GUJARAT GAS

PIPING MATERIAL SPECIFICATION FOR

STEEL PIPELINE, VALVE, FITTIN, FLANGE, GASKET, STUD, NUT

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1. GENERAL

All material shall confirm to latest revision of ASTM, API, MSS, BS standards and/or GGL technical specifications. Design and fabrication shall confirm to ASME for pressure piping, ASME B 31.8 and ASME B 31.3

Piping Material Specification sheets for different classes, which are part of this specifications, shows materials to be used. Each specification sheet shall be used within its Pressure/Temperature range.

2. DEFINITIONS

Shall	:	This verbal form indicates requirements strictly to be followed in order to confirm to the standards and from which no deviation is permitted
Should	:	This verbal form indicates that among several possibilities one is particularly suitable without mentioning or excluding others or that a certain course of action is preferred but not necessarily required
May	:	This verbal form indicates a course of action permissible within the limits of this standard.
Can	:	This verbal form is used for statements of possibility & capability, whether material, physical or casual

3. CODES AND STANDARDS

The latest revision of the following shall be considered as part of this specification.

- ASME B 16.5 - Steel Pipe Flanges and Flanged Fittings
- ASME B 16.9 - Factory made Wrought Steel Butt welding Fittings
- ASME B 16.10 - Face to Face/ End to End dimension of valves.
- ASME B 16.11 - Forged Steel Fittings, Socket Welding and Threaded
- ASME B 16.20 - Metallic Gaskets for Pipe Flanges.
- ASME B 16.21 - Non-Metallic Flat Gasket for Pipe Flanges
- ASME B 16.25 - Butt welding ends
- ASME B 16.34 - Valves- Flanged, Threaded and welding ends
- ASME B 16.47 - Large Diameter Steel Flanges (26" throu 60")
- ASME B 31.3 - Process Piping
- ASME B 31.4 - Pipeline Transportation system for Liquid hydrocarbons & other Liquids
- ASME B 31.8 - Gas Transmissions and Distribution Piping System
- ASME B 36.10 - Welded and Seamless Wrought Steel Pipe
- ASME B 46.1 - Surface Texture
- API 5L - Line Pipe
- API 6D - Pipeline Valves
- API 590 - Steel Line Blank
- API 600 - Steel Gate Valves Flanges and Butt welding Ends
- API 602 - Steel Gate, Globe, and Check Valves for Sizes NPS 4 (DN 100) and Smaller for the Petroleum and Natural Gas Industries
- BS 1873 - Specification for Steel globe and globe stop and check valves (flanged and butt-welding ends) for the petroleum, petrochemical and allied industries
- BS EN ISO 15761 - Steel gate, globe and check valves for sizes DN 100 and smaller, for the petroleum and natural gas industries

- BS 17292 - Metal Ball valves for Petroleum, Petrochemical and allied industries.
- MSS SP 44 - Steel Pipe line Flanges
- MSS SP 75 - Specification for High Test Wrought Butt Welding Fittings
- MSS SP 97 - Integrally Reinforced Forged Branch Outlet Fitting – Socket Welding, Threaded and Butt welding Ends
- ASTM A 105 - Standard Specification for Carbon Steel Forgings for Piping Applications
- ASTM A 193 - Standard specification for Alloy Steel and Stainless Steel bolting Materials for High temp Service and Other Special Purpose Applications
- ASTM A 194 - Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service or both
- ASTM A 320 - Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service
- ASTM A 216 - Standard Specification for Steel Casting, Carbon, Suitable for Fusion Welding, for High Temperature Service
- ASTM A 234 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature
- ASTM A 285 - Standard Specification for Pressure Vessel Plates, Carbon Steel, Low- and Intermediate-Tensile Strength
- ASTM A 694 - Standard Specification for Carbon and Alloy Steel forgings, for Pipe Flanges, Fitting, Valves and Parts for High Pressure Transmission Service.
- ASTM A 333 - Standard Specification for Seamless and Welded Steel Pipe for Low-Temperature Service and Other Applications with Required Notch Toughness
- ASTM A 350 - Standard Specification for Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components ASTM A 420 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low Temperature Service
- ASTM A 860 - Standard Specification for Wrought High Strength Ferritic Steel Butt-Welding Fittings

4. ABBREVIATIONS

4.1 Flange Facing

RTJ	-	Ring Type Joint
FF	-	Flat Face
RF	-	Raised Face

4.2 Fittings

PE	-	Plain End
BE	-	Bevel End
BW	-	Butt Weld
PBE	-	Plain Both End
POE	-	Plain One End
TBE	-	Threaded Both End
TOE	-	Threaded One End
LR	-	Long Radius
SR	-	Short Radius

4.3 Connections

BW	-	Butt-Weld

FLGD	-	Flanged
SCRD	-	Screwed
SO	-	Slip-On
SW	-	Socket Weld
THRD	-	Threaded
WN	-	Weld Neck

4.4 Wall Thickness

SCH	-	Schedule in accordance with ASME B 36.10 or B 36.19
STD	-	Standard Weight Wall Thickness
XS	-	Extra Strong Wall Thickness
XXS	-	Double Extra Strong Wall Thickness

4.5 Valve Description

BC	-	Bolted Cap
BB	-	Bolted Bonnet
ES	-	Extension Stem
FB	-	Full Bore
MO	-	Motor Operated
GO	-	Gear Operated
NRS	-	Non-Rising Stem (with inside screw)
OS&Y	-	Outside Screw and Yoke
RB	-	Reduced Bore
RS	-	Rising Stem
SC	-	Screwed Cap
UB	-	Union Bonnet
UC	-	Union Cap
WB	-	Welded Bonnet

4.6 Pipes Description

BE	-	Beveled End
CS	-	Carbon Steel
ERW	-	Electric Resistance Welded
EFW	-	Electric Fusion Welded
FS	-	Forged Steel
HFI	-	High Frequency Induction
SAW	-	Submerged Arc Welded
SMLS	-	Seamless
NIPL	-	Pipe Nipple

5. GENERAL REQUIREMENT

All materials shall be inspected and tested as per approved Quality Assurance Plan in accordance with relevant standard/code/GGL specifications.

5.1 PIPE:

5.1.1 Pipe dimensions shall be in accordance with API 5L and/or ASME B 36.10 for Carbon Steel pipes.

5.1.2 Nominal pipe sizes 1¼", 2½", 3½" and 5" shall not be used except where they are required for specific intended application. When these sizes are used on equipments, the connecting piping shall be increased or decreased to standard sizes as close to equipment as practical.

5.1.3 All pipes above 2" shall have bevel ends. 1½" and below piping shall have plain/threaded ends as per relevant standard.

5.1.4 Screwed full couplings shall be restricted for instrument connections only (up to 1½").

5.2 FLANGES & FITTINGS

5.2.1 Flanges shall be in accordance with the following codes:

For Class 150 to 600,

Upto 24" NB excluding 22"NB	-	As per ASME B 16.5
26" NB and above	-	As per ASME B 16.47 Series A

5.2.2 Flange bolting shall be fully threaded alloy steel stud bolt with two heavy hex nuts and washer as per the relevant material standard. All CS/AS stud bolts and nuts shall be hot dip galvanized as per ASTM A 153 or Electro Galvanized. Stud bolts shall have full continuous threads & lengths shall be ½" longer than that specified in ASME B 16.5 with the provision that a minimum of one thread & maximum of three threads outside each nut & complete with 2 threads to facilitate bolt tensioning. Stud bolts shall be threaded full length with two heavy hexagonal nuts.

5.2.3 Permanent hook eye shall be provided on blinds of weight greater than 60 lbs to facilitate changing of rings.

5.2.4 The nuts shall be double chamfered, semi-finished heavy hexagonal type and shall be made by the hot forged process & stamped as per respective material specification.

5.2.5 Flange bolts shall be tightened equally and sequentially to impose equal pressure on the gasket and to avoid distortion or over stressing of the equipment.

5.2.6 When rating changes occur at flanged joints both the flanges shall be of higher rating if they are of same material.

5.2.7 The dimensions of spectacle blinds, spacer and blinds shall be as per ASME B 16.48. Spectacle blinds/spacers and blinds for sizes and rating not available in ASME B 16.48 shall be supplied as per manufacturer standard and design shall be submitted to GGL for review and approval. The corrosion allowance shall be as per the respective class.

5.2.8 Special branch fittings and Quick opening closure shall be designed, manufactured, inspected and tested as per ASME B 31.8 code and/or ASME Section VII. The manufacture to furnish design, WPS, PQR to TPIA for approval and 100% radiography examination /UT/MPT witnessed by TPIA. The design shall be submitted to GGL for review.

5.2.9 All fittings shall be seamless in construction unless and otherwise specified. However, fittings in size 16" and above welded fittings may be acceptable, subject to GGL review and approval.

5.2.10 The thickness of reducing fittings shall match the wall thickness of the higher schedule pipe wall and shall meet the requirement of ASME B 31.8.

5.2.11 Fittings shall have at least the same nominal wall thickness as the pipe to which they attach. Welded fittings materials shall be compatible with the piping material.

5.2.12 Changes in directions in piping shall normally be made by long radius (LR) butt welded bend in accordance with Piping Material Specification. The LR bend shall be manufactured and supply as per GGL technical data sheet

and Schedule of Rate.

5.2.13 Cold formed or Miter bends are not permitted.

5.2.14 Short radius (SR) welding elbows shall not be used unless absolutely required for clearance purpose. These shall be marked as SR on piping layout drawings and isometrics.

5.2.15 All flow tee fittings shall be designed, manufactured, heat treated, inspected & tested as per relevant standards/code requirement and GGL specification. For welded fittings manufacturer to furnish design, WPS, PQR to TPIA for approval and 100% radiography examination report/UT/MT/DP to be witnessed by TPIA.

5.2.16 Special branch fittings shall be designed, manufactured, inspected and tested as per ASME B 31.8 code.

5.2.17 All instrument connections shall be from top or central-horizontal of the header.

5.2.18 Gaskets for raised face flanges shall be spiral wound, PTFE or non-asbestos (CNAF) filled with inner and outer ring with SS 316 in accordance with ASME B 16.20. All spiral wound gaskets shall be supplied with SS outer centering ring and inner compression ring of SS.

5.2.19 All pipe threads, coupling and plug threads shall be NPT in accordance with ASME B 1.20.1.

5.2.20 Unless otherwise specified, threaded nipples and caps shall be used for instrument connections and hydrostatic vent & drains and will normally be carbon steel.

5.2.21 For Pipe joints of size 1 1/2" & below, SW or threaded fittings shall be used.

5.3 VALVES

5.3.1 Vendor shall supply valves in accordance with the valve specification along with auxiliaries, if any , such as gear operated, bypass, sealant injection, vent, drains etc. wherever specified in the specification/data sheets, notes and other enclosures to the requisition. In case of conflict/s between valve specification data sheet, GGL Technical specification and PMS, specification data sheet shall govern.

5.3.2 For valves sizes 2" NB and above, notch toughness values shall be determined to provide protection against fracture initiation and propagation. The minimum energy value and shear area shall be as per GGL specification or as per relevant code and standard if not specified in GGL specification.

5.3.3 Valves shall be installed for ease of operation and maintenance. Valves stem should be directing upwards with vertical axis for ease in operation.

5.3.4 All flanged valves shall have flanges integral (except forged valves) with the valve body. Flange face finish shall be as per ASME B 16.5 unless otherwise specified in GGL valve specification/data sheets.

5.3.5 All valves with non-metallic seats and seals shall be fire safe type, Fire safe type test shall be as per API 607/ API 6FA or BS 6755 part-2 (Latest editions) by approved certification body. Fire safe type certificate shall be reviewed by GGL/ TPIA and shall be furnished to the GGL for record.

5.3.6 Following requirement of Check valves shall be met over and above the valve specification sheet requirements

5.3.6.1 Wherever check valve disc assembly is supported from the cover of check valves the following shall be ascertained.

- Positive location/positioning of cover must be provided to ensure correct alignment of valve disc.
- Hinge pin design must permit accurate alignment of the disc and valve seat.

5.3.6.2 For heavy check valves (50 kg & above), provisions shall be available for lifting by way of lugs, eyebolts and other such standard devices per standard industry practice.

5.3.7 If any overlay weld-deposit is used for the body seat ring, seating surface, the seat ring base material shall be at least equal to the corrosion resistance of material of the shell.

5.3.8 Soft-seated ball and plug valves shall be supplied with anti-static devices.

5.3.9 All ball valves shall be Bi-directional.

5.3.10 Ball shall be solid type unless otherwise specified.

5.3.11 Body seat shall be renewable type.

5.3.12 Ball valve with lubrication fittings, for the ball seats as well as for the stem, shall be provided to prevent the minor leaks or reduce operating torque.

5.3.13 Trunion -mounted ball valves shall be supplied with provision for double block and bleed facility.

5.3.14 A body bleed port with Globe valve, independent of lubrication fittings shall be provided

5.3.15 Gear operated shall be as under, with position indicators for open/close positions, with limit stops (limit stops are not applicable for gate and globe valves)

For Globe valves	-	Totally enclosed bevel gear in grease case with grease nipples/plugs
For Ball / Plug valves	-	Totally enclosed helical worm or combination of helical worm and spur gear in grease case with grease nipples/plugs

5.3.16 Ball valves even with wrench or lever operators shall have "Open" Position indicators with limit stops.

5.3.17 Wherever lock open (LO) / lock close (LC) specified in the valve Bill of Material, the valve shall be provided with locking arrangement such as pad lock and chain.

5.3.18 All valves shall be hydro tested & air tested for body and seat as per respective valve data sheet. The sequence of pressure testing of soft seated valves shall be as follows:

Initially the hydro test for body shall be performed, after this the hydro test for seat shall be done then the low-pressure air test and high pressure pneumatic test shall be performed. In case the valve does not pass the low pressure air test and high pressure pneumatic leakage is observed through the seat, vendor shall replace the seats and entire test sequence is to be repeated to check the soundness of valve. The test and retest shall be witness by GGL/TPIA.

5.3.19 Steel casting of valves shall be 100% radiographed irrespective of rating and size in accordance with ASME B16.34 Mandatory appendices – I.

5.3.20 Magnetic particle and Dye penetration testing shall also be done on all castings. Procedure and acceptance criteria shall be as per ASME B16.34 appendices – II and III.

5.3.21 For all valve forging, ultrasonic testing and magnetic particle testing shall be carried out as per ASME B16.34 Annexure III & IV.

5.3.22 Valve body thickness, wherever not specified in the standard, shall be as per ASME B 16.34. The corrosion allowance shall be considered as 1.6 mm while deriving the design thickness.

5.3.23 Socket weld end valves with non-metallic seats or seals shall be provided with 80mm long nipples having materials and thickness equivalent to those specified in the relevant piping specifications. These nipples shall be welded and tested to both ends of the valve by the Manufacturer, before fitting packing, seats and seals. The pipe wall thickness of nipple shall be selected considering the valve body thickness.

5.3.24 Stem protection is required for all CS globe valves where 11-13% Cr. trims are specified. The stem shall be totally enclosed in a sleeve, which shall be packed with grease.

5.3.25 No cast, ductile or malleable iron, aluminum, plastic or copper bearing alloy shall be used in Natural Gas service.

5.3.26 All material shall be new, clean and free from rust, pits and obvious defects.

5.3.27 Material selection for soft seats/seals for Ball valves shall be suitable for maximum differential pressure, corresponding to pressure/temperature rating and service fluid handled on a continuous basis. The seat/seal material in valve data sheets for Ball valves is indicative only. Vendor can propose an alternative seat provided he furnishes the pressure/temperature rating of the proposed seat material which shall cover the class temperature pressure rating of the valve and is superior to the seat/seal material specified in the valve datasheets and subject to GGL approval.

5.4 MARKING:

5.4.1 Valve marking, symbols, abbreviations etc. shall be in accordance with API 6D and MSS-SP-25 and/or the standard referred in the specification sheet as applicable. Vendor's name, valve rating, material designation, nominal size, direction of flow (if any) etc. shall be integral on the body.

5.4.2 Each valve shall have a corrosion resistant tag giving size, valve tag no. / code no., securely attached to the valve body.

5.4.3 Paint or ink for marking shall not contain any harmful metal or metal salt such as zinc, lead or copper which cause corrosive attach on heating.

5.5 DISPATCH:

5.5.1 Each end of the valve shall be protected, against ingress of foreign material & damages, with the following materials:

Flange face	:	Wood or plastic cover
Beveled end	:	Wood or plastic cover
SW or Screwed End	:	Plastic cap

5.5.2 End protector of wood/plastic to be used on the flange faces shall be attached by at least three bolts and shall not be smaller than the outside diameter of the flange. However the plastic cap for SW & Screwed. End valves shall be press fit type.

5.6 OTHERS:

5.6.1 Flange joints to be kept Minimum.

5.6.2 All Temperature connections shall be of size 1/2" NB flanged.

5.6.3 Pressure connections shall be 3/4" SW nipples with isolation valve.

5.6.4 Globe type valve shall be used for TMBV double block & bleed test.

PIPING MATERIAL SPECIFICATION	GUJARAT GAS LIMITED	PRESSURE RATING : 150#
		DESIGN PRESSURE : 19 BARG
		TEMPERATURE RANGE : 0°C - 65°C
		LOCATION CLASS : CLASS IV
CODE : ASME B 31.8	SERVICE : NATURAL GAS	CORROSION ALL. : 1.5 MM inclusive

ITEM	SHORT CODE	SIZE FROM-THRU	DESCRIPTION	RATING /SCH. / WT	DIMENSION STANDARD	MATERIAL STANDARD	REMARKS
PIPELINE	PL	4"- 12"	BE, ERW OR SEAMLESS	6.4 MM	API 5L	API 5L Gr. X52 (PSL 2)	U/G-PRIMARILY ELECTRIC RESISTANCE WELDED A/G- PRIMARILY SEAMLESS
STATION PIPING	SP	2"	BE, SEAMLESS	SCH 80	ASME B 36.10	ASTM A 106 Gr. B Charpy at 0°C OR ASTM A 333 Gr. 6	
		3"	BE, SEAMLESS	SCH 40	ASME B 36.10	ASTM A 106 Gr. B Charpy at 0°C OR ASTM A 333 Gr. 6	
		4" - 12"	BE, SEAMLESS	6.4 MM	ASME B 36.10	ASTM A 106 Gr. B Charpy at 0°C OR ASTM A 333 Gr. 6	
VENT PIPE	VP	1/2" – 1 ½"	PE, SEAMLESS	SCH 80	ASME B 36.10	ASTM A 106 Gr. B Charpy at 0°C OR ASTM A 333 Gr. 6	
		2"	BE, SEAMLESS	SCH 80	ASME B 36.10	ASTM A 106 Gr. B Charpy at 0°C OR ASTM A 333 Gr. 6	
		3"	BE, SEAMLESS	SCH 40	ASME B 36.10	ASTM A 106 Gr. B Charpy at 0°C OR ASTM A 333 Gr. 6	
		4"	BE, SEAMLESS	6.4 MM	ASME B 36.10	ASTM A 106 Gr. B Charpy at 0°C OR ASTM A 333 Gr. 6	
BALL VALVE	BLV	1/2" – 1 ½"	SW OR THREADED	800#	BS 17292	BODY: ASTM A 105 (Charpy at 0°C) BALL: A351 CF8M/SS316	FLOATING BALL VALVE SOCKET WELD - ASME B 16.11 THREDED - ASME B1.20.1.
		2" - 3"	BW OR FLGD RF 125-250 AARH	150#	API 6D	BODY: ASTM A 216 Gr. WCB (Charpy at 0°C) BALL: A351 CF8M/SS316	FLOATING BALL VALVE BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
		4" -12"	BW OR FLGD RF 125-250 AARH	150#	API 6D	BODY: ASTM A 216 Gr. WCB (Charpy at 0°C) BALL: A351 CF8M/SS316	TRUNION MOUNTED BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5 UNDERGROUND- EXTENDED STEM
GLOBE VALVE	GLV	1/2" – 1 ½"	SW OR THREADED	800#	BS EN ISO 15761	BODY: ASTM A 105 (Charpy at 0° C) TRIM: SS316	SOCKET WELD - ASME B 16.11 THREDED - ASME B1.20.1.

		2"-4"	BW OR FLGD RF 125-250 AARH	150#	BS EN ISO 15761	BODY: ASTM A 216 Gr. WCB Charpy at 0° C TRIM: SS316	BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
		Above 4"	BW OR FLGD RF 125-250 AARH	150#	BS 1873	BODY: ASTM A 216 Gr. WCB Charpy at 0° C TRIM: SS316	BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
LIFT CHECK VALVE	NRV	1/2" – 1 ½"	SW	800#	BS EN ISO 15761	BODY: ASTM A 105 Charpy at 0°C	HORIZONTAL INSTALLATION SOCKET WELD - ASME B 16.11
SWING CHECK VALVE		2" – 12"	BW OR FLGD RF 125-250 AARH	150#	API 6D OR BS 1868	BODY: ASTM A 216 Gr. WCB Charpy at 0° C	HORIZONTAL INSTALLATION OR VERTICAL INSTALLATION WITH UPWARD FLOW DIRECTION BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
PLUG VALVE	PLV	2" – 12"	BW OR FLGD RF	150#	API 6D	BODY: ASTM A 216 Gr. WCB Charpy at 0° C	BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
ELBOWS LR / LR BENDS	EL	1/2" – 1 ½"	SW, 1.5 D	3000#	ASME B 16.11	ASTM A 105 Gr. B Charpy at 0° C	SOCKET WELD - ASME B 16.11
		2"-3"	BW, 1.5D	M	ASME B 16.9	ASTM A 234 Gr. WPB Charpy at 0° C	BUTT WELD - ASME B 16.25
		4" - 12"	BW, 1.5 D OR 3D	M	ASME B 16.9	MSSP 75 WPHY 52 (For pipeline) / ASTM A 234 WPB Charpy at 0° C OR (For Station Piping)	BUTT WELD - ASME B 16.25
REDUCERS CONCENTRIC	RC	2"-3"	BW	MXM	ASME B 16.9	ASTM A 234 Gr. WPB Charpy at 0° C	BUTT WELD - ASME B 16.25
		4" - 12"	BW	MXM	ASME B 16.9	MSSP 75 WPHY 52 (For pipeline) / ASTM A 234 WPB Charpy at 0° C (For Station Piping)	BUTT WELD - ASME B 16.25
TEE EQUAL AND REDUCING	T	1/2" – 1 ½"	SW	3000#	ASME B 6.11	ASTM A 105 Charpy at 0° C	SOCKET WELD - ASME B 16.11
		2"-3"	BW	MXM	ASME B 16.9	ASTM A 234 Gr. WPB Charpy at 0° C	BUTT WELD - ASME B 16.25
		4" - 12"	BW	MXM	ASME B 16.9	MSSP 75 WPHY 52 (For pipeline) / ASTM A 234 WPB Charpy at 0° C (For Station Piping)	BUTT WELD - ASME B 16.25
SOCKOLET /THREDOLET	S	1/2" to 1 1/2"	SW OR THREADED	3000#	MSS-SP 97	ASTM A 105 Charpy at 0° C	SOCKET WELD - ASME B 16.11 THREADED - ASME B1.20.1
WELDOLET	W	2" – 12"	BW	M XM	MSS-SP 97	ASTM A 105 Charpy at 0° C	BUTT WELD - ASME B 16.25
END CAP	C	1/2" – 1 ½"	SW	3000#	ASME B 16.11	ASTM A 105 Charpy at 0° C	SOCKET WELD - ASME B 16.11 BUTT WELD - ASME B 16.25
		2" – 12"	BW	M	ASME B 16.9	ASTM A 234 Gr. WPB Charpy at 0° C	
PIPE NIPPLE	NIPL	1/2" – 1 ½"	PE, SEAMLESS	SCH 80	ASME B 36.10	ASTM A 106 Gr. B Charpy at 0° C	-

COUPLING (FULL or HALF)	COUP	1/2" – 1 ½"	SW OR THREADED	3000#	ASME B 16.11	ASTM A 105 Charpy at 0° C	SOCKET WELD - ASME B 16.11 THREADED - ASME B1.20.1
FLANGE	FW	1/2" to 1 1/2"	SORF, 125-250 AARH	150#	ASME B 16.5	ASTM A 105 Charpy at 0° C	-
		2"-3"	WNRF, 125-250 AARH	150# Bevel End WT M	ASME B 16.5	ASTM A 105 Charpy at 0° C	-
		4" – 12"	WNRF, 125-250 AARH	150# Bevel End WT M	ASME B 16.5	MSS SP 44 GR F 52 (For pipeline)/ ASTM A 105 with Charpy at 0° C (For station piping)	-
BLIND FLANGE	FB	1/2" to 1 1/2"	RF, 125-250 AARH	150#	ASME B 16.5	ASTM A 105 Charpy at 0° C	-
		2"-3"	RF, 125-250 AARH	150#	ASME B 16.5	ASTM A 105 Charpy at 0° C	-
		4" – 12"	RF, 125-250 AARH	150#	ASME B 16.5	MSS SP 44 Gr. F 52 (For pipeline)/ ASTM A 105 with Charpy at 0° C (For station piping)	-
SPECTACLE BLIND	FSB	2"-12"	RF, 125-250 AARH	150#	ASME B 16.48	ASTM A 105 Charpy at 0° C	-
STUD & NUT / BOLT	B	1/2" – 12"	-	-	ASME B 18.2	STUD:ASTM A 193 B7 NUT: ASTM A 194 Gr.2H ASTM A 153	HOT DIP GALVENIZED
GASKET SPIRAL WOUND	G	1/2" – 12"	-	0.175" THICKNESS	ASME B 16.20	SPIRAL WOUND CNAF FILLER + INNER & OUTER RING SS316	COMPATIBLE WITH ASME B 16.5 FLANGES

NOTE:

1. M = THICKNESS TO MATCH PIPE WALL THICKNESS
2. THIS SPECIFICATIONS SHALL BE READ IN CONJUCTION WITH GENERAL NOTES AND DATA SHEETS & TECHNICAL SPECIFICATIONS OF AN INDIVIDUAL ITEM

BRANCH TABLE

BRANCH SIZE

HEADER SIZE	1/2"	3/4"	1"	1 ½"	2"	3"	4"	6"	8"	10"	12"	14"	16"
1/2"	T												
3/4"	T	T											
1"	T	T	T										
1 ½"	T	T	T	T									
2"	S	T	T	T	T								
3"	S	S	S,W	T	T	T							
4"	S	S	S	S	T	T	T						
6"	S	S	S	S	W	T	T	T					
8"	S	S	S	S	W	W	T	T	T				
10"	S	S	S	S	W	W	T	T	T	T			
12"	S	S	S	S	W	W	W	T	T	T	T		
14"	S	S	S	S	W	W	W	T	T	T	T	T	
16"	S	S	S	S	W	W	W	T	T	T	T	T	T

LEGEND

T : EQUAL/REDUCING TEE
S : SOCKOLET
W : WELDOLET

PIPING MATERIAL SPECIFICATION	GUJARAT GAS LIMITED	PRESSURE RATING : 300#
		DESIGN PRESSURE : 49 BARG
		TEMPERATURE RANGE : -10°C - 65°C
		LOCATION CLASS : CLASS IV
CODE : ASME B 31.8	SERVICE : NATURAL GAS	CORROSION ALL. : 1.5MM inclusive

ITEM	SHORT CODE	SIZE FROM-THRU	DESCRIPTION	RATING /SCH. / WT	DIMENSION STANDARD	MATERIAL STANDARD	REMARKS
PIPELINE	PL	4"- 12"	BE, ERW OR SEAMLESS	6.4 MM	API 5L	API 5L Gr. X52 (PSL 2)	U/G-PRIMARILY ELECTRIC RESISTANCE WELDED A/G- PRIMARILY SEAMLESS CHARPY TEST AS PER MOC Note: For 12" MAOP is 42 Barg for operating the pipeline at hoop stress below 30%
STATION PIPING	SP	2"	BE, SEAMLESS	SCH 80	ASME B 36.10	ASTM A 333 Gr. 6	
		3"	BE, SEAMLESS	SCH 40	ASME B 36.10	ASTM A 333 Gr. 6	
		4" - 6"	BE, SEAMLESS	6.4 MM	ASME B 36.10	ASTM A 333 Gr. 6	
		8" - 12"	BE, SEAMLESS	SCH 40	ASME B 36.10	ASTM A 333 Gr. 6	
VENT PIPE	VP	1/2" – 1 ½"	PE, SEAMLESS	SCH 80	ASME B 36.10	ASTM A 333 Gr. 6	CHARPY TEST AS PER MOC
		2"	BE, SEAMLESS	SCH 80	ASME B 36.10	ASTM A 333 Gr. 6	
		3"	BE, SEAMLESS	SCH 40	ASME B 36.10	ASTM A 333 Gr. 6	
		4"	BE, SEAMLESS	6.4 MM	ASME B 36.10	ASTM A 333 Gr. 6	
BALL VALVE	BLV	1/2" – 1 ½"	SW OR THREADED	800#	BS EN ISO 17292	BODY: ASTM A 350 Gr. LF2 BALL: A351 CF8M/SS316	FLOATING BALL VALVE SOCKET WELD - ASME B 16.11 THREDED - ASME B1.20.1.
		2" - 3"	BW OR FLGD RF 125-250 AARH	300#	API 6D	BODY: ASTM A 352 Gr. LCB / LCC ASTM A 350 Gr. LF2 BALL:	FLOATING BALL VALVE BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
		4" -12"	BW OR FLGD RF 125-250 AARH	300#	API 6D	U/G BODY: ASTM A 216 Gr. WCB A/G BODY ASTM A 352 Gr. LCB/LCC ASTM A 350 Gr. LF2 BALL: A351 CF8M/SS316	TRUNION MOUNTED BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5 UNDERGROUND- EXTENDED STEM
GLOBE VALVE	GLV	1/2" – 1 ½"	SW OR THREADED	800#	BS EN ISO 15761	BODY: ASTM A 350 Gr. LF2 TRIM: SS 316	SOCKET WELD - ASME B 16.11 THREDED - ASME B1.20.1.

		2" -4"	BW OR FLGD RF 125-250 AARH	300#	BS EN ISO 15761	BODY ASTM A 352 Gr. LCB/LCC, ASTM A 350 Gr. LF2 TRIM:	BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
		Above 4"	BW OR FLGD RF 125-250 AARH	300#	BS 1873	BODY ASTM A 352 Gr. LCB/LCC, ASTM A 350 Gr. LF2 TRIM:	BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
LIFT CHECK VALVE	NRV	1/2" – 1 ½"	SW	800#	BS EN ISO 15761	BODY: ASTM A 350 Gr. LF2	HORIZONTAL INSTALLATION SOCKET WELD - ASME B 16.11
SWING CHECK VALVE		2" – 12"	BW OR FLGD RF 125-250 AARH	300#	API 6D OR BS 1868	BODY ASTM A 352 Gr. LCB/LCC	HORIZONTAL INSTALLATION OR VERTICAL INSTALLATION WITH UPWARD FLOW DIRECTION BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
PLUG VALVE	PLV	2" – 12"	BW OR FLGD RF	300#	API 6D	BODY ASTM A 352 Gr. LCB/LCC,	BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
ELBOWS LR / LR BENDS	EL	1/2" – 1 ½"	SW, 1.5 D	3000#	ASME B 16.11	ASTM A 350 Gr. LF2	SOCKET WELD – ASME B 16.11
		2"-3"	BW, 1.5D	M	ASME B 16.9	ASTM A 420 Gr. WPL6	BUTT WELD - ASME B 16.25
		4" - 12"	BW, 1.5 D OR 3D	M	ASME B 16.9	MSSP 75 WPHY 52 (For pipeline) / ASTM A 420 Gr. WPL6 (For Station Piping)	BUTT WELD - ASME B 16.25
REDUCERS CONCENTRIC	RC	2"-3"	BW	MXM	ASME B 16.9	ASTM A 420 Gr. WPL6	BUTT WELD - ASME B 16.25
		4" - 12"	BW	M x M	ASME B 16.9	MSSP 75 WPHY 52 (For pipeline) / ASTM A 420 Gr. WPL6 (For Station Piping)	BUTT WELD - ASME B 16.25
TEE EQUAL AND REDUCING	T	1/2" – 1 ½"	SW	3000#	ASME B 6.11	ASTM A 350 Gr. LF2	SOCKET WELD – ASME B 16.11
		2"-3"	BW	MXM	ASME B 16.9	ASTM A 420 Gr.WPL 6	BUTT WELD - ASME B 16.25
		4" - 12"	BW	MXM	ASME B 16.9	MSSP 75 WPHY 52 (For pipeline) / ASTM A 420 Gr. WPL 6 (For Station Piping)	BUTT WELD - ASME B 16.25
SOCKOLET / THREDOLET	S	1/2" - 1 1/2"	SW OR THREADED	3000#	MSS-SP 97	ASTM A 350 Gr. LF2	SOCKET WELD - ASME B 16.11 THREADED - ASME B1.20.1
WELDOLET	W	2" – 12"	BW	MXM	MSS-SP 97	ASTM A 350 Gr. LF2	BUTT WELD - ASME B 16.25
END CAP	C	1/2" – 1 ½"	SW	3000#	ASME B 16.11	ASTM A350 Gr. LF2	SOCKET WELD - ASME B 16.11
		2" – 3"	BW	M	ASME B16.9	ASTM A 420 Gr.WPL 6	BUTT WELD - ASME B 16.25
		4"-12"	BW	M	ASME B 16.9	MSSP 75 WPHY 52 (For pipeline) / ASTM A 420 Gr. WPL 6 (For Station Piping)	BUTT WELD - ASME B 16.25
PIPE NIPPLE	NIPL	1/2" – 1 ½"	PE, SEAMLESS	SCH 80	ASME B 36.10	ASTM A 333 Gr. 6	-

COUPLING (FULL or HALF)	COUP	1/2" – 1 ½"	SW OR THREADED	3000#	ASME B 16.11	ASTM A 350 Gr. LF2	SOCKET WELD - ASME B 16.11 THREADED - ASME B1.20.1
FLANGE	FW	1/2"- 1 1/2"	SORF, 125-250 AARH	300#	ASME B 16.5	ASTM A 350 Gr. LF2	-
		2"-3"	WNRF, 125-250 AARH	300# Bevel End WT M	ASME B 16.5	ASTM A 350 Gr. LF2	-
		4" - 12"	WNRF, 125-250 AARH	300# Bevel End WT M	ASME B 16.5	MSS SP 44 Gr.F52 (For pipeline)/ ASTM A 350 Gr. LF2 (For station piping)	-
BLIND FLANGE	FB	1/2" - 1 1/2"	RF, 125-250 AARH	300#	ASME B 16.5	ASTM A 350 Gr. LF2	-
		2"-3"	RF, 125-250 AARH	300#	ASME B 16.5	ASTM A 350 Gr. LF2	-
		4"-12"	RF, 125-250 AARH	300#	ASME B 16.5	MSS SP 44 Gr. F52 (For pipeline)/ ASTM A 350 Gr. LF2 (For station piping)	-
SPECTACLE BLIND	FSB	2-12"	RF, 125-250 AARH	300#	ASME B 16.48	MSS SP 44 Gr. F52 (For pipeline)/ ASTM A 350 Gr. LF2 (For station piping)	-
STUD & NUT / BOLT	B	1/2" – 12"	-	-	ASME B 18.2	STUD:ASTM A 320 Gr. L7 NUT: ASTM A 194 Gr.7	HOT DIP GALVENIZED
GASKET SPIRAL WOUND	G	1/2" – 12"	-	0.175" THICKNESS	ASME B 16.20	SPIRAL WOUND CNAF FILLER + INNER & OUTER RING SS316	COMPATIBLE WITH ASME B 16.5 FLANGES

NOTE:

1. M = THICKNESS TO MATCH PIPE WALL THICKNESS
2. THIS SPECIFICATIONS SHALL BE READ IN CONJUCTION WITH GENERAL NOTES AND DATA SHEETS & TECHNICAL SPECIFICATIONS OF AN INDIVIDUAL ITEM

BRANCH TABLE

BRANCH SIZE

HEADER SIZE	1/2"	3/4"	1"	1 ½"	2"	3"	4"	6"	8"	10"	12"	14"	16"
1/2"	T												
3/4"	T	T											
1"	T	T	T										
1 ½"	T	T	T	T									
2"	S	T	T	T	T								
3"	S	S	S,W	T	T	T							
4"	S	S	S	S	T	T	T						
6"	S	S	S	S	W	T	T	T					
8"	S	S	S	S	W	W	T	T	T				
10"	S	S	S	S	W	W	T	T	T	T			
12"	S	S	S	S	W	W	W	T	T	T	T		
14"	S	S	S	S	W	W	W	T	T	T	T	T	
16"	S	S	S	S	W	W	W	T	T	T	T	T	T

LEGEND

T : EQUAL/REDUCING TEE
S : SOCKOLET
W : WELDOLET

PIPING MATERIAL SPECIFICATION	GUJARAT GAS LIMITED	PRESSURE RATING : 600# DESIGN PRESSURE : 98 BARG TEMPERATURE RANGE : -10°C -65°C LOCATION CLASS : CLASS III & IV
CODE : ASME B 31.8	SERVICE : NATURAL GAS	CORROSION ALL. :1.5MM inclusive

ITEM	SHORT CODE	SIZE FROM-THRU	DESCRIPTION	RATING /SCH. / WT	DIMENSION STANDARD	MATERIAL STANDARD	REMARKS
PIPELINE	PL	4"- 6"	BE, ERW OR SEAMLESS	6.4 MM	API 5L	API 5L Gr. X52 (PSL2)	U/G-PRIMARILY ELECTRIC RESISTANCE WELDED A/G- PRIMARILY SEAMLESS CHARPY AS PER MOC Note : Hoop Stress below 30%
		8"		9.5 MM	API 5L	API 5L Gr. X65 (PSL2)	
		12"		12.7 MM	API 5L	API 5L Gr. X65 (PSL2)	
STATION PIPING	SP	2"	BE, SEAMLESS	SCH 80	ASME B 36.10	ASTM A 333 Gr. 6	
		3"	BE, SEAMLESS	SCH 40	ASME B 36.10	ASTM A 333 Gr. 6	
		4"	BE, SEAMLESS	SCH 80	ASME B 36.10	ASTM A 333 Gr. 6	
		6"	BE, SEAMLESS	SCH 80	ASME B 36.10	ASTM A 333 Gr. 6	
		8" - 12"	BE, SEAMLESS	SCH 80	ASME B 36.10	ASTM A 333 Gr. 6	
VENT PIPE	VP	1/2" – 1 ½"	PE, SEAMLESS	SCH 160	ASME B 36.10	ASTM A 333 Gr. 6	CHARPY AS PER MOC
		2"	BE, SEAMLESS	SCH 80	ASME B 36.10	ASTM A 333 Gr. 6	
		3"	BE, SEAMLESS	SCH 40	ASME B 36.10	ASTM A 333 Gr. 6	
		4"	BE, SEAMLESS	SCH 80	ASME B 36.10	ASTM A 333 Gr. 6	
BALL VALVE	BLV	1/2" – 1 ½"	SW OR THREADED	800#	BS 17292	BODY: ASTM A 350 Gr. LF2 BALL: A351 CF8M/SS316	FLOATING BALL VALVE SOCKET WELD – ASME B 16.11 THREDED - ASME B1.20.1.
		2" - 3"	BW OR FLGD RF 125-250 AARH	600#	API 6D	BODY: ASTM A 352 Gr. LCB/LCC, ASTM A 350 Gr. LF2 BALL: A351 CF8M/SS316	TRUNION MOUNTED BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
		4" -12"	BW OR FLGD RF 125-250 AARH	600#	API 6D	U/G BODY: ASTM A 216 Gr. WCB A/G BODY ASTM A 352 Gr. LCB/LCC, ASTM A 350 Gr. LF2 BALL: A351 CF8M/SS316	TRUNION MOUNTED BUTT WELD - ASME B 16.25 FLANGED END – ASME B 16.5 UNDERGROUND- EXTENDED STEM
GLOBE VALVE	GLV	1/2" – 1 ½"	SW OR THREADED	800#	BS EN ISO 15761	BODY: ASTM A 350 Gr. LF2 TRIM: SS316	SOCKET WELD - ASME B 16.11 THREDED - ASME B1.20.1
		2" – 4"	BW OR FLGD RF 125-250 AARH	600#	BS EN ISO 15761	BODY ASTM A 352 Gr. LCB/LCC, ASTM A 350 Gr. LF2 TRIM: SS316	BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5

		Above 4"	BW OR FLGD RF 125-250 AARH	600#	BS 1873	BODY ASTM A 352 Gr. LCB/LCC, ASTM A 350 Gr. LF2 TRIM: SS316	BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
LIFT CHECK VALVE	NRV	1/2" – 1 ½"	SW	800#	BS EN ISO 15761	BODY: ASTM A 350 Gr. LF2	HORIZONTAL INSTALLATION SOCKET WELD - ASME B 16.11
SWING CHECK VALVE		2" – 12"	BW OR FLGD RF 125-250 AARH	600#	API 6D OR BS 1868	BODY ASTM A 352 Gr. LCB/LCC, ASTM A 350 Gr. LF2	HORIZONTAL INSTALLATION OR VERTICAL INSTALLATION WITH UPWARD FLOW DIRECTION BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
PLUG VALVE	PLV	2" – 12"	BW OR FLGD RF	600#	API 6D	BODY ASTM A 352 Gr. LCB/LCC, ASTM A 350 Gr. LF2	BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
ELBOWS LR / LR BENDS	EL	1/2" – 1 ½"	SW, 1.5 D	6000#	ASME B 16.11	ASTM A 350 Gr. LF 2	SOCKET WELD - ASME B 16.11
		2"-3"	BW, 1.5D	M	ASME B 16.9	ASTM A 420 Gr. WPL6	BUTT WELD - ASME B 16.25
		4" - 8"	BW, 1.5 D for station piping and 3D or 6D for underground pipeline	M	ASME B 16.9	MSSP 75 WPHY 52 (For pipeline) / ASTM A 420 Gr. WPL6 (For Station Piping)	BUTT WELD - ASME B 16.25
		12"	BW, 1.5 D for station piping and 3D or 6D for underground pipeline	M	ASME B 16.9	MSSP 75 WPHY 65 (For pipeline) / ASTM A 420 Gr. WPL6 (For Station Piping)	BUTT WELD - ASME B 16.25
REDUCERS CONCENTRIC	RC	2"-3"	BW	M x M	ASME B 16.9	ASTM A 420 Gr. WPL6	BUTT WELD - ASME B 16.25
		4" - 8"	BW, 1.5 D for station piping and 3D or 6D for underground pipeline	M x M	ASME B 16.9	MSSP 75 WPHY 52 (For pipeline) / ASTM A 420 Gr. WPL6 (For Station Piping)	BUTT WELD - ASME B 16.25
		12"	BW	M x M	ASME B 16.9	MSSP 75 WPHY 65 (For pipeline) / ASTM A 420 Gr. WPL6 (For Station Piping)	BUTT WELD - ASME B 16.25
TEE EQUAL AND REDUCING	T	1/2" – 1 ½"	SW	6000#	ASME B1 6.11	ASTM A 350 Gr.LF2	SOCKET WELD - ASME B16.11
		2"-3"	BW	M x M	ASME B 16.9	ASTM A 420 Gr.WPL 6	BUTT WELD - ASME B 16.25
		4" - 8"	BW	M x M	ASME B 16.9	MSSP 75 WPHY 52 (For pipeline) / ASTM A 420 Gr. WPL6 (For Station Piping)	BUTT WELD - ASME B 16.25
		12"	BW	M x M	ASME B 16.9	MSSP 75 WPHY 65 (For pipeline) / ASTM A 420 Gr. WPL6 (For Station Piping)	BUTT WELD - ASME B 16.25
SOCKOLET / THREDOLET	S	1/2" to 1 1/2"	SW OR THREADED	6000#	MSS SP 97	ASTM A 350 Gr.LF2	SOCKET WELD - ASME B 16.11 BUTT WELD - ASME B 16.25
WELDOLET	W	2" – 12"	BW	MXM	MSS SP 97	ASTM A 350 Gr. LF2	BUTT WELD - ASME B 16.25

END CAP	C	1/2" – 1 ½"	SW	6000#	ASME B 16.11	ASTM 350 Gr.LF2	SOCKET WELD - ASME B 16.11
		2" – 3"	BW	M	ASME B16.9	ASTM A 420 Gr.WPL 6	BUTT WELD - ASME B 16.25
		4" - 8"	BW, 1.5 D OR 3D	M	ASME B 16.9	MSSP 75 WPHY 52 (For pipeline) / ASTM A 420 Gr. WPL6 (For Station Piping)	BUTT WELD - ASME B 16.25
		12"	BW	M	ASME B 16.9	MSSP 75 WPHY 65 (For pipeline) / ASTM A 420 Gr.WPL 6 (Station Piping)	BUTT WELD - ASME B 16.25
PIPE NIPPLE	NIPL	1/2" – 1 ½"	PE, SEAMLESS	SCH 160	ASME B 36.10	ASTM A 333 Gr. 6	-
COUPLING (FULL or HALF	COUP	1/2" – 1 ½"	SW OR THREADED	6000#	ASME B 16.11	ASTM A 350 Gr. LF2	SOCKET WELD - ASME B 16.11 THREDED - ASME B1.20.1
FLANGE	FW	1/2" to 1 1/2"	SORF, 125-250 AARH	600#	ASME B 16.5	ASTM A 350 Gr.LF2	-
		2"-3"	WNRF, 125-250 AARH	600# Bevel End WT M	ASME B 16.5	ASTM A 350 Gr.LF2	-
		4"-8"	WNRF, 125-250 AARH	600# Bevel End WT M	ASME B 16.5	MSS SP 44 Gr. F52 OR (For pipeline) \ ASTM A 350 Gr. LF2 (For station piping)	
		12"	WNRF, 125-250 AARH	600# Bevel End WT M	ASME B 16.5	MSS SP 44 Gr. F65 (For pipeline) \ ASTM A 350 Gr. LF2 (For station piping)	-
BLIND FLANGE	FB	1/2" to 1 1/2"	RF, 125-250 AARH	600#	ASME B 16.5	ASTM A 350 Gr. LF2	-
		2"-3"	RF, 125-250 AARH	600#	ASME B 16.5	ASTM A 350 Gr. LF2	-
		4"-8"	RF, 125-250 AARH	600#	ASME B 16.5	MSS SP 44 Gr. F52 (For pipeline)\ ASTM A 350 LF2 (For station piping)	-
		12"	RF, 125-250 AARH	600#	ASME B 16.5	MSS SP 44 Gr.F65 (For pipeline) \ MSS SP 44 Gr. F52 (For station piping)	-
SPECTACLE BLIND	FSB	2-3"	RF, 125-250 AARH	600#	ASME B 16.48	ASTM A 350 Gr. LF2	-
		4"-8"	RF, 125-250 AARH	600#	ASME B 16.5	MSS SP 44 Gr. F52 (For pipeline)\ ASTM A 350 LF2 (For station piping)	
		"12"	RF, 125-250 AARH	600#	ASME B 16.48	MSS SP 44 Gr. F65 (For pipeline)\ ASTM A 350 LF2 (For station piping)	-

STUD & NUT / BOLT	B	1/2" – 12"	-	-	ASME B 18.2	STUD:ASTM A 320 Gr.L7 NUT: ASTM A 194 Gr.7 ASTM A 153	HOT DIP GALVENIZED
GASKET SPIRAL WOUND	G	1/2" – 12"	-	600# 0.175" THICKNESS	ASME B 16.20	SPIRAL WOUND CNAF FILLER + INNER & OUTER RING SS316	COMPATIBLE WITH ASME B 16.5 FLANGES

NOTE:

1. M = THICKNESS TO MATCH PIPE WALL THICKNESS
2. THIS SPECIFICATIONS SHALL BE READ IN CONJUCTION WITH GENERAL NOTES AND DATA SHEETS & TECHNICAL SPECIFICATIONS OF AN INDIVIDUAL ITEM

BRANCH TABLE

HEADER SIZE	1/2"	3/4"	1"	1 ½"	2"	3"	4"	6"	8"	10"	12"	14"	16"
1/2"	T												
3/4"	T	T											
1"	T	T	T										
1 ½"	T	T	T	T									
2"	S	T	T	T	T								
3"	S	S	S,W	T	T	T							
4"	S	S	S	S	T	T	T						
6"	S	S	S	S	W	T	T	T					
8"	S	S	S	S	W	W	T	T	T				
10"	S	S	S	S	W	W	T	T	T	T			
12"	S	S	S	S	W	W	W	T	T	T	T		
14"	S	S	S	S	W	W	W	T	T	T	T	T	
16"	S	S	S	S	W	W	W	T	T	T	T	T	T

LEGEND

T : EQUAL/REDUCING TEE
S : SOCKOLET
W : WELDOLET