INTER PLANT STANDARD – STEEL INDUSTRY		
IPSS	**SPECIFICATION FOR AIR CYLINDERS**	**IPSS: 1-02-026-18** *(Second Revision)*
	Corresponding IS does not exist	Formerly: IPSS: 1-02-026-85

0. FOREWORD

0.1 This Interplant Standards activity in steel industry has been initiated under the aegis of the Indian Standards Institution (ISI) and the Steel Authority of India Ltd (SAIL). This Interplant Standards, prepared by the Standards Committee on Hydraulic, Pneumatic and Lubricating Equipment, IPSS 1:2, with the active participation of the representatives of all the steel plants, major consultants and established manufacturers of O-rings was adopted by the Approval Committee on Air Cylinders on March, 1985. Thereafter standard was again revised in January, 2018.

0.2 Interplant Standards for steel industry primarily aim at achieving rationalization and unification of parts and sub-assemblies used in plant equipment and accessories, and provide guidance in indenting stores or equipment for existing or new installations by individual steel plants. For exercising effective the inventories, it is advisable to select a fewer number of sizes (or types) from among those mentioned in this standard for the purpose of company standards of individual steel plants. It is not desirable to make deviations in technical requirements.

1. SCOPE

This interplant Standard covers the requirements of the heavy duty air cylinders having nominal bores from 32 to 320 mm for the uses in the steel industries. The cylinder shall be operated by compressed air of 6 bar supplied through airline filter (IPSS: 1-02-018-84 Specification for airline filters), air pressure regulator (IPSS: 1-02-009-94 Specification for air pressure regulator) and airline lubricator (IPSS: 1-02-015-84 Specification for airline lubricator).

2. TECHNOLOGY

For the purpose of this standard the definitions given in IS: 10416 “Glossary of terms relating to fluid power(First Revision)” shall apply.

3. BASIC CYLINDERS

3.1 **Bores and Ports** – The bores and ports of the basic air cylinders shall be as given in Table 1.

3.2 **Tube** – This will be made from cold drawn tube as per IS: 9158– 1979 'Specification for cold drawn high pressure fluid power cylinder tubes. The same shall be internally honed and chrome plated as per IS: 1337-1993 'Specification for electroplated coatings of hard chromium on iron and steel for engineering purposes (Fourth revision)'and shall be heavy7, non-corrosive and finely finished for sustained leak proof operation of piston seals.

3.3 **Piston Packing** – They shall be made of nitrile neoprene [See IPSS: 1-02-023-84 "Specification for oil the resistant nitrile rubber sheets and gaskets and IPSS: 1-02-024-84 "Specification for oil resistant neoprene (Chloroprene) rubber sheets, gaskets] or polyurethane and shall be fully vulcanized single piece construction so that the impacts against the end plates are dampened even in non-cushioned air cylinders.

Note 1 – When the temperature near the external surface of the air cylinder shall be above 80^{o}C packing and seals shall be made of heat-resistant viton material.

Note 2 – Unless stated otherwise the working temperature of the cylinder shall be assumed to be less than 80oC.

3.3.1 The V-packing, if used, shall be selected by the manufacturers according to IPSS: 1-02-016-17 'Specification for sets of V-packing for hydraulic machines'.

3.4 **O-Rings** – The O-rings between the end plates and the tubes shall be selected by the manufacturer's from the IPSS : 1-02-001 'Specification for O-rings.

3.5 **Piston Rods** – It will be of carbon steel, finely ground to ear perfect-roundness and hard chrome plated conforming to IS: 1337-1993 to ensure lasting leak-proof performance of the rod seal materials.

The end threads and the diameters of the piston rods of the basic cylinder shall be as given in Table – 1.

The piston rod shall have a flat with a hole. The flat shall have champers to protect rod seal during installation.

3.6 **Head and Cap** – They shall be made from superior aluminium ally zinc plated steel light alloy die castings.

3.7 **Tie Rods** – They shall be made from high tensile steel.

3.8 **Cushioning Arrangements** – Suitably designed adjustable and lockable cushioning arrangement consisting of a check value and needle value shall be provided to avoid impact at the end of the stroke. The check value allows free return at the start of the reverse stroke.

3.9 **Rod-cum-Wiper Seals** – They shall be made of nitrile / viton and shall be of double lipped type to ensure bubble free sealing of the internal pressure and prevention of damaging dirt, entering the cylinder through the wiping action.

3.10 **Pistons** – They shall be single piece or 2 pieces aluminium zinc plated steel high grade cast iron having sufficiently long bearing area to present misalignment.

3.11 **Bushings** – Replaceable bronze bushing / bearing shall be provide between the end plate and the piston rod.

3.12 **Stop Tube** –It is a spacer between the rod and cap and the piston rod which provides separation between the piston and the rod bearing. It shall be provided by the manufacturer whenever he feels necessary for prevention of buckling of the piston rod, then the stop tube is provided the overall length of the cylinder increases by the length of the stop tube.

3.13 **Other Components** – All other ferrous and non-ferrous components of the air cylinders shall be as suitable selected by the manufacturers.

4. STROKES

The strokes of the air cylinder shall be as per the requirement of the purchaser. But preference shall be for those covered by IS: 10411-1983 ‘Recommendation on nominal strokes for fluid power cylinder’.

4.1 Tolerance on strokes shall be as given in Table 2.

5. MOUNTING STYLES

This standard shall cover the various types of mounting styles as given in Table 3 to 8 (see also IS: 10143-1995, Mounting dimensions for pneumatic fluid power

cylinders. Single rod-detachable mounting 10 bar series bore 32 mm to 320 mm).

6. DIMENSIONS OF MOUNTINGS

The dimensions of the mountings shall be as given in **Tables 3 to 5**.

7. MAXIMUM WORKING PRESSURE

All the air cylinders covered by this standard shall be meant for a maximum working pressure of 10 bars.

8. TESTING

8.1 The testing pressure for all the air cylinders shall be 20 bars.

Before the delivery of the air cylinder, it will be tested in the premises of the manufacturer in the presence of purchaser's representative unless stated otherwise.

During testing of the air cylinder by holding for one minute, there shall be no leakage of the air at the end of the forward and backward stroke. At least 50 forward and 50 backward stroke shall be performed during the testing.

8.2 **Hydraulic Testing** – The air cylinder shall be subjected to hydraulic pressure of 80 bars for three minutes and there shall be no leakage.

9. DESIGNATION

An air cylinder of bore dia. 80 mm, roddia.25 mm, stroke 200 mm mounting MS1 shall be designated as Cylinder, Air 80/25- x 200 MSI, IPSS: 1-02-026-18.

10. GUARANTEE

Along with the air cylinder the supplier shall also submit a guarantee certificate against use of any defective material and / or any bad workmanship for a period of 12 (twelve) months of actual use of 18 (eighteen) months from the date of receipt of the air cylinder by the purchaser.

11. TECHNICAL INFORMATIONS

In addition to the designation as given in 9 the following technical information are also to be given by the purchaser for inviting quotations:

a) Quality
b) Single acting or double acting

c) The drawing, if the mounting dimensions are other than these covered by this standard, front and rear split, flange mounting, clevis heat mounting, female trunnion , trunnion at the end, etc. if the parts of any specific special material is required that is to be indicated in the drawing. If the port holes are on other side than indicated in this standard the same should be indicated in the drawing.

d) Cushioning desired on cap end size or head end side or both sides.

e) Whether bore of the tube of the cylinder shall be chrome plated.

f) Whether double eye clevis is desired.

g) Whether any other thread or finish of the piston rod end is required than what is given into this standard.

h) Whether spherical bearings are required at the clevis, to avoid the effect of the literal thrust.

i) Whether the piston rod or any other diameter is required than mentioned in this standard.

12. DELIVERY

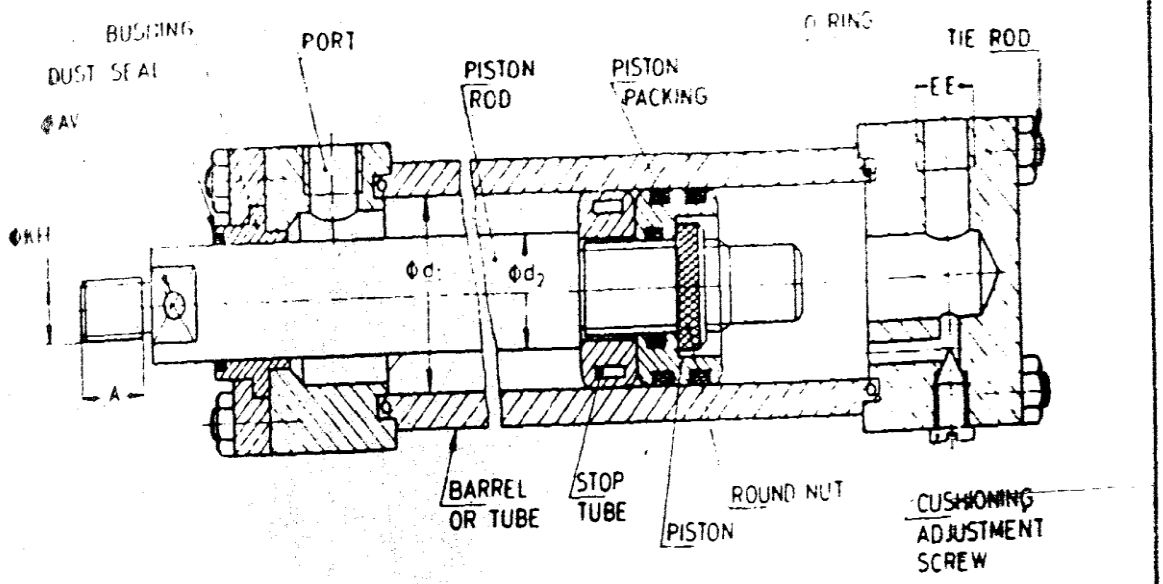
The air cylinder shall be delivered in suitable packed condition so that there is no possibility of damage in the transit. Bothe ports shall be kept suitably plugged with threaded plastic cap

13. MARKING

The manufacturers name and designation shall be legibly marking on the body of the air cylinder.

TABLE 1 BASIC AIR CYLINDER

(Clauses 3.1 *and* 3.5)



All dimensions in millimetres.

Bore Dia d_1 IS : 8526-1977•	Nominal Port (EE) Thread Size IS : 554-1975†	Nominal Port Size	ϕAV	A	ϕd_1‡	ϕKH
32	R_p 1/8	3	2	21	12	M10 × 1·25
40	R_p 1/4	8	5	24	16	M12 × 1·25
50	R_p 1/4	8	6	32	26	M16 × 1·50
63	R_p 3/8	10	8	32	25	M16 × 1·50
80	R_p 3/8	10	8	40	25	M20 × 1·50
100	R_p 1/2	16	8	40	32	M20 × 1·50
125	R_p 1/2	16	10	54	40	M27 × 2·00
160	R_p 3/4	34 20 38	10	72	40	M36 × 2·00
200	R_p 3/4	45 20 45 50	10	72	45	M36 × 2·00
250	R_p 1	25	10	84	56	M42 × 2·00
320	R_p 1	25	10	96	56	M48 × 2·00

•Specification for sizes for cylinders, bores and ports for pneumatic cylinders

†Dimensions for pipe threads where pressure light joints are required on the threads (*second revision*).

‡Conforming to ISO 2901.

TABLE 2 – STROKES WITH TOLERANCES

(Clause 4.1)

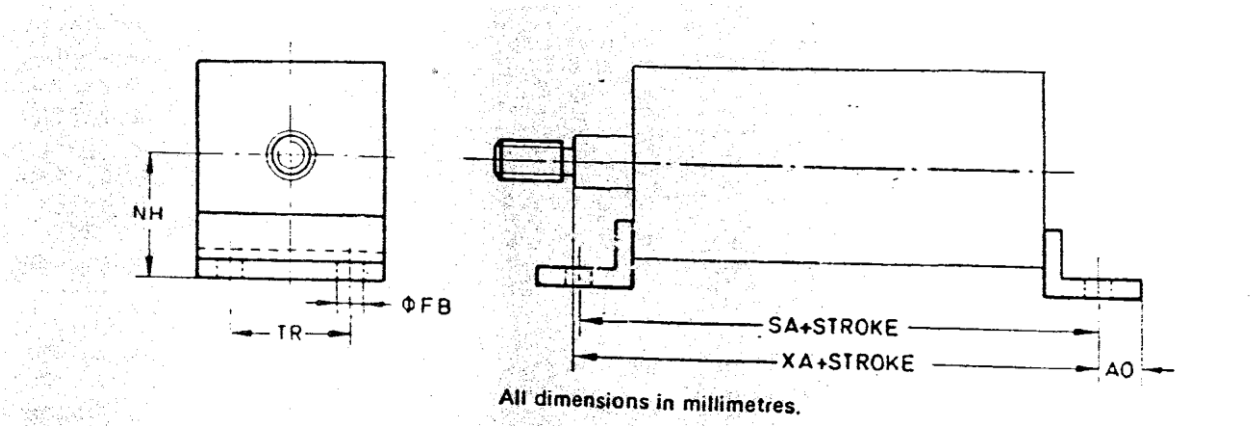
All dimensions in millimetres

Cylinder Bore	Stroke	Tolerance on Stroke
32 40	Up to and including 500	+2 0
50	Above 500	+3.2 0
63 80	Upto and Including 500	+2.5 0
100	Above 500	+4 0
125 160	Upto and Including 500	+4 0
200 250 320	Above 500	+5 0

NOTE: - The tolerances given in this table shall apply to strokes upto and including 1250 mm. Tolerances for longer strokes to be agreed to between the manufacturer and the user.

TABLE 3 DIMENSIONS OF END ANGLES MOUNTING (MSI)

(Clauses 5 and 6)

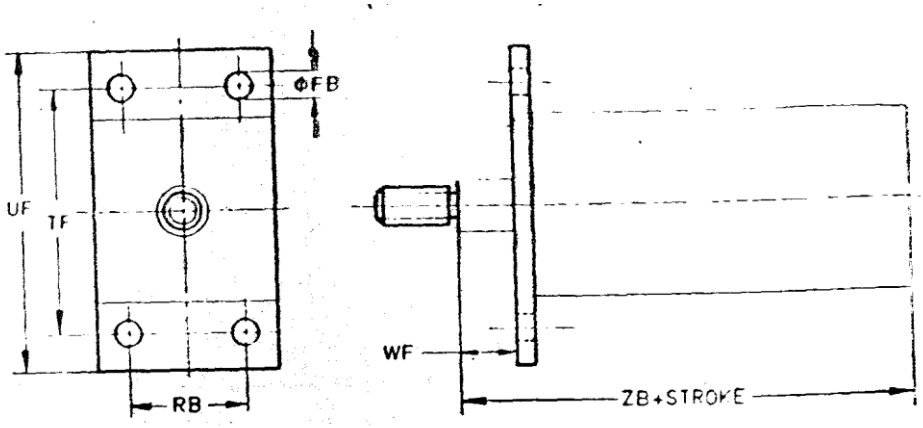


(figure)

Nominal Bore Dia	FB (H13)	NH (Js15)	SA	XA	Tolerance on SA and XA	TR (Js14)	AO MAX
32	7	32	142	114		32	11
40	9	36	161	163	± 1.25	36	15
50	9	45	170	175		45	15
63	9	50	185	190		50	15
80	12	63	210	215	± 1.6	63	20
100	14	71	220	230		75	25
125	16	90	250	270		98	25
160	18	115	300	320	±2	115	25
200	22	135	320	345		135	35
250	26	165	350	380		165	40
320	33	200	390	425	±2.5	200	45

TABLE 4 DIMENSIONS OF RECTANGULAR FLANGL HEAD MOUNTING (MFI)

(Clauses 5 and 6)

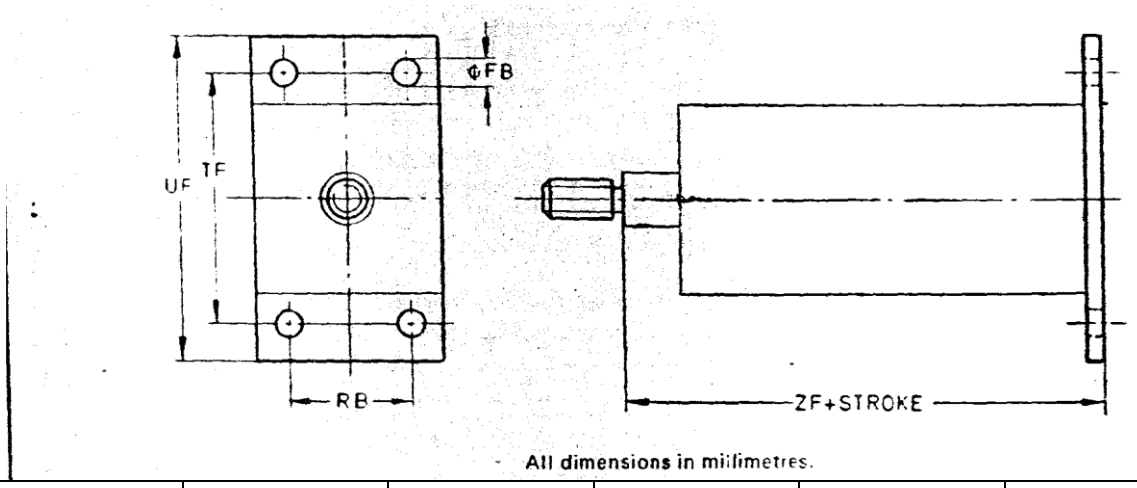


All dimensions in millimetres.

Nominal Bore Dia	FB (H13)	RB (Js 14)	TF (Js 14)	WF	Tolerance on WF	ZB Max
32	7	32	64	16		124
40	9	36	72	20	±1.6	142
50	9	45	90	25		149
63	9	50	100	25		165
80	12	63	126	30	±2	182
100	14	75	150	35		198
125	16	90	180	45		235
160	18	119	230	60	±2.5	264
200	22	135	270	70		280
250	26	165	330	80		305
320	33	200	400	90		340

TABLE 5 DIMENSIONS OF RECTANGULAR FLANGL CAP MOUNTING (MF2)

(Clauses 5 and 6)

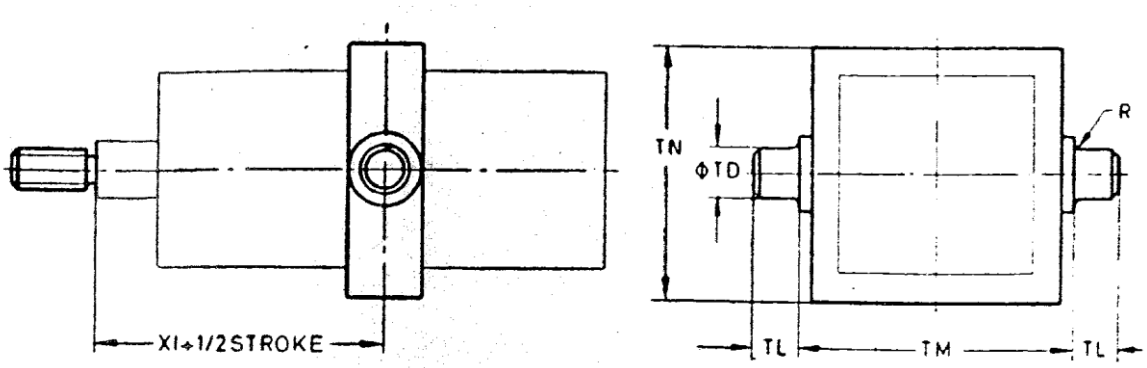


All dimensions in millimetres.

Nominal Bore Dia	FB (H13)	RB (Js 14)	TF (Js 14)	ZF	Tolerance on ZF
32	7	32	64	130	
40-	9	36	72	145	±1.25
50	9	45	90	155	
63	9	50	100	170	
80	12	63	126	190	±1.6
100	14	75	150	205	
125	16	90	180	245	
160	18	119	230	280	+2
200	22	135	270	300	
250	26	165	330	330	
320	33	200	400	370	±2.5

TABLE 6 DIMENSIONS OF MALE TRUNION INTERMEDIATE MOUNTING (MT4)

(Clauses 5)

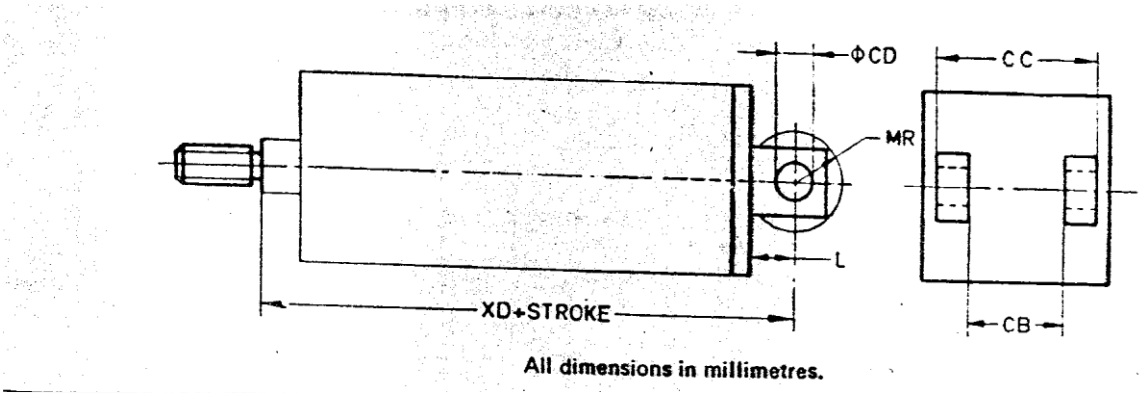


All dimensions in millimetres.

Nominal Bore Dia	TD (E9)	TL (h14)	TM (h14)	TN Max	R Max
32	12	12	50	65	1
40	16	16	63	75	1.5
50	16	16	75	95	1.6
63	20	20	90	105	1.6
80	20	20	110	130	1.6
100	25	25	132	145	2.0
125	25	25	160	175	2.0
160	32	32	200	220	2.5
200	32	32	250	260	2.5
250	40	40	320	320	3.2
320	50	50	400	400	3.2

TABLE 7 DIMENSIONS OF CLEVIS CAP MOUNTING (MP2)

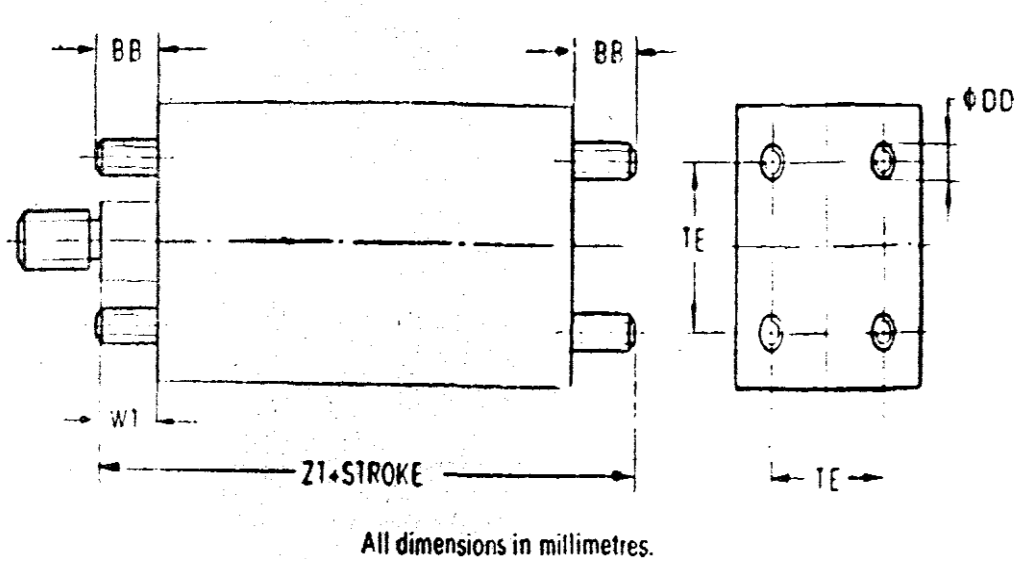
(Clauses 5)



Nominal Bore Dia	CB (H14)	CC (h14)	CD (H9)	L Min	XD	Tolerance On XD	EW	Tolerance on EW
32	26	45	10	12	140		26	
40-	28	52	12	15	160	±1.25	28	
50	32	60	12	15	170		32	-0.2
63	40	70	16	20	190		40	-0.6
80	50	90	16	20	210	±1.6	50	
100	60	110	20	25	230		60	
125	70	130	25	30	275		70	
160	90	170	30	35	315	±2	90	
200	90	170	30	35	335		90	-0.5
250	110	200	40	45	375		110	-1.2
320	120	220	45	50	420	±2.5	120	

TABLE 8 DIMENSIONS OF THE RODS CAP AND HEAD MOUNTING (MX1)

(Clauses 5)



All dimensions in millimetres.

Nominal Bore Dia	WT Min	ZT Max	BB	Tolerance on BB
32	16	147	17	
40	20	162	17	
50	25	178	23	+3
63	25	193	23	0
80	30	218	28	
100	35	233	28	
125	45	279	34	
160	60	322	42	+5
200	70	342	42	0
250	80	380	50	
320	90	430	60	
Note – The dimension TE is to be fixed by the manufacturer.				