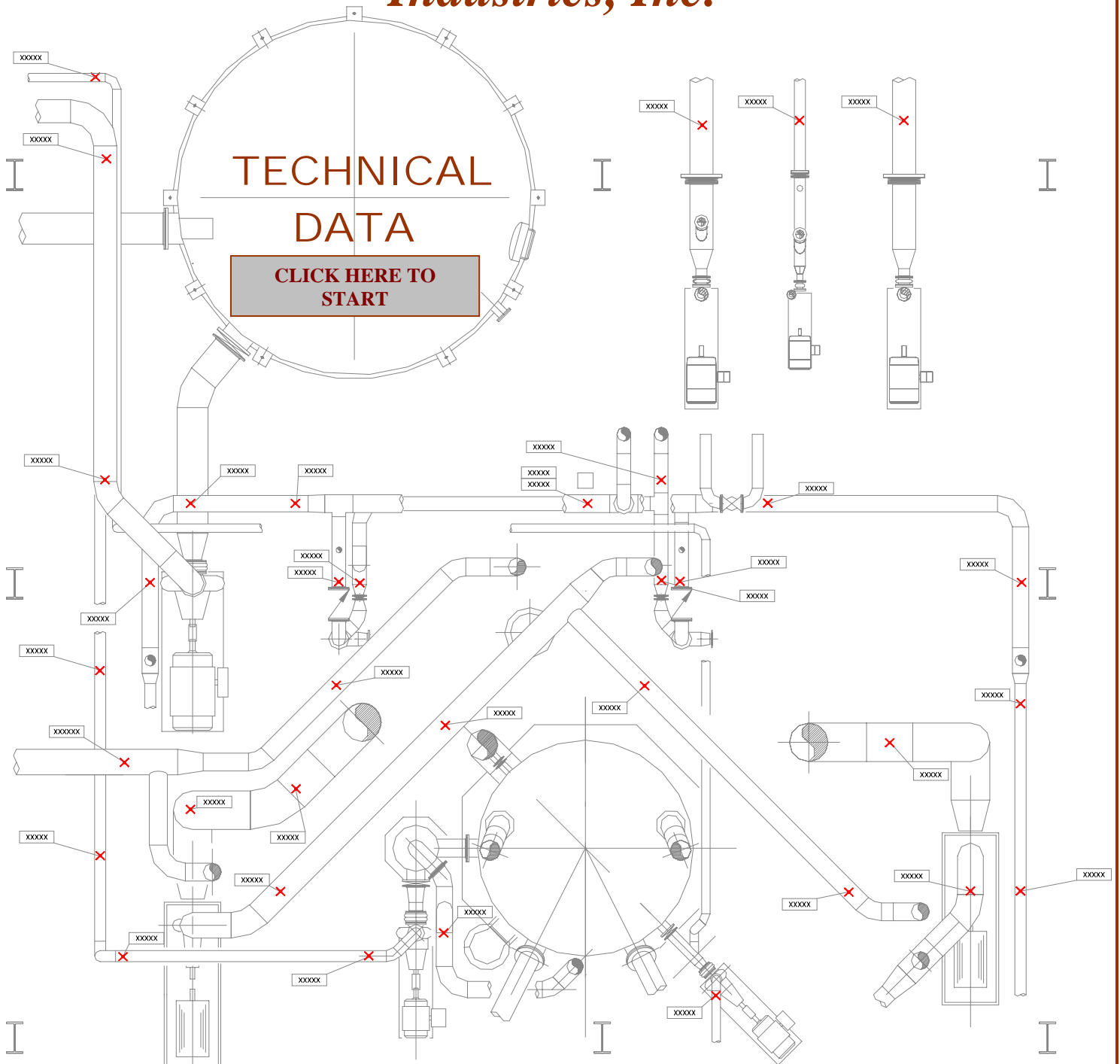


PHS

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TECHANICAL DATA /e

Revision 0

TECHNICAL INFORMATION

REFERENCE DATA – METRIC CONVERSION CHART

	TO CONVERT FROM	TO	MULTIPLY BY
Angle	degree	radian (rad)	1.745329×10^{-2}
	radian (rad)	degree	5.729578×10^{-1}
Area	foot ²	square meter (m ²)	9.290304×10^{-2}
	inch ²	square meter (m ²)	6.451600×10^{-4}
	circular mil	square meter (m ²)	5.067075×10^{-10}
	square centimeter (cm ²)	square inch (in ²)	1.550003×10^{-1}
	square meter (m ²)	foot ²	1.076391×10^{-1}
	square meter (m ²)	inch ²	1.550003×10^{-3}
	square meter (m ²)	circular mil	1.973525×10^{-9}
Bending Moment of Torque	lbf•ft	newton meter (N•m)	1.355818
	lbf•in	newton meter (N•m)	1.129848×10^{-1}
	N•m	lbf•ft	7.375621×10^{-1}
	N•m	lbf•in	8.850748
Force	pounds-force (lbf)	newtons (N)	4.448222
Length	foot (ft)	meter (m)	3.048000×10^{-1}
	inch (in)	meter (m)	2.540000×10^{-2}
	mil	meter (m)	2.540000×10^{-5}
	inch (in)	micrometer (µm)	2.540000×10^{-4}
	meter (m)	foot (ft)	3.280840
	meter (m)	inch (in)	3.937008×10^{-1}
	meter (m)	mil	3.937008×10^{-4}
	micrometer (µm)	Inch (in)	3.937008×10^{-5}
Mass	ounce (avoirdupois)	kilogram (kg)	2.834952×10^{-2}
	pound (avoirdupois)	kilogram (kg)	4.535924×10^{-1}
	on (short, 2000 lb)	kilogram (kg)	9.071847×10^{-2}
	on (long, 2240 lb)	kilogram (kg)	1.016047×10^{-3}
	kilogram (kg)	ounce (avoirdupois)	3.527396×10^{-1}
	kilogram (kg)	pound (avoirdupois)	2.204622
	kilogram (kg)	ton (short 2000 lb)	1.102311×10^{-3}
	kilogram (kg)	ton (long 2240 lb)	9.842064×10^{-4}
Mass Per Unit Length	lb/ft	kilogram per meter (kg/m)	1.488164
	lb/in	kilogram per meter (kg/m)	1.785797×10^{-1}
	kg/m	lb/ft	6.719689×10^{-1}
	kg/m	lb/in	5.599741×10^{-2}
Mass Per Unit Volume	lb/ft ³	kilogram per cubic meter (kg/m ³)	1.601846×10^{-1}
	lb/in ³	kilogram per cubic meter (kg/m ³)	2.767990×10^{-4}
	kg/m ³	lb/ft ³	6.242797×10^{-2}
	kg/m ³	lb/in ³	3.612730×10^{-5}
	lbs/ft ³	lbs/in ³	1.728000×10^{-3}
Mass Per Area Unit	lb/ft ²	kilogram per square meter (kg/m ²)	4882428
	kg/m ²	pound per square foot (lb/ft ²)	2.048161×10^{-1}
Pressure or Stress	lbf/in ² (psi)	pascal (Pa)	6.894757×10^{-3}
	kip/in ² (ksi)	pascal (Pa)	6.894757×10^{-6}
	lbf/in ² (psi)	megapascals (MPa)	6.894757×10^{-3}
	pascal (Pa)	pound force per sq. inch (psi)	1.450377×10^{-4}
	pascal (Pa)	kip per sq. inch (ksi)	1.450377×10^{-7}
	megapascals (MPa)	lbf/in ² (psi)	1.450377×10^{-2}
Section Properties	section modulus S (in ³)	S (m ³)	1.638706×10^{-5}
	section modulus S (M ³)	S (in ³)	6.102374×10^{-4}
	moment of inertia I (in ⁴)	I (m ⁴)	4.162314×10^{-7}
	moment of inertia I (M ⁴)	I (in ⁴)	2.402510×10^{-6}
	modulus of elasticity E (psi)	E (Pa)	6.894757×10^{-3}
	modulus of elasticity E (Pa)	E (psi)	1.450377×10^{-4}
Temperature	degree Fahrenheit	degree Celsius	$t^{\circ C} = t^{\circ F} - 32) / 1.8$
	degree Celsius	degree Fahrenheit	$t^{\circ F} = 1.8 t^{\circ C} + 32$
Volume	foot ³	cubic meter (m ³)	2.831685×10^{-2}
	inch ³	cubic meter (m ³)	1.638706×10^{-2}
	cubic centimeter (cm ³)	cubic inch (in ³)	6.102374×10^{-2}
	cubic meter (m ³)	foot ³	3.531466×10^{-1}
	cubic meter (m ³)	inch ³	6.102376×10^{-4}
	gallon (U.S. liquid)	cubic meter (m ³)	3.785412×10^{-3}

ABBREVIATIONS

AISC	= American Institute of Steel Construction
AISI	= American Iron & Steel Institute
ANSI	= American National Standards Institute
ASTM	= American Society for Testing & Materials
AWWA	= American Water Works Association
Dia.	= Diameter
Ft.	= Feet
Ga	= Gauge
I.D.	= Inside Diameter
In.	= Inch
Lbs.	= Pounds
Max.	= Maximum
Min.	= Minimum
MSS	= Manufacturers' Standardization Society
NFPA	= National Fire Protection Association
O.D.	= Outside Diameter
Oz.	= Ounces
psi	= Pounds Per Square Inch
PVC	= Poly Vinyl Chloride
UNC	= Unified Course Threads
UNCR	= Unified Course Threads (Rounded Root)

METRIC SYMBOLS

cm	= centimeter
kg	= kilogram
kN	= kilonewton
m	= meter
µm	= micrometer
mm	= millimeter
MPa	= megapascal
N	= newton
Nm	= newton-meter
Pa	= pascal

TECHNICAL INFORMATION

PIPE WEIGHTS FOR STANDARD AND HEAVY WEIGHT PIPE

Nominal Pipe Size	Pipe Schedule	PIPE DATA			PIPE WEIGHT			
		Outside Dia.		Wall Th'k in	w/ Gas, Air, Steam		w/ Water	
		in	mm		lbs/ft	N/m	lbs/ft	N/m
½" (15mm)	Std / 40	0.840	22	0.109	0.9	12	1.0	14
	XS / 80			0.147	1.1	16	1.2	17
¾" (20mm)	Std / 40	1.050	28	0.113	1.1	17	1.4	20
	XS / 80			0.154	1.5	22	1.7	24
1" (25mm)	Std / 40	1.315	34	0.133	1.7	25	2.1	30
	XS / 80			0.179	2.2	32	2.5	36
1¼" (32mm)	Std / 40	1.660	42	0.140	2.3	33	2.9	43
	XS / 80			0.191	3.0	44	3.6	52
1½" (40mm)	Std / 40	1.900	48	0.145	2.7	40	3.6	53
	XS / 80			0.200	3.6	53	4.4	64
2" (50mm)	Std / 40	2.375	60	0.154	3.7	53	5.1	75
	XS / 80			0.218	5.0	73	6.3	92
2½" (65mm)	Std / 40	2.875	75	0.203	5.8	85	7.9	115
	XS / 80			0.276	7.7	112	9.5	139
3" (80mm)	Std / 40	3.500	89	0.216	7.6	111	11	157
	XS / 80			0.300	10	150	13	191
3½" (90mm)	Std / 40	4.000	102	0.226	9.1	133	13	195
	XS / 80			0.318	13	182	16	239
4" (100mm)	Std / 40	4.500	114	0.237	11	157	16	238
	XS / 80			0.337	15	219	20	291
5" (125mm)	Std / 40	5.563	141	0.258	15	213	23	340
	XS / 80			0.375	21	303	29	418
6" (150mm)	Std / 40	6.625	168	0.280	19	277	31	460
	XS / 80			0.432	29	417	40	582
8" (200mm)	Std / 40	8.625	219	0.322	29	417	50	733
	XS / 80			0.500	43	633	63	922
10" (250mm)	Std / 40	10.75	273	0.365	40	591	75	1090
	XS / 60			0.500	55	799	87	1271
12" (300mm)	Std	12.75	235	0.375	50	723	99	1439
	XS			0.500	65	955	112	1641
14" (350mm)	Std / 30	14.00	355.6	0.375	55	796	114	1669
	XS			0.500	72	1052	130	1892
16" (400mm)	Std / 30	16.00	406.4	0.375	63	913	142	2069
	XS / 40			0.500	83	1208	159	2326
18" (450mm)	Std	18.00	457.2	0.375	71	1030	172	2509
	XS			0.500	93	1364	192	2800
20" (500mm)	Std / 20	20.00	508.0	0.375	79	1147	205	2988
	XS / 30			0.500	104	1520	227	3313
24" (600mm)	Std / 20	24.00	609.6	0.375	95	1381	279	4067
	XS			0.500	125	1831	306	4460
30" (750mm)	Std	30.00	762.0	0.375	119	1731	410	5983
	XS / 20			0.500	158	2299	444	6478
36" (900mm)	Std	36.00	914.4	0.375	143	2082	566	8256
	XS / 20			0.500	190	2766	607	8853
42" (1050mm)	Std	42.00	1066.8	0.375	167	2433	746	10888
	XS / 20			0.500	222	3234	794	11587

Pipe Weights are based on Carbon Steel pipe

TECHNICAL INFORMATION

AMERICAN WATER WORKS ASSOCIATION - DUCTILE IRON PIPE DATA

BASED UPON AWWA C108-70 CLASS 53

NOMINAL PIPE SIZE		O.D. SIZE		WALL THICKNESS		WEIGHT OF PIPE		WEIGHT OF PIPE FILLED WITH WATER	
in.	mm	in.	mm	in.	mm	Lbs./Ft.	Kg/m	Lbs./Ft.	Kg/m
3	80	3.96	100.6	0.31	7.9	11.2	16.7	15.0	22.3
4	100	4.80	121.9	0.32	8.1	14.2	21.1	20.1	29.9
6	150	6.90	175.3	0.34	8.6	22.0	32.7	35.1	52.2
8	200	9.05	229.9	0.36	9.1	31.0	46.1	54.0	80.4
10	250	11.1	281.9	0.38	9.7	40.4	60.1	76.8	114.3
12	300	13.2	335.3	0.40	10.2	50.7	75.5	103.0	153.3
14	350	15.3	388.6	0.42	10.7	62.4	92.9	133.5	198.7
16	400	17.4	442.0	0.43	10.9	72.8	108.3	165.9	246.9
18	450	19.5	495.3	0.44	11.2	83.6	124.4	201.5	299.9
20	500	21.6	548.6	0.45	11.4	95.2	141.7	241.0	358.7
24	600	25.8	655.3	0.47	11.9	119.2	177.4	329.4	490.2
30	750	32.0	812.8	0.51	13.0	161.3	240.0	487.8	725.9
36	900	38.3	972.8	0.58	14.7	219.5	326.7	688.8	1025.1
42	1050	44.5	1130.3	0.65	16.5	285.2	424.4	920.1	1369.3
48	1200	50.8	1290.3	0.72	18.3	360.3	536.2	1189.2	1769.8
54	1350	57.1	1450.3	0.81	20.6	455.0	677.1	1502.2	2235.6

Note: Add flange weight for flanged ductile iron pipe

CAST IRON PIPE DATA

MECHANICAL JOINT PIPE CLASS 150

NOMINAL PIPE SIZE		O.D. SIZE		WALL THICKNESS		WEIGHT OF PIPE		WEIGHT OF PIPE FILLED WITH WATER	
in.	mm	in.	mm	in.	mm	Lbs./Ft.	Kg/m	Lbs./Ft.	Kg/m
3	80	3.96	100.6	0.32	8.1	12.9	19.2	16.6	24.7
4	100	4.80	121.9	0.35	8.9	16.4	24.4	22.1	32.9
6	150	6.90	175.3	0.38	9.7	25.7	38.2	38.5	57.3
8	200	9.05	229.9	0.41	10.4	36.7	54.6	59.8	89.0
10	250	11.1	281.9	0.44	11.2	48.7	72.5	84.2	125.3
12	300	13.2	335.3	0.48	12.2	62.9	93.6	113.9	169.5
14	350	15.3	388.6	0.51	13.0	78.8	117.3	148.1	220.4
16	400	17.4	442.0	0.54	13.7	95.0	141.4	185.3	275.8
18	450	19.5	495.3	0.58	14.7	114.7	170.7	228.7	340.4
20	500	21.6	548.6	0.62	15.7	135.9	202.2	277.4	412.8
24	600	25.8	655.3	0.73	18.5	190.4	283.4	391.4	582.5
30	750	32.0	812.8	0.85	21.6	277.3	412.7	589.3	877.0
36	900	38.3	972.8	0.94	23.9	368.9	549.0	817.9	1217.2
42	1050	44.5	1130.3	1.05	26.7	479.1	713.0	1091.1	1623.8
48	1200	50.8	1290.3	1.14	29.0	595.2	885.8	1398.2	2080.8

Note: Add flange weight for flanged cast iron pipe

INCHES	FAHRENHEIT	POUNDS	POUNDS
MILLIMETERS	CELSIUS	NEWTONS	KILOGRAMS

TECHNICAL INFORMATION

NO-HUB CAST IRON PIPE DATA

BASED UPON CAST IRON SOIL PIPE INSTITUTE STANDARDS 301-72, TABLE 1

NOMINAL PIPE SIZE:		O.D. SIZE		WALL THICKNESS		WEIGHT OF PIPE		WEIGHT OF PIPE FILLED W/WATER		
in.	mm	in.	mm	in.	mm	Lbs./Ft.	Kg/m	Lbs./Ft.	Kg/m	
1½"	40	1.9	48.3	0.16	4.1	2.7	4.0	6.2	9.2	3.73
2"	50	2.35	59.7	0.16	4.1	3.6	5.4	8.6	12.8	5.72
3"	80	3.35	85.1	0.16	4.1	5.2	7.7	13.5	20.1	12.80
4"	100	4.38	111.3	0.19	4.8	7.4	11.0	20.2	30.1	23.10
5"	125	5.30	134.6	0.19	4.8	9.6	14.3	27.5	40.9	35.50
6"	150	6.30	160.0	0.19	4.8	11.0	16.4	34.0	50.6	51.00
8"	200	8.38	212.9	0.23	5.8	18.0	26.8	57.5	85.6	69.30

DECIMAL EQUIVALENTS

DECIMALS OF AN INCH & EQUIVALENT MILLIMETERS

FRACTION	DECIMAL	MM	FRACTION	DECIMAL	MM	FRACTION	DECIMAL	MM	FRACTION	DECIMAL	MM
½	0.0313	0.794	⅜	0.2813	7.144	⅞	0.5313	13.494	⅔	0.7813	19.844
⅙	0.0625	1.588	⅝	0.3125	7.938	⅚	0.5625	14.288	⅚	0.8125	20.638
⅓	0.0938	2.381	⅞	0.3438	8.731	⅝	0.5938	15.081	⅞	0.8438	21.431
⅜	0.1250	3.175	⅜	0.3750	9.525	⅜	0.6250	15.875	⅜	0.8750	22.225
⅓	0.1563	3.969	⅞	0.4063	10.319	⅞	0.6563	16.669	⅞	0.9063	23.019
⅓	0.1875	4.763	⅞	0.4375	11.113	⅞	0.6875	17.463	⅞	0.9375	23.813
⅓	0.2188	5.556	⅞	0.4688	11.906	⅞	0.7188	18.256	⅞	0.9688	24.606
¼	0.2500	6.350	½	0.5000	12.700	¾	0.7500	19.050	1	1.0000	25.400

ELECTRICAL CONDUIT SIZES

NOMINAL CONDUIT SIZE	ELECTRICAL METALLIC CONDUIT O.D.	INTERMEDIATE METALLIC CONDUIT O.D.	STEEL RIGID CONDUIT O.D.
½	0.706	0.815	0.840
¾	0.922	1.029	1.050
1	1.163	1.290	1.315
1¼	1.510	1.638	1.660
1½	1.740	1.863	1.900
2	2.197	2.360	2.375
2½	2.875	2.857	2.875
3	3.500	3.476	3.500
3½	4.000	3.971	4.000
4	4.500	4.466	4.500
5			5.563
6			6.625

C-CLAMP SET SCREW TORQUE

FOR SET SCREW IN MSS TYPE 19 AND 23 C-CLAMPS PER MSS-SP-69

SET SCREW SIZE		MAXIMUM TORQUE VALUE	
		INCH-POUNDS	NEWTON-METERS
¼	M6	40	4.5
⅜	M10	60	6.8
½	M12	125	14.1
⅝	M16	250	28.2
¾	M20	400	45.2
⅞	M20	665	75.1

TECHNICAL INFORMATION

COPPER TUBING DATA - TYPE L

NOMINAL TUBING SIZE		O.D. SIZE		WALL THICKNESS		WEIGHT OF TUBING		WEIGHT OF TUBING FILLED WITH WATER	
in.	mm	in.	mm	in.	mm	Lbs./Ft.	Kg/m	Lbs./Ft.	Kg/m
¼	8	0.375	9.5	0.030	0.8	0.13	0.19	0.15	0.22
⅜	10	0.500	12.7	0.035	0.9	0.20	0.29	0.26	0.39
½	15	0.625	15.9	0.040	1.0	0.29	0.42	0.38	0.57
⅝	18	0.750	19.1	0.042	1.1	0.36	0.54	0.51	0.76
¾	20	0.875	22.2	0.045	1.1	0.46	0.68	0.66	0.98
1	25	1.125	28.6	0.050	1.3	0.66	0.97	1.01	1.50
1¼	32	1.375	34.9	0.055	1.4	0.88	1.32	1.42	2.11
1½	40	1.625	41.3	0.060	1.5	1.14	1.70	1.91	2.84
2	50	2.125	54.0	0.070	1.8	1.75	2.60	3.09	4.60
2½	65	2.625	66.7	0.080	2.0	2.48	3.69	4.54	6.76
3	80	3.125	79.4	0.090	2.3	3.33	4.96	6.28	9.35
3½	90	3.625	92.1	0.100	2.5	4.29	6.38	8.28	12.32
4	100	4.125	104.8	0.110	2.8	5.38	8.01	10.57	15.73
5	125	5.125	130.2	0.125	3.2	7.61	11.30	15.69	23.35
6	150	6.125	155.6	0.140	3.6	10.20	15.20	21.81	32.46
8	200	8.125	206.4	0.200	5.1	19.26	28.70	39.49	58.77
10	250	10.125	257.2	0.250	6.4	20.10	29.90	61.69	91.81
12	300	12.125	308.0	0.280	7.1	40.40	60.10	85.83	127.73

COPPER TUBING DATA - TYPE K

NOMINAL TUBING SIZE		O.D. SIZE		WALL THICKNESS		WEIGHT OF TUBING		WEIGHT OF TUBING FILLED WITH WATER	
in.	mm	in.	mm	in.	mm	Lbs./Ft.	Kg/m	Lbs./Ft.	Kg/m
¼	8	0.375	9.5	0.035	0.9	0.14	0.21	0.17	0.25
⅜	10	0.500	12.7	0.049	1.2	0.27	0.40	0.32	0.48
½	15	0.625	15.9	0.049	1.2	0.34	0.51	0.43	0.64
⅝	18	0.750	19.1	0.049	1.2	0.42	0.63	0.56	0.83
¾	20	0.875	22.2	0.065	1.7	0.64	0.95	0.83	1.24
1	25	1.125	28.6	0.065	1.7	0.84	1.25	1.18	1.76
1¼	32	1.375	34.9	0.065	1.7	1.04	1.55	1.57	2.34
1½	40	1.625	41.3	0.072	1.8	1.36	2.02	2.10	3.13
2	50	2.125	54.0	0.083	2.1	2.06	3.07	3.37	5.02
2½	65	2.625	66.7	0.095	2.4	2.92	4.35	4.92	7.32
3	80	3.125	79.4	0.109	2.8	4.00	5.95	6.96	10.36
3½	90	3.625	92.1	0.120	3.0	5.12	7.62	9.02	13.42
4	100	4.125	104.8	0.134	3.4	6.51	9.69	11.57	17.22
5	125	5.125	130.2	0.160	4.1	9.67	14.4	17.67	26.30
6	150	6.125	155.6	0.192	4.9	13.87	20.6	25.07	37.31
8	200	8.125	206.4	0.271	6.9	25.90	38.5	45.40	67.56
10	250	10.125	257.2	0.338	8.6	40.30	60.0	70.72	105.25
12	300	12.125	308.0	0.405	10.3	57.80	86.0	101.48	151.02

TECHNICAL INFORMATION

PIPE WEIGHTS FOR PVC AND CPVC PIPE – TYPES I & II

PIPE DATA					PVC PIPE WEIGHT				CPVC PIPE WEIGHT			
Nominal Pipe Size	Pipe Schedule	Outside Dia.		Wall Th'k	w/ Gas, Air		w/ Water		w/ Gas, Air		w/ Water	
		in	mm	in	lbs/ft	N/m	lbs/ft	N/m	lbs/ft	N/m	lbs/ft	N/m
1/8" (3mm)	40	0.405	10	0.068	0.05	0.7	0.07	1.0				
	80			0.095	0.06	0.9	0.08	1.1				
1/4" (6mm)	40	0.54	14	0.088	0.08	1.2	0.13	1.9	0.09	1.3	0.13	2.0
	80			0.119	0.10	1.5	0.13	2.0	0.12	1.7	0.14	2.1
3/8" (10mm)	40	0.675	17	0.091	0.11	1.6	0.19	2.8	0.12	1.8	0.20	3.0
	80			0.126	0.14	2.1	0.20	3.0	0.16	2.3	0.22	3.2
1/2" (15mm)	40	0.840	22	0.109	0.17	2.4	0.30	4.4	0.19	2.7	0.31	4.6
	80			0.147	0.21	3.1	0.31	4.6	0.24	3.5	0.33	4.8
	120			0.170	0.24	3.4	0.32	4.7				
3/4" (20mm)	40	1.050	28	0.113	0.22	3.2	0.45	6.6	0.25	3.6	0.47	6.9
	80			0.154	0.29	4.2	0.47	6.9	0.32	4.7	0.50	7.3
	120			0.170	0.31	4.5	0.48	7.0				
1" (25mm)	40	1.315	34	0.133	0.33	4.8	0.70	10	0.37	5.4	0.73	11
	80			0.179	0.42	6.2	0.74	11	0.47	6.9	0.77	11
	120			0.200	0.46	6.8	0.75	11				
1 1/4" (32mm)	40	1.660	42	0.140	0.44	6.5	1.1	16	0.50	7.2	1.1	16
	80			0.191	0.58	8.5	1.1	17	0.65	9.5	1.2	17
	120			0.215	0.65	9.5	1.2	17				
1 1/2" (40mm)	40	1.900	48	0.145	0.53	7.8	1.4	21	0.60	8.7	1.5	21
	80			0.200	0.71	10	1.5	22	0.79	12	1.5	22
	120			0.225	0.79	11	1.5	22				
2" (50mm)	40	2.375	60	0.154	0.72	10	2.2	32	0.80	12	2.2	33
	80			0.218	0.98	14	2.3	33	1.1	16	2.3	34
	120			0.250	1.1	16	2.3	34				
2 1/2" (65mm)	40	2.875	75	0.203	1.1	17	3.2	47	1.3	18	3.3	48
	80			0.276	1.5	22	3.3	49	1.7	24	3.5	50
	120			0.300	1.6	24	3.4	49				
3" (80mm)	40	3.500	89	0.216	1.5	22	4.7	68	1.7	24	4.8	70
	80			0.300	2.0	29	4.9	71	2.2	33	5.0	73
	120			0.350	2.3	34	5.0	73				
3 1/2" (90mm)	40	4.000	102	0.226	1.8	26	6.1	89	2.0	29	6.2	91
	80			0.318	2.5	36	6.3	92	2.7	40	6.5	95
4" (100mm)	40	4.500	114	0.237	2.1	31	7.6	111	2.4	34	7.8	114
	80			0.337	2.9	43	7.9	116	3.3	48	8.2	119
	120			0.437	3.7	54	8.2	120				
5" (125mm)	40	5.563	141	0.258	2.9	42	12	168				
	80			0.375	4.1	60	12	175				
6" (150mm)	40	6.625	168	0.280	3.7	54	16	237	4.2	61	17	242
	80			0.432	5.6	82	17	247	6.3	91	17	253
	120			0.562	7.1	104	17	254				
8" (200mm)	40	8.625	219	0.322	5.6	82	27	398	6.3	91	28	405
	80			0.500	8.5	124	28	413	9.5	139	29	423
10" (250mm)	40	10.75	273	0.365	8.0	116	42	615	8.9	130	43	624
	80			0.593	13	184	44	639	14	206	45	654
12" (300mm)	40	12.75	235	0.406	11	153	59	862	12	171	60	874
	80			0.687	17	254	61	897	19	283	63	917
14" (350mm)	40	14.00	355.6	0.437	12	182	71	1038				
	80			0.750	21	304	74	1081				
16" (400mm)	40	16.00	406.4	0.500	16	238	93	1356				
	80			0.843	27	391	97	1409				
18" (450mm)	40	18.00	457.2	0.562	22	328	119	1743				
	80			0.937	34	489	122	1781				
20" (500mm)	40	20.00	508.0	0.593	27	388	147	2146				
	80			1.031	42	618	152	2217				
24" (600mm)	40	24.00	609.6	0.687	37	542	211	3086				
	80			1.218	60	879	219	3189				

PVC and CPVC pipe weights are based on the "average I.D."

TECHNICAL INFORMATION

USEFUL WEIGHT FORMULAS

PIPE

$$\text{Weight (lb/ft)} = 10.68 \times T \times (D - T) \times F$$

PIPE CONTENTS

$$\text{Weight (lb/ft)} = 0.3405 \times G \times (D - 2T)^2$$

LEGEND

D = Outside Diameter (inches)

F = Material Weight Factor

G = Specific Gravity of Pipe Contents

Normally 1.0 for water, 0 for air and steam.

L = Length (inches)

T = Pipe Wall, Plate, or Bar Thickness (inches)

W = Width (inches)

PLATE AND BAR

$$\text{Weight (lb)} = 0.2833 \times T \times W \times L \times F$$

ROUND ROD

$$\text{Weight (lb/ft)} = 2.67D^2$$

MATERIAL WEIGHT FACTORS

Carbon Steel & Cr-Mo1.00

Aluminum0.35

Brass1.12

Cast Iron0.91

Copper1.14

Ferritic stainless steel0.95

Austenitic stainless steel1.02

Wrought iron0.98

CALCULATING OF PIPING INSULATION WEIGHT

The weight per foot of insulation is calculated by using the weight factor "X" from the table below and multiplying by the insulation density (lbs/cu-ft).

EXAMPLE: A 16" pipe with 3½" of insulation is found to have a weight factor of 1.49 (from table below). With an insulation density of 11 lb/cu-ft, the calculation for insulation weight is 1.49 x 11 = 16.39

INSULATION WEIGHT FACTOR – X

NOMINAL PIPE SIZE	NOMINAL INSULATION THICKNESS											
	1"	1½"	2"	2½"	3"	3½"	4"	4½"	5"	5½"	6"	
1	.057	.10	.16	.23	.31	.40						
1¼	.051	.12	.15	.22	.30	.39						
1½	.066	.11	.21	.29	.38	.48						
2	.080	.14	.21	.29	.37	.47	.59					
2½	.091	.19	.27	.36	.46	.58	.70	.83				
3	.10	.17	.25	.34	.44	.56	.68	.81				
3½	.15	.23	.31	.41	.54	.66	.7897			
4	.13	.21	.30	.39	.51	.63	.77	.96	1.10			
5	.15	.24	.34	.45	.58	.71	.88	1.04	1.20			
6	.17	.27	.38	.51	.64	.83	.97	1.13	1.34			
8		.34	.47	.66	.80	.97	1.17	1.36	1.56	1.75		
10		.43	.59	.75	.93	1.12	1.32	1.54	1.76	1.99		
12		.50	.68	.88	1.07	1.28	1.52	1.74	1.99	2.24	2.50	
14		.51	.70	.90	1.11	1.34	1.57	1.81	2.07	2.34	2.62	
16		.57	.78	1.01	1.24	1.49	1.74	2.01	2.29	2.58	2.88	
18		.64	.87	1.12	1.37	1.64	1.92	2.21	2.51	2.82	3.14	
20		.70	.96	1.23	1.50	1.79	2.09	2.40	2.73	3.06	3.40	
24		.83	1.13	1.44	1.77	2.10	2.44	2.80	3.16	3.54	3.92	

General Formula: For pipe sizes not shown in the table above (special O.D. pipe, etc.), use the following formula to determine the insulation weight:

$$\text{Insulation Weight: (lb/ft)} = 0.0218 \times I \times T \times (T + D)$$

Where: I = Insulation density (lb/cu-ft)

T = Insulation thickness (inches)

D = Outside diameter of pipe (inches)

TECHNICAL INFORMATION

MAXIMUM HORIZONTAL HANGER SPACING

PER MSS-SP69, AND ANSI B31.1

NOMINAL PIPE SIZE OR TUBE DIA.	STANDARD WEIGHT STEEL PIPE SERVICE (FEET / METERS)		COPPER TUBING SERVICE (FEET / METERS)	
	WATER	VAPOR	WATER	VAPOR
	¼	7	8	5
8	2.13	2.44	1.52	1.52
¾	7	8	5	6
10	2.13	2.44	1.52	1.83
½	7	8	5	6
15	2.13	2.44	1.52	1.83
¾	7	9	5	7
20	2.13	2.74	1.52	2.13
1	7	9	6	8
25	2.13	2.74	1.83	2.44
1¼	7	9	7	9
32	2.13	2.74	2.13	2.74
1½	9	12	8	10
40	2.74	3.66	2.44	3.05
2	10	13	8	11
50	3.05	3.96	2.44	3.35
2½	11	14	9	13
65	3.35	4.27	2.74	3.96
3	12	15	10	14
80	3.66	4.57	3.05	4.27
3½	13	16	11	15
90	3.96	4.88	3.35	4.57
4	14	17	12	16
100	4.27	5.18	3.66	4.88
5	16	19	13	18
125	4.88	5.79	3.96	5.49
6	17	21	14	20
150	5.18	6.40	4.27	6.10
8	19	24	16	23
200	5.79	7.32	4.88	7.01
10	22	26	18	25
250	6.71	7.92	5.49	7.62
12	23	30	19	28
300	7.01	9.14	5.79	8.53
14	25	32		
350	7.62	9.75		
16	27	35		
400	8.23	10.67		
18	28	37		
450	8.53	11.28		
20	30	39		
500	9.14	11.89		
24	32	42		
600	9.75	12.80		
30	33	44		
750	10.06	13.41		

LOAD CHART FOR THREADED ROD

MATERIALS: ASTM A36, A575 GR. 1020 OR A576 GR 1020

NOMINAL ROD DIAMETER	MAXIMUM SAFE ROD LOAD ROD TEMPERATURE		WEIGHT PER FOOT METER	ROOT AREA IN. ² MM ²
	650°F 349°C	750°F 399°C		
	¼	240		
M6	1068	934	0.248	0.017
¾	610	540	0.360	0.068
M10	2714	2402	0.536	0.044
½	1130	1010	0.668	0.126
M12	5027	4493	0.994	0.081
¾	1810	1610	1.04	0.202
M16	8052	7162	1.55	0.130
¾	2710	2420	1.50	0.302
M20	12055	10765	2.23	0.195
¾	3770	3360	2.04	0.419
M20	16770	14947	3.04	0.270
1	4960	4420	2.67	0.552
M24	22064	19662	3.97	0.356
1¼	8000	7140	3.38	0.889
M30	35587	31762	5.03	0.574
1½	11630	10370	4.17	1.293
M36	51735	46130	6.20	0.834
1¾	15700	14000	6.01	1.744
M42	69840	62278	8.94	1.125
2	20700	18460	8.18	2.300
M48	92082	82117	12.17	1.484
2¼	27200	24260	10.68	3.023
M56	120996	107918	15.89	1.950
2½	33500	29880	13.52	3.716
M64	149021	132918	20.12	2.398
2¾	41580	37066	16.69	4.619
M72	184964	164884	24.83	2.980
3	50580	45085	20.19	5.621
M80	225000	200556	30.04	3.627

GAUGE THICKNESS

GAUGE	MINIMUM	NOMINAL
3	0.215	0.239
3	5.461	6.071
7	0.167	0.179
7	4.242	4.547
11	0.108	0.120
11	2.743	3.048
12	0.093	0.105
12	2.362	2.667
13	0.080	0.090
13	2.032	2.286
14	0.066	0.075
14	1.676	1.905
16	0.053	0.060
16	1.346	1.524
18	0.042	0.048
18	1.067	1.219

DIMENSIONS	TEMPERATURE	LOADS	WEIGHT
INCHES	FAHRENHEIT	POUNDS	POUNDS
MILLIMETERS	CELSIUS	NEWTONS	KILOGRAMS

HANGER SPACING FOR PVC AND CPVC PIPING

Pipe		PVC										CPVC												
Size	Sch.	60° F		80° F		100° F		120° F		140° F		73° F		100° F		120° F		140° F		160° F		180° F		
		ft	mm	ft	mm	ft	mm	ft	mm	ft	mm	ft	mm	ft	mm	ft	mm	ft	mm	ft	mm	ft	mm	
½"	40	4.5	1.37	4.5	1.37	4.0	1.22	2.5	0.76	2.5	0.76	5.0	1.52	4.5	1.37	4.5	1.37	4.0	1.22	2.5	0.76	2.5	0.76	
15mm	80	5.0	1.52	4.5	1.37	4.5	1.37	3.0	0.91	2.5	0.76	5.5	1.68	5.5	1.68	4.5	1.37	4.5	1.37	3.0	0.91	2.5	0.76	
	120	5.0	1.52	5.0	1.52	4.5	1.37	3.0	0.91	2.5	0.76													
¾"	40	5.0	1.52	4.5	1.37	4.0	1.22	2.5	0.76	2.5	0.76	5.0	1.52	5.0	1.52	4.5	1.37	4.0	1.22	2.5	0.76	2.5	0.76	
20mm	80	5.5	1.68	5.0	1.52	4.5	1.37	3.0	0.91	2.5	0.76	5.5	1.68	5.5	1.68	5.0	1.52	4.5	1.37	3.0	0.91	2.5	0.76	
	120	5.5	1.68	5.0	1.52	4.5	1.37	3.0	0.91	2.5	0.76													
1"	40	5.5	1.68	5.0	1.52	4.5	1.37	3.0	0.91	2.5	0.76	5.5	1.68	5.5	1.68	5.0	1.52	4.5	1.37	3.0	0.91	2.5	0.76	
25mm	80	6.0	1.83	5.5	1.68	5.0	1.52	3.5	1.07	3.0	0.91	6.0	1.83	6.0	1.83	5.5	1.68	5.0	1.52	3.5	1.07	3.0	0.91	
	120	6.0	1.83	5.5	1.68	5.0	1.52	3.5	1.07	3.0	0.91													
1 ¼"	40	5.5	1.68	5.5	1.68	5.0	1.52	3.0	0.91	3.0	0.91	5.5	1.68	5.5	1.68	5.5	1.68	5.0	1.52	3.0	0.91	3.0	0.91	
32mm	80	6.0	1.83	6.0	1.83	5.5	1.68	3.5	1.07	3.0	0.91	6.5	1.98	6.0	1.83	6.0	1.83	5.5	1.68	3.5	1.07	3.0	0.91	
	120	6.5	1.98	6.0	1.83	5.5	1.68	3.5	1.07	3.5	1.07													
1 ½"	40	6.0	1.83	5.5	1.68	5.0	1.52	3.5	1.07	3.0	0.91	6.0	1.83	6.0	1.83	5.5	1.68	5.0	1.52	3.5	1.07	3.0	0.91	
40mm	80	6.5	1.98	6.0	1.83	5.5	1.68	3.5	1.07	3.5	1.07	7.0	2.13	6.5	1.98	6.0	1.83	5.5	1.68	3.5	1.07	3.5	1.07	
	120	6.5	1.98	6.5	1.98	6.0	1.83	4.0	1.22	3.5	1.07													
2"	40	6.0	1.83	5.5	1.68	5.0	1.52	3.5	1.07	3.0	0.91	6.0	1.83	6.0	1.83	5.5	1.68	5.0	1.52	3.5	1.07	3.0	0.91	
50mm	80	7.0	2.13	6.5	1.98	6.0	1.83	4.0	1.22	3.5	1.07	7.0	2.13	7.0	2.13	6.5	1.98	6.0	1.83	4.0	1.22	3.5	1.07	
	120	7.5	2.29	7.0	2.13	6.5	1.98	4.0	1.22	3.5	1.07													
2 ½"	40	7.0	2.13	6.5	1.98	6.0	1.83	4.0	1.22	3.5	1.07	7.0	2.13	7.0	2.13	6.5	1.98	6.0	1.83	4.0	1.22	3.5	1.07	
65mm	80	7.5	2.29	7.5	2.29	6.5	1.98	4.5	1.37	4.0	1.22	8.0	2.44	7.5	2.29	7.5	2.29	6.5	1.98	4.5	1.37	4.0	1.22	
	120	8.0	2.44	7.5	2.29	7.0	2.13	4.5	1.37	4.0	1.22													
3"	40	7.0	2.13	7.0	2.13	6.0	1.83	4.0	1.22	3.5	1.07	7.0	2.13	7.0	2.13	7.0	2.13	6.0	1.83	4.0	1.22	3.5	1.07	
80mm	80	8.0	2.44	7.5	2.29	7.0	2.13	4.5	1.37	4.0	1.22	8.0	2.44	8.0	2.44	7.5	2.29	7.0	2.13	4.5	1.37	4.0	1.22	
	120	8.5	2.59	8.0	2.44	7.5	2.29	5.0	1.52	4.5	1.37													
3 ½"	40	7.5	2.29	7.0	2.13	6.5	1.98	4.0	1.22	4.0	1.22	7.5	2.29	7.5	2.29	7.0	2.13	6.5	1.98	4.0	1.22	4.0	1.22	
90mm	80	8.5	2.59	8.0	2.44	7.5	2.29	5.0	1.52	4.5	1.37	8.5	2.59	8.5	2.59	8.0	2.44	7.5	2.29	5.0	1.52	4.5	1.37	
4"	40	7.5	2.29	7.0	2.13	6.5	1.98	4.5	1.37	4.0	1.22	7.5	2.29	7.5	2.29	7.0	2.13	6.5	1.98	4.5	1.37	4.0	1.22	
100mm	80	9.0	2.74	8.5	2.59	7.5	2.29	5.0	1.52	4.5	1.37	8.5	2.59	9.0	2.74	8.5	2.59	7.5	2.29	5.0	1.52	4.5	1.37	
	120	9.5	2.90	9.0	2.74	8.5	2.59	5.5	1.68	5.0	1.52													
5"	40	8.0	2.44	7.5	2.29	7.0	2.13	4.5	1.37	4.0	1.22	8.0	2.44	8.0	2.44	7.5	2.29	7.0	2.13	5.0	1.52	4.5	1.37	
125mm	80	9.5	2.90	9.0	2.74	8.0	2.44	5.5	1.68	5.0	1.52	9.0	2.74	9.0	2.74	8.5	2.59	8.0	2.44	5.5	1.68	5.0	1.52	
6"	40	8.5	2.59	8.0	2.44	7.5	2.29	5.0	1.52	4.5	1.37	8.5	2.59	8.0	2.44	7.5	2.29	7.0	2.13	5.0	1.52	4.5	1.37	
150mm	80	10.0	3.05	9.5	2.90	9.0	2.74	6.0	1.83	5.0	1.52	10.0	3.05	9.5	2.90	9.0	2.74	8.0	2.44	5.5	1.68	5.0	1.52	
	120	11.5	3.51	10.5	3.20	9.5	2.90	6.5	1.98	6.0	1.83													
8"	40	9.0	2.74	8.5	2.59	8.0	2.44	5.0	1.52	4.5	1.37	9.5	2.90	9.0	2.74	8.5	2.59	7.5	2.29	5.5	1.68	5.0	1.52	
200mm	80	11.0	3.35	10.5	3.20	9.5	2.90	6.5	1.98	5.5	1.68	11.0	3.35	10.5	3.20	10.0	3.05	9.0	2.74	6.0	1.83	5.5	1.68	
10"	40	10.0	3.05	9.0	2.74	8.5	2.59	5.5	1.68	5.0	1.52	10.5	3.20	10.0	3.05	9.5	2.90	8.0	2.44	6.0	1.83	0.56	0.17	
250mm	80	12.0	3.66	11.0	3.35	10.0	3.05	7.0	2.13	6.0	1.83	11.5	3.51	11.0	3.35	10.5	3.20	9.5	2.90	6.5	1.98	0.60	0.18	
12"	40	11.5	3.51	10.5	3.20	9.5	2.90	6.5	1.98	5.5	1.68	11.5	3.51	10.5	3.20	10.0	3.05	8.5	2.59	6.5	1.98	6.0	1.83	
300mm	80	13.0	3.96	12.0	3.66	10.5	3.20	7.5	2.29	6.5	1.98	12.5	3.81	12.0	3.66	11.5	3.51	10.5	3.20	7.5	2.29	6.5	1.98	
14"	40	12.0	3.66	11.0	3.35	10.0	3.05	7.0	2.13	6.0	1.83													
350mm	80	13.5	4.11	13.0	3.96	11.0	3.35	8.0	2.44	7.0	2.13													
16"	40	12.5	3.81	11.5	3.51	10.5	3.20	7.5	2.29	6.5	1.98													
400mm	80	14.0	4.27	13.5	4.11	11.5	3.51	8.5	2.59	7.5	2.29													
18"	40	13.0	3.96	12.0	3.66	11.0	3.35	8.0	2.44	7.0	2.13													
450mm	80	14.5	4.42	14.0	4.27	12.0	3.66	9.0	2.74	8.0	2.44													
20"	40	13.5	4.11	12.5	3.81	11.5	3.51	8.5	2.59	7.5	2.29													
500mm	80	15.0	4.57	14.5	4.42	12.5	3.81	9.5	2.90	8.5	2.59													
24"	40	14.0	4.27	13.0	3.96	12.0	3.66	9.0	2.74	8.0	2.44													
600mm	80	18.5	5.64	15.0	4.57	13.0	3.96	10.0	3.05	9.0	2.74													

TECHNICAL INFORMATION
THERMAL EXPANSION OF PIPE MATERIALS

DIMENSIONS	
INCHES PER FOOT	
MILLIMETERS PER METER	

TEMPERATURE	CARBON STEEL THROUGH 3% CR MO	ALLOY STEELS THROUGH 9% CR MO	STAINLESS STEELS (304, 316, 347)	COPPER	BRASS	ALUMINUM
0	-0.0051		-0.0078	-0.0079	-0.0081	-0.0104
-17.8	-0.4250		-0.6500	-0.6583	-0.6750	-0.8666
50	-0.0015		-0.0022	-0.0022	-0.0023	-0.0030
10.0	-0.1250		-0.1833	-0.1833	-0.1917	-0.2500
70	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100	0.0023	0.0022	0.0034	0.0034	0.0035	0.0046
37.8	0.1917	0.1833	0.2833	0.2833	0.2917	0.3833
150	0.0061	0.0058	0.0090	0.0091	0.0093	0.0123
65.6	0.5083	0.4833	0.7500	0.7583	0.7750	1.0250
200	0.0099	0.0094	0.0146	0.0151	0.0152	0.0200
93.3	0.8250	0.7833	1.2166	1.2583	1.2666	1.6666
250	0.0141	0.0132	0.0203	0.0208	0.0214	0.0283
121	1.1750	1.1000	1.6916	1.7333	1.7833	2.3582
300	0.0182	0.0171	0.0261	0.0267	0.0276	0.0366
149	1.5166	1.4249	2.1749	2.2249	2.2999	3.0499
350	0.0226	0.0210	0.0321	0.0327	0.0340	0.0452
177	1.8833	1.7499	2.6749	2.7249	2.8332	3.7665
400	0.0270	0.0250	0.0380	0.0388	0.0405	0.0539
204	2.2499	2.0833	3.1665	3.2332	3.3749	4.4915
450	0.0316	0.0292	0.0440	0.0449	0.0472	0.0628
232	2.6332	2.4332	3.6665	3.7415	3.9332	5.2331
500	0.0362	0.0335	0.0501	0.0512	0.0540	0.0717
260	3.0165	2.7916	4.1748	4.2665	4.4998	5.9748
550	0.0411	0.0379	0.0562	0.0574	0.0610	0.0810
288	3.4249	3.1582	4.6831	4.7831	5.0831	6.7497
600	0.0460	0.0424	0.0624	0.0639	0.0680	0.0903
316	3.8332	3.5332	5.1998	5.3248	5.6664	7.5247
650	0.0512	0.0469	0.0687	0.0703	0.0753	
343	4.2665	3.9082	5.7248	5.8581	6.2747	
700	0.0563	0.0514	0.0750	0.0768	0.0826	
371	4.6915	4.2832	6.2498	6.3997	6.8831	
750	0.0617	0.0562	0.0815	0.0834	0.0902	
399	5.1415	4.6831	6.7914	6.9497	7.5164	
800	0.0670	0.0610	0.0880	0.0900	0.0978	
427	5.5831	5.0831	7.3330	7.4997	8.1497	
850	0.0726	0.0658	0.0946	0.0967	0.1056	
454	6.0498	5.4831	7.8830	8.0580	8.7996	
900	0.0781	0.0707	0.1012	0.1037	0.1135	
482	6.5081	5.8914	8.4330	8.6413	9.4580	
950	0.0835	0.0756	0.1080	0.1105	0.1216	
510	6.9581	6.2997	8.9996	9.2080	10.1329	
1000	0.0889	0.0806	0.1148	0.1175	0.1298	
538	7.4080	6.7164	9.5663	9.7913	10.8162	
1050	0.0946	0.0855	0.1216			
566	7.8830	7.1247	10.1329			
1100	0.1004	0.0905	0.1284			
593	8.3663	7.5414	10.6996			

TECHNICAL INFORMATION

COMMON STRUCTURAL SHAPES USED FOR PIPE SUPPORTS

STRUCTURAL SHAPE	SIZE	WEIGHT PER FOOT	DEPTH IN	FLANGE WIDTH IN	THICKNESS IN	SECTION MODULUS IN ³
ANGLE	L 1½ x 1½ x ¼	2.3	1½	1½	¼	0.13
	L 2 x 2 x ¼	3.2	2	2	¼	0.25
	L 2½ x 2½ x ¼	4.1	2½	2½	¼	0.38
	L 3 x 3 x ¼	4.9	3	3	¼	0.58
	L 3 x 3 x ⅜	7.2	3	3	⅜	0.83
	L 3 x 3 x ½	9.4	3	3	½	1.07
	L 3½ x 3½ x ⅜	8.5	3½	3½	⅜	1.15
	L 4 x 4 x ⅜	9.8	4	4	⅜	1.52
	L 4 x 4 x ½	12.8	4	4	½	1.97
	L 5 x 5 x ½	16.2	5	5	½	3.16
	L 6 x 6 x ½	19.6	6	6	½	4.61
	L 6 x 6 x ¾	28.7	6	6	¾	6.66
CHANNEL	C 3 x 4.1	4.1	3	1⅜	¼	1.10
	C 4 x 5.4	5.4	4	1⅜	⅜	1.93
	C 5 x 6.7	6.7	5	1¾	⅜	3.00
	C 6 x 8.2	8.2	6	1⅞	⅜	4.38
	C 8 x 11.5	11.5	8	2¼	⅜	8.14
	C 10 x 15.3	15.3	10	2⅝	⅜	13.50
SQUARE TUBING	ST 2 x 2 x ¼	5.4	2	2	¼	0.77
	ST 3 x 3 x ¼	8.8	3	3	¼	2.10
	ST 4 x 4 x ¼	12.2	4	4	¼	4.11
	ST 4 x 4 x ⅜	17.3	4	4	⅜	5.35
	ST 4 x 4 x ½	21.6	4	4	½	6.13
	ST 6 x 6 x ¼	19.0	6	6	¼	10.10
I-BEAM	ST 6 x 6 x ⅜	27.5	6	6	⅜	13.90
	ST 6 x 6 x ½	35.2	6	6	½	16.80
	ST 8 x 8 x ¼	25.8	8	8	¼	18.80
	ST 8 x 8 x ⅜	38.9	8	8	⅜	26.40
	ST 8 x 8 x ½	48.9	8	8	½	32.90
	S 4 x 7.7	7.7	4	2⅝	⅜	3.04
W 4 x 13	13.0	4⅞	4	⅜	5.46	
W 6 x 12	12.0	6	4	¼	7.31	
I-BEAM	W 6 x 15	15.0	6	6	¼	9.72
	W 6 x 20	20.0	6¼	6	⅜	13.40
	W 8 x 18	18.0	8⅞	5¼	⅜	15.20
	W 8 x 24	24.0	7⅞	6½	⅜	20.90
	W 8 x 31	31.0	8	8	⅜	27.50
	W 10 x 22	22.0	10⅞	5¾	⅜	23.20
	W 10 x 33	33.0	9¼	8	⅜	35.00
	W 12 x 26	26.0	12¼	6½	⅜	33.40
	W 12 x 40	40.0	12	8	½	51.90

Note: Flange thickness for I-Beam and Channel is the "mean" thickness

TECHNICAL INFORMATION

WELDING

BASIC WELDING SYMBOLS AND THEIR LOCATION SIGNIFICANCE

Location Significance	Fillet	Plug or Slot	Spot or Projection	Seam	Back or backing	Surfacing	Edge	Flange	Corner
Arrow side									
Other side						not used			
Both sides		not used	not used	not used	not used	not used	not used	not used	not used
No arrow side or other side significance	not used	not used			not used	not used	not used	not used	not used

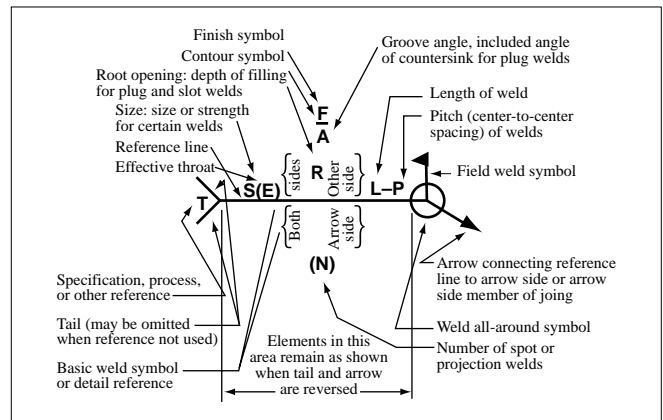
SUPPLEMENTARY SYMBOLS USED WITH WELDING SYMBOLS

Flush Contour Symbol		Convex Contour Symbol			
Flush contour symbol indicates face of weld to be made flush. When used without a finish symbol, indicates weld to be welded flush without subsequent finishing.		Convex contour symbol indicates face of weld to be finished to convex contour.			
Finish symbol (user's standard) indicates method of obtaining specified contour but not degree of finish.		Finish symbol (user's standard) indicates method of obtaining specified contour but not degree of finish.			
Weld-All-Around Symbol		Melt-Thru Symbol		Field Weld Symbol	
	Weld all-around symbol indicates that weld extends completely around the joint		Melt-thru symbol is not dimensioned (except height) Any applicable weld symbol		Field weld symbol indicates that weld is to be made at a place other than that of initial construction

BASIC JOINTS – Identification of arrow side and other side of joint

Butt Joint	T-Joint
Corner Joint	

LOCATION OF ELEMENTS OF A WELDING SYMBOL



ARROW SIDE AND OTHER SIDE MEMBER OF JOINT

Lap Joint	Edge Joint

DESIGNATION OF WELDING AND ALLIED PROCESSES BY LETTERS

AACair carbon arc cutting	Bbrazing	CWcold welding	ESWelectroslag welding	FOCchemical flux cutting
AAWair acetylene welding	BBblock brazing	DBdip brazing	EXWexplosion welding	FOWforge welding
ABDadhesive bonding	BMAWbare metal arc welding	DFBdiffusion brazing	FBfurnace brazing	FRWfriction welding
ABarc brazing	CACcarbon arc cutting	DFWdiffusion welding	FCAWflux cored arc welding	FSfurnace soldering
ACarc cutting	CAWcarbon arc welding	DSdip soldering	FCAW-EGflux cored arc welding-electrogas	FWflash welding
AHWatomic hydrogen welding	CAW-Ggas carbon arc welding	EASPelectric arc spraying	FLBflow brazing	GMACgas metal arc cutting
AOCoxygen arc cutting	CAW-Sshielded carbon arc welding	EBCelectron beam cutting	FLOWflow welding	GMAWgas metal arc welding
AWarc welding	CAW-Ttwin carbon arc welding	EBWelectron beam welding	FLSPflame spraying	GMAW-EGgas metal arc welding-electrogas

TECHNICAL INFORMATION

COMPONENT TYPES

FIGURE NUMBER:	MSS-SP-69	WW-H-171	FIGURE NUMBER:	MSS-SP-69	WW-H-171
1A	7	7	126LD PVC	8	8
1A CT	7	7	126PVC	8	8
12	16	16	132	13	15
12CT	16	16	136	38	38
14	27	54	128	36, 37, 38	36, 37, 38, 39
15	21	21	140	43	33
17	44	45	142	41	42
34	11	11	157	30	30
34CT	11	11	175	4	4
38	15	15	175SP	4	4
38CT	15	15	192	19	—
39	44	45	192W	19	—
40	46	47	193	23	23
47	23	23	196	23	23
47SS	23	23	200	1	12
238	23	23	200VT	1	12
238SS	23	23	217	25	—
49	13	—	222	24	24
53	46	47	240	6	—
69	31	32	247	38	38
81	12	25	265P	40	41
81CT	12	25	276	14	14
81BRT	12	35	276P	14	14
81PT	12	35	279	17	17
81SG	12	35	279L	17	17
81SCT	12	35	283	24	24
82	30	30	283PVC	24	24
84	32	33	283SP	24	24
89	8	8	283SS	24	24
91	3	3	297	28	28
91Z	3	3	298	4	4
100	1	1	303	34	35
100PVC	1	1	304	3	3
100SS	1	1	304SP	3	3
100CI	1	1	304Z	3	3
100CT	1	12	337	34	35
100EL	1	1	351 to 357Z	39A or 39B	40A or 40B
100SH	1	1	650	18	19
101	39	39	702	21	21
113A	22	22	800	10	10
113B	22	22	800CT	10	10
125	37	38	800N	10	10
126	8	8	800PVC	10	10
126CT	8	8	1010	35	—
126LD	8	8			