



Metric Fittings & Valves



ENGINEERING GUIDE

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TECHNICAL INFORMATION

MATERIALS

THERMOPLASTICS

UPVC - All PVC referenced in this publication is unplasticized PVC, commonly referred to as UPVC.

PVC - Poly Vinyl Chloride

PVC is one of the most specified thermoplastics for piping system components, including valves, fittings, flanges and many specialty products. PVC has excellent chemical and corrosion resistance to a broad range of fluids including water, deionized water, most mineral acids, bases, salts and paraffinic hydrocarbon solutions. PVC is not recommended for use with chlorinated or aromatic hydrocarbons, esters or polar solvents such as ketones. Spears® PVC materials conform to ASTM Cell Classification 12454-B (formerly designated as Type I, Grade 1). The maximum recommended service temperature of PVC products is 60°C (140°F).

CPVC - Chlorinated Poly Vinyl Chloride

Chlorinated PVC is used for higher temperature applications than PVC, especially for handling hot corrosive liquids. With similar chemical and corrosion resistance to PVC, increased chlorine content gives CPVC superior thermal resistance. CPVC is not recommended for use with chlorinated or aromatic hydrocarbons, esters, or polar solvents such as ketones. Spears® CPVC materials conform to ASTM Cell Classification 23447-B (formerly designated as Type IV, Grade 1). The maximum recommended service temperature of CPVC products is 93°C (200°F).

ELASTOMERS

EPR (EPDM) Ethylene propylene rubber

Used in O-ring seals, EPR is recommended for water, chlorinated water, dilute acids and alkalines, alcohols, and has excellent resistance to ozone. EPR is not recommended for petroleum oils, di-ester lubricants, strong acids, or strong alkalines. The maximum recommended service temperature of EPR is 149°C (300°F).

FKM - Fluorocarbon elastomer

Used in O-ring seals, FKM exhibits a very broad range of chemical resistance, including petroleum oils, di-ester based lubricants, silicate fluids and greases, halogenated hydrocarbons and mineral acids. FKM is not recommended for ketones, amines, anhydrous ammonia, hot hydrofluoric or chlorosulfonic acids or automotive brake fluids. The maximum recommended service temperature of FKM is 204°C (400°F).

NITRILE (Buna-N) - Nitrile elastomer

Used in O-ring seals, nitrile elastomers are recommended for petroleum oils and fluids, silicone oils and greases, di-ester based lubricants, ethylene glycol based fluids and cold water. Nitrile is not recommended for phosphate ester hydraulic fluids, halogenated hydrocarbons, strong acids, ketone, ozone or automotive brake fluids. The maximum recommended service temperature of nitrile is 135°C (275°F).

IMPORTANT

SPECIFICATION STANDARDS ORIGIN

Not all metric fitting sizes are the same. Today's global markets have varying standards, norms and interpretations of metric sizing. Identification of the standards origin for which fittings are being specified is essential in assuring that the proper fitting is obtained for each application.

METRIC SIZE DIAMETERS: ACTUAL (O.D.) vs. NOMINAL (I.D.)

Pipe and fitting sizes are specified according to a diameter. It is important to know if a specification of size is an actual O.D. (d), or a nominal diameter (DN) which is based on pipe I.D.

Where applicable, Spears® metric socket fittings in this price schedule have size columns to indicate both actual "d" and nominal "DN". It is always best to identify the actual pipe O.D. being used in order to select the proper fitting.

THREADS

Spears® metric thread fittings use BSP (British Standard Pipe) threads designated in inch-sizes, which also conform to ISO 7/1 metric threads. ASTM Iron Pipe Size (IPS) threads use NPT (National Pipe Thread) threads which are also designated as inch size, conforming to ASTM F 1498. BSP threads are not compatible with NPT threads.

SPEARS® METRIC FITTINGS

PN16 PVC AND CPVC METRIC FITTINGS

Injection Molded.

Size Range:	20mm through 63mm socket, actual "d" 1/2" through 2" threaded
Sockets:	ISO 727
Threads - BSP:	ISO 7/1
Laying Lengths:	ISO 264
Pressure Rating:	PN16 = 16 BAR at 23°C (232 psi at 73°F)

PN10 (CLASS 10/12) PVC METRIC SOCKET FITTINGS

Injection Molded.

Size Range:	160mm and 225mm socket, actual "d" 73°F
Sockets:	ISO 727 diameters (ASTM D 2467 socket length)
Pressure Rating:	160mm: PN12 = 12 BAR at 23°C (174 psi at 73°F) 225mm: PN10 = 10 BAR at 23°C (145 psi at 73°F)



Metric Fittings Technical Materials, Fittings & Valves Overview

PVC ASTM SCHEDULE 40 SOCKET X BSP ADAPTER FITTINGS (WHITE & GRAY)

Injection Molded.

Size Range:	3/4" through 3" socket x threaded, nominal
Sockets:	Iron Pipe Size (IPS) to ASTM D 2466
Threads - BSP:	ISO 7/1
Pressure Rating:	Designed for use with corresponding size and pressure of ASTM D 1785 Schedule 40 pipe with 50% derating of threaded system.

PVC TRANSITION UNIONS

Injection molded; specially designed for transitions between ASTM IPS (Iron Pipe Size) systems and either ISO (International Standards Organization) metric, or JIS (Japanese Industrial Standards) metric systems.

Size Range:	ASTM IPS (inch): 1/2" through 4", nominal - connect to - ISO Metric (mm): 20mm through 110mm socket, actual "d" 1/2" through 4" BSP threaded - or to - JIS Metric (mm): 16mm through 100mm socket, nominal "DN"
Sockets:	ASTM IPS (inch): ASTM D 2467 ISO Metric (mm): ISO 727 diameters (ASTM D 2467 socket length) JIS Metric (mm): JIS K6741 diameters (ASTM D 2467 socket length)
Threads:	NPT: ASTM F 1498 BSP: ISO 7/1
Pressure Rating:	16.2 BAR at 23°C (235 psi at 73°F)

PVC & CPVC METRIC VALVES

TRUE UNION BALL VALVES & BALL CHECK VALVES

Size Range:	20mm through 110mm socket, actual "d" 1/2" through 2" BSP threaded
Sockets:	ISO 727 diameters (ASTM D 2467 socket length)
Threads - BSP:	ISO 7/1
Pressure Rating:	20mm - 62mm: 16.2 BAR at 23°C (235 psi at 73°F) 75mm - 110mm: 10.3 BAR at 23°C (150 psi at 73°F)

GATE VALVES

Size Range:	20mm through 63mm socket, actual "d" 1/2" through 2" BSP threaded
Sockets:	ISO 727 diameters (ASTM 2467 socket length)
Threads - BSP:	ISO 7/1
Pressure Rating:	13.8 BAR at 23°C (200 psi at 73°F)

Metric Fittings Technical
ASTM & Metric Dimensions & Standards Comparison



SCHEDULE 40 & SCHEDULE 80 PIPE DIMENSIONS
ASTM STANDARD D 1785

Nominal Pipe Size (inch)	Mean Outside Diameter (inch)	O.D Tolerance (inch)	Minimum Wall Thickness (inch)	
			Schedule 40	Schedule 80
1/2	0.840	±0.004	0.109	0.147
3/4	1.050	±0.004	0.113	0.154
1	1.315	±0.005	0.133	0.179
1-1/4	1.660	±0.005	0.140	0.191
1-1/2	1.900	±0.006	0.145	0.200
2	2.375	±0.006	0.154	0.218
2-1/2	2.875	±0.007	0.203	0.276
3	3.500	±0.008	0.216	0.300
4	4.500	±0.009	0.237	0.337
6	6.625	±0.011	0.280	0.420
8	8.625	±0.015	0.322	0.500
10	10.750	±0.015	0.365	0.593
12	12.750	±0.015	0.406	0.687

ASTM PIPE PRESSURE RATINGS

Inch	mm O.D.	Schedule 40		Schedule 80	
		psi	BAR	psi	BAR
1/2	21.34	600	41.3	850	58.6
3/4	26.67	480	33.1	690	47.5
1	33.40	450	31.0	630	43.4
1-1/4	42.16	370	25.5	520	35.8
1-1/2	48.26	330	22.7	470	32.4
2	60.32	280	19.3	400	27.5
2-1/2	73.02	300	20.6	420	28.9
3	88.90	260	17.9	370	25.5
4	114.30	220	15.1	320	22.0
6	168.28	180	12.4	280	19.3
8	219.08	160	11.0	250	17.2
10	273.05	140	9.7	230	15.8
12	323.85	130	8.9	230	15.8

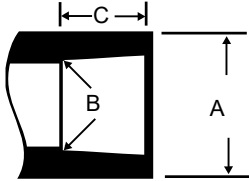
SCHEDULE 40 & SCHEDULE 80 BASIC SOCKET DIMENSIONS
ASTM STANDARDS D 2466 & D 2467

Nominal Size (inch)	Diameter			Schedule 40 Socket Length Minimum C	Schedule 80 Socket Length Minimum C
	Entrance A	Bottom B	Tolerance (inch)		
1/2	0.848	0.836	± 0.004	0.688	0.875
3/4	1.058	1.046	± 0.004	0.719	1.000
1	1.325	1.310	± 0.005	0.875	1.125
1-1/4	1.670	1.655	± 0.005	0.938	1.250
1-1/2	1.912	1.894	± 0.006	1.094	1.375
2	2.387	2.369	± 0.006	1.156	1.500
2-1/2	2.889	2.868	± 0.007	1.750	1.750
3	3.516	3.492	± 0.008	1.875	1.875
4	4.518	4.491	± 0.009	2.000	2.250
6	6.647	6.614	± 0.011	3.000	3.000
8	8.655	8.610	± 0.015	4.000	4.000
10	10.780	10.735	± 0.015	5.000	5.000
12	12.780	12.735	± 0.015	6.000	6.000



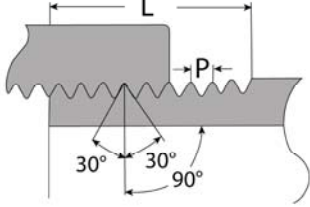
Metric Fittings Technical ASTM & Metric Dimensions & Standards Comparison

PVC METRIC FABRICATED FITTINGS BASIC SOCKET DIMENSIONS



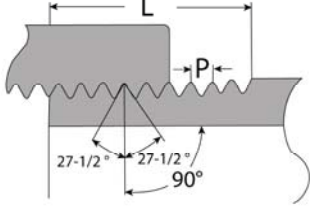
Size	Socket Entrance A		Tolerance ±		Socket Bottom B		Tolerance ±		C Socket Depth (Minimum)	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
110mm	4.346	110.39	0.015	0.38	4.316	109.63	0.015	0.38	2.5000	63.50
125mm	4.934	125.32	0.016	0.41	4.930	125.22	0.016	0.41	2.750	69.85
160mm	6.319	160.50	0.020	0.51	6.270	159.26	0.020	0.51	3.500	88.90
200mm	7.900	200.66	0.026	0.66	7.848	199.34	0.026	0.66	4.250	107.95
225mm	8.870	225.30	0.029	0.74	8.829	224.26	0.029	0.74	4.750	120.65
250mm	9.875	250.83	0.032	0.81	9.811	249.20	0.032	0.81	5.250	133.35
280mm	11.059	280.90	0.035	0.89	10.992	279.20	0.035	0.89	5.750	146.05
315mm	12.441	316.00	0.039	0.99	12.363	314.02	0.039	0.99	6.500	165.10

**AMERICAN NATIONAL STANDARD TAPER PIPE THREADS
(NPT)
ANSI STANDARD B1.20.1
ASTM STANDARD D 2464, F 437, F 1498**



Nominal Sizes (inch)	Threads per Inch	Effective Thread Length L inches	Pitch of Thread P inches
1/2	14	0.5337	0.07143
3/4	14	0.5457	0.07143
1	11-1/2	0.6828	0.08696
1-1/4	11-1/2	0.7068	0.08696
1-1/2	11-1/2	0.7235	0.08696
2	11-1/2	0.7565	0.08696
2-1/2	8	1.1375	0.12500
3	8	1.2000	0.12500
4	8	1.3000	0.12500

**BSP ISO 7/1
PARALLEL THREADS**



Nominal Size (inch)	Threads per Inch	Effective Thread Length L mm	Pitch of Thread P mm
1/2	14	13.152	1.8143
3/4	14	14.514	1.8143
1	11	16.714	2.3091
1-1/4	11	19.050	2.3091
1-1/2	11	19.050	2.3091
2	11	23.378	2.3091
2-1/2	11	26.698	2.3091
3	11	29.873	2.3091
4	11	35.791	2.3091

STANDARDS COMPARISON

JIS K6747 mm		DIN 8062 mm		ASTM D 1785			NPT-ANSI B1.20.1 Tapered Thread		BSP-ISO 7/1 Parallel Thread	
Nominal	Actual O.D.	Nominal	Actual O.D.	Nominal	Actual O.D.		Designation	Threads per inch	Designation	Threads per 25.4mm
				inches	inches	mm				
16	22	15	20	1/2	.840	21.34	1/2	14	1/2	14
20	26	20	25	3/4	1.050	26.67	3/4	14	3/4	14
25	32	25	32	1	1.315	33.40	1	11-1/2	1	11
30	38	32	40	1-1/4	1.660	42.16	1-1/4	11-1/2	1-1/4	11
40	48	40	50	1-1/2	1.900	48.26	1-1/2	11-1/2	1-1/2	11
50	60	50	63	2	2.375	60.32	2	11-1/2	2	11
75	89	80	90	3	3.500	88.90	3	8	3	11
100	114	100	110	4	4.500	114.30	4	8	4	11