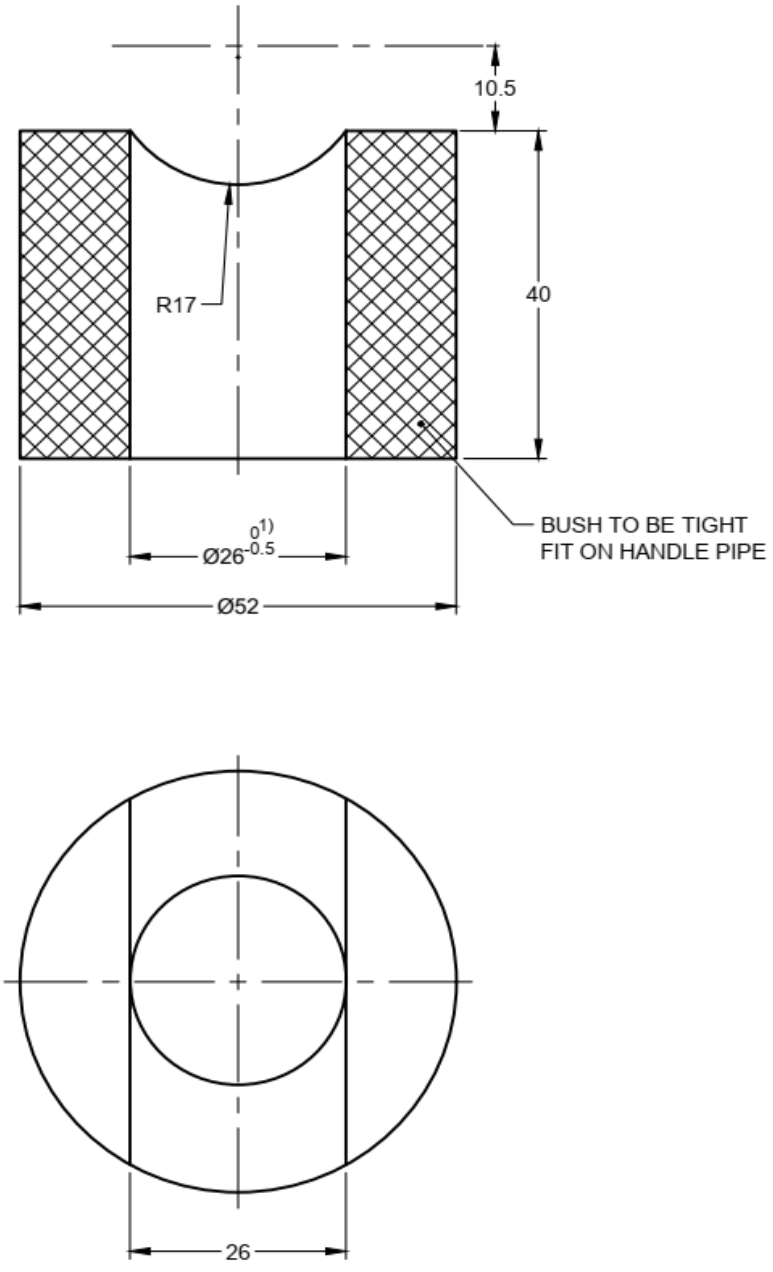


13D HANDLE NUT

All dimensions in millimetres.

FIG. 13 HANDLE PARTS

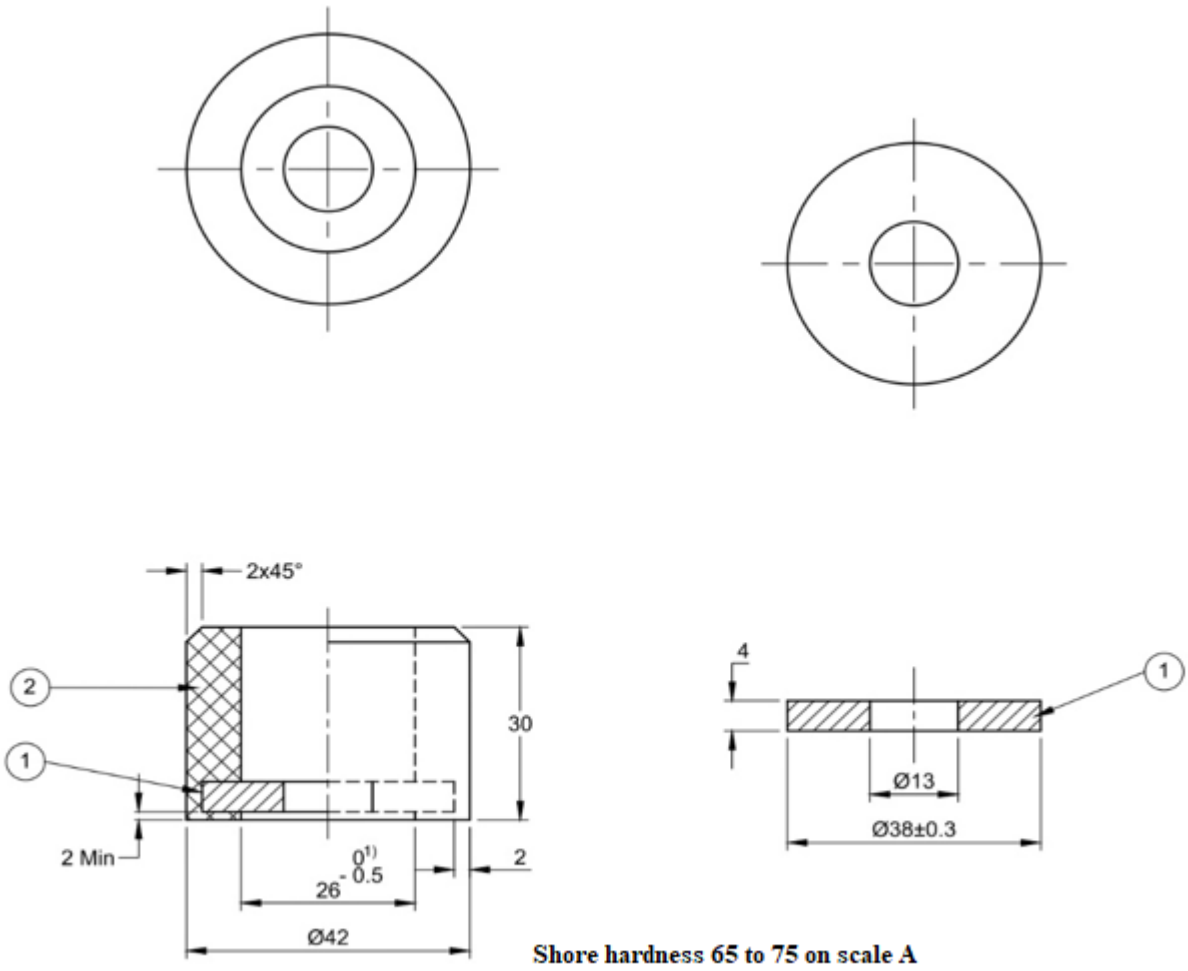
[1)] Indicates critical dimensions



All dimensions in millimetres.

FIG. 14 HANDLE CUSHION TOP

[1)] Indicates critical dimensions

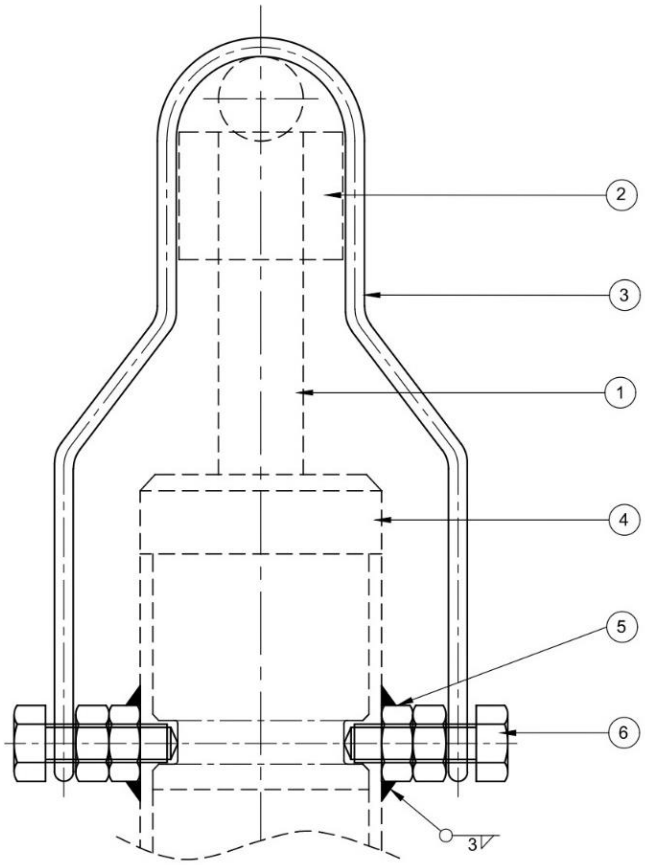


Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	1	Washer (hot dip galvanized)	Quality A of Grade E 250 of IS 2062
ii)	2	1	Bottom cushion	Nitrile rubber

All dimensions in millimetres.

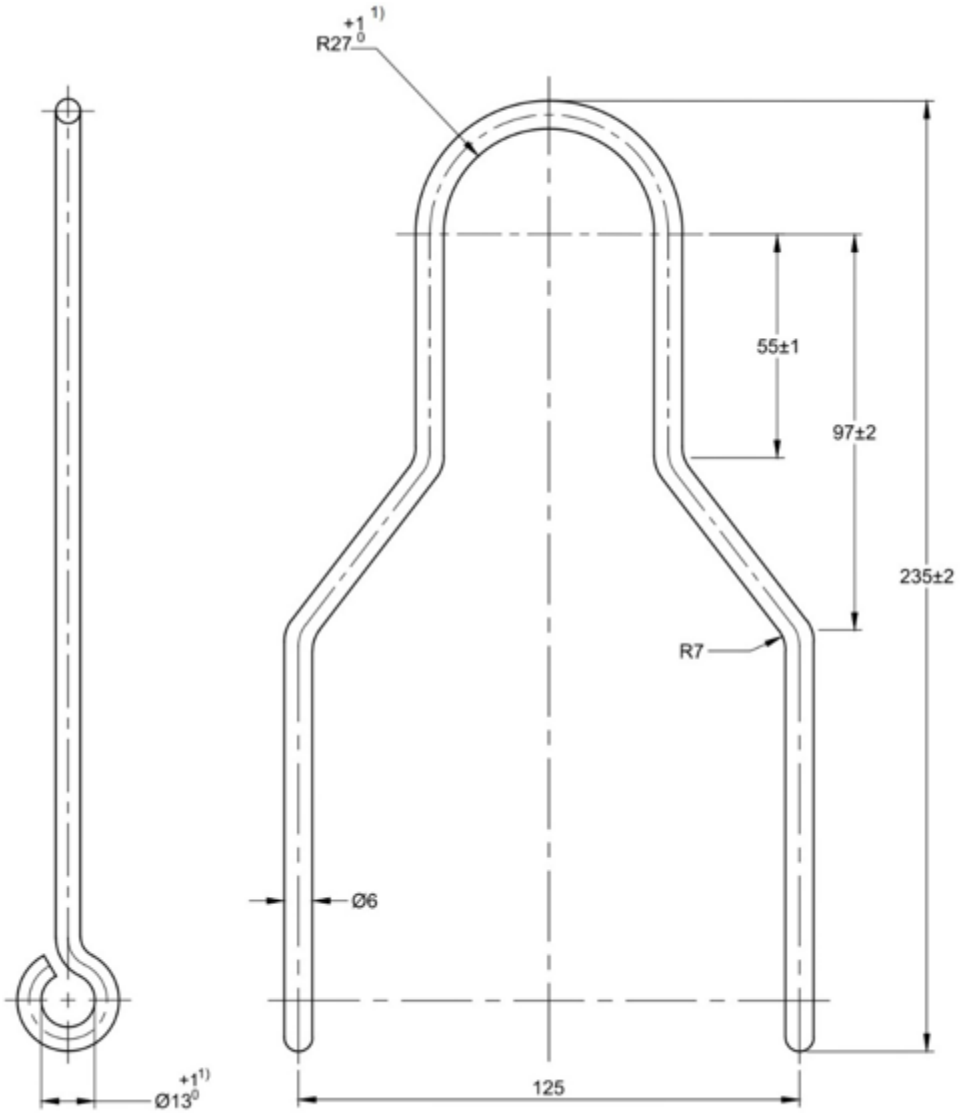
FIG. 15 BOTTOM CUSHION

[1)] Indicates critical dimensions



Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	1	Handle assembly	IS 1239 (Part 1)
ii)	2	1	Handle cushion top	Nitrile rubber
iii)	3	1	Handle retainer	Grade SL of IS 4454
iv)	4	1	Top guide bush	HDPE
v)	5	4	Hex nut M12	IS 1363 (Part 3)
vi)	6	2	Hex screw M12-40 mm long	IS 1363 (Part 3)

FIG. 16 HANDLE RETAINER



17A HANDLE RETAINER

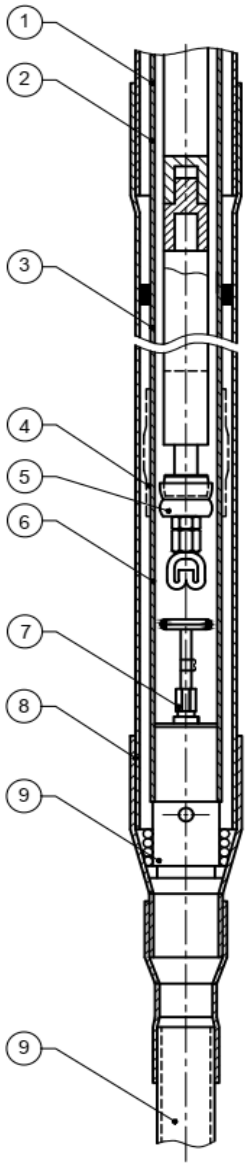
NOTES

1 Cold formed and electrogalvanized.
2 Two eyes to be in the same axis.

All dimensions in millimetres.

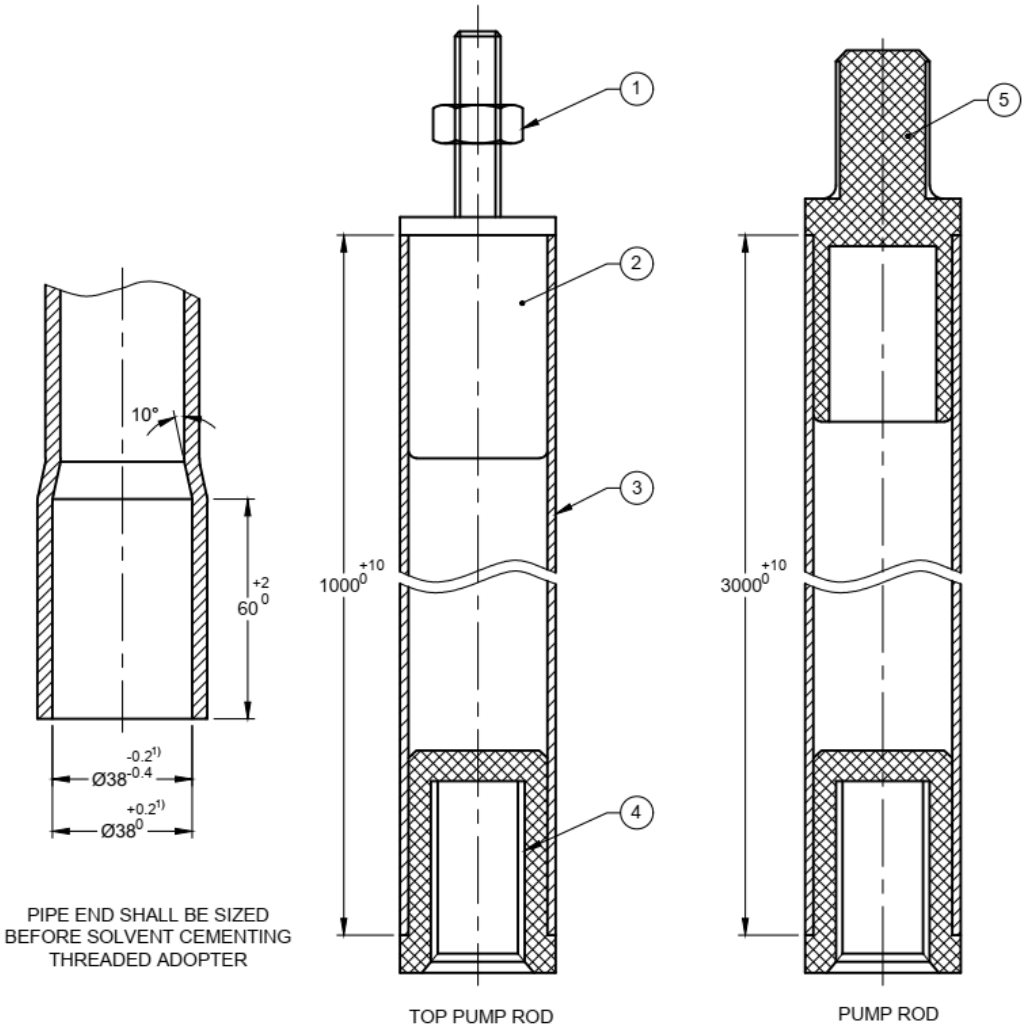
FIG. 17 HANDLE RETAINER PARTS

[1] Indicates critical dimensions



Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	—	Rising main	uPVC
ii)	2	—	Pump rod	uPVC
iii)	3	—	Pipe centralizer	Nitrile rubber
iv)	4	—	Threaded coupler	uPVC IS 7834 (Part 1)
v)	5	1	Piston assembly	—
vi)	6	1	Cylinder	uPVC
vii)	7	1	Foot valve assembly	—
viii)	8	1	Reducer socket	uPVC
ix)	9	1	Rubber seat	Nitrile rubber
x)	10	—	Lower well casing	uPVC

FIG. 18 UPPER WELL ASSEMBLY

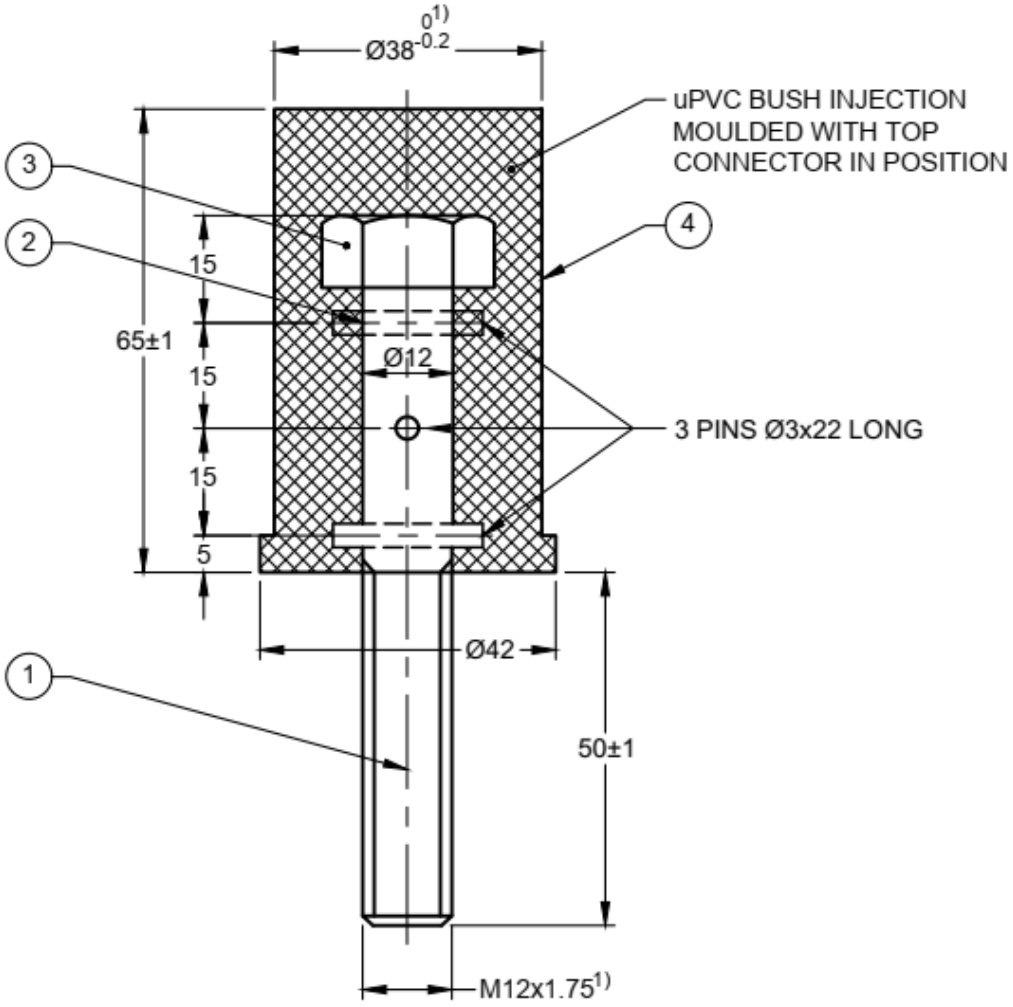


Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	1	Check nut M12	IS 1367 (Part 14/Sec 2)
ii)	2	1	Top connector	uPVC IS 7834 (Part 1)
iii)	3	1	Pump rod pipe	uPVC
iv)	4	1	Threaded adopter (F)	uPVC IS 7834 (Part 1)
v)	5	1	Threaded adopter (M)	uPVC IS 7834 (Part 1)

All dimensions in millimetres.

FIG. 19 PUMP ROD

[1)] Indicates critical dimensions



20 A TOP CONNECTOR

NOTES

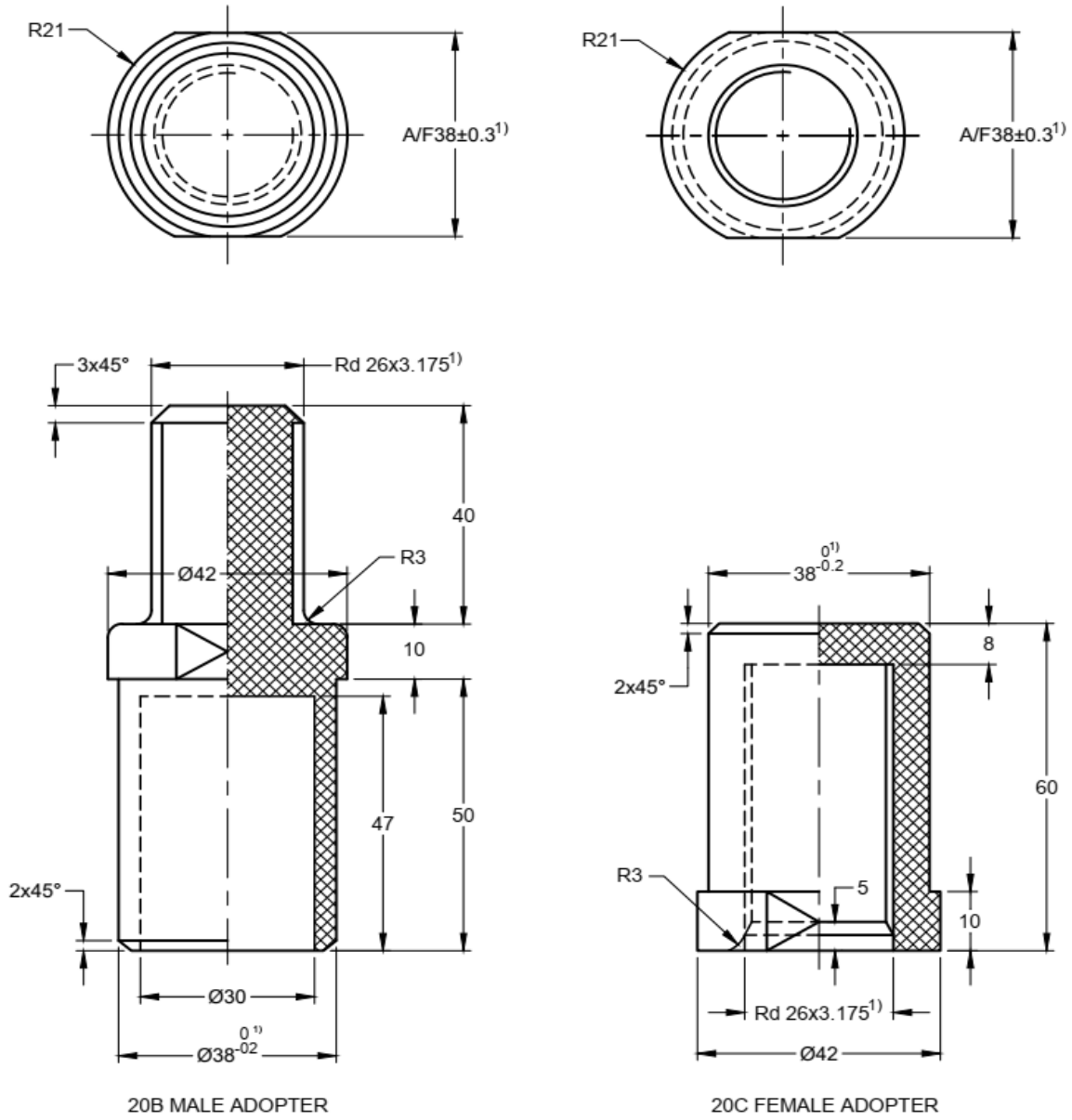
1 Nut to be tack welded with connector bolt.
2 All sharp corner to be removed by smooth filling radius 2.
3 Out of roundness shall not exceed 0.3.
4 Sharp edges of pins to be rounded off.

Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	1	Top connector bolt	X04Cr19Ni9 of IS 6603
ii)	2	3	Pin	X04Cr19Ni9 of IS 6603
iii)	3	1	Nut M12	Grade A2 of IS 1367 (Part 14/Sec 2)
iv)	4	1	Bush	uPVC IS 7834 (Part 1)

All dimensions in millimetres.

FIG. 20 PUMP ROD PARTS (CONTINUED)

[1] Indicates critical dimensions



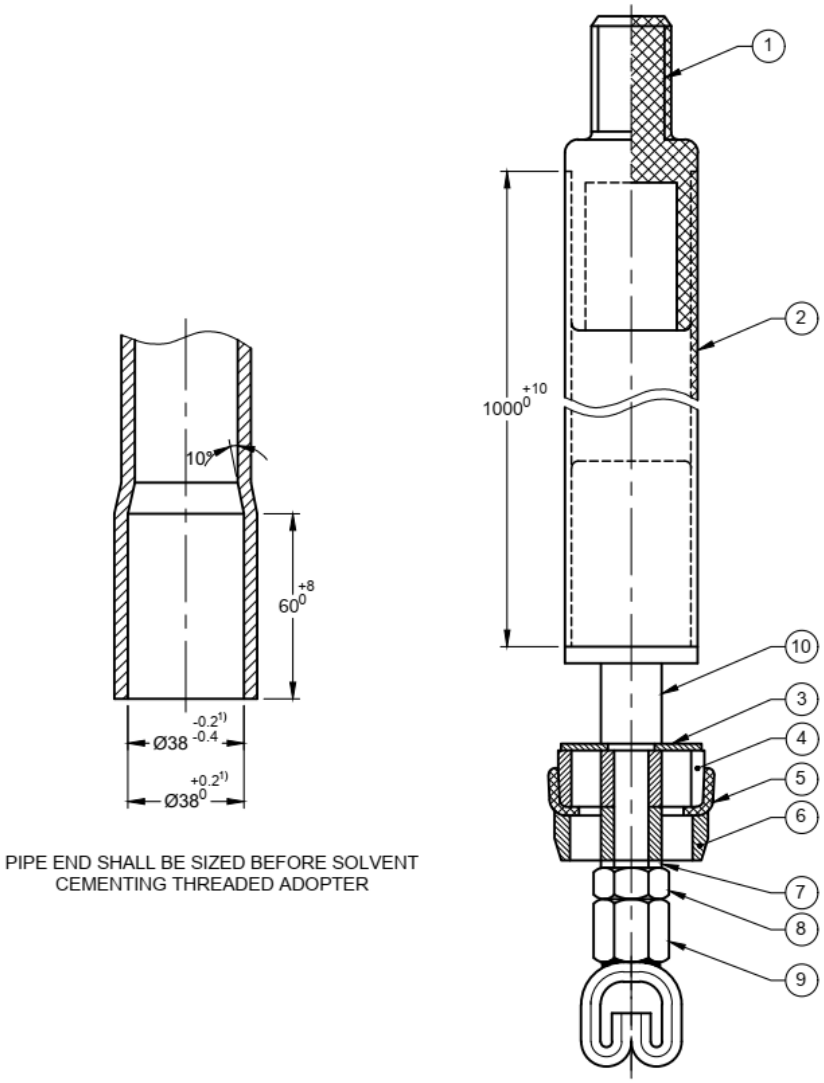
NOTES

1 All sharp corners to be avoided.
2 Out of roundness shall not exceed 0.3. **3**
For knuckle threads profile (*see* Fig. 28).

All dimensions in millimetres.

FIG. 20 PUMP ROD PARTS

[1)] Indicates critical dimensions

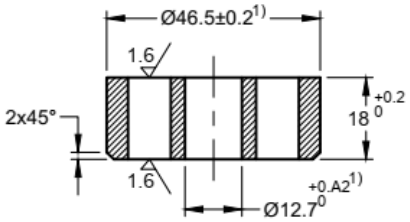


Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	1	Threaded adopter	uPVC IS 7834 (Part 1)
ii)	2	1	Piston rod pipe	uPVC
iii)	3	1	Piston flap valve	Nitrile rubber as per Annex C
iv)	4	1	Piston plate	Polyacetal *see* Annex B
v)	5	1	Cup seal	Nitrile rubber as per Annex C
vi)	6	1	Follower plate	Polyacetal *see* Annex B
vii)	7	1	Washer	SS04Cr19Ni9 of IS 6603
viii)	8	1	Hex. nut M12	IS 1367 (Part 14/Sec 2)
ix)	9	1	Grapple	SS04Cr19Ni9 of IS 6603
x)	10	1	Bottom connector	—

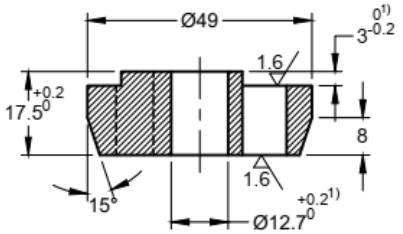
All dimensions in millimetres.

FIG. 21 PISTON ROD ASSEMBLY

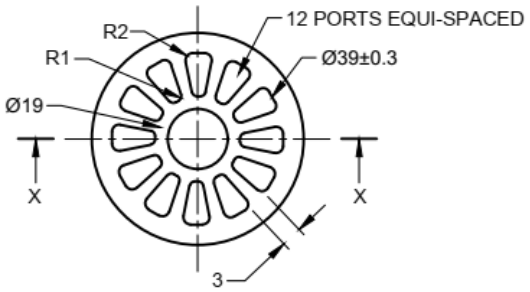
[1)] Indicates critical dimensions



SECTION X-X

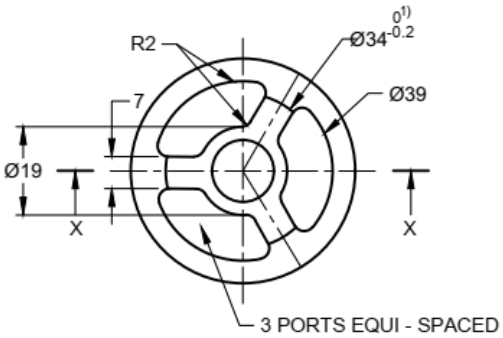


SECTION X-X



NOTES
1) TOP AND BOTTOM SURFACE TO BE SMOOTH
2) ALL PORTS TO BE CLEANED

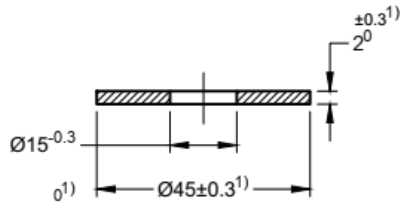
22A PISTON PLATE



22B FOLLOWER PLATE

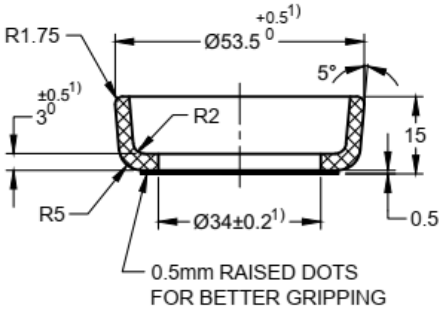
NOTES

1 Top and bottom surface to be smooth.
2 All ports to be cleaned.



SHORE HARDNESS 65 TO 75 ON SCALE A

22C PISTON FLAP VALVE



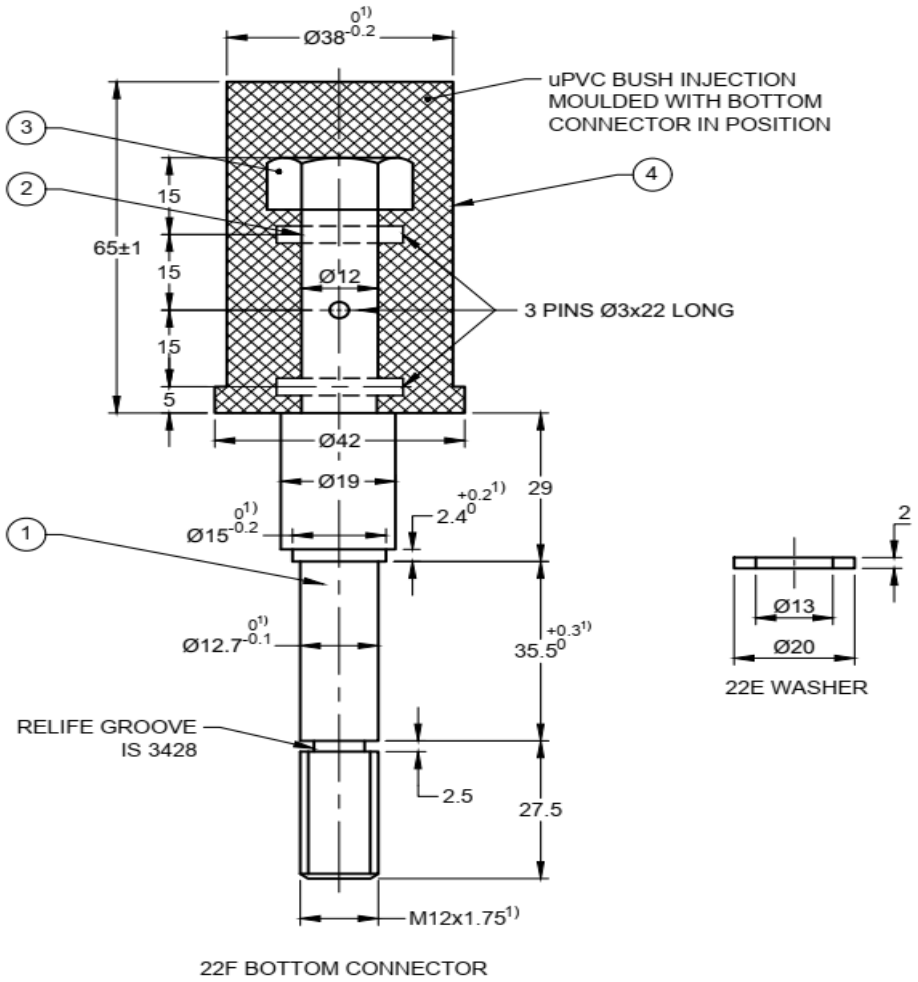
SHORE HARDNESS 75 TO 85 ON SCALE A

22D CUP SEAL

All dimensions in millimetres.

FIG. 22 PISTON ROD ASSEMBLY PARTS (CONTINUED)

[1] Indicates critical dimensions



Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	1	Bottom connector	X04Cr19Ni9 of IS 6603
ii)	2	3	Pin	X04Cr19Ni9 of IS 6603
iii)	3	1	Nut M12	IS 1367 (Part 14/Sec 2)
iv)	4	1	Bush	uPVC IS 7834 (Part 1)

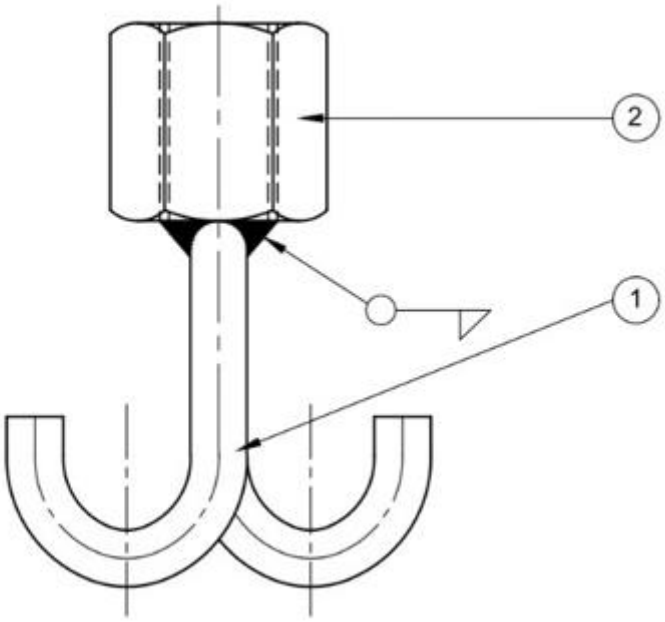
NOTES

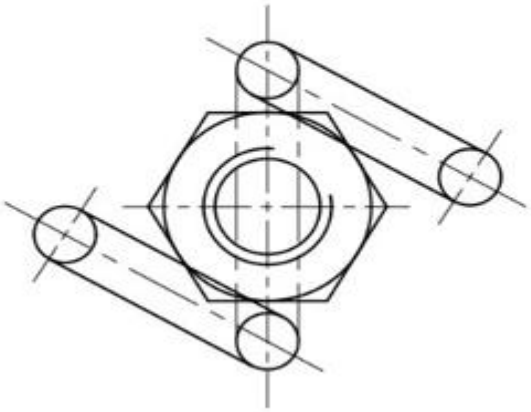
1 Nut to be tack welded with connector bolt.
2 All sharp corner to be removed by smooth filling.
3 Out of roundness shall not exceed 0.3.
4 Sharp edges of pins to be rounded off.

All dimensions in millimetres.

FIG. 22 PISTON ROD ASSEMBLY PARTS

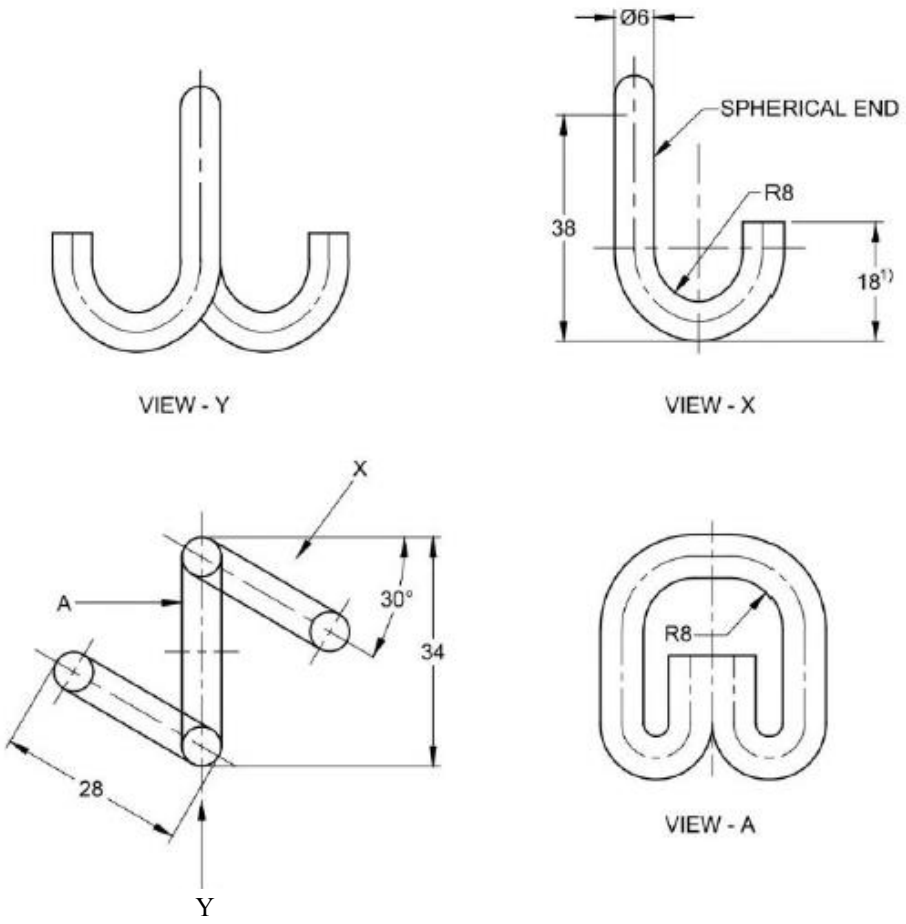
[1] Indicates critical dimensions



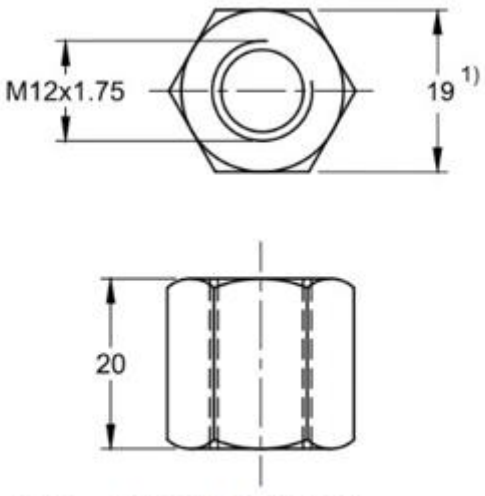


Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	1	Hook	X04Cr19Ni9 of IS 6603
ii)	2	1	Grapple coupling M12-20 mm long	IS 1367 (Part 14/Sec 1)

FIG. 23 GRAPPLE



24 A HOOK

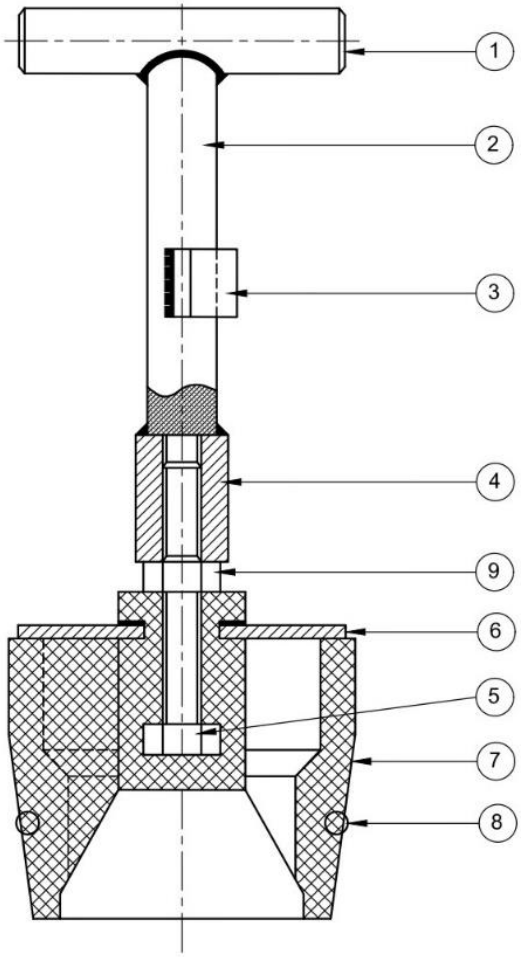


24 B GRAPPLE COUPLING

All dimensions in millimetres.

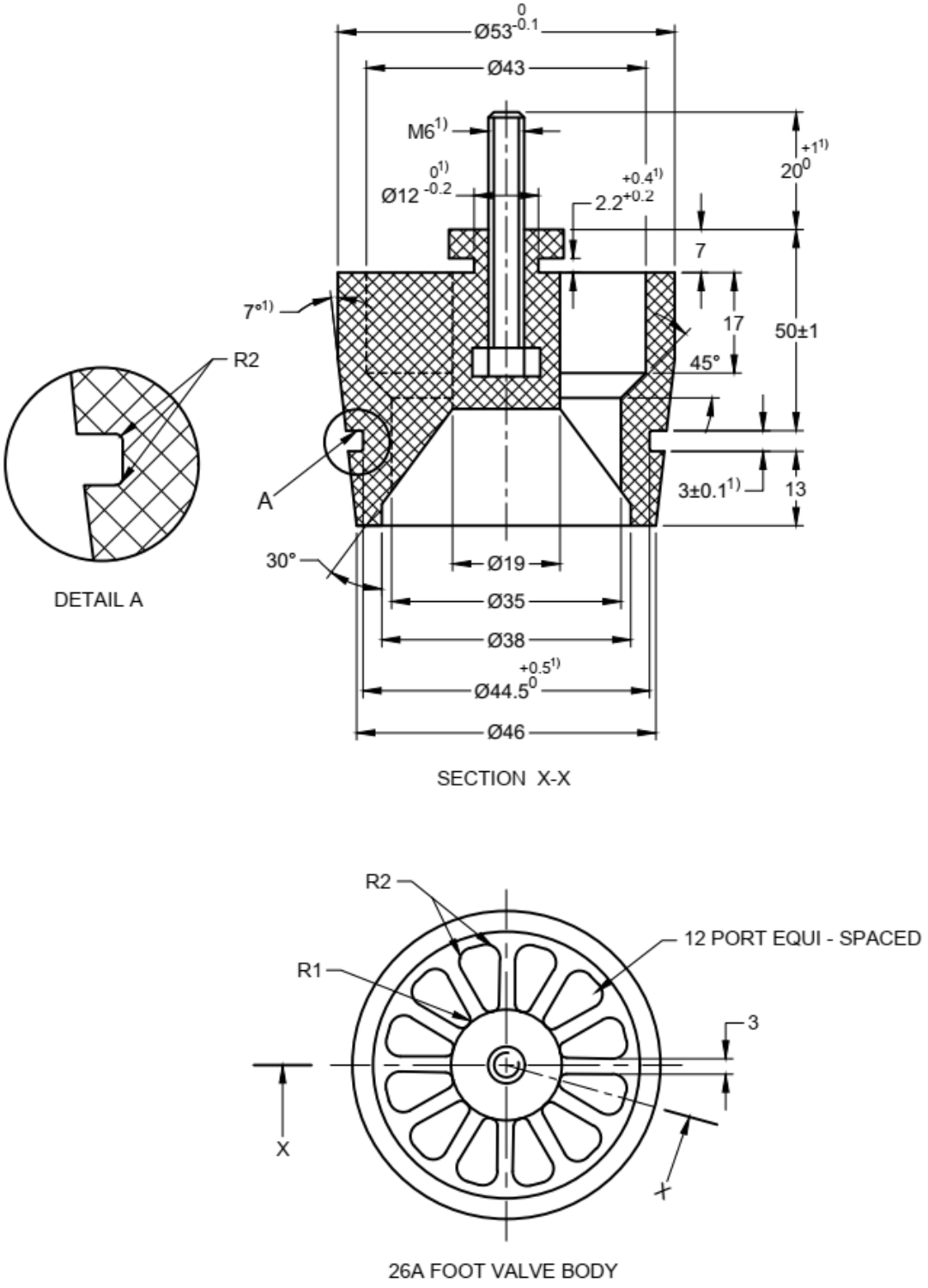
FIG. 24 GRAPPLE PARTS

[1)] Indicates critical dimensions



Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	1	Rod	X04Cr19Ni9 of IS 6603
ii)	2	1	Guide rod	X04Cr19Ni9 of IS 6603
iii)	3	1	Guide	X04Cr19Ni9 of IS 6603
iv)	4	1	Foot valve guide bush	X04Cr19Ni9 of IS 6603
v)	5	1	Hex. bolt M6	IS 1367 (Part 14/Sec 1)
vi)	6	1	Flap valve	Nitrile rubber
vii)	7	1	Foot valve body	HDPE
viii)	8	1	‘O’ Ring	Nitrile rubber
ix)	9	1	Check nut M6 (stainless steel)	IS 1367 (Part 14/Sec 2)

FIG. 25 FOOT VALVE ASSEMBLY

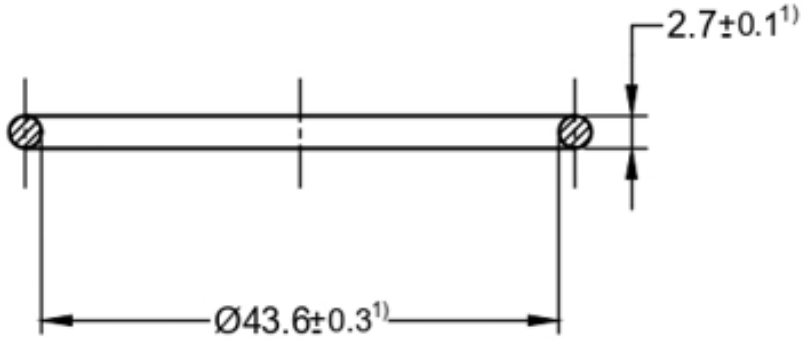


NOTE — Bolt M6-40 mm long to be positioned in die during moulding, it shall be vertical to the flap valve surface.

All dimensions in millimetres.

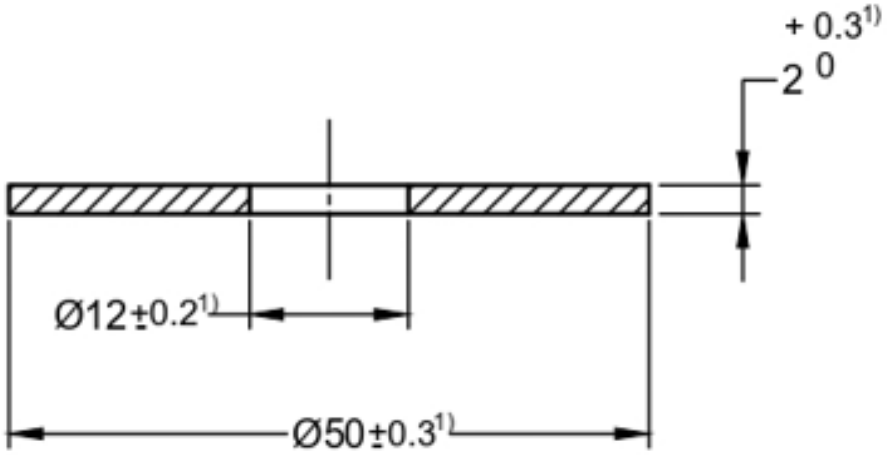
FIG. 26A FOOT VALVE ASSEMBLY PART (CONTINUED)

[1] Indicates critical dimensions



SHORE HARDNESS 65 TO 75 ON SCALE A

26 B "O" RING



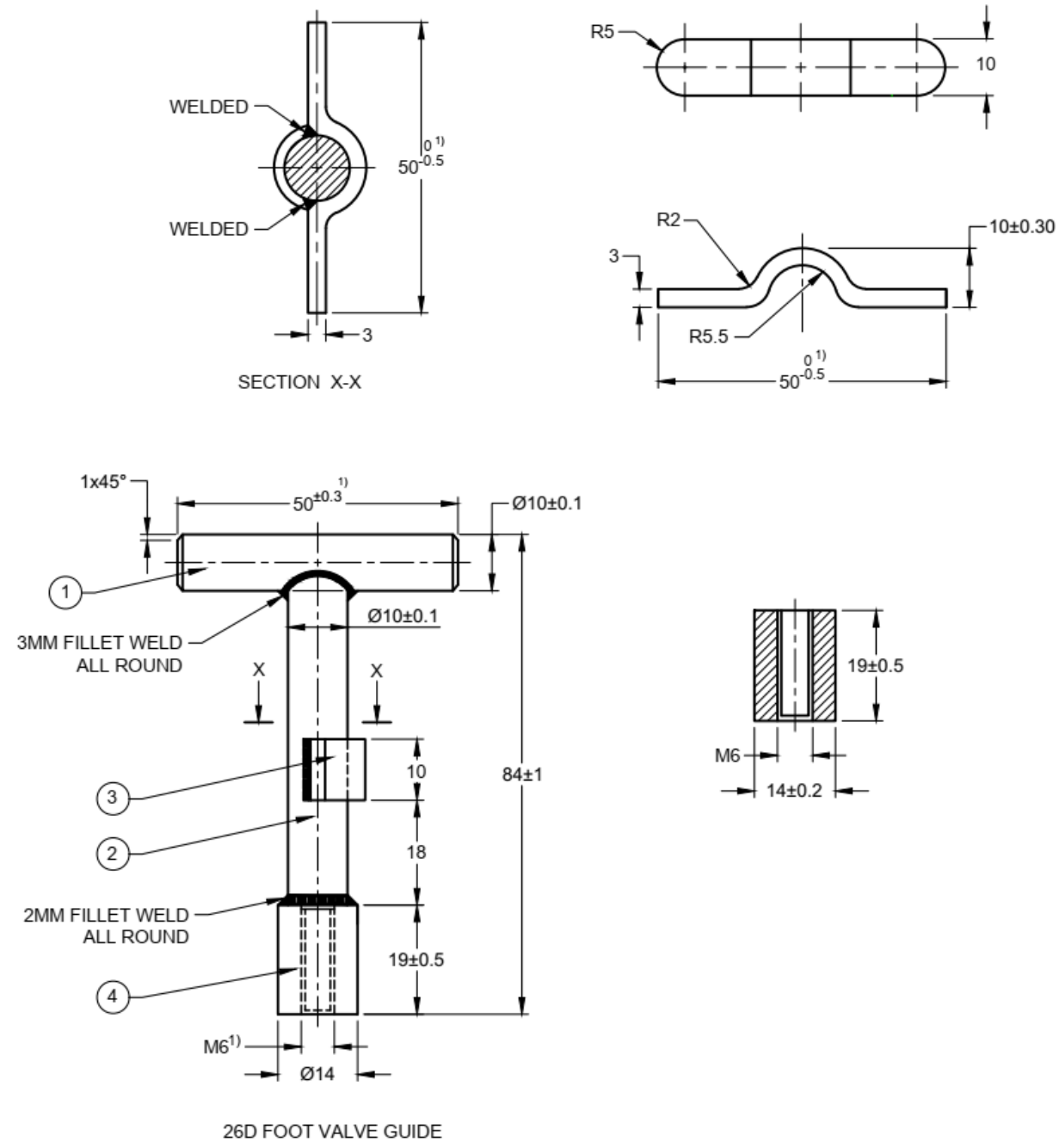
SHORE HARDNESS 65 TO 75 ON SCALE A

26 C FLAP VALVE

All dimensions in millimetres.

FIG. 26 FOOT VALVE ASSEMBLY PART (CONTINUED)

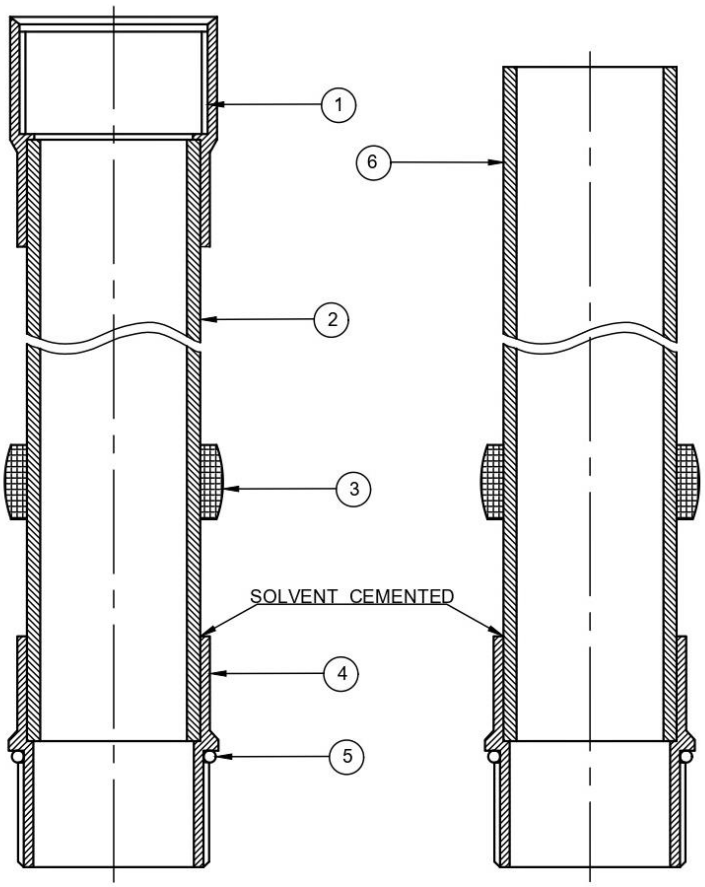
[1)] Indicates critical dimensions



All dimensions in millimetres.

FIG. 26 FOOT VALVE ASSEMBLY PART

[1)] Indicates critical dimensions



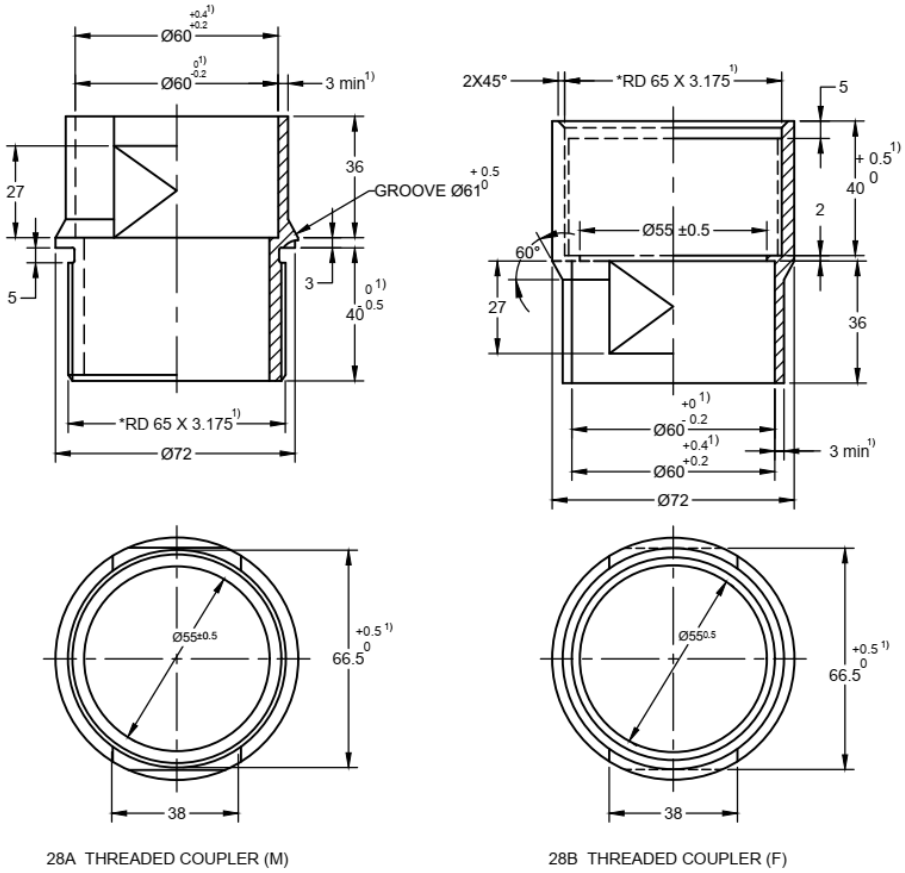
Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	1	Threaded coupler (F)	uPVC IS 7834 (Part 1)
ii)	2	1	Rising main pipe	uPVC
iii)	3	1	Centralizer	Nitrile rubber as per Annex C
iv)	4	1	Threaded coupler (M)	uPVC IS 7834 (Part 1)
v)	5	1	'O' Ring	Nitrile rubber as per Annex C
vi)	6	1	Rising main top	uPVC

NOTE — Centralizer to be fixed in place before solvent cementing threaded coupler.

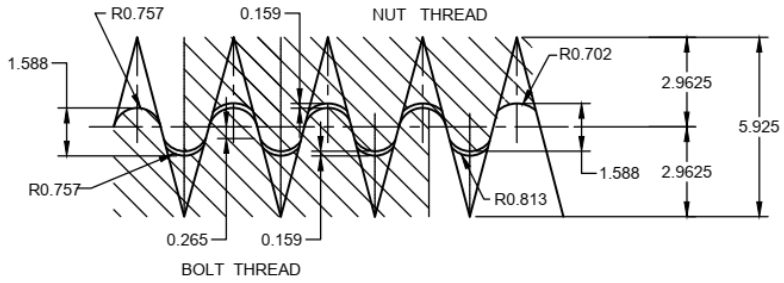
All dimensions in millimetres.

FIG. 27 RISING MAIN

[1)] Indicates critical dimensions



28A THREADED COUPLER (M) 28B THREADED COUPLER (F)



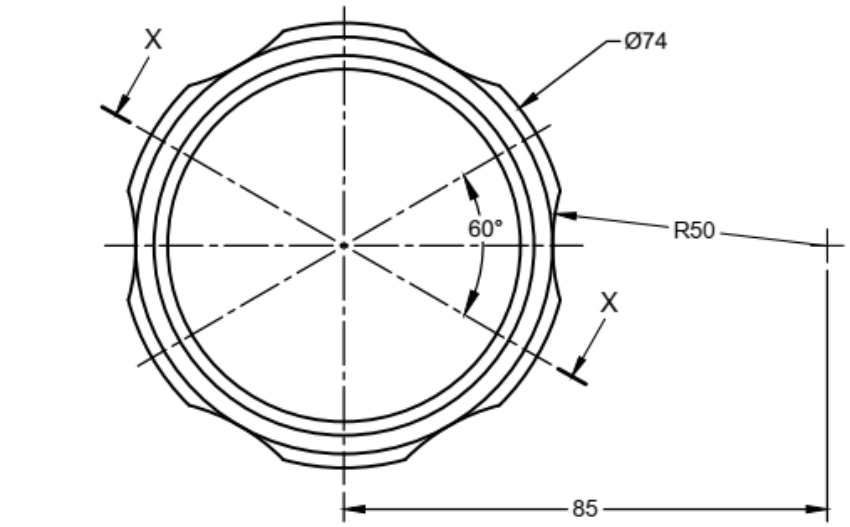
Sl No.	*Nominal Size*		*Major Diameter*		*Minor Diameter*		*Pitch Diameter*	
			Min	*Max*	*Min*	*Max*	*Min*	*Max*
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
i)	Rd 26	Nut	26.4	27.0	23.2	23.9	24.41	24.80
ii)	Rd 26	Bolt	25.4	25.9	22.3	22.7	24.00	24.35
iii)	Rd 65	Nut	65.4	66.0	62.2	62.9	63.41	63.80
iv)	Rd 65	Bolt	64.4	64.9	61.3	61.7	63.00	63.35

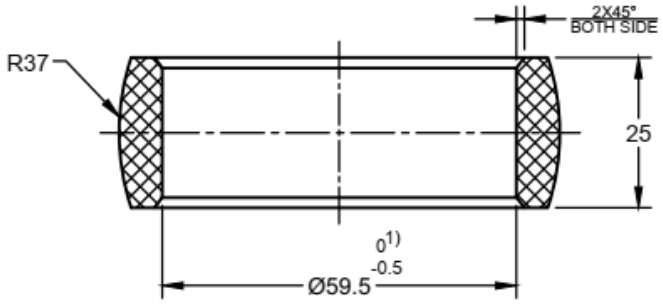
All dimensions in millimetres.

FIG. 28 RISING MAIN PARTS (CONTINUED)

[1] Indicates critical dimensions

* Threads profile of knuckle screw threads.

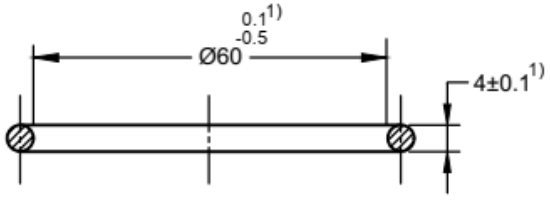




SECTION X-X

SHORE HARDNESS 75 TO 85 ON SCALE A

28 C RISER PIPE CENTRALIZER



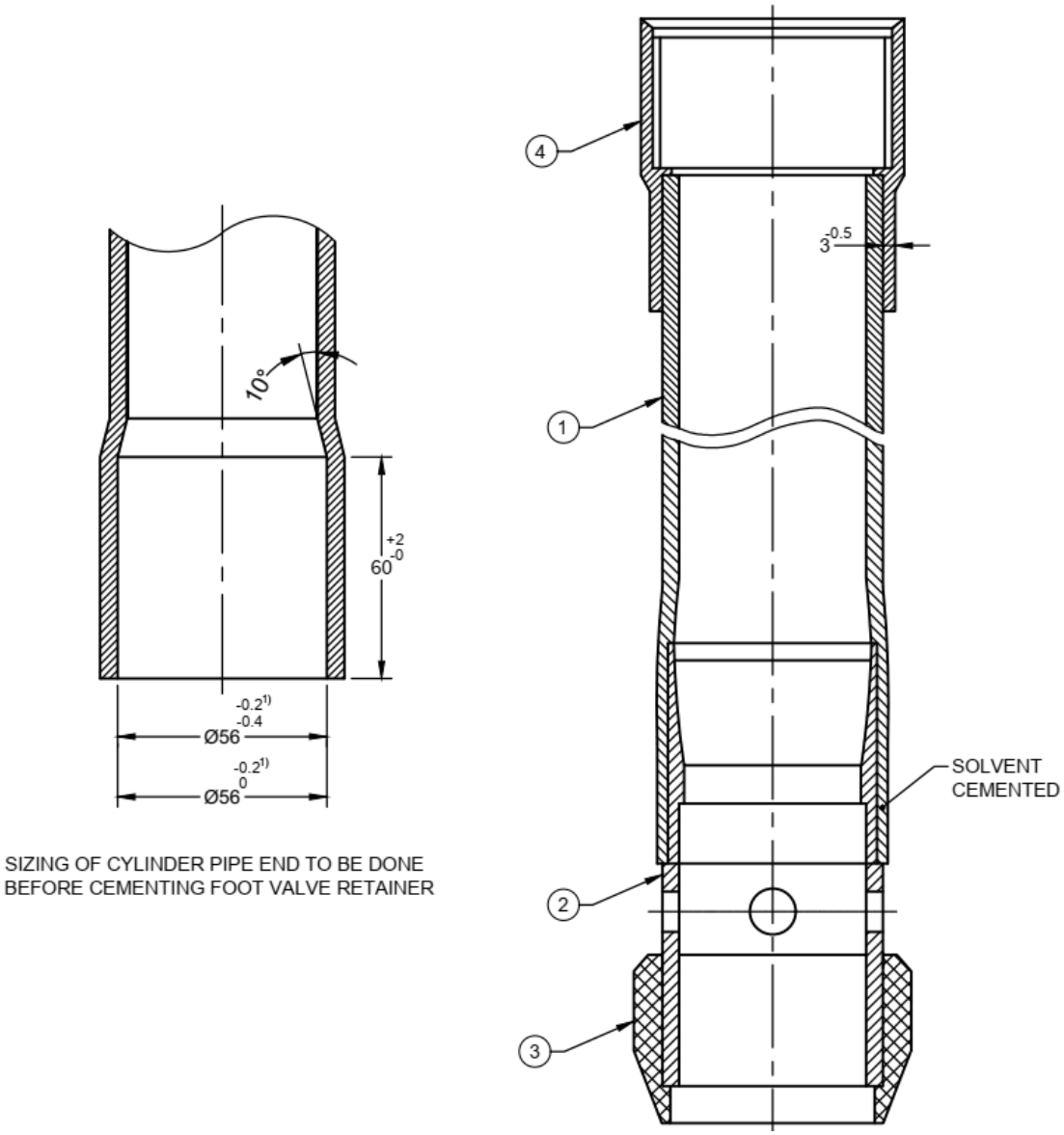
SHORE HARDNESS 65 TO 75 ON SCALE A

28 D 'O' RING

All dimensions in millimetres.

FIG. 28 RISING MAIN PARTS

[1)] Indicates critical dimensions

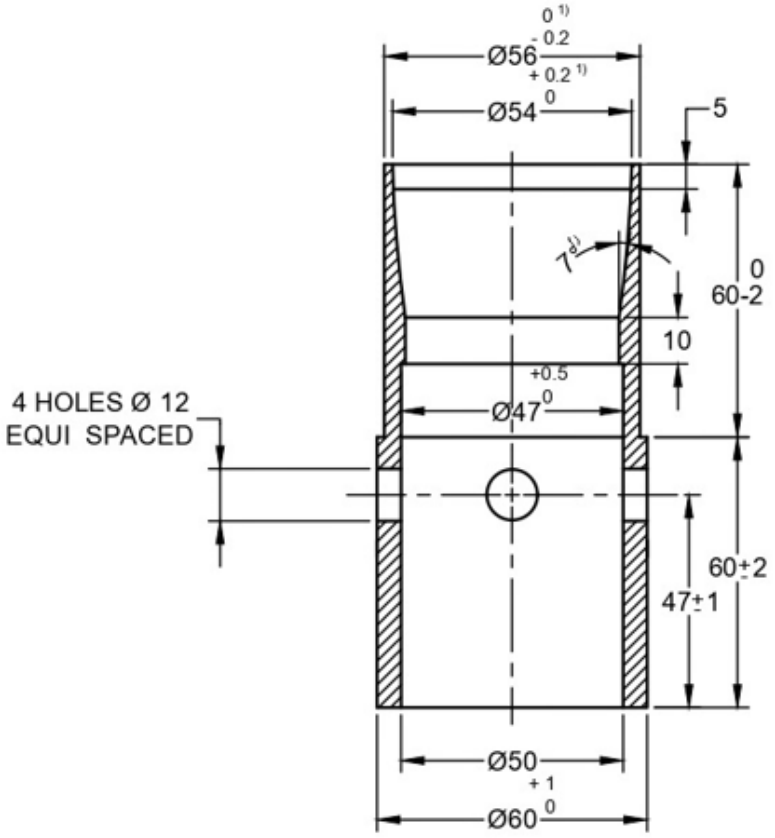


Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	1	Cylinder pipe	uPVC
ii)	2	1	Foot valve retainer	uPVC IS 7834 (Part 1)
iii)	3	1	Rubber seat	Nitrile rubber as per Annex C
iv)	4	1	Threaded coupler (F)	uPVC IS 7834 (Part 1)

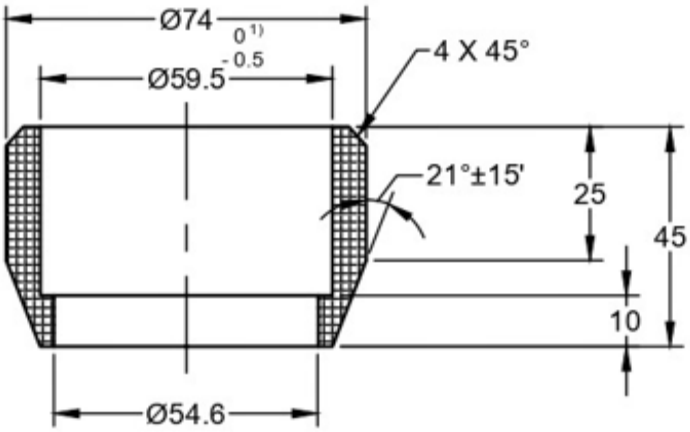
All dimensions in millimetres.

FIG. 29 CYLINDER PIPE

[1)] Indicates critical dimensions



30 A FOOT VALVE RETAINER



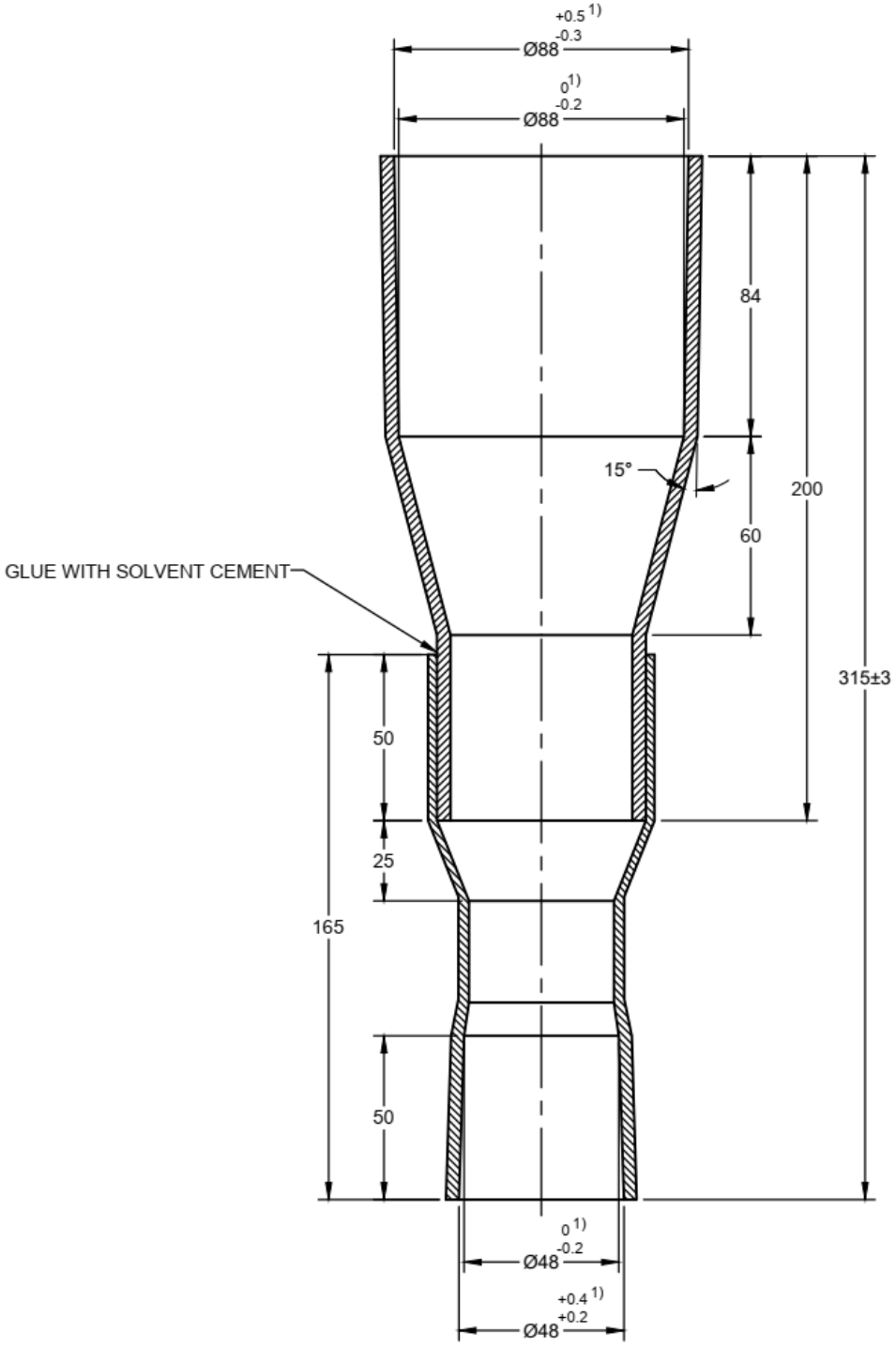
30 B RUBBER SEAT

NOTES
1 To be fixed suitable adhesive.
2 Shore hardness 75 to 85 mm on scale A.

All dimensions in millimetres.

FIG. 30 CYLINDER PIPE PARTS

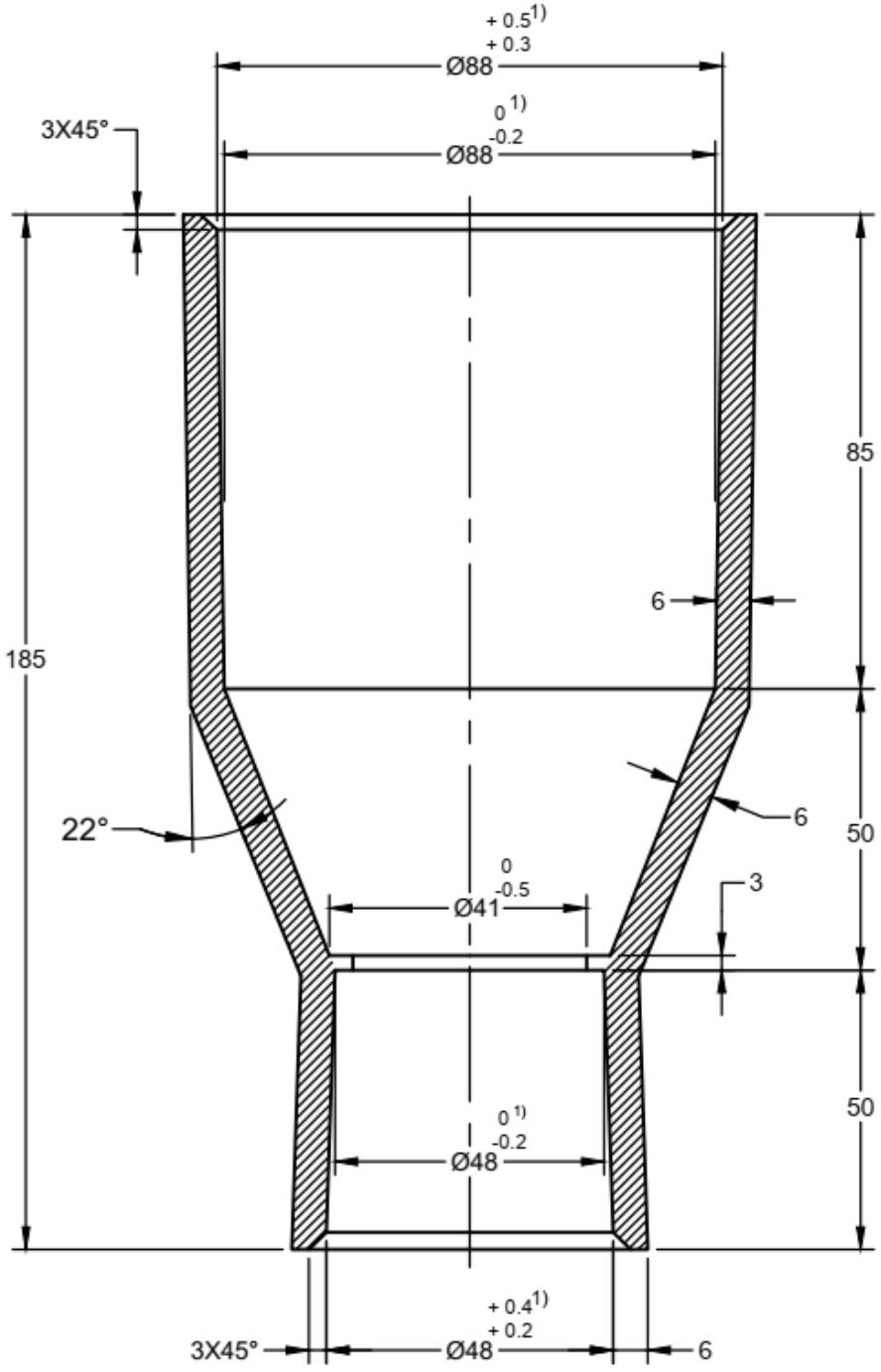
[1)] Indicates critical dimensions



All dimensions in millimetres.

FIG. 31 REDUCING SOCKET

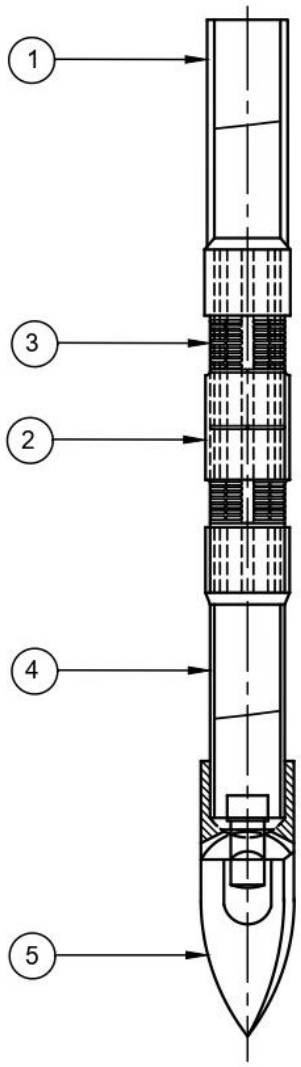
[1)] Indicates critical dimensions



All dimensions in millimetres.

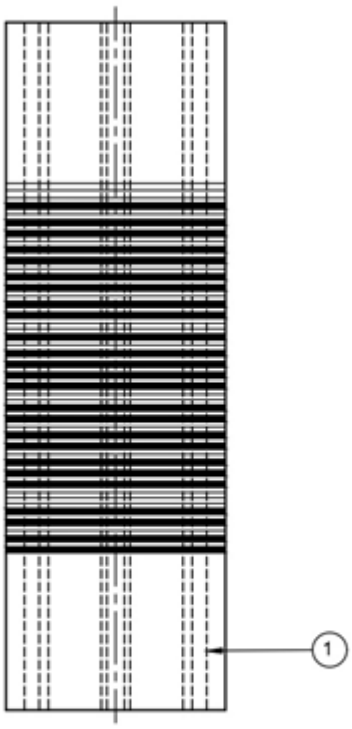
FIG. 31A REDUCING SOCKET (ALTERNATE DESIGN)

[1)] Indicates critical dimensions

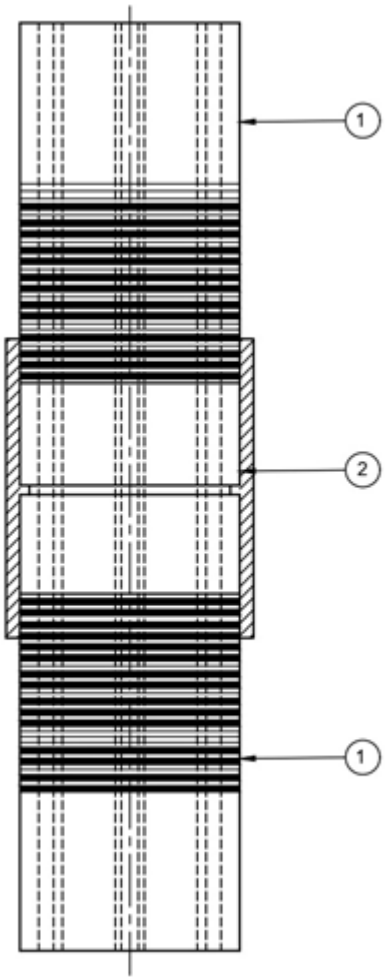


Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	1	Lower well casing	uPVC
ii)	2	1	Screen coupler	uPVC IS 7834 (Part 1)
iii)	3	2	Well screen	uPVC
iv)	4	1	Sand trap	uPVC
v)	5	1	Coupler plug	Grade FG 150 of IS 210

FIG. 32 LOWER WELL ASSEMBLY



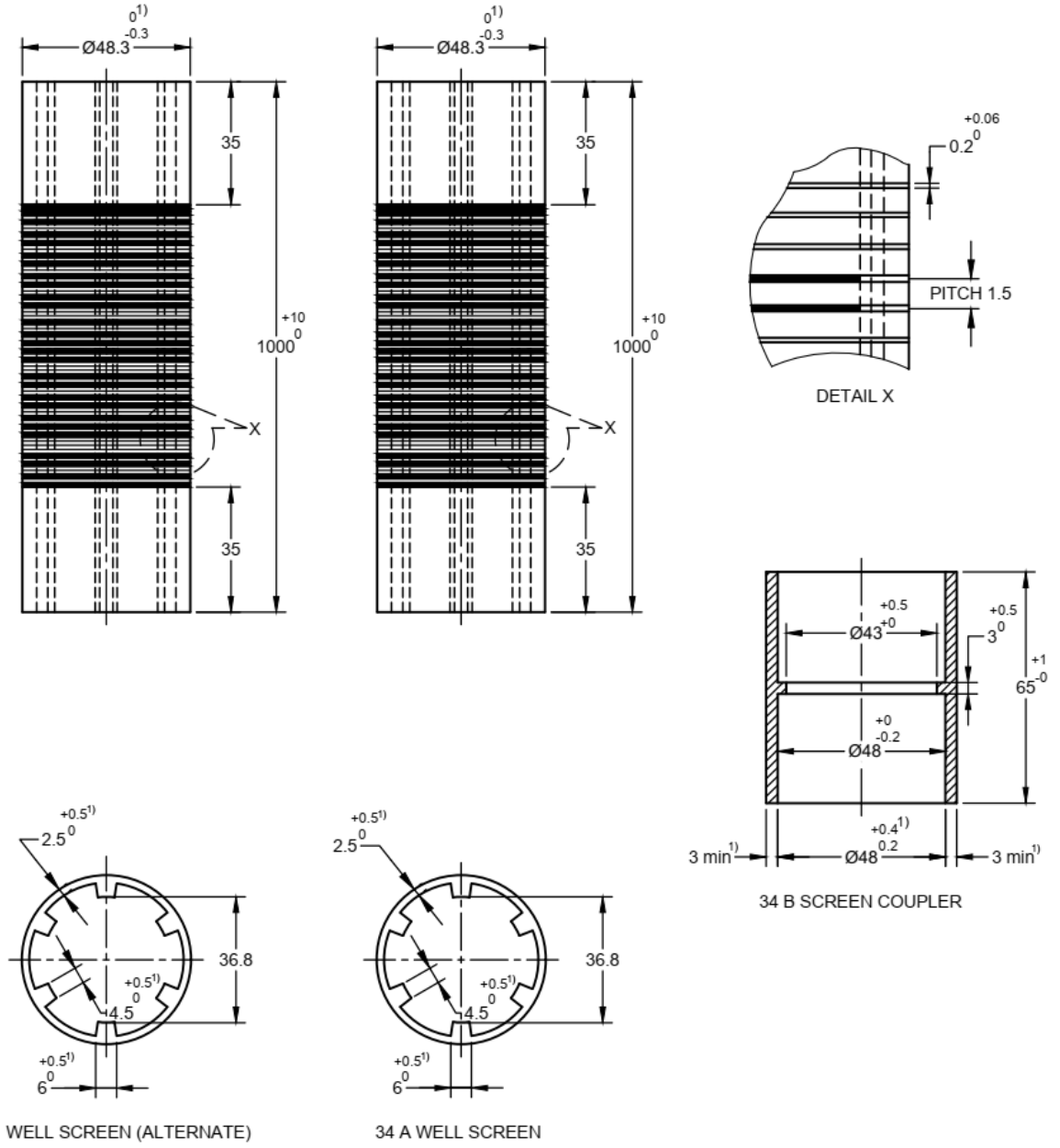
33A WELL SCREEN (ALTERNATE)



NOTE — For tubewell depth beyond 50 m screen as per IS 12818 to be used.

Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	2	Well screen	uPVC
ii)	2	1	Screen coupler	uPVC IS 7834 (Part 1)

FIG. 33 WELL SCREEN



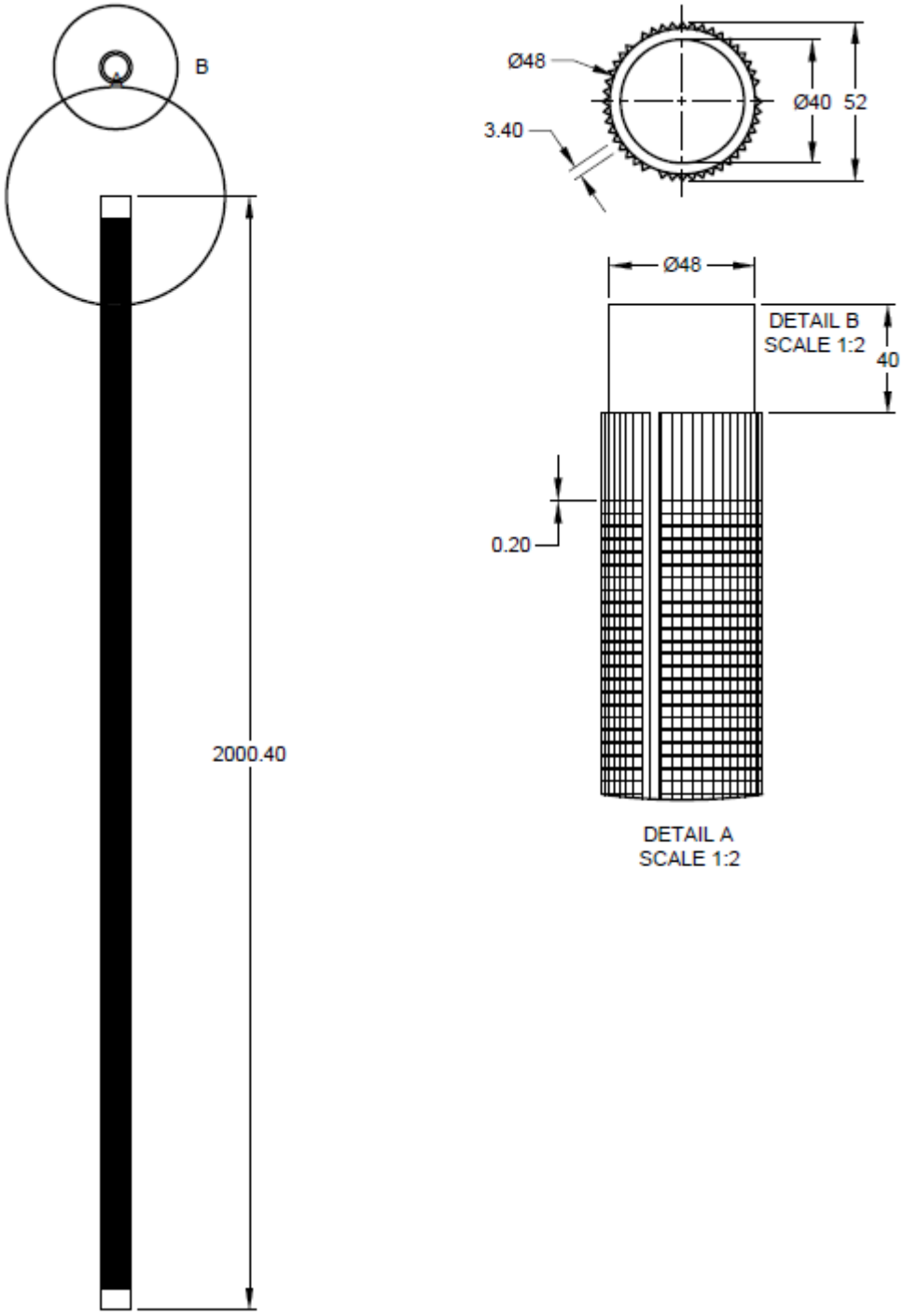
NOTES

1 Depth of cut to penetrate pipe wall fully.
2 Penetration into rib not to be exceed 0.2 mm.
3 The diameter $\emptyset\ 48.3^{0\ 1)}_{+0.3}$ is the mean outside diameter of the well screen.

All dimensions in millimetres.

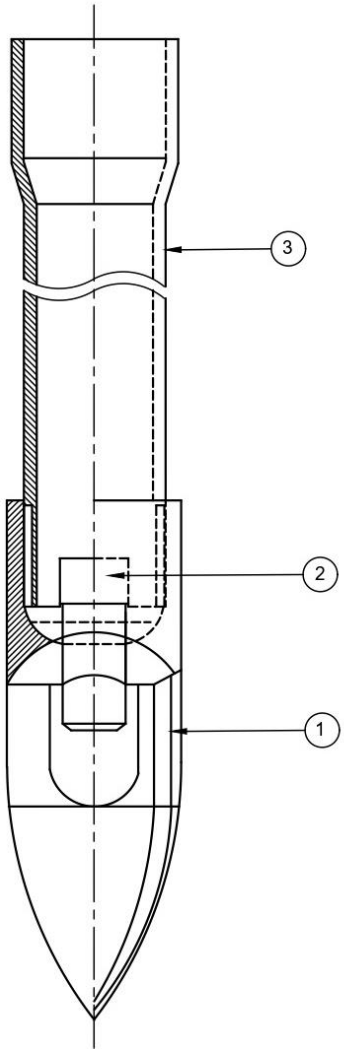
FIG. 34 WELL SCREEN PARTS

[1)] Indicates critical dimensions



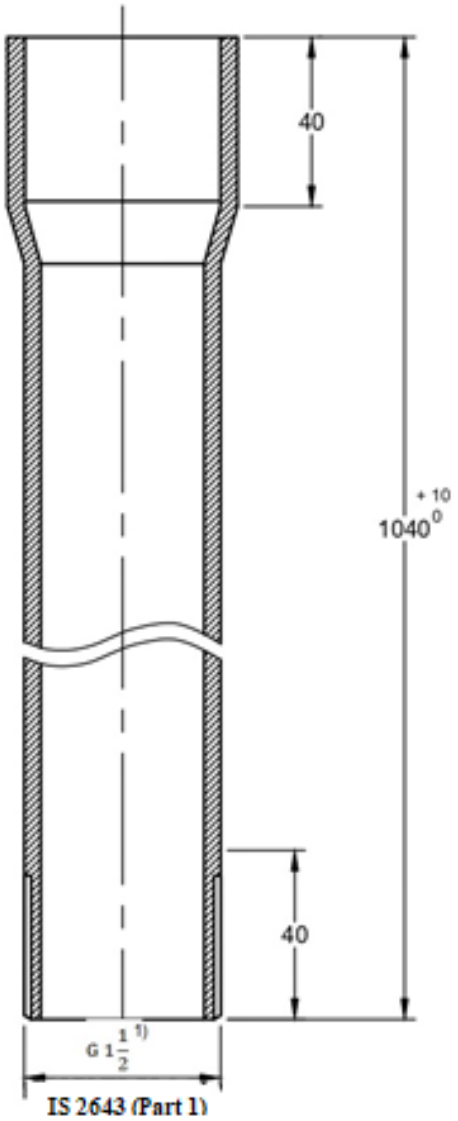
All dimensions in millimetres.

FIG. 34C RIBBED SCREEN PIPE AS PER IS 12818



Sl No.	*Part No.*	*No. off*	*Description*	*Material*
(1)	(2)	(3)	(4)	(5)
i)	1	1	Cutter	Grade FG 150 of IS 210
ii)	2	1	Plug	Grade FG 150 of IS 210
iii)	3	1	Sand trap	uPVC

FIG. 35 SAND TRAP ASSEMBLY

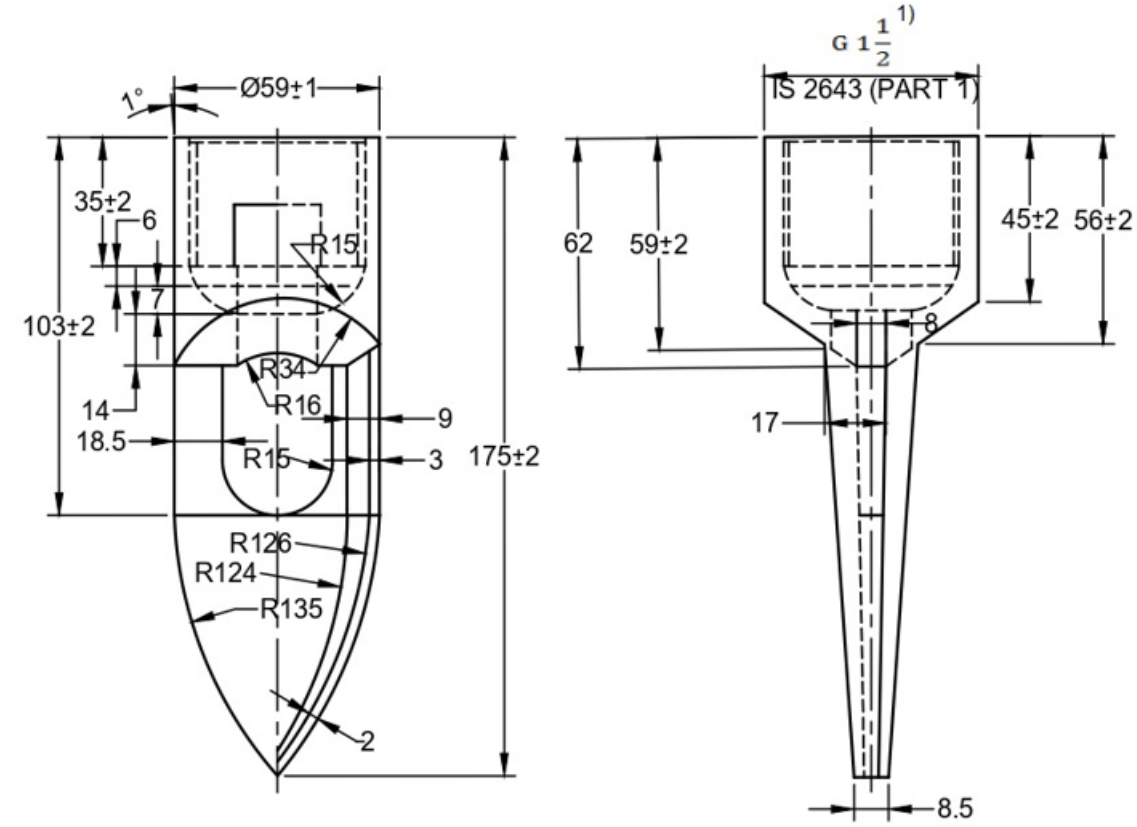


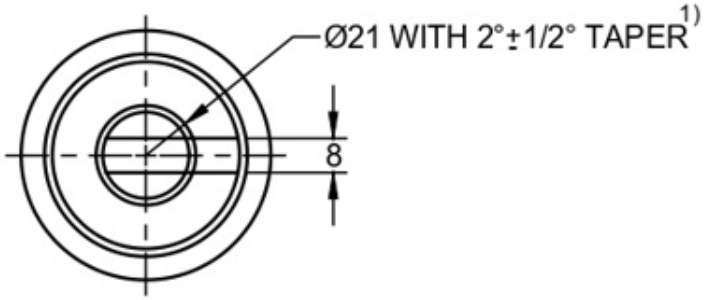
36 A SAND TRAP

All dimensions in millimetres.

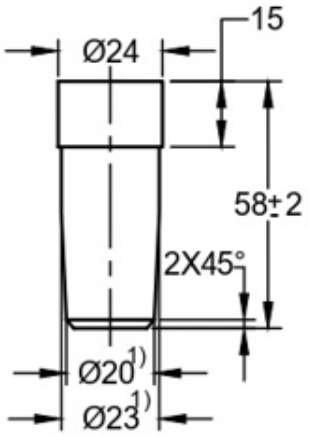
FIG. 36 SAND TRAP ASSEMBLY PARTS (CONTINUED)

[1] Indicates critical dimensions





36 B CUTTER

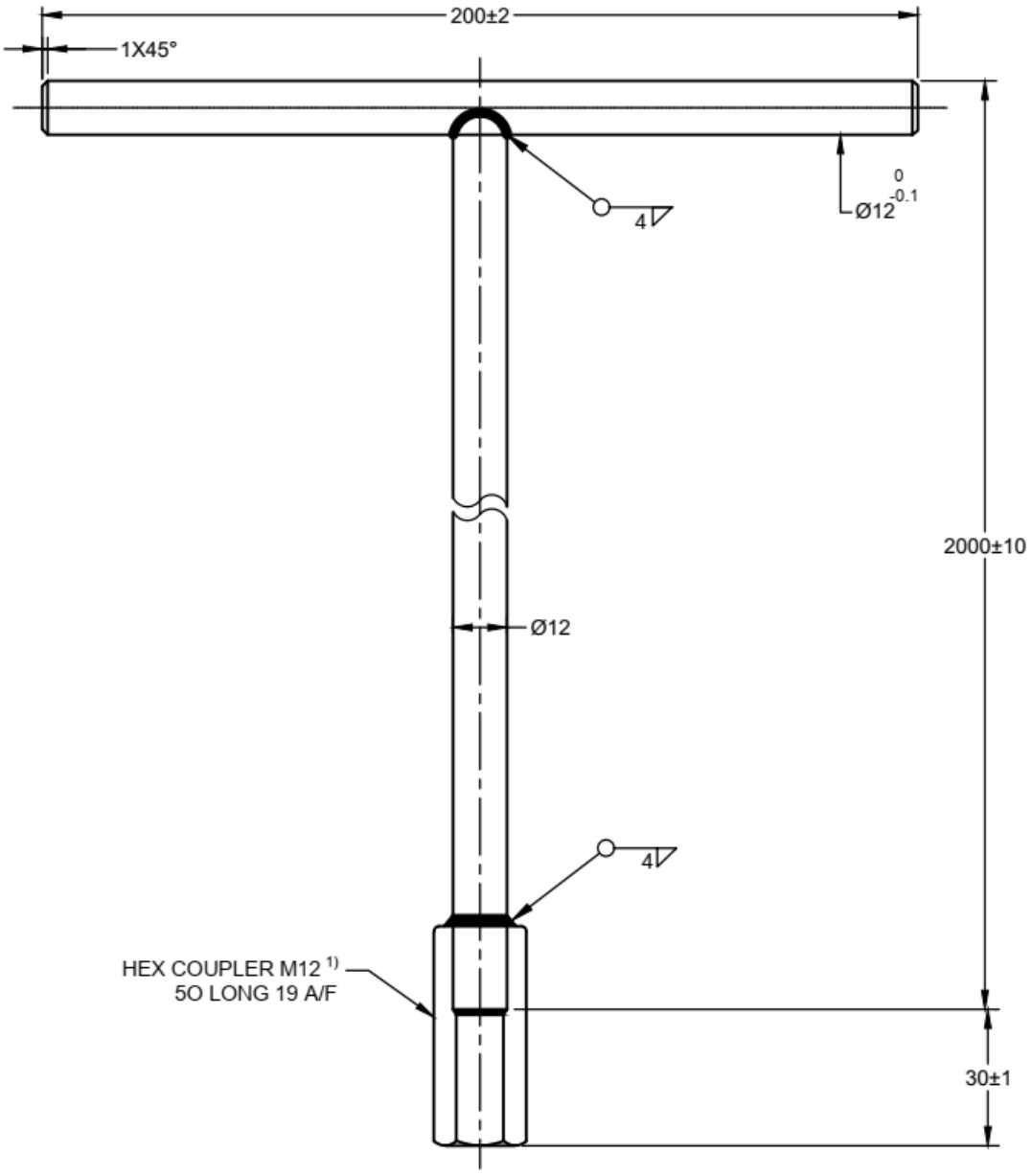


36 C PLUG

All dimensions in millimetres.

FIG. 36 SAND TRAP ASSEMBLY PARTS

[1)] Indicates critical dimensions



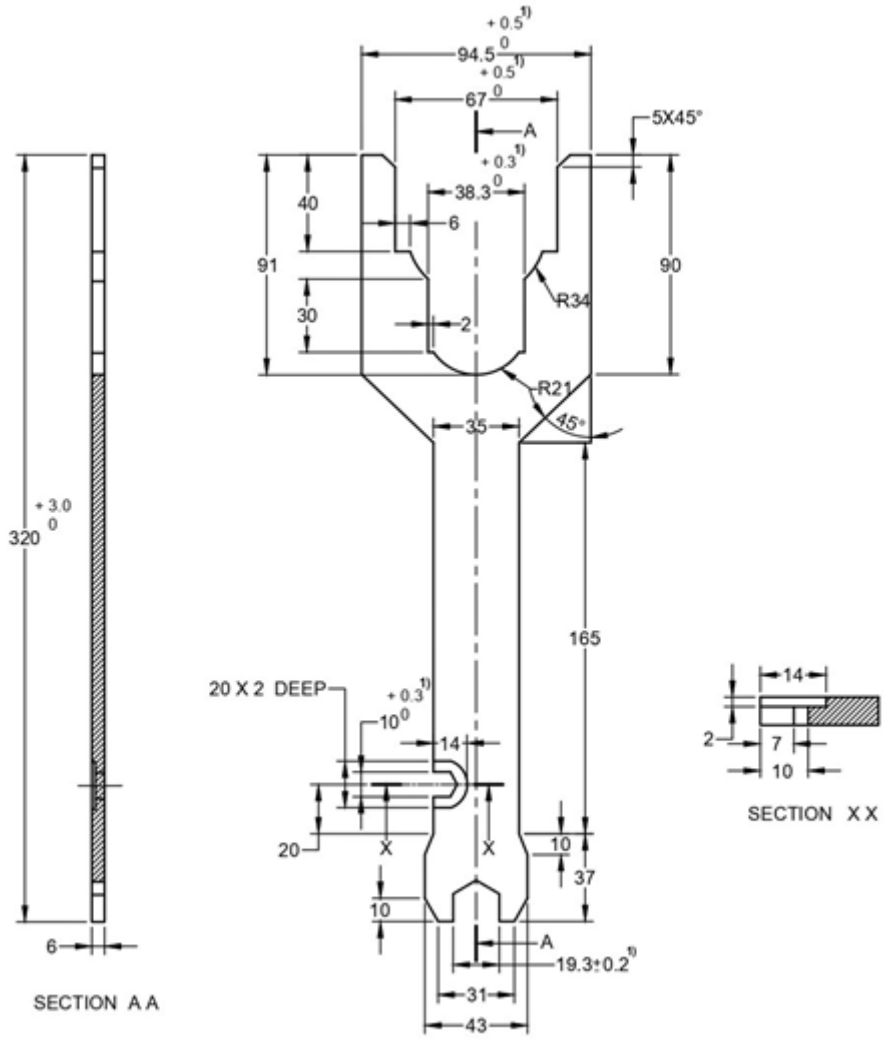
NOTES

1 Electrogalvanized to 30 micrometres (µm) minimum.
2 Material for retrieving rod shall be of quality of a grade E250 of IS 2062.

All dimensions in millimetres.

FIG. 37 RETRIEVING ROD

[1)] Indicates critical dimensions



QUALITY A OF GRADE E250 OF IS 2062

All dimensions in millimetres.

FIG. 38 COMBINATION SPANNER

[1] Indicates critical dimensions

ANNEX A

(*Clause* 2)

LIST OF REFERRED STANDARDS

IS No.	*Title*
IS 210 : 2009	Grey iron castings — Specification (*fifth revision*)
IS 1239 (Part 1) : 2004	Steel tubes, tubulars and other wrought steel fittings — Specification: Part 1 Steel tubes (*sixth revision*)
IS 1363	Hexagon head bolts, screws and nuts of product grade 'C':
(Part 1) : 2023/ ISO 4016 : 2022	Hexagon head bolts (size range M5 to M64) (*sixth revision*)
(Part 3 : 2018)/ ISO 4034 : 2012	(Style 1) hexagon nuts (size range M5 to M64) (*fifth revision*)
IS 1367	Technical supply conditions for threaded steel fasteners:
(Part 3 : 2017)/ ISO 898-1 : 2013	Mechanical properties of fasteners made of carbon steel and bolts, screws and studs (*fifth revision*)
(Part 6 : 2018)/ ISO 898-2 : 2012	Mechanical properties of fasteners made of carbon steel and alloy steel — Nuts with specified property classes — Coarse thread and fine pitch thread (*fourth revision*)
(Part 14)	Mechanical properties of corrosion-resistant stainless steel fasteners,
(Sec 1 : 2023)/ ISO 3506-1 : 2020	Bolts screws and studs with specified grades and property classes (*fifth revision*)
(Sec 2 : 2023)/ ISO 3506-2 : 2020	Nuts with specified grades and property classes (*fifth revision*)
IS 1573 : 1986	Specification for electroplated coatings of zinc on iron and steel (*second revision*)
IS 2016 : 1967	Specification for plain washers (*first revision*)
IS 2062 : 2011	Hot rolled medium and high tensile structural steel — Specification (*seventh revision*)
IS 2102 (Part 1) : 1993/ISO 2768-1 : 1989	General tolerances: Part 1 Tolerances for linear and angular dimensions without individual tolerance indications (*third revision*)
IS 2500 (Part 1) : 2000/ISO 2859-1 : 1999	Sampling procedure for inspection by attributes: Part 1 Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection (*third revision*)
IS 2629 : 1985	Recommended practice for hot-dip galvanizing of iron and steel (*first revision*)
IS 2811 : 1987	Recommendations for manual tungsten inert-gas arc welding of austenitic stainless steel (*first revision*)
IS 4454 (Part 1) : 2001	Steel wire for mechanical springs — Specification: Part 1 Cold drawn unalloyed steel wire (*third revision*)
IS 4759 : 1996	Hot-dip zinc coatings on structural steel and other allied products — Specification (*third revision*)
IS 5206 : 1983	Specification for covered electrodes for manual metal arc welding of stainless steel and other similar high alloy steels (*first revision*)
IS 6481 : 1971	Guide for principal uses and styles of fibreboard containers
IS 6603 : 2001	Stainless steel bars and flats — Specification (*first revision*)
IS 7328 : 2020	Specification for polyethylene material for moulding and extrusion (*third revision*)
IS 7834 (Part 1) : 1987	Specification for injection moulded PVC socket fittings with solvent cement joints for water supplies: Part 1 General requirements (*first revision*)

IS No.	*Title*
IS 9595 : 1996	Metal-arc welding of carbon and carbon manganese steels — Recommendations (*fifth revision*)
IS 12818 : 2010	Unplasticized polyvinyl chloride (PVC-U) screen and casing pipes for bore/tubewells — Specification (*second revision*)
IS 14182 : 1994	Solvent cement for use with unplasticized polyvinyl chloride plastic pipe and fittings — Specification

ANNEX B

(*Clause* 4.7)

SPECIFICATION FOR POLYACETAL

B-1 Properties of polyacetal are given below for guidance only:

Sl No.	*Property*	*Unit*	*Value*
(1)	(2)	(3)	(4)
i)	Density at 27 °C	g/cm^3	1.42
ii)	Percentage water absorption (24 h immersions)	—	0.32
iii)	Vicat softening point	°C	174
iv)	Tensile strength	MPa	66
v)	Percentage elongation at break	—	25
vi)	Izod impact strength	kg.cm/cm	5.98 to 7.62

ANNEX C

(*Clause* 4.9)

SPECIFICATION FOR NITRILE RUBBER COMPONENTS

Sl No.	*Property*	*Type* 1	*Type* 2
(1)	(2)	(3)	(4)
i)	Shore hardness, scale A	70 ± 5	80 ± 5
ii)	Tensile strength (MPa), *Min*	12.5	12.6
iii)	Ultimate percentage elongation, *Min*	250	150
iv)	Compression set after 24^{0}_{-2}h at 70 °C ± 1 °C, *Max*, percent	20	20

ANNEX D

(*Clause* 9)

RECOMMENDED PROCEDURE FOR PACKING

D-1 The following procedure for packing of direct action handpumps is recommended.

a) Head, handle and stand, after being wrapped individually in polyethylene bags, shall be packed in a hessian bag with stuffing of straw around them;

b) PVC pipe set along with rubber and other loose components shall be packed in a 7 ply corrugated fiber board (CFB) box made of 120 GSM kraft paper having internal dimensions 3 200 mm × 279 mm × 305 mm conforming to style 0302 of IS 6481 with 'Lid' covering full height of the 'Tray'. All the creases are to be reinforced with calico-cloth of 75 mm width to prevent tear. Two 280 mm × 305 mm pieces of 3 mm thick plywood shall be glued to the ends of the tray and two 15 mm holes drilled in plywood, tray and lid to facilitate placing of a cotton rope as sling handling the packed box. The total weight of the box shall not exceed 500 N (50 kg);

c) The pipes, starting with the larger diameter first, shall be filled in the tray and items like sand trap, screen, piston rod assembly and retrieving rod be kept at the top after being covered with a 2 ply corrugated liner with proper blocking to arrest their movement. Rubber and other loose components, duly packed in polyethylene pouches, shall be placed in the box. A suitable material like rubberized coir or paper shredding's shall be placed on the top for providing cushion for pipe movement inside;

d) The box will be strapped at least at 5 places at regular interval with 12 mm polypropylene strap; and

e) All the threaded portions having male threads shall be fitted with plastic thread protectors before packing.

ANNEX E

(*Foreword*)

COMMITTEE COMPOSITION

Handpumps Sectional Committee, MED 27

Organisation	*Representative(s)*
In Personal Capacity (*A-504, K.G. Chandra Vista, OMR, Opposite to Satyabhama University, Sholinganallur, Chennai*)	SHRI G. SHANMUGANATHAN **(*Chairperson*)**
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Apex International, Noida	SHRI LALIT KHANNA SHRI SANCHIT KHANNA (*Alternate*)
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United Nations International Children's Emergency Fund, Denmark, Copenhagen	SHRI SYLVAIN BERTRAND DR PETER HARVEY (*Alternate*)

Organisation	*Representative(s)*
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In Personal Capacity *(B11/301 Brahma Majestic CHS, NIBM road, Pune-411048)*	SHRI VISHWAS JOSHI
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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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