K-LOK®

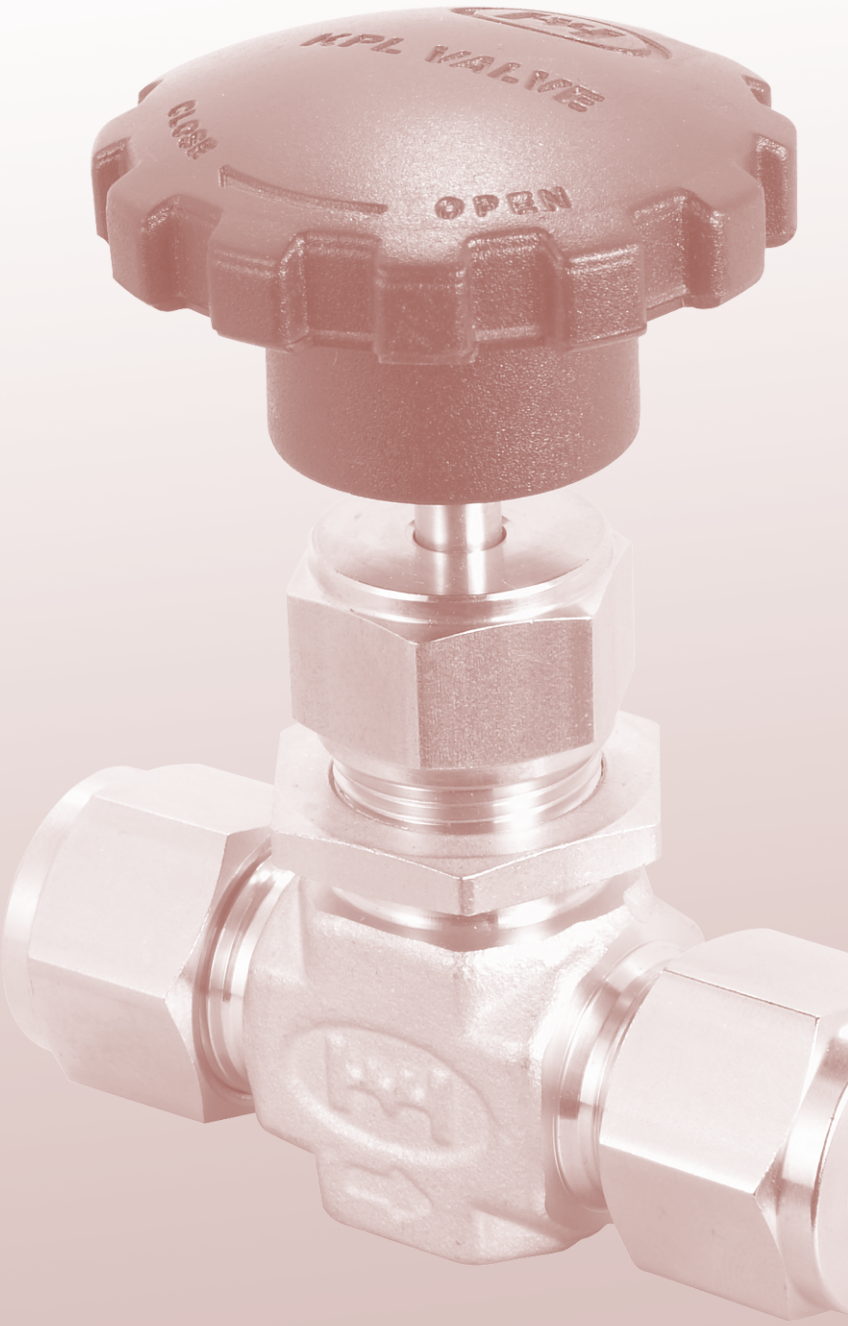
API Q1, 6D
License # 6D-0694

Quality
ISO 9001
SAI GLOBAL

KPL NEEDLE VALVES



KPL VALVE IND. CO., LTD.


KPL VALVE
CLOSE
OPEN



Certificate of Authority to use the Official API Monogram

License Number: 6D-0694 **ORIGINAL**

The American Petroleum Institute hereby grants to

KPL VALVE IND. CO. LTD.
793-4, Ojung-Dong, Ojung-Gu,
Bucheon-City, Kyeonggi-Do,
South Korea

the right to use the Official API Monogram® on manufactured products under the conditions in the official publications of the American Petroleum Institute entitled API Spec Q1® and **API Spec 6D** and in accordance with the provisions of the License Agreement.

In all cases where the Official API Monogram is applied, the API Monogram should be used in conjunction with this certificate number: **6D-0694**

The American Petroleum Institute reserves the right to revoke this authorization to use the Official API Monogram for any reason satisfactory to the Board of Directors of the American Petroleum Institute.

The scope of this license includes the following product: Ball Valves

QMS Exclusions: No Exclusions identified as Applicable

American Petroleum Institute

Effective Date: AUGUST 21, 2009
Expiration Date: AUGUST 21, 2012
To verify the authenticity of this license, go to www.api.org/compositelist.

Director of Training and Certification Programs

American Petroleum Institute



CERTIFICATE OF REGISTRATION

This is to certify that:

KPL VALVE IND. CO., LTD.

#793-4, Ojung-Dong, Ojung-Gu, Bucheon-City, Gyeonggi-Do
REPUBLIC OF KOREA

operates a

QUALITY MANAGEMENT SYSTEM

which complies with the requirements of

ISO 9001:2008

for the following scope

The registration covers the Quality Management System for Design, development, production and servicing of valves and fittings.

Certificate No: QEC25626

Issued: 5 July 2010
Expires: 4 July 2013

Originally Certified: 5 July 2007
Current Certification: 29 June 2010

Alex Ershkovich
General Manager – Certification Services

Duncan Lilley
Global Head – Assurance Services

ANAB

SAI GLOBAL



VELOSI INTERNATIONAL KOREA — WAY We Are You

The Worldwide Inspection, Expediting and Procurement Specialists

FIRE TEST CERTIFICATE

Certification No. : FTC-080808-01-RENEWAL3

This is to certify that the following materials have been inspected on random basis by Velosi Korea and found to be satisfactory in the Fire Test in accordance with API 6D design / API 607, fifth edition / ISO 10497 : 2004(E), second edition.

Manufacturer	: KPL VALVE IND. CO., LTD.
Location	: # 793-4, Ojung-Dong, Ojung-Gu, Bucheon City, Kyounggi-Do, Korea
Product	: Ball Valve
Material Description	: Body – A105, A182-F11, A182-F22, A182-F304, A182-F304L, A182-F316, A182-F316L, A352-LF2, MONEL, TITANIUM, ALLOY 20, HASTELLOY, DUPLEX Ball – A182-F304, A182-F304L, A182-F316, A182-F316L, A351-CF3, A351-CF3M, A351-CF8, A351-CF8M, MONEL, TITANIUM, ALLOY 20, HASTELLOY, DUPLEX
Type of End	: Screwed End, Socket Weld End, Flanged End
Size of Tested	: 1/2", 1", 2"
Class of Tested	: #150, #300, #600, #1500
Other Valves Qualified According to Size	: (#150) – #150, #300 (#300) – #300, #400, #600 (#600) – #600, #800, #900 (#1500) – #1500, #2500
Pressure Ratings	: (1/2") – 3/4", 1", 1-1/4", 1-1/2" (2") – 1-1/2", 2", 2-1/2", 3"

Date of Test : from November 01, 1999 to November 25, 1999
Validity : 8th of August 2008 ~ 7th of August 2011 (Renewal-3)

Velosi International - Korea
Date : 8th of August 2008

Hee-Hyun, Kim
President

The issue of this certificate shall not relieve the Supplier or Manufacturer from any responsibility or such guarantees as may be arranged, nor no interpreted so as in any way to imply acceptance of such goods. Neither shall Velosi Korea be held responsible in any way whatsoever for the technical accuracy and contents of the purchase order.

Velosi Korea	Velosi Europe	Velosi America	Velosi Certification	Velosi Malaysia
Seoul Office #5th Sankyo Bldg., 396-196 Sankyo-Dong, Mapo-Ku, Seoul, Korea Tel: 82-2-338 2383-4 Fax: 82-2-338 2385 E-mail : wayne@chol.com wayne@paran.co.kr	UK Office Aberdeen Office Italy Office Benelux Office Egypt Office	USA Office Australia Office	UAE Office Qatar Office Kuwait Office Oman Office India Office	Malaysia Office Singapore Office Indonesia Office



VELOSI INTERNATIONAL KOREA — WAY We Are You

The Worldwide Inspection, Expediting and Procurement Specialists

FIRE TEST CERTIFICATE

Certification No. : FTC-080808-02-RENEWAL3

This is to certify that the following materials have been inspected on random basis by Velosi Korea and found to be satisfactory in the Fire Test in accordance with API 6D design / API 6FA, third edition / API RP6F, third edition.

Manufacturer	: KPL VALVE IND. CO., LTD.
Location	: # 793-4, Ojung-Dong, Ojung-Gu, Bucheon-City, Kyounggi-Do, Korea
Product	: Ball Valve
Material Description	: Body – A105, A182-F11, A182-F22, A182-F304, A182-F304L, A182-F316, A182-F316L, A352-LF2, MONEL, TITANIUM, ALLOY 20, HASTELLOY, DUPLEX Ball – A182-F304, A182-F304L, A182-F316, A182-F316L, A351-CF3, A351-CF3M, A351-CF8, A351-CF8M, MONEL, TITANIUM, ALLOY 20, HASTELLOY, DUPLEX
Type of End	: Screwed End, Socket Weld End, Flanged End
Size of Tested	: 2"
Class of Tested	: #150, #300, #600, #1500
Other Valves Qualified According to Size	: (2") – 2", 2-1/2", 3", 4" (#300) – #300, #600, #600 (#600) – #600, #900 (#1500) – #1500, #2500
Pressure Ratings	

Date of Test : from November 01, 1999 to November 25, 1999
Validity : 8th of August 2008 ~ 7th of August 2011 (Renewal-3)

Velosi International - Korea
Date : 8th of August 2008

Hee-Hyun, Kim
President

The issue of this certificate shall not relieve the Supplier or Manufacturer from any responsibility or such guarantees as may be arranged, nor no interpreted so as in any way to imply acceptance of such goods. Neither shall Velosi Korea be held responsible in any way whatsoever for the technical accuracy and contents of the purchase order.

Velosi Korea	Velosi Europe	Velosi America	Velosi Certification	Velosi Malaysia
Seoul Office #5th Sankyo Bldg., 396-196 Sankyo-Dong, Mapo-Ku, Seoul, Korea Tel: 82-2-338 2383-4 Fax: 82-2-338 2385 E-mail : wayne@chol.com wayne@paran.co.kr	UK Office Aberdeen Office Italy Office Benelux Office Egypt Office	USA Office Australia Office	UAE Office Qatar Office Kuwait Office Oman Office India Office	Malaysia Office Singapore Office Indonesia Office



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FIRE TEST CERTIFICATE

Certification No. : FTC-080808-03-RENEWAL3

This is to certify that the following materials have been inspected on random basis by Velosi Korea and found to be satisfactory in the Fire Test in accordance with BS 6755 Part 2, Appendix A and Appendix B.

Manufacturer	: KPL VALVE IND. CO., LTD.
Location	: # 793-4, Ojung-Dong, Ojung-Gu, Bucheon-City, Kyounggi-Do, Korea
Product	: Ball Valve
Material Description	: Body – A105, A182-F11, A182-F22, A182-F304, A182-F304L, A182-F316, A182-F316L, A352-LF2, MONEL, TITANIUM, ALLOY 20, HASTELLOY, DUPLEX Ball – A182-F304, A182-F304L, A182-F316, A182-F316L, A351-CF3, A351-CF3M, A351-CF8, A351-CF8M, MONEL, TITANIUM, ALLOY 20, HASTELLOY, DUPLEX
Type of End	: Screwed End, Socket Weld End, Flanged End
Size of Tested	: 1/2", 1", 2"
Class of Tested	: #150, #300, #600, #1500
Other Valves Qualified According to Size	: (1/2") – 1/4", 3/8", 1/2", 3/4" (1") – 3/4", 1", 1-1/4", 1-1/2" (2") – 1-1/2", 2", 2-1/2", 3"
Pressure Ratings	: (#150) – #150, #300 (#300) – #300, #400, #600 (#600) – #600, #800, #900 (#1500) – #1500, #2500

Date of Test : from November 01, 1999 to November 25, 1999
Validity : 8th of August 2008 ~ 7th of August 2011 (Renewal-3)

Velosi International - Korea
Date : 8th of August 2008

Hee-Hyun, Kim
President

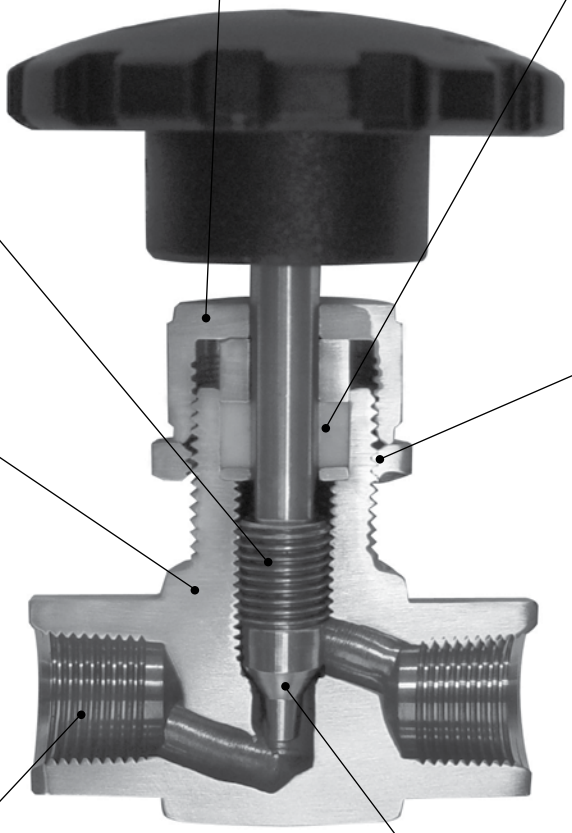
The issue of this certificate shall not relieve the Supplier or Manufacturer from any responsibility or such guarantees as may be arranged, nor no interpreted so as in any way to imply acceptance of such goods. Neither shall Velosi Korea be held responsible in any way whatsoever for the technical accuracy and contents of the purchase order.

Velosi Korea	Velosi Europe	Velosi America	Velosi Certification	Velosi Malaysia
Seoul Office #5th Sankyo Bldg., 396-196 Sankyo-Dong, Mapo-Ku, Seoul, Korea Tel: 82-2-338 2383-4 Fax: 82-2-338 2385 E-mail : wayne@chol.com wayne@paran.co.kr	UK Office Aberdeen Office Italy Office Benelux Office Egypt Office	USA Office Australia Office	UAE Office Qatar Office Kuwait Office Oman Office India Office	Malaysia Office Singapore Office Indonesia Office

Packing Nut
· allows smooth packing adjustment.

Stem Threads
· are rolled and hard chrome-plated for maximum service life.

Packing Materials
· are available in PTFE(standard) and GRAPHITE(option)



Integral Bonnet
· is available with straight and angle pattern.

Panel Mounting Nut
· allows easy mounting(standard)

Variety of End Connections
· include K-LOK tube fittings.
male / female NPT, PT threads.
pipe and tube socket weldeds.

Variety of Stem Tip
· include vee, regulating, and soft seat with kel-f

Forged Integral Bonnet Needle Valves

Features

- Pressures to 5000 PSIG.
- Temperatures from -54° C to 232° C with standard PTFE packing; up to 315° C with optional GRAPHITE packing.
- Choice of materials : 316L, 316, 304L, 304, stainless steel, carbon steel, etc.
- Straight and Angle pattern body styles.
- Variety of end connections includes gageable K- LOK® tube fittings.

Working pressure in PSIG

ASME / ANSI B 16.34	GROUP No. 2.2	GROUP No. 1.1
MATERIAL NAME	316SS	A105
CLASS (ANSI)	2080	1250
TEMPERATURE @ PRESSURE(PSIG)		
100° F(38° C)	5000	3000
200° F(93° C)	4295	2730
300° F(148° C)	3875	2660
350° F(176° C)	3715	2615
400° F(204° C)	3560	-
450° F(232° C)	3435	-

Technical Data

These ratings are for a standard valve having PTFE packing.
Optional seal materials will affect the Temperature ratings.

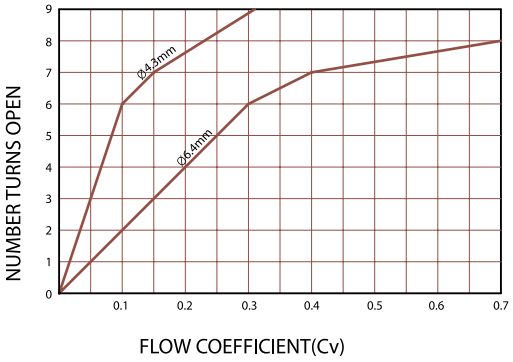
VALVE MATERIAL	TEMPERATURE RATING	PRESSURE RATING 100° F(38° C)
316 or 304	-65° F to 450° F (-54° C to 232° C)	5000psi (351kg/cm²)
BRASS	-65° F to 400° F (-54° C to 204° C)	3000psi (211kg/cm²)

Testing

- Standard Production Test - Each valve is100% tested with pneumatic at 1000PSIG. for leak age at the seat and packing. Each test is per formed to a maximum allowable leak rate of 0.1 sec/min.

- Optional Hydrostatic Test - This hydrostatic shell test is performed with pure water at 1 1/2 times the working pressure.

Flow Coefficient(Cv) @ Turns open



Forged Integral Bonnet Needle Valves

◈ K-LOK JOINT

Materials of Construction

NO	PARTS	MATERIALS		
		316SS	304SS	BRASS
1	BODY	316SS	304SS	BRASS
2	FERRULE NUT	316SS		BRASS
3	FRONT FERRULE			
4	BACK FERRULE			
5	STEM	316SS		
6	PACKING RING			
7	PACKING	PTFE / GRAPHITE		
8	GLAND	304SS		
9	PACKING NUT	304SS		BRASS
10	HANDLE	PHENOLIC / STAINLESS STEEL		
11	PANEL NUT	304SS		

* Standard lubrication : Nickel anti - seize lubricant. (hydrocarbon carrier)
* Standard Seat : Metal to Metal / Body Material.
* Optional Seat : Metal to Metal / Stellite, Hard coating, Soft Seat. (TFE Seat)

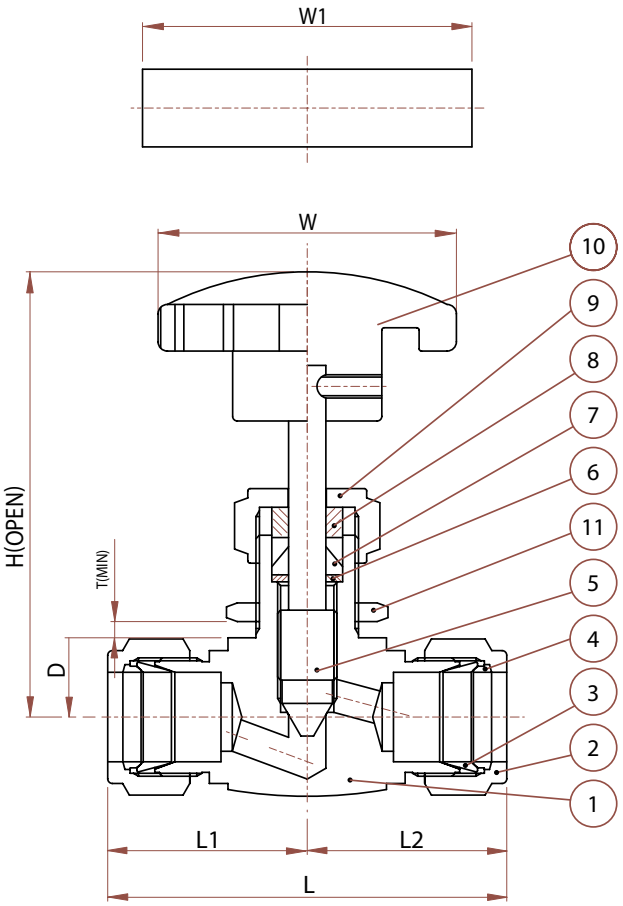


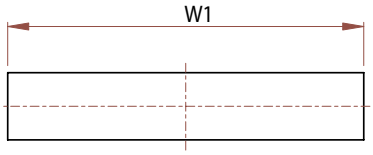
Table of Dimensions

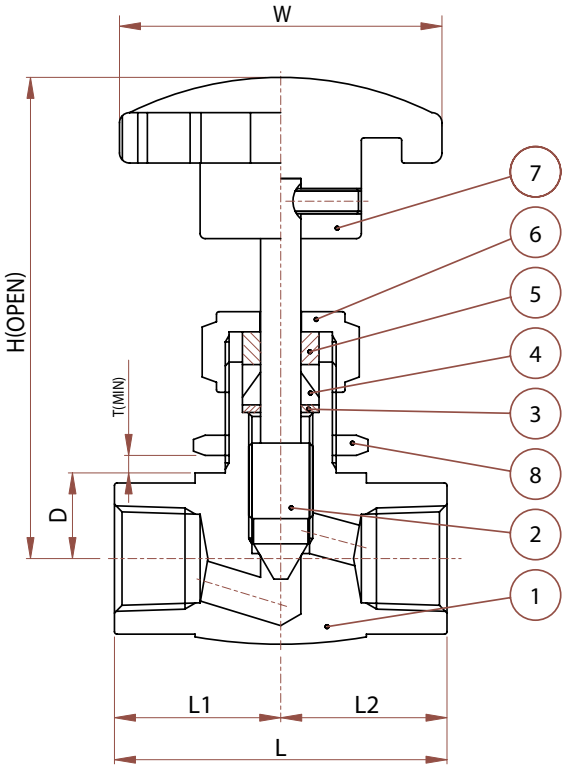
BASIC ORDERING NUMBER	END CONNECTION		ORIFICE	Cv	DIMENSION							
	INLET	OUTLET			L	L1	L2	D	T	W	W1	H
KNT-6T	1/8" K-LOK	1/8" K-LOK	2.0	0.09	54	27	27	12	3	35	48	61
KNT-6M	6mm K-LOK	6mm K-LOK	4.3	0.37	58	29	29	9.5	3	35	56	61
KNT-8T	1/4" K-LOK	1/4" K-LOK			58	29	29	9.5	3	35	56	61
KNT-8M	8mm K-LOK	8mm K-LOK	4.3		58	29	29	9.5	3	35	56	78
KNT-10T	3/8" K-LOK	3/8" K-LOK	6.3	0.73	66	33	33	14	3	48	56	76
KNT-10M	10mm K-LOK	10mm K-LOK			66	33	33	14	3	48	56	76
KNT-12M	12mm K-LOK	12mm K-LOK	6.4		74	37	37	14.5	3	64	70	92
KNT-15T	1/2" K-LOK	1/2" K-LOK			74	37	37	14.5	3	64	70	92
KNT-16T	5/8" K-LOK	5/8" K-LOK	8.0	1.1	86	43	43	17.5	3.5	64	70	103
KNT-16M	16mm K-LOK	16mm K-LOK			86	43	43	17.5	3.5	64	70	103
KNT-20T	3/4" K-LOK	3/4" K-LOK			86	43	43	17.5	3.5	64	70	103
KNT-25T	1" K-LOK	1" K-LOK	9.5	1.8	100	50	50	20	4	64	90	107
KNT-25M	25mm K-LOK	25mm K-LOK	9.5		100	50	50	20	4	64	90	107

* All dimensions in millimeters. Dimensions shown with k-lok nuts in finger-tight position, Where applicable.

Forged Integral Bonnet Needle Valves

◈ THREAD ENDS.





Materials of Construction

NO	PARTS	MATERIALS			
		316SS	304SS	A105	BRASS
1	BODY	316SS	304SS	A105	BRASS
2	STEM	316SS			
3	PACKING RING				
4	PACKING	PTFE / GRAPHITE			
5	GLAND	304SS			
6	PACKING NUT	304SS		A105	BRASS
7	HANDLE	PHENOLIC / STAINLESS STEEL			
8	PANEL NUT	304SS			

* Standard lubrication : Nickel anti - seize lubricant. (hydrocarbon carrier)
* Standard Seat : Metal to Metal / Body Material.
* Optional Seat : Metal to Metal / Stellite, Hard coating, Soft Seat. (TFE Seat)

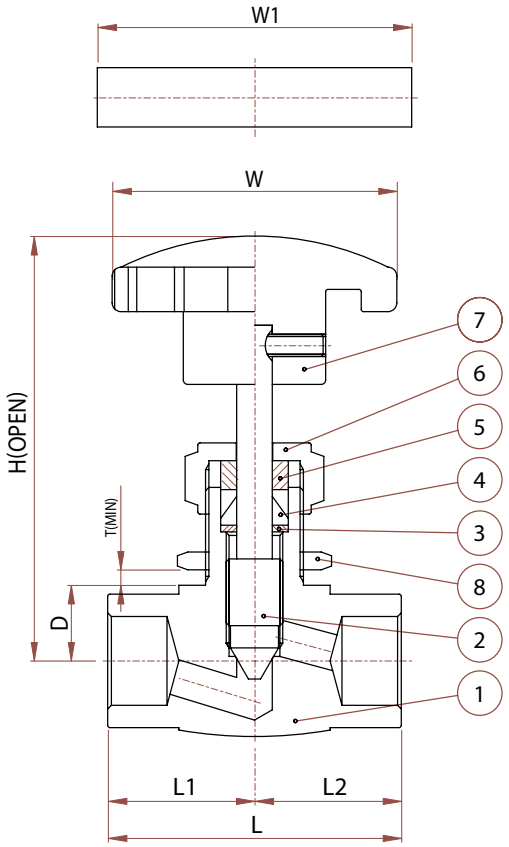
Table of Dimensions

BASIC ORDERING NUMBER	END CONNECTION		ORIFICE	Cv	DIMENSION							
	INLET	OUTLET			L	L1	L2	D	T	W	W1	H
KNF-6A	1/8" FEMALE	1/8" FEMALE	4.3	0.37	44	22	22	9.5	3	35	56	61
KNF-8A	1/4" FEMALE	1/4" FEMALE	6.3		54	27	27	14	3	48	56	76
KNF-10A	3/8" FEMALE	3/8" FEMALE	6.4	0.73	60	30	30	14.5	3	64	70	92
KNF-15A	1/2" FEMALE	1/2" FEMALE	8.0	1.1	66	33	33	17.5	3.5	64	70	103
KNF-20A	3/4" FEMALE	3/4" FEMALE	9.5	1.8	76	38	38	20	4	64	90	107
KNF-25A	1" FEMALE	1" FEMALE	14	2.2	92	46	46	26	4	-	92	115
KNM-6A	1/8" MALE	1/8" MALE	2.0	0.09	44	22	22	9.5	3	35	56	61
KNM-8A	1/4" MALE	1/4" MALE	4.3	0.37	54	27	27	14	3	48	56	76
KNM-10A	3/8" MALE	3/8" MALE	6.4	0.73	60	30	30	14.5	3	64	70	92
KNM-15A	1/2" MALE	1/2" MALE			66	33	33	17.5	3.5	64	70	103
KNM-20A	3/4" MALE	3/4" MALE	8.0	1.1	76	38	38	20	4	64	90	107
KNM-25A	1" MALE	1" MALE	9.5	1.8	92	46	46	26	4	-	92	115

* All dimensions in millimeters. Dimensions shown with k-lok nuts in finger-tight position, Where applicable.

Forged Integral Bonnet Needle Valves

◈ S.W ENDS / TUBE S.W ENDS



Materials of Construction

NO	PARTS	MATERIALS			
		316SS	304SS	A105	BRASS
1	BODY	316SS	304SS	A105	BRASS
2	STEM	316SS			
3	PACKING RING				
4	PACKING	PTFE / GRAPHITE			
5	GLAND	304SS			
6	PACKING NUT	304SS	A105	BRASS	
7	HANDLE	PHENOLIC / STAINLESS STEEL			
8	PANEL NUT	304SS			

* Standard lubrication : Nickel anti - seize lubricant. (hydrocarbon carrier)
* Standard Seat : Metal to Metal / Body Material.
* Optional Seat : Metal to Metal / Stellite, Hard coating, Soft Seat. (TFE Seat)

Table of Dimensions

BASIC ORDERING NUMBER	END CONNECTION		ORIFICE	Cv	DIMENSION							
	INLET	OUTLET			L	L1	L2	D	T	W	W1	H
KNW-6A	1/8" PIPE S.W	1/8" PIPE S.W	4.3		44	22	22	9.5	3	35	56	61
KNW-8A	1/4" PIPE S.W	1/4" PIPE S.W	6.3	0.37	54	27	27	14	3	48	56	76
KNW-10A	3/8" PIPE S.W	3/8" PIPE S.W	6.4	0.73	60	30	30	14.5	3	64	70	92
KNW-15A	1/2" PIPE S.W	1/2" PIPE S.W	8.0	1.1	66	33	33	17.5	3.5	64	70	103
KNW-20A	3/4" PIPE S.W	3/4" PIPE S.W	9.5	1.8	76	38	38	20	4	64	90	107
KNW-25A	1" PIPE S.W	1" PIPE S.W	14	2.2	92	46	46	26	4	-	92	115
KNW-8T	1/4" TUBE S.W	1/4" TUBE S.W	2.0	0.09	44	22	22	12	3	35	56	61
KNW-10T	3/8" TUBE S.W	3/8" TUBE S.W	4.3	0.37	54	27	27	12	3	48	56	76
KNW-15T	1/2" TUBE S.W	1/2" TUBE S.W	6.4	0.73	60	30	30	14	3	64	70	92
KNW-20T	3/4" TUBE S.W	3/4" TUBE S.W	8.0	1.1	66	33	33	16	3.5	64	70	103
KNW-25T	1" TUBE S.W	1" TUBE S.W	9.5	1.8	76	38	38	20	4	64	70	107
KNW-6M	6mm TUBE S.W	6mm TUBE S.W	2.0	0.09	44	22	22	12	3	35	56	61
KNW-8M	8mm TUBE S.W	8mm TUBE S.W	4.3	0.37	54	27	27	12	3	48	56	76
KNW-10M	10mm TUBE S.W	10mm TUBE S.W	6.4	0.73	60	30	30	14	3	64	70	92
KNW-12M	12mm TUBE S.W	12mm TUBE S.W	8.0	1.1	66	33	33	16	3.5	64	70	103
KNW-16M	16mm TUBE S.W	16mm TUBE S.W		1.1	66	33	33	16	3.5	64	70	103

* All dimensions in millimeters. Dimensions shown with k-lok nuts in finger-tight position, Where applicable.

Forged Integral Bonnet
Angle Pattern Needle Valves

◈ K-LOK JOINT

Materials of Construction

NO	PARTS	MATERIALS		
		304SS	316SS	BRASS
1	BODY	304SS	316SS	BRASS
2	FERRULE NUT	316SS		BRASS
3	FRONT FERRULE			
4	BACK FERRULE			
5	STEM	316SS		
6	PACKING RING			
7	PACKING	PTFE / GRAPHITE		
8	GLAND	304SS		
9	PACKING NUT	304SS		BRASS
10	HANDLE	PHENOLIC / STAINLESS STEEL		
11	PANEL NUT	304SS		

* Standard lubrication : Nickel anti - seize lubricant. (hydrocarbon carrier)
* Standard Seat : Metal to Metal / Body Material.
* Optional Seat : Metal to Metal / Stellite, Hard coating, Soft Seat. (TFE Seat)

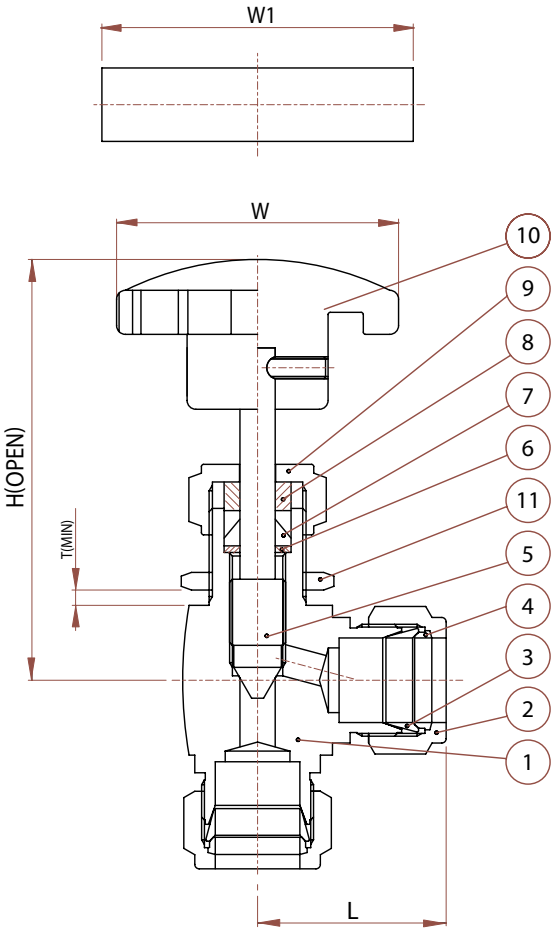


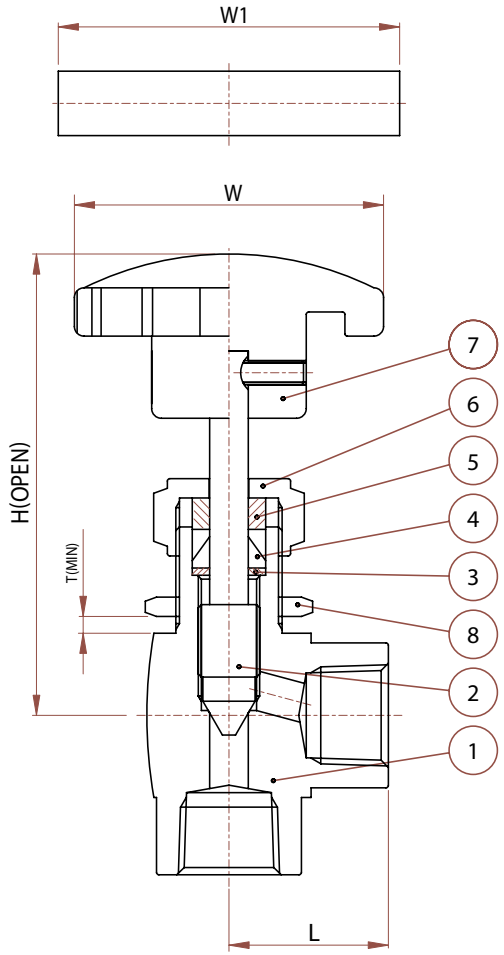
Table of Dimensions

BASIC ORDERING NUMBER	END CONNECTION		ORIFICE	Cv	DIMENSION				
	INLET	OUTLET			L	T	W	W1	H
KAT-6T	1/8" K-LOK	1/8" K-LOK	2.0	0.09	27	3	35	48	61
KAT-6M	6mm K-LOK	6mm K-LOK	4.3	0.37	29	3	35	56	61
KAT-8T	1/4" K-LOK	1/4" K-LOK			29	3	35	56	61
KAT-8M	8mm K-LOK	8mm K-LOK	6.3	0.73	30	3	48	56	78
KAT-10T	3/8" K-LOK	3/8" K-LOK			34.3	3	48	56	75
KAT-10M	10mm K-LOK	10mm K-LOK			34.3	3	48	56	75
KAT-12M	12mm K-LOK	12mm K-LOK			37	3	64	70	93
KAT-15T	1/2" K-LOK	1/2" K-LOK			37	3	64	70	93
KAT-16T	5/8" K-LOK	5/8" K-LOK	8.0	1.1	42	3.5	64	70	104
KAT-16M	16mm K-LOK	16mm K-LOK			42	3.5	64	70	104
KAT-20T	3/4" K-LOK	3/4" K-LOK			42	3.5	64	70	104
KAT-25T	1" K-LOK	1" K-LOK	9.5	1.8	50	4	64	90	107

* All dimensions in millimeters. Dimensions shown with k-lok nuts in finger-tight position, Where applicable.

Forged Integral Bonnet Angle Pattern Needle Valves

◈ THREAD ENDS.



Materials of Construction

NO	PARTS	MATERIALS			
		316SS	304SS	A105	BRASS
1	BODY	316SS	304SS	A105	BRASS
2	STEM	316SS			
3	PACKING RING				
4	PACKING	PTFE / GRAPHITE			
5	GLAND	304SS			
6	PACKING NUT	304SS		A105	BRASS
7	HANDLE	PHENOLIC / STAINLESS STEEL			
8	PANEL NUT	304SS			

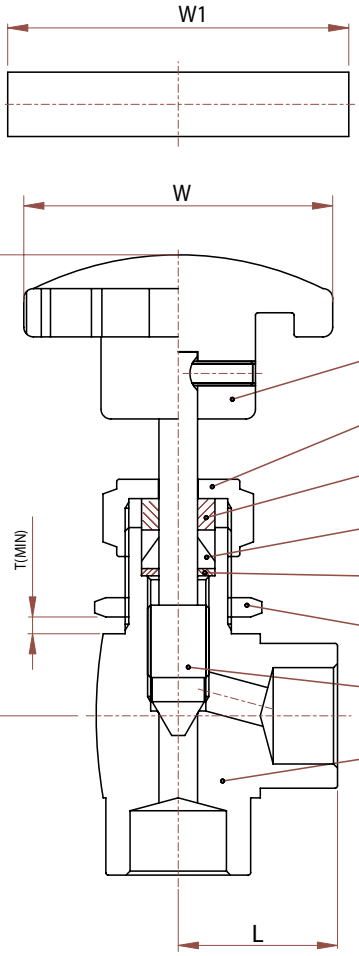
* Standard lubrication : Nickel anti - seize lubricant. (hydrocarbon carrier)
* Standard Seat : Metal to Metal / Body Material.
* Optional Seat : Metal to Metal / Stellite, Hard coating, Soft Seat. (TFE Seat)

Table of Dimensions

BASIC ORDERING NUMBER	END CONNECTION		ORIFICE	Cv	DIMENSION				
	INLET	OUTLET			L	T	W	W1	H
KAF-6A	1/8" FEMALE	1/8" FEMALE		0.37	22	3	35	56	65
KAF-8A	1/4" FEMALE	1/4" FEMALE	6.3		29.5	3	48	56	75
KAF-10A	3/8" FEMALE	3/8" FEMALE	6.4	0.73	34.5	3	64	70	93
KAF-15A	1/2" FEMALE	1/2" FEMALE	8.0	1.1	36.5	3.5	64	70	104
KAF-20A	3/4" FEMALE	3/4" FEMALE	9.5	1.8	42	4	64	90	107
KAF-25A	1" FEMALE	1" FEMALE	11	2.2	46	4	-	92	115
KAM-6A	1/8" MALE	1/8" MALE	2.0	0.09	22	3	35	56	65
KAM-8A	1/4" MALE	1/4" MALE	4.3	0.37	27	3	48	56	78
KAM-10A	3/8" MALE	3/8" MALE	6.4	0.73	30	3	64	70	86
KAM-15A	1/2" MALE	1/2" MALE			33	3.5	64	70	98
KAM-20A	3/4" MALE	3/4" MALE	8.0	1.1	38	4	64	70	105
KAM-25A	1" MALE	1" MALE	9.5	1.8	46	4	-	92	115

* All dimensions in millimeters. Dimensions shown with k-lok nuts in finger-tight position, Where applicable.

Forged Integral Bonnet
Angle Pattern Needle Valves



◈ S.W ENDS / TUBE S.W ENDS

Materials of Construction

NO	PARTS	MATERIALS			
		316SS	304SS	A105	BRASS
1	BODY	316SS	304SS	A105	BRASS
2	STEM	316SS			
3	PACKING RING				
4	PACKING	PTFE / GRAPHITE			
5	GLAND	304SS			
6	PACKING NUT	304SS		A105	BRASS
7	HANDLE	PHENOLIC / STAINLESS STEEL			
8	PANEL NUT	304SS			

* Standard lubrication : Nickel anti - seize lubricant. (hydrocarbon carrier)
* Standard Seat : Metal to Metal / Body Material.
* Optional Seat : Metal to Metal / Stellite, Hard coating, Soft Seat. (TFE Seat)

Table of Dimensions

BASIC ORDERING NUMBER	END CONNECTION		ORIFICE	Cv	DIMENSION				
	INLET	OUTLET			L	T	W	W1	H
KAW-6A	1/8" PIPE S.W	1/8" PIPE S.W		0.37	22	3	35	56	65
KAW-8A	1/4" PIPE S.W	1/4" PIPE S.W	6.3		29.5	3	48	56	75
KAW-10A	3/8" PIPE S.W	3/8" PIPE S.W	6.4	0.73	34.5	3	64	70	93
KAW-15A	1/2" PIPE S.W	1/2" PIPE S.W	8.0	1.1	36.5	3.5	64	70	104
KAW-20A	3/4" PIPE S.W	3/4" PIPE S.W	9.5	1.8	42	4	64	90	107
KAW-25A	1" PIPE S.W	1" PIPE S.W	11	2.2	46	4	-	92	115
KAW-6T	1/8" PIPE S.W	1/8" PIPE S.W	2.0	0.09	22	3	35	56	65
KAW-8T	1/4" TUBE S.W	1/4" TUBE S.W	4.3	0.37	27	3	48	56	78
KAW-10T	3/8" TUBE S.W	3/8" TUBE S.W	6.4	0.73	30	3	64	70	86
KAW-15T	1/2" TUBE S.W	1/2" TUBE S.W			33	3.5	64	70	98
KAW-20T	3/4" TUBE S.W	3/4" TUBE S.W	8.0	1.1	38	4	64	70	105
KAW-25T	1" TUBE S.W	1" TUBE S.W	9.5	1.8	46	4	-	92	115

* All dimensions in millimeters. Dimensions shown with k-lok nuts in finger-tight position, Where applicable.

Screwed Bonnet Type Needle Valves

Features

- Pressures to 5000 PSIG.
- Temperatures from -54° C to 232° C with standard PTFE packing; up to 315° C with optional GRAPHITE packing.
- Choice of materials : 316L, 316, 304L, 304, stainless steel, carbon steel, etc.
- Straight and Angle pattern body styles.
- Variety of end connections includes gageable K- LOK® tube fittings.

Working pressure in PSIG

ASME / ANSI B 16.34	GROUP No. 2.2	GROUP No. 1.1
MATERIAL NAME	316LSS	A105
CLASS (ANSI)	2080	1250
TEMPERATURE @ PRESSURE(PSIG)		
100° F(38° C)	5000	3000
200° F(93° C)	4295	2730
300° F(148° C)	3875	2660
350° F(176° C)	3715	2615
400° F(204° C)	3560	-
450° F(232° C)	3435	-

Technical Data

These ratings are for a standard valve having PTFE packing.
Optional seal materials will affect the Temperature ratings.

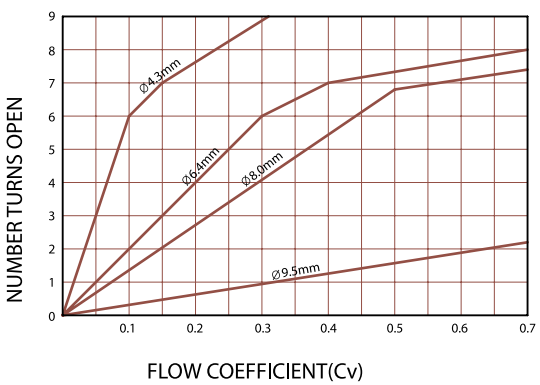
VALVE MATERIAL	TEMPERATURE RATING	PRESSURE RATING 100° F(38° C)
316 or 304	-65° F to 450° F (-54° C to 232° C)	5000psi (351kg/cm²)
BRASS	-65° F to 400° F (-54° C to 204° C)	3000psi (211kg/cm²)

Testing

- Standard Production Test - Each valve is100% tested with pneumatic at 1000PSIG. for leak age at the seat and packing. Each test is per formed to a maximum allowable leak rate of 0.1 sec/min.

- Optional Hydrostatic Test - This hydrostatic shell test is performed with pure water at 1 1/2 times the working pressure.

Flow Coefficient(Cv) @ Turns open



Screwed Bonnet Type Needle Valves

◈ K-LOK JOINT

Materials of Construction

NO	PARTS	MATERIALS		
		304SS	316SS	BRASS
1	BODY	304SS	316SS	BRASS
2	FERRULE NUT	316SS		BRASS
3	FRONT FERRULE			
4	BACK FERRULE			
5	BONNET	304SS	316SS	BRASS
6	STEM	316SS		
7	PACKING RING			
8	PACKING	PTFE / GRAPHITE		
9	GLAND	304SS		
10	PACKING NUT	304SS		BRASS
11	HANDLE	STAINLESS STEEL		

* Standard lubrication : Nickel anti - seize lubricant. (hydrocarbon carrier)
* Standard Seat : Metal to Metal / Body Material.
* Optional Seat : Metal to Metal / Stellite, Hard coating, Soft Seat. (TFE Seat)

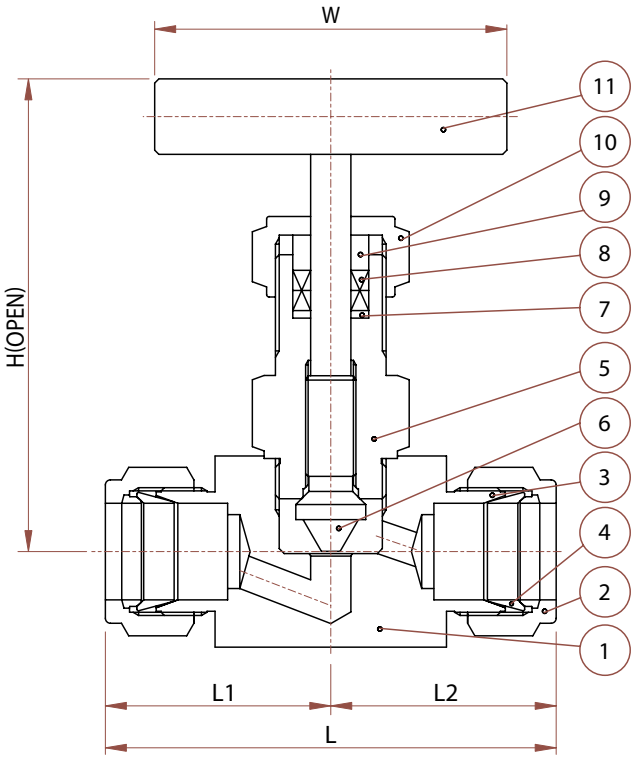


Table of Dimensions

BASIC ORDERING NUMBER	END CONNECTION		ORIFICE	Cv	DIMENSION			
	INLET	OUTLET			L	L1	L2	W
KST-6T	1/8" K-LOK	1/8" K-LOK	2.0	0.09	58	29	29	56
KST-6M	6mm K-LOK	6mm K-LOK	4.3	0.37	62	31	31	56
KST-8T	1/4" K-LOK	1/4" K-LOK			62	31	31	56
KST-8M	8mm K-LOK	8mm K-LOK	6.4	0.73	64	32	32	56
KST-10T	3/8" K-LOK	3/8" K-LOK			70	35	35	56
KST-10M	10mm K-LOK	10mm K-LOK			70	35	35	56
KST-12M	12mm K-LOK	12mm K-LOK			74	37	37	56
KST-15T	1/2" K-LOK	1/2" K-LOK			74	37	37	56
KST-16T	5/8" K-LOK	5/8" K-LOK	8.0	1.1	90	45	45	70
KST-16M	16mm K-LOK	16mm K-LOK			90	45	45	70
KST-20T	3/4" K-LOK	3/4" K-LOK			90	45	45	70
KST-25T	1" K-LOK	1" K-LOK	9.5	1.8	104	52	52	70

* All dimensions in millimeters. Dimensions shown with k-lok nuts in finger-tight position, Where applicable.

Screwed Bonnet Type Needle Valves

◈ THREAD ENDS.

Materials of Construction

NO	PARTS	MATERIALS		
		316SS	304SS	A105
1	BODY	316SS	304SS	A105
2	BONNET			
3	STEM	316SS		
4	PACKING RING			
5	PACKING	PTFE / GRAPHITE		
6	GLAND	304SS		
7	PACKING NUT	304SS		A105
8	HANDLE	STAINLESS STEEL		

* Standard lubrication : Nickel anti - seize lubricant. (hydrocarbon carrier)
* Standard Seat : Metal to Metal / Body Material.
* Optional Seat : Metal to Metal / Stellite, Hard coating, Soft Seat. (TFE Seat)

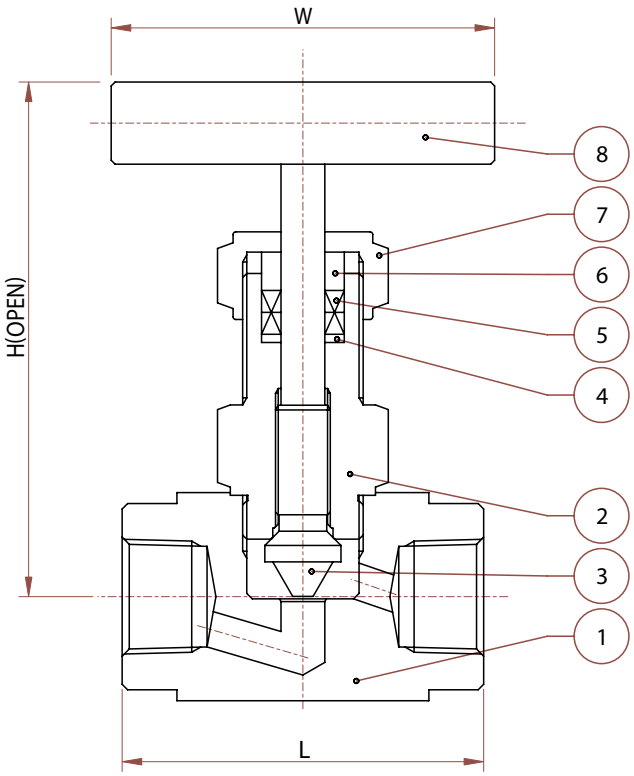


Table of Dimensions

BASIC ORDERING NUMBER	END CONNECTION		ORIFICE	Cv	DIMENSION		
	INLET	OUTLET			L	W	H
KSF-6A	1/8" FEMALE	1/8" FEMALE	4.3	0.37	48	56	65
KSF-8A	1/4" FEMALE	1/4" FEMALE			58	56	78
KSF-10A	3/8" FEMALE	3/8" FEMALE	5	0.73	58	70	71
KSF-15A	1/2" FEMALE	1/2" FEMALE	6.5	1.1	70	70	87
KSF-20A	3/4" FEMALE	3/4" FEMALE	8	1.8	80	90	101
KSF-25A	1" FEMALE	1" FEMALE	11	2.2	96	92	143
KSF-32A	1 1/4" FEMALE	1 1/4" FEMALE	14	2.8	112	151	147
KSF-40A	1 1/2" FEMALE	1 1/2" FEMALE	16	4.6	120	151	160
KSF-50A	2" FEMALE	2" FEMALE	18	5.3	130	151	166

* All dimensions in millimeters. Dimensions shown with k-lok nuts in finger-tight position, Where applicable.

Screwed Bonnet Type Needle Valves

◈ SOCKET WELDED ENDS

Materials of Construction

NO	PARTS	MATERIALS		
		316SS	304SS	A105
1	BODY	316SS	304SS	A105
2	BONNET			
3	STEM	316SS		
4	PACKING RING			
5	PACKING	PTFE / GRAPHITE		
6	GLAND	304SS		
7	PACKING NUT	304SS		A105
8	HANDLE	STAINLESS STEEL		

* Standard lubrication : Nickel anti - seize lubricant. (hydrocarbon carrier)
* Standard Seat : Metal to Metal / Body Material.
* Optional Seat : Metal to Metal / Stellite, Hard coating, Soft Seat. (TFE Seat)

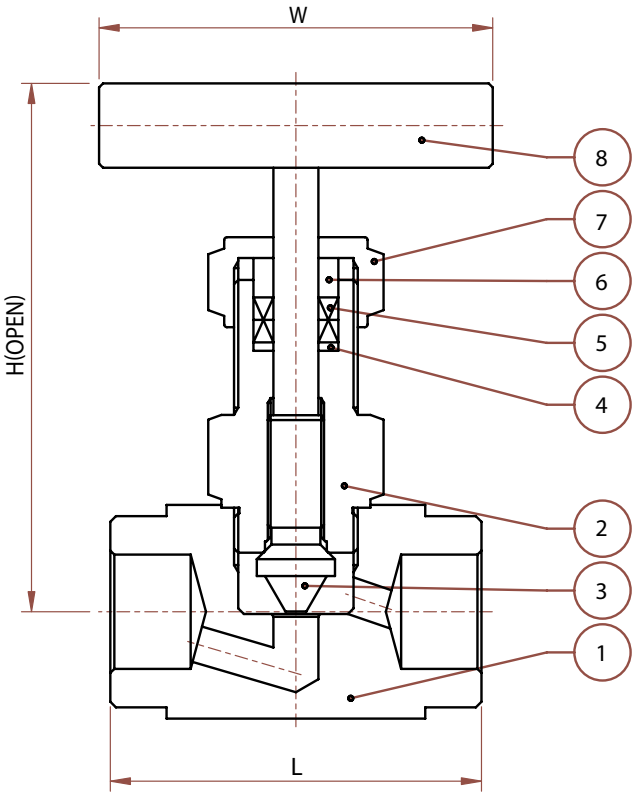


Table of Dimensions

BASIC ORDERING NUMBER	END CONNECTION		ORIFICE	Cv	DIMENSION		
	INLET	OUTLET			L	W	H
KSW-6A	1/8" PIPE S.W	1/8" PIPE S.W	4.3	0.37	48	56	65
KSW-8A	1/4" PIPE S.W	1/4" PIPE S.W			58	56	78
KSW-10A	3/8" PIPE S.W	3/8" PIPE S.W	5	0.73	58	70	71
KSW-15A	1/2" PIPE S.W	1/2" PIPE S.W	6.5	1.1	70	70	87
KSW-20A	3/4" PIPE S.W	3/4" PIPE S.W	8	1.8	80	90	101
KSW-25A	1" PIPE S.W	1" PIPE S.W	11	2.2	96	92	143
KSW-32A	1 1/4" PIPE S.W	1 1/4" PIPE S.W	14	2.8	112	151	147
KSW-40A	1 1/2" PIPE S.W	1 1/2" PIPE S.W	16	4.6	120	151	160
KSW-50A	2" PIPE S.W	2" PIPE S.W	18	5.3	130	151	166

* All dimensions in millimeters. Dimensions shown with k-lok nuts in finger-tight position, Where applicable.

Union Bonnet Type Needle Valves

Features

- Pressures to 6000, 10000 PSIG.
- Temperatures from -54° C to 232° C with standard PTFE packing; up to 315° C with optional GRAPHITE packing.
- Choice of materials : 316L, 316, 304L, 304, stainless steel, carbon steel, etc.
- Straight and Angle pattern body styles.
- Variety of end connections includes gageable K- LOK® tube fittings.

Working pressure in PSIG

ASME / ANSI B 16.34	GROUP No. 2.2	
MATERIAL NAME	316SS	
CLASS (ANSI)	2500	4500
TEMPERATURE @ PRESSURE(PSIG)		
100° F(38° C)	6000	10000
200° F(93° C)	5160	9290
300° F(148° C)	4660	8390
400° F(204° C)	4280	7705
450° F(232° C)	4130	7435

Technical Data

These ratings are for a standard valve having PTFE packing.
Optional seal materials will affect the Temperature ratings.

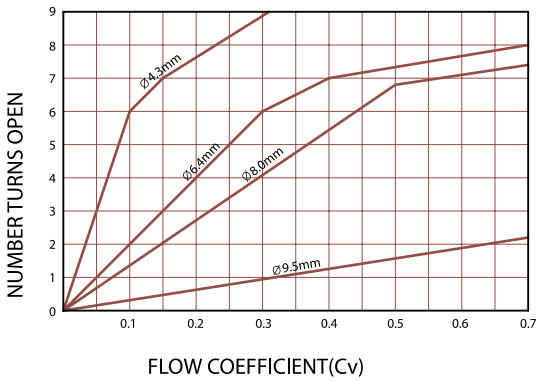
VALVE MATERIAL	TEMPERATURE RATING	PRESSURE RATING100° F(38° C)
316 or 304 CARBON STEEL	-65° F to 450° F (-54° C to 232° C)	6000psi (422kg/cm²)
		10000psi (703kg/cm²)

Testing

- Standard Production Test - Each valve is100% tested with pneumatic at 1000PSIG. for leak age at the seat and packing. Each test is per formed to a maximum allowable leak rate of 0.1 sec/min.

- Optional Hydrostatic Test - This hydrostatic shell test is performed with pure water at 1 1/2 times the working pressure.

Flow Coefficient(Cv) @ Turns open



Union Bonnet Type Needle Valves

◈ K-LOK JOINT

Materials of Construction

NO	PARTS	MATERIALS	
		304SS	316SS
1	BODY	304SS	316SS
2	FERRULE NUT	316SS	
3	FRONT FERRULE		
4	BACK FERRULE		
5	STEM	316SS	
6	PACKING RING		
7	PACKING	PTFE / GRAPHITE	
8	GLAND	304SS	
9	BONNET	304SS	316SS
10	PACKING BOLT		
11	UNION NUT		
12	PACKING NUT	304SS	
13	HANDLE	STAINLESS STEEL	
14	PANEL NUT	304SS	

* Standard lubrication : Nickel anti - seize lubricant. (hydrocarbon carrier)
* Standard Seat : Metal to Metal / Body Material.
* Optional Seat : Metal to Metal / Stellite, Hard coating, Soft Seat. (TFE Seat)

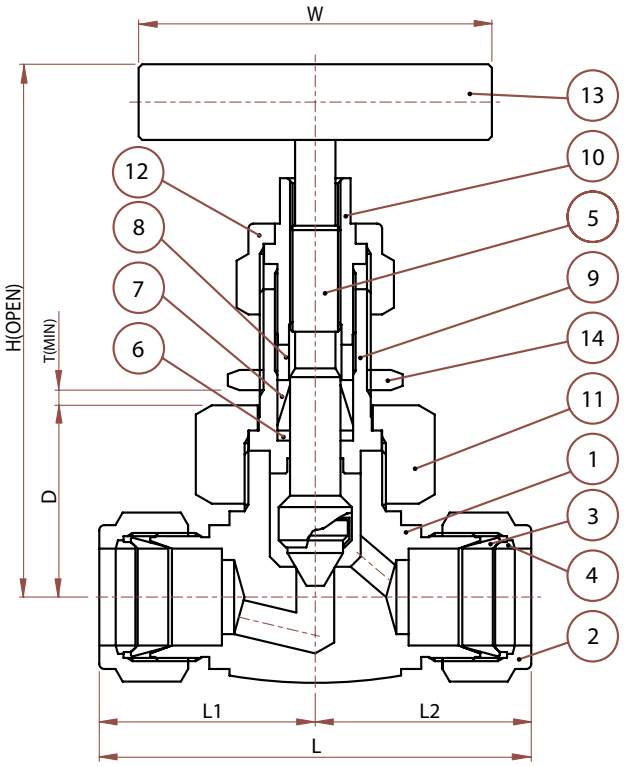


Table of Dimensions / 6000PSIG

BASIC ORDERING NUMBER	END CONNECTION		ORIFICE	Cv	DIMENSION						
	INLET	OUTLET			L	L1	L2	T	D	W	H
KUT-6M	6mm K-LOK	6mm K-LOK	4.3	0.37	58	29	29	3	35	56	98
KUT-8T	1/4" K-LOK	1/4" K-LOK									
KUT-8M	8mm K-LOK	8mm K-LOK									
KUT-10T	3/8" K-LOK	3/8" K-LOK	6.4	0.73	68	34	34	4	42	70	110
KUT-10M	10mm K-LOK	10mm K-LOK									
KUT-12M	12mm K-LOK	12mm K-LOK			72	36	36				
KUT-15T	1/2" K-LOK	1/2" K-LOK									

* All dimensions in millimeters. Dimensions shown with k-lok nuts in finger-tight position, Where applicable.

Union Bonnet Type Needle Valves

◈ THREAD ENDS.

Materials of Construction

NO	PARTS	MATERIALS		
		316SS	304SS	A105
1	BODY	316SS	304SS	A105
2	STEM	316SS		
3	PACKING RING			
4	PACKING	PTFE / GRAPHITE		
5	GLAND	304SS		
6	BONNET	316SS	304SS	A105
7	PACKING BOLT			
8	UNION NUT			
9	PACKING NUT	304SS		BRASS
10	HANDLE	STAINLESS STEEL		
11	PANEL NUT	304SS		

* Standard lubrication : Nickel anti - seize lubricant. (hydrocarbon carrier)
* Standard Seat : Metal to Metal / Body Material.
* Optional Seat : Metal to Metal / Stellite, Hard coating, Soft Seat. (TFE Seat)

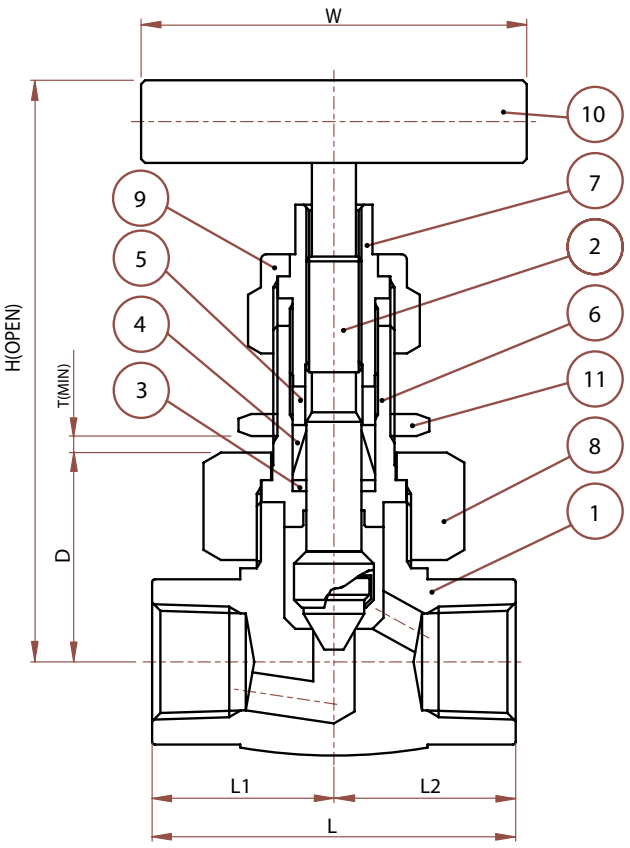


Table of Dimensions / 6000PSIG

BASIC ORDERING NUMBER	END CONNECTION		ORIFICE	Cv	DIMENSION						
	INLET	OUTLET			L	L1	L2	D	T	W	H
KUF-6A	1/8" FEMALE	1/8" FEMALE	4	0.37	54	27	27	31.5	3	56	88
KUF-8A	1/4" FEMALE	1/4" FEMALE	4	0.37	54	27	27	31.5	3	56	88
KUF-10A	3/8" FEMALE	3/8" FEMALE	5	0.73	60	30	30	32	3	70	93
KUF-15A	1/2" FEMALE	1/2" FEMALE	7	1.1	66	33	33	38	3.5	70	114
KUF-20A	3/4" FEMALE	3/4" FEMALE	9	1.8	76	38	38	44	4	70	126
KUF-25A	1" FEMALE	1" FEMALE	10	2.2	92	46	46	57	4	92	146
KUM-6A	1/8" MALE	1/8" MALE	2.0	0.09	54	27	27	35	3	56	98
KUM-8A	1/4" MALE	1/4" MALE	4.3	0.37	54	27	27	35	3	56	98
KUM-10A	3/8" MALE	3/8" MALE	6.4	0.73	60	30	30	35	3	70	98
KUM-15A	1/2" MALE	1/2" MALE	8.0	1.1	66	33	33	42	3.5	70	110
KUM-20A	3/4" MALE	3/4" MALE	8.0	1.1	76	38	38	42	4	70	110
KUM-25A	1" MALE	1" MALE	9.5	1.8	92	46	46	50	4	92	120

* All dimensions in millimeters. Dimensions shown with k-lok nuts in finger-tight position, Where applicable.

Union Bonnet Type Needle Valves

◈ S.W ENDS / TUBE S.W ENDS

Materials of Construction

NO	PARTS	MATERIALS		
		316SS	304SS	A105
1	BODY	316SS	304SS	A105
2	STEM	316SS		
3	PACKING RING			
4	PACKING	PTFE / GRAPHITE		
5	GLAND	304SS		
6	BONNET	316SS	304SS	A105
7	PACKING BOLT			
8	UNION NUT			
9	PACKING NUT	304SS		A105
10	HANDLE	STAINLESS STEEL		
11	PANEL NUT	304SS		

* Standard lubrication : Nickel anti - seize lubricant. (hydrocarbon carrier)
* Standard Seat : Metal to Metal / Body Material.
* Optional Seat : Metal to Metal / Stellite, Hard coating, Soft Seat. (TFE Seat)

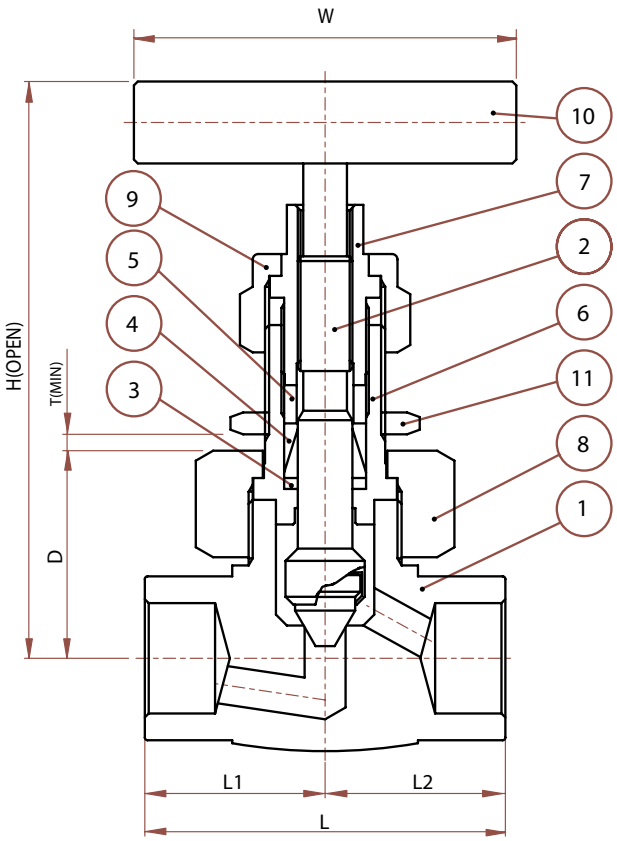


Table of Dimensions / 6000PSIG

BASIC ORDERING NUMBER	END CONNECTION		ORIFICE	Cv	DIMENSION						
	INLET	OUTLET			L	L1	L2	D	T	W	H
KUW-6A	1/8" PIPE	1/8" PIPE	4	0.37	54	27	27	31.5	3	56	88
KUW-8A	1/4" PIPE	1/4" PIPE	4	0.37	54	27	27	31.5	3	56	88
KUW-10A	3/8" PIPE	3/8" PIPE	5	0.73	60	30	30	32	3	70	93
KUW-15A	1/2" PIPE	1/2" PIPE	7	1.1	66	33	33	38	3.5	70	114
KUW-20A	3/4" PIPE	3/4" PIPE	9	1.8	76	38	38	44	4	70	126
KUW-25A	1" PIPE	1" PIPE	10	2.2	92	46	46	57	4	92	146
KUW-6T	1/8" TUBE	1/8" TUBE	2.0	0.09	54	27	27	35	3	56	98
KUW-8T	1/4" TUBE	1/4" TUBE	4.3	0.37	54	27	27	35	3	56	98
KUW-10T	3/8" TUBE	3/8" TUBE	6.4	0.73	60	30	30	35	3	70	98
KUW-15T	1/2" TUBE	1/2" TUBE	8.0	1.1	66	33	33	42	3.5	70	110
KUW-20T	3/4" TUBE	3/4" TUBE	8.0	1.1	76	38	38	42	4	70	110
KUW-25T	1" TUBE	1" TUBE	9.5	1.8	92	46	46	50	4	92	120

* All dimensions in millimeters. Dimensions shown with k-lok nuts in finger-tight position, Where applicable.

Forged Long Bonnet Needle Valves

Features

- Pressures to 5000 PSIG.
- Temperatures from -54° C to 232° C with standard PTFE packing; up to 315° C with optional GRAPHITE packing.
- Choice of materials : 316L, 316, 304L, 304, stainless steel, carbon steel, etc.
- Straight and Angle pattern body styles.
- Variety of end connections includes gageable K- LOK® tube fittings.

Working pressure in PSIG

ASME / ANSI B 16.34	GROUP No. 2.2
MATERIAL NAME	319SS
CLASS (ANSI)	1250
TEMPERATURE @ PRESSURE(PSIG)	
100° F(38° C)	3000
200° F(93° C)	2580
300° F(148° C)	2330
400° F(204° C)	2140
450° F(232° C)	2065
500° F(260° C)	1990
600° F(315° C)	1880

Technical Data

These ratings are for a standard valve having PTFE packing.
Optional seal materials will affect the Temperature ratings.

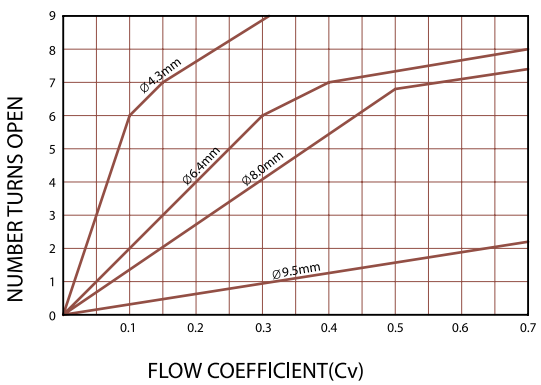
WALVE MATERIAL	TEMPERATURE RATING	PRESSURE RATING100° F(38° C)
316 or 304 Stainless steel	-65° F to 450° F (-54° C to 232° C)	3000psi (211kg/cm²)

Testing

- Standard Production Test - Each valve is100% tested with pneumatic at 1000PSIG. for leak age at the seat and packing. Each test is per formed to a maximum allowable leak rate of 0.1 sec/min.

- Optional Hydrostatic Test - This hydrostatic shell test is performed with pure water at 1 1/2 times the working pressure.

Flow Coefficient(Cv) @ Turns open



Forged Long Bonnet Needle Valves

◈ K-LOK JOINT

Materials of Construction

NO	PARTS	MATERIALS	
		304SS	316SS
1	BODY	304SS	316SS
2	FERRULE NUT	316SS	
3	FRONT FERRULE		
4	BACK FERRULE		
5	STEM	316SS	
6	PACKING RING		
7	PACKING	PTFE / GRAPHITE	
8	GLAND	304SS	
9	BONNET	304SS	316SS
10	UNION NUT	316SS	
11	PACKING NUT	304SS	
12	HANDLE	STAINLESS STEEL	

* Standard lubrication : Nickel anti - seize lubricant. (hydrocarbon carrier)
* Standard Seat : Metal to Metal / Body Material.
* Optional Seat : Metal to Metal / Stellite, Hard coating, Soft Seat. (TFE Seat)

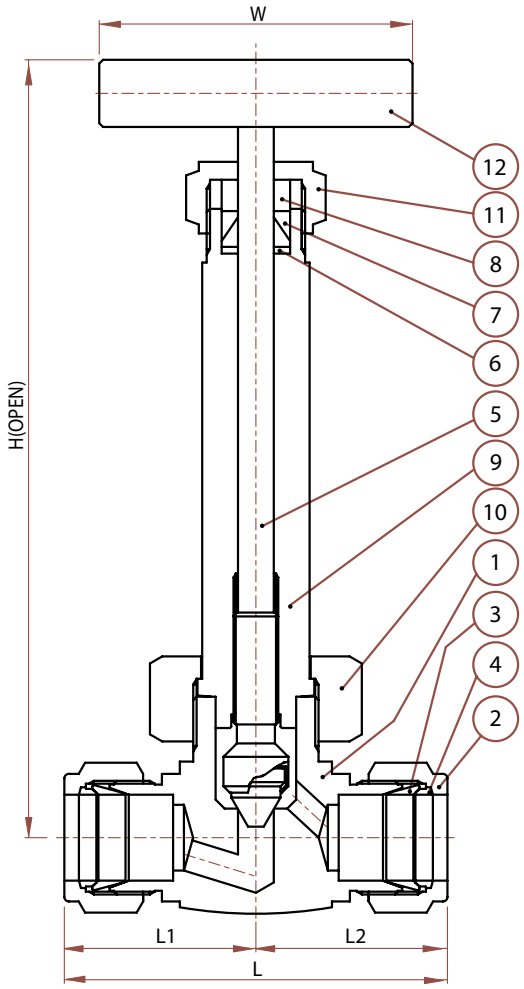


Table of Dimensions

BASIC ORDERING NUMBER	END CONNECTION		ORIFICE	Cv	DIMENSION				
	INLET	OUTLET			L	T	W	W1	H
KLT-6M	6mm K-LOK	6mm K-LOK	4.3	0.37	58	29	29	48	165
KLT-8T	1/4" K-LOK	1/4" K-LOK							
KLT-8M	8mm K-LOK	8mm K-LOK	6.4	0.73	60	30	30	56	170
KLT-10T	3/8" K-LOK	3/8" K-LOK			66	33	33	56	170
KLT-10M	10mm K-LOK	10mm K-LOK			66	33	33	56	170
KLT-12M	12mm K-LOK	12mm K-LOK			70	35	35	56	170
KLT-15T	1/2" K-LOK	1/2" K-LOK			70	35	35	56	170
KLT-16T	5/8" K-LOK	5/8" K-LOK	8.0	1.1	86	43	43	70	175
KLT-16M	16mm K-LOK	16mm K-LOK			86	43	43	70	175
KLT-20T	3/4" K-LOK	3/4" K-LOK			86	43	43	70	175
KLT-25T	1" K-LOK	1" K-LOK	9.5	1.8	100	50	50	70	185

* All dimensions in millimeters. Dimensions shown with k-lok nuts in finger-tight position, Where applicable.

Forged Long Bonnet Type Needle Valves

◈ THREAD ENDS.

Materials of Construction

NO	PARTS	MATERIALS		
		316SS	304SS	A105
1	BODY	316SS	304SS	A105
2	STEM	316SS		
3	PACKING RING			
4	PACKING	PTFE / GRAPHITE		
5	GLAND	304SS		
6	BONNET	316SS	304SS	A105
7	UNION NUT			
8	PACKING NUT	304SS		A105
9	HANDLE	STAINLESS STEEL		

* Standard lubrication : Nickel anti - seize lubricant. (hydrocarbon carrier)
* Standard Seat : Metal to Metal / Body Material.
* Optional Seat : Metal to Metal / Stellite, Hard coating, Soft Seat. (TFE Seat)

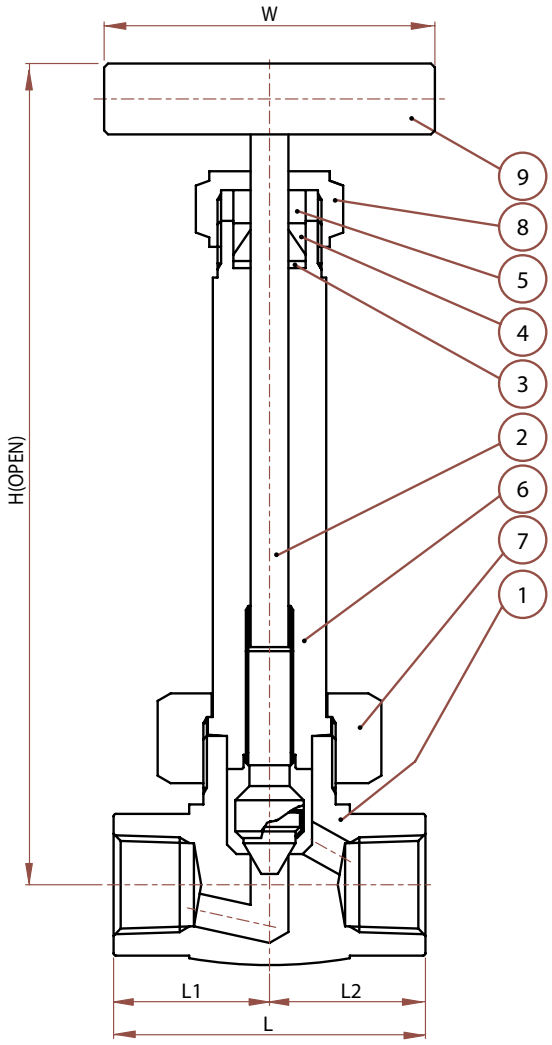


Table of Dimensions

BASIC ORDERING NUMBER	END CONNECTION		ORIFICE	Cv	DIMENSION				
	INLET	OUTLET			L	L1	L2	W	H
KLF-8A	1/4" FEMALE	1/4" FEMALE	4.3	0.37	54	27	27	56	165
KLF-10A	3/8" FEMALE	3/8" FEMALE	6.4	0.73	60	30	30	70	170
KLF-15A	1/2" FEMALE	1/2" FEMALE	8.0	1.1	66	33	33	70	175
KLF-20A	3/4" FEMALE	3/4" FEMALE	9.5	1.8	76	38	38	70	185
KLF-25A	1" FEMALE	1" FEMALE	11	2.2	92	46	46	92	200

* All dimensions in millimeters. Dimensions shown with k-lok nuts in finger-tight position, Where applicable.

Forged Long Bonnet Type Needle Valves

◈ SOCKET WELDED ENDS

Materials of Construction

NO	PARTS	MATERIALS		
		316SS	304SS	A105
1	BODY	316SS	304SS	A105
2	STEM	316SS		
3	PACKING RING			
4	PACKING	PTFE / GRAPHITE		
5	GLAND	304SS		
6	BONNET	316SS	304SS	A105
7	UNION NUT			
8	PACKING NUT	304SS		A105
9	HANDLE	STAINLESS STEEL		

* Standard lubrication : Nickel anti - seize lubricant. (hydrocarbon carrier)
* Standard Seat : Metal to Metal / Body Material.
* Optional Seat : Metal to Metal / Stellite, Hard coating, Soft Seat. (TFE Seat)

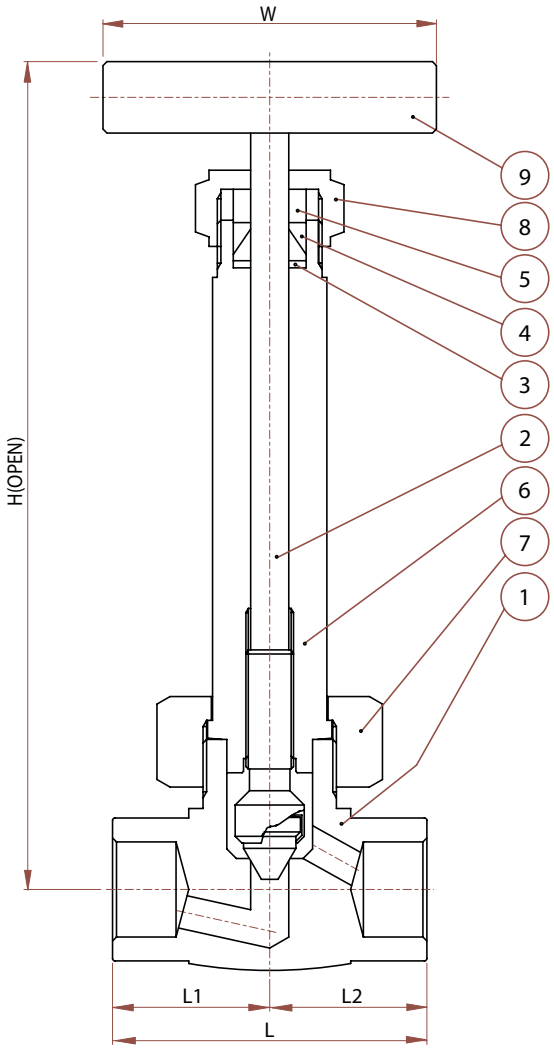


Table of Dimensions

BASIC ORDERING NUMBER	END CONNECTION		ORIFICE	Cv	DIMENSION				
	INLET	OUTLET			L	L1	L2	W	H
KLW-8A	1/4" PIPE	1/4" PIPE	4.3	0.37	54	27	27	56	165
KLW-10A	3/8" PIPE	3/8" PIPE	6.4	0.73	60	30	30	70	170
KLW-15A	1/2" PIPE	1/2" PIPE	8.0	1.1	66	33	33	70	175
KLW-20A	3/4" PIPE	3/4" PIPE	9.5	1.8	76	38	38	70	185
KLW-25A	1" PIPE	1" PIPE	11	2.2	92	46	46	92	200

* All dimensions in millimeters. Dimensions shown with k-lok nuts in finger-tight position, Where applicable.

Ordering Information

K	N	T	-	*	*	*
SYMBOL OF KPL VALVES	TYPE OF VALVE	END CONNECTION		SIZE	SEAT	PACKING

TYPE OF VALVE

- N — NEEDLE VALVE
- A — ANGLE VALVE
- G — GLOBE VALVE
- U — UNION BONNET NEEDLE VALVES
- S — SCREWED BONNET NEEDLE VALVES
- L — LONG BONNET NEEDLE VALVE

END CONNECTION

- T — K-LOK TUBE
- F — FEMALE THREAD
- M — MALE THREAD
- W — SOCKET WELD

SIZE

INCH TUBE

- 6T 1/8"
- 8T 1/4"
- 10T 3/8"
- 15T 1/2"
- 16T 5/8"
- 20T 3/8"
- 25T 1"

METRIC TUBE

- 6M 6mm
- 8M 8mm
- 10M 10mm
- 12M 12mm
- 16M 16mm

SCHEDULE PIPE

- 6A 1/8"
- 8A 1/4"
- 10A 3/8"
- 15A 1/2"
- 20A 3/4"
- 25A 1"
- 32 A 1 1/4"
- 40A 1 1/2"
- 50A 2"

SEAT

- S — SOFT SEAT

PACKING

- G — GRAPHITE

TECHNICAL DATA

1. LIST OF MATERIAL SPECIFICATIONS - ASME / ANSI B16.34
2. HYDROSTATIC TEST PRESSURE FOR SHELL & CLOSURE - ASME / ANSI B16.34
3. PRESSURE - TEMPERATURE RATINGS FOR STANDARD CLASS VALVES - ASME / ANSI B16.34
4. CORROSION DATA
5. WEIGHTS AND MEASURES

1. LIST OF MATERIAL SPECIFICATIONS - ASME / ANSI B16.34

Applicable ASTM Specification

Material Group No.	Norminal Designation	Forgings Spec.-Grade Notes	Castings Spec.-Grade Notes	Tubular Products Spec.-Grade notes
1.1	Carbon	A 105 (1) (2)	A 216 - WCB (1)	A 672 - B 70
		A 350 - LF2		A 672 - C 70
1.9	1 Cr - 1/2 Mo	A 182 - F 12 (3) (4)		
	11/4 Cr - 1/2 Mo	A 182 - F 11 (3) (4)		
1.10	21/4 Cr - Mo	A 182 - F 22 (4)	A 217 - WC 6 (3) (5)	
2.1	18 Cr -8 Ni	A 182 - F 304 (7) A 182 - F 304H	A 217 - WC 9 (3) (5) A 351 - CF 3 (8) A 351 - CF 8 (7)	A 312 - TP 304 (7) A 312 - TP 304H A 358 - 304 (7) A 376 - TP 304 (7) A 376 - TP 304H A 430 - FP 304 (7) A 430 - FP 304H
2.2	16 Cr - 12 Ni - 2 Mo	A 182 - F 316 A 182 - F 316H		A 312 - TP 316 (7) A 312 - TP 316H A 358 - 3016 (7) A 376 - TP 316 (7) A 376 - TP 316H A 430 - FP 316 (7) (9) A 430 - FP 316H
	18 Cr - 8 Ni			A 312 - CF 8A (10)
	18 Cr - 13 Ni - 3 Mo		A 351- CF 3A (10)	A 312 - TP 316 (7)
	18 Cr - 9 Ni - 2 Mo		A 351 - CF 3M (11)	
2.3	18 Cr - 8 Ni	A 182 - F 304L	A 351 - CF 8M (7)	A 312 - TP 304L (8)
	16 Cr - 12 Ni - 2 Mo	A 182 - F 316L		A 312 - TP 316L

NOTES :
(1) Upon prolonged exposure to temperatures above 800° F (425° C), the carbide phase of carbon steel may be converted to graphite.
(2) Only killed steel shall be used above 800° F(455° C)
(3) Use normalized and tempered material only.
(4) Permissible, but not recommended for prologned usage above about 1100° F(595° C)
(5) Not to be used over 1100° F(595° C)
(7) At temperatures over 1100° F(540° C), use only if the material is heat treated by heating it to a minimum temperature of 1900° F(1040° C) and quenching in water or rapidly cooling by other means.
(10) Not to be uesd over 650° F(345° C)
(11) Not to be uesd over 850° F(455° C)

2. HYDROSTATIC TEST PRESSURE FOR SHELL & CLOSURE - ASME / ANSI B16.34

Material Group No.	Shell Test Pressures by Classes					Closure Test Pressures by Classes				
	600	900	1500	2500	4500	600	900	1500	2500	4500
	psi / kg/cm²	psi / kg/cm²	psi / kg/cm²	psi / kg/cm²	psi / kg/cm²	psi / kg/cm²	psi / kg/cm²	psi / kg/cm²	psi / kg/cm²	psi / kg/cm²
1.1	2225 / 157	3350 / 235	5575 / 391	9275 / 651	16675 / 1172	1650 / 116.5	2450 / 172.5	4100 / 288.5	6800 / 478.5	12225 / 860.0
1.9	2250 / 159	3375 / 238	5625 / 396	9375 / 660	16875 / 1187	1650 / 116.5	2475 / 174.5	4125 / 290.5	6875 / 483.5	12375 / 870.5
1.10	2250 / 159	3375 / 238	5625 / 396	9375 / 660	16875 / 1187	1650 / 116.5	2475 / 174.5	4125 / 290.5	6875 / 483.5	12375 / 870.5
2.1	2175 / 152	3250 / 228	5400 / 380	9000 / 633	16200 / 1139	1600 / 112.5	2400 / 169.0	3975 / 279.5	6600 / 464.5	11900 / 837.0
2.2	2175 / 152	3250 / 228	5400 / 380	9000 / 633	16200 / 1139	1600 / 112.5	2400 / 169.0	3975 / 279.5	6600 / 464.5	11900 / 837.0
2.3	1800 / 127	2700 / 190	4500 / 317	7500 / 528	13500 / 949	1320 / 93.5	2000 / 141.0	3300 / 232.5	5500 / 387.0	9900 / 696.5

NOTES :
(1) All pressures are given as gage pressure.
(2) Test pressures are based on paragraphs 7.1 and 7.2 on ASME / B16.34
(3) Material groups are as listed above.

3. PRESSURE - TEMPERATURE RATINGS FOR STANDARD CLASS VALVES - ASME / ANSI B16.34

Ratings for Group 1.1 Materials

(°F/psi)

Temperature, °F	Working Pressure by Classes, psi				
	600	900	1500	2500	4500
-20 to 100	1480	2220	3705	6170	11110
200	1350	2025	3375	5625	10120
300	1315	1970	3280	5470	9845
400	1270	1900	3170	5280	9505
500	1200	1795	2995	4990	8980
600	1095	1640	2735	4560	8210
650	1075	1610	2685	4775	8055
700	1065	1600	2665	4440	7990
750	1010	1510	2520	4200	7560
800	825	1235	2060	3430	6170
850	535	805	1340	2230	4010
900	345	515	860	1430	2570
950	205	310	515	860	1545
1000	105	155	260	430	770

(°C/kg /cm²)

Temperature, °C	Working Pressure by Classes, kg /cm²				
	600	900	1500	2500	4500
-29 to 38	104.1	156.2	260.3	433.9	780.9
50	102.2	153.2	255.3	425.5	765.9
100	94.6	141.8	236.5	394.1	709.4
150	92.3	138.4	230.6	384.3	691.8
200	89.3	134.1	223.4	372.4	670.3
250	85.0	127.7	212.7	354.6	638.1
300	79.0	118.5	197.5	329.2	592.4
350	75.4	113.1	188.4	314.1	565.3
375	74.3	111.6	185.9	309.9	557.8
400	70.4	105.5	175.9	293.2	527.7
425	58.6	88.0	146.6	244.3	439.9
450	40.9	61.3	102.2	170.2	306.4
475	27.6	41.1	69.0	115.1	207.2
500	17.9	26.9	44.9	74.7	134.5
525	10.6	15.8	26.4	44.1	79.2
540	6.6	10.0	16.6	27.7	49.9

Ratings for Group 1.9 Materials

(°F/psi)

Temperature, °F	Working Pressure by Classes, psi				
	600	900	1500	2500	4500
-20 to 100	1500	2250	3750	6250	11250
200	1425	2135	3560	5930	10675
300	1345	2020	3365	5605	10090
400	1315	1975	3290	5485	9875
500	1285	1925	3210	5350	9630
600	1210	1815	3025	5040	9070
650	1175	1765	2940	4905	8825
700	1135	1705	2840	4730	8825
750	1065	1595	2660	4430	7970
800	1015	1525	2540	4230	7610
850	975	1460	2435	4060	7305
900	900	1350	2245	3745	6740
950	755	1130	1885	3145	5660
1000	445	670	1115	1860	3349
1050	275	410	684	1145	2060
1100	190	290	480	800	1440
1150	105	155	260	430	770
1200	70	105	170	285	515

(°C/kg /cm²)

Temperature, °C	Working Pressure by Classes, kg /cm²				
	600	900	1500	2500	4500
-29 to 38	105.4	158.2	263.7	439.5	791.0
50	104.3	156.4	260.7	434.6	782.3
100	99.4	149.2	248.6	414.4	745.9
150	94.5	141.8	236.5	394.0	709.3
200	92.8	139.1	231.9	386.5	695.7
250	90.7	136.0	226.7	377.9	680.2
300	86.6	129.8	216.3	360.5	648.9
350	82.1	123.1	205.2	341.9	615.4
375	79.1	118.7	197.8	329.8	593.6
400	74.6	112.0	186.5	310.9	559.6
425	71.6	107.4	179.0	298.3	536.8
450	68.9	103.4	172.3	287.3	517.1
475	64.5	96.9	161.4	269.0	484.2
500	56.7	85.0	141.7	236.0	425.2
525	41.3	62.0	103.3	172.2	310.0
550	26.0	39.1	65.1	108.5	195.3
575	17.3	26.0	43.3	72.2	129.9
600	12.0	17.9	30.0	50.0	89.9
625	6.9	10.3	17.2	28.8	51.7
650	4.7	7.1	11.8	19.7	35.5

NOTES :
(1) All pressures are given as gage pressure.
(2) Pressure in kg/cm² are shown for convenience.
(3) material groups are as listed in page 22
(4) For temperature kg/cm² limitations, see footnotes on page 22

PRESSURE - TEMPERATURE RATINGS FOR STANDARD

Ratings for Group 1.10 Materials

(°F/psi)

Temperature, °F	Working Pressure by Classes, psi				
	600	900	1500	2500	4500
-20 to 100	1500	2250	3750	6250	11250
200	1430	2150	3580	5965	10740
300	1355	2030	3385	5640	10150
400	1295	1945	3240	5400	9720
500	1280	1920	3200	5330	9595
600	1210	1815	3025	5040	9070
650	1175	1765	2940	4905	8825
700	1135	1705	2840	4730	8515
750	1065	1595	2660	4430	7970
800	1015	1525	2540	4230	7610
850	975	1460	2435	4060	7305
900	900	1350	2245	3745	6740
950	755	1130	1885	3145	5660
1000	535	805	1340	2230	4010
1050	400	595	995	1660	2985
1100	225	340	565	945	1700
1150	205	310	515	860	1545
1200	110	165	275	460	825

(°C/kg /cm²)

Temperature, °C	Working Pressure by Classes, kg /cm²				
	600	900	1500	2500	4500
-29 to 38	105.4	158.2	263.7	439.5	791.0
50	104.4	156.6	261.0	435.1	783.2
100	100.0	150.0	250.0	416.8	750.2
150	95.1	142.7	237.8	396.3	713.3
200	91.5	137.2	228.6	381.1	686.0
250	90.1	135.3	225.5	375.8	676.5
300	86.6	129.8	216.3	360.5	648.9
350	82.1	123.1	205.2	341.9	615.4
375	79.1	118.7	197.8	329.8	593.6
400	74.6	112.0	186.5	310.9	559.6
425	71.6	107.4	179.0	298.3	538.8
450	68.9	103.4	172.3	287.3	517.1
475	64.5	96.9	161.4	269.0	484.2
500	56.7	85.0	141.7	236.2	425.2
525	44.7	67.1	111.8	186.3	335.4
550	33.3	50.1	83.4	139.1	250.2
575	23.9	35.8	59.7	99.4	179.1
600	15.6	23.4	39.0	64.9	116.8
625	13.6	20.3	33.9	56.4	101.5
650	7.4	11.2	18.7	31.0	55.9

Ratings for Group 2.1 Materials

(°F/psi)

Temperature, °F	Working Pressure by Classes, psi				
	600	900	1500	2500	4500
-20 to 100	1440	2160	3600	6000	10800
200	1200	1800	3000	5000	9000
300	1055	1585	2640	4400	7920
400	940	1410	2350	3920	7055
500	875	1310	2185	3640	6550
600	830	1245	2075	3460	6230
650	815	1225	2040	3400	6120
700	805	1210	2015	3360	6050
750	795	1195	1990	3320	5975
800	790	1180	1970	3280	5905
850	780	1165	1945	3240	5830
900	770	1150	1920	3200	5760
950	750	1125	1870	3120	5615
1000	645	965	1610	2685	4835
1050	620	925	1545	2570	4630
1100	515	770	1285	2145	3860
1150	390	585	980	1630	2930
1200	310	465	770	1285	2315
1250	220	330	550	915	1645
1300	165	245	410	685	1235
1350	125	185	310	515	925
1400	95	145	240	400	720
1450	70	105	170	285	515
1500	50	70	120	200	360

(°C/kg /cm²)

Temperature, °C	Working Pressure by Classes, kg /cm²				
	600	900	1500	2500	4500
-20 to 38	101.2	151.8	253.0	421.7	759.0
50	97.6	146.3	243.9	406.5	731.6
100	83.4	125.0	208.4	347.4	625.3
150	74.1	111.1	185.3	308.8	555.7
200	66.8	100.2	167.0	278.4	501.0
250	62.3	93.4	155.7	259.5	467.1
300	59.2	88.9	148.2	246.9	444.4
350	57.2	85.9	143.1	238.4	429.2
375	56.6	84.9	141.5	235.9	424.6
400	56.0	84.0	140.0	233.4	420.0
425	55.4	83.1	138.5	230.9	415.5
450	54.8	82.2	136.9	228.3	410.9
475	54.1	81.3	135.4	225.8	406.4
500	53.1	79.7	132.9	221.5	398.6
525	48.7	73.0	121.1	202.9	365.3
550	44.5	66.7	111.3	185.4	333.7
575	40.9	61.4	102.4	170.6	307.0
600	34.1	51.1	85.2	142.0	255.6
625	26.7	40.0	66.7	111.1	200.1
650	21.4	32.2	53.6	89.3	160.9
675	15.8	23.8	39.3	65.9	118.6
700	12.2	18.3	30.5	50.8	91.5
725	9.5	14.2	23.6	39.3	70.8
750	7.4	11.2	18.7	31.0	55.9
775	5.7	8.6	14.3	23.8	42.8
800	4.2	6.3	10.5	17.4	31.4

NOTES :
(1) All pressures are given as gage pressure.
(2) Pressure in kg/cm² are shown for convenience.
(3) material groups are as listed in page 22
(4) For temperature kg/cm² limitations, see footnotes on page 22

PRESSURE - TEMPERATURE RATINGS FOR STANDARD

Ratings for Group 2.2 Materials

(°F/psi)

Temperature, °F	Working Pressure by Classes, psi				
	600	900	1500	2500	4500
-20 to 100	1440	2160	3600	6000	10800
200	1240	1860	3095	5160	9290
300	1120	1680	2795	4660	8390
400	1030	1540	2570	4280	7705
500	955	1435	2390	3980	7165
600	905	1355	2255	3760	6770
650	890	1330	2220	3700	6660
700	865	1295	2160	3600	6480
750	845	1270	2110	3520	6335
800	830	1245	2075	3460	6230
850	810	1215	2030	3380	6085
900	790	1180	1970	3280	5905
950	775	1160	1930	3220	5795
1000	725	1090	1820	3030	5450
1050	720	1080	1800	3000	5400
1100	645	965	1610	2685	4835
1150	550	825	1370	2285	4115
1200	410	620	1030	1715	3085
1250	365	545	910	1515	2725
1300	275	410	685	1145	2060
1350	205	310	515	860	1545
1400	150	225	380	630	1130
1450	115	175	290	485	875
1500	85	125	205	345	620

(°C/kg /cm²)

Temperature, °C	Working Pressure by Classes, kg /cm²				
	600	900	1500	2500	4500
-29 to 38	101.3	151.8	253.0	421.8	759.1
50	98.2	147.2	245.3	408.9	736.1
100	86.1	129.1	215.2	358.6	645.6
150	78.5	117.8	196.3	327.2	588.9
200	72.7	109.1	181.9	303.2	545.7
250	68.1	102.2	170.2	283.7	510.7
300	64.5	96.8	161.2	268.8	483.8
350	62.0	93.1	155.1	258.8	465.3
375	60.6	90.9	151.4	252.4	545.3
400	59.3	89.0	148.5	247.4	445.3
425	58.4	87.7	146.1	243.6	438.3
450	57.3	85.9	143.2	238.6	429.5
475	55.8	83.7	139.5	232.5	418.5
500	54.8	82.1	136.7	228.0	410.3
525	52.6	78.9	131.5	219.1	394.5
550	50.9	76.4	127.3	212.1	381.8
575	49.2	73.7	122.9	204.8	368.6
600	43.7	65.6	109.3	182.1	327.8
625	37.2	55.9	93.1	155.1	279.2
650	28.8	43.2	72.0	120.0	216.0
675	25.8	38.6	64.4	107.4	185.1
700	20.3	30.4	50.7	84.5	152.1
725	15.7	23.6	39.3	65.5	117.9
750	11.2	17.9	30.0	50.0	89.9
775	9.3	14.0	23.2	38.7	69.9
800	7.1	10.7	17.8	29.8	53.5

Ratings for Group 2.3 Materials

(°F/psi)

Temperature, °F	Working Pressure by Classes, psi				
	600	900	1500	2500	4500
-20 to 100	1200	1800	3000	5000	9000
200	1015	1520	2530	4220	7595
300	910	1360	2270	3780	6805
400	825	1240	2065	3440	6190
500	765	1145	1910	3180	5725
600	720	1080	1800	3000	5400
650	700	1050	1750	2920	5255
700	685	1030	1715	2860	5150
750	670	1010	1680	2800	5040
800	660	985	1645	2740	4930
850	645	965	1610	2680	4825

(°C/kg /cm²)

Temperature, °C	Working Pressure by Classes, kg /cm²				
	600	900	1500	2500	4500
-29 to 38	84.3	126.5	210.9	351.4	632.5
50	81.54	122.3	203.7	339.6	611.2
100	70.4	105.5	175.8	293.1	527.5
150	63.7	95.5	159.2	265.3	477.6
200	58.5	87.8	146.3	243.8	438.9
250	54.5	81.7	136.1	226.9	408.5
300	51.5	77.2	128.7	214.5	386.2
350	49.0	73.5	122.6	204.4	367.8
375	48.1	72.2	120.3	200.6	361.0
400	47.2	70.9	118.1	196.7	354.1
425	46.3	69.4	115.7	192.9	347.3
450	45.4	68.1	113.5	189.2	340.5

NOTES :
(1) All pressures are given as gage pressure.
(2) Pressure in kg/cm² are shown for convenience.
(3) material groups are as listed in page 22
(4) For temperature kg/cm² limitations, see footnotes on page 22

4. CORROSION DATA

CORROSIVE MEDIA	Cast Iron	Carbon Steel	Bronze	St.St.F 304	St.St.F 316	St.St. 12% Cr.	Monel
Acetic Acid - Pure	C	C	C	B	A	A	A
Acetic Acid - 10%	C	C	C	B	A	A	A
Acetic Anhydride	C	C	C	B	B	B	B
Acetone	A	A	A	A	A	A	A
Alcohol Methyl (Methanol)	B	B	B	A	A	A	A
Alcohol Methyl 150°F	B	B	B	B	A	B	B
Ammonia - Conc, & Aq, Sol.	A	A	D	A	A	A	B
Ammonia - Gas	A	A	D	A	A	A	B
Ammonium Chloride - Still	D	D	D	B	A	C	A
Ammonium Nitrate	C	C	D	A	A	B	C
Ammonium Phosphate - Sat.	D	D	C	B	A	B	B
Ammonium Sulphate							
1% & 5% - Agit. Aer.	C	C	C	B	A	C	B
Ammonium - Satured	C	C	C	C	A	C	B
Amyl Acetate	C	C	B	B	B	C	B
Aniline	C	C	C	B	B	C	B
Arsenic Acid -150°F	D	D	D	B	B	C	D
Asphalt	B	B	A	A	A	A	A
Barium Chloride - Sat.	C	C	B	A	A	C	B
Barium - Aqueous Sol.	C	C	C	B	A	C	B
Benzoic Acid	D	D	B	A	A	C	B
Benzol	B	B	B	A	A	B	A
Boric Acid	D	D	B	A	A	B	A
Butane Gas	B	B	A	B	B	B	B
Butyric Acid	D	D	C	A	A	A	B
Calcium Bisulphite	D	D	D	B	A	C	D
Calcium Carbonate	D	D	C	B	A	C	B
Calcium Chloride	C	C	B	C	B	C	A
Calcium Hypochlorite	D	D	D	C	C	D	D
Carbon Tetrachloride	B	B	B	A	A	A	B
Carbonic Acid	D	D	D	B	A	C	A
Chlorine - Dry Gas	B	B	C	B	B	B	B
Chlorine - Moist.	D	D	D	D	D	D	C
Chromic Acid	C	C	D	B	A	C	B
Citric Acid - 5% -Still	D	D	C	A	A	A	A
Citric Acid - Sat.	D	D	C	B	A	B	A
Copper Nitrate	D	D	D	A	A	A	C
Copper Sulphate	D	D	D	A	A	A	B
Creosote - crude	A	A	C	A	A	A	A
Dowthems	B	B	A	A	A	A	A
Ethers	B	A	B	A	A	B	D
Ethyl Alcohol	B	B	B	A	A	B	B
Ethylene Glycol	A	A	A	A	A	A	A
Ferric Chloride	D	D	D	D	D	D	D
Ferric Sulphate	D	D	D	B	A	C	C
Ferrous Chloride	D	D	D	D	D	D	C
Ferrous Sulphate	D	D	B	B	B	B	B
Fluorine	D	D	D	D	D	D	C
Formaldehyde - cold	B	A	A	A	A	A	A
Formic Acid	D	D	B	C	A	C	B
Furfural	B	A	A	A	A	A	A
Gasoline Sour	B	B	C	A	A	B	B
Gasoline Reflned	B	A	A	A	A	A	A
Gelatine	D	D	B	B	A	C	A
Glucose	B	B	A	A	B	B	A
Glue - Dry	B	A	A	A	A	A	A
Glycerine	B	B	B	A	A	A	A
Hydrochloric Acid(Muriatic)	D	D	D	D	D	D	C
Hydrocyanic Acid	C	C	D	A	A	C	C
Hydrofluoric Acid	D	D	C	D	A	D	B
Hydrogen - Gas	B	B	B	A	A	A	A
Hydrogen Peroxide	C	C	D	A	A	B	B
Hydrogen Sulphide - Dry	B	B	D	A	A	B	C
Hydrogen Sulphide - Wet	C	C	D	A	A	B	D
Iodine - Dry - Wet	D	D	D	D	D	D	D
kerosene	B	B	A	A	A	A	A
Laquer Solvents	B	B	B	A	A	B	B
Lactic Acid - 1%	D	D	D	A	A	B	C
Lactic Acid - 5%	D	D	D	A	A	B	C
Lactic Acid - 5% - Boiling	D	D	D	A	B	D	D
Lactic Acid 10% - 150°F	D	D	D	B	C	D	D
Lactic Acid - Cone - 70°F	D	D	D	B	C	D	D
Lime Sulphur	A	A	D	A	A	A	B
Linseed Oil	A	A	B	B	B	B	B
lubricating Oil - Sour	C	C	D	A	A	B	C

CORROSIVE MEDIA	Cast Iron	Carbon Steel	Bronze	St.St.F 304	St.St.F 316	St.St. 12% Cr.	Monel
Lubricating Oil - Refined	A	A	B	A	A	A	B
Magnesium Chloride	C	C	B	B	B	B	B
Magnesium Hydroxide	C	C	C	A	A	B	A
Magnesium Sulphate	C	B	B	B	B	C	B
Mercuric Chloride	D	D	D	D	C	D	C
Mercury	A	A	D	A	A	A	B
Methane Gas	B	B	A	B	B	B	B
Methylethylketone	A	A	A	A	A	A	A
Milk (Fresh or Sour)	D	D	B	A	A	B	A
Naphtha (Crude or Pure)	B	B	B	A	A	B	B
Natural Gas	B	B	B	A	A	A	A
Nickel Chlorlde	D	D	D	B	B	C	B
Nickel Sulphate	D	D	B	B	B	D	B
Nitric Acid - Crude	D	D	D	C	B	D	D
Nitric Acid - 5÷50%	D	D	D	A	A	A	D
Nitric Acid - Conc. 70°F	D	D	D	A	A	A	D
Nitric Acid - Conc. Boiling	D	D	D	C	B	D	D
Nitric Acid - Fuming Conc. 110°F	D	D	D	A	A	B	D
Nitric Acid - Fuming Conc.Boiling	D	D	D	D	D	D	D
Nitrobenzene	B	B	D	B	A	B	B
Oils - Miner. & Veget.	B	B	B	A	A	B	B
Oxalic Acid - 10% - 70°F	D	D	B	A	A	D	B
Oxalic Acid - 10% - Boiling	D	D	B	D	C	D	D
Oxygen	B	B	A	A	A	A	A
Petroleum Oils - Crude	B	B	C	A	A	A	A
Phosphoric Acid - Crude	C	C	D	D	D	D	D
Phosphoric Acid - 5% & Boiling	D	D	D	A	A	B	C
Phosphoric Acid - 10% Still	D	D	D	B	A	C	C
Phosphoric Acid - 10% Agitated	D	D	D	C	D	D	D
Phosphoric Acid - 10% Aer.-Boil.	D	D	D	D	A	D	D
Picric Acid	C	C	D	A	A	C	C
Potassium Chloride	B	B	B	C	C	B	B
Potassium Cyanide	B	B	D	A	A	B	B
Potassium Hydroxide - 5% - Still	A	A	D	A	A	A	A
Potassium Hydroxide - 50% - Boil.	B	A	D	A	A	A	A
Potassium Nitrate	B	B	B	A	A	A	B
Propane Gas	B	B	A	A	A	A	A
Sea Water	D	D	B	B	A	D	A
Soap Solution	B	A	A	A	A	A	A
Sodium Bicabonate	C	C	B	A	A	A	B
Sodium Carbonate - 5÷50%	B	B	B	A	A	A	B
Sodium Chloride	C	C	B	B	A	C	A
Sodium Cyanide	B	B	D	B	B	C	B
Sodium hydroxide	B	C	B	B	A	C	A
Sodium Hypochlorite	D	D	D	C	B	D	C
Sodium Nitrate	B	B	B	B	A	B	B
Sodium Phosphate (di - Basic)	C	C	C	B	B	C	B
Sodium Phosphate (tri - Basic)	B	B	D	B	B	B	B
Sodium Sulphate	B	B	B	B	A	B	A
Sodium Sulphide	B	B	D	B	A	B	A
Steam	A	A	C	A	A	A	A
Stearic Acid - Conc.	C	C	C	A	A	C	B
Sulphur - 500°F - Molten	C	C	D	A	A	B	B
Sulphur Bioxide	B	B	B	A	A	B	A
Sulphuric Acid - < 10%	D	D	C	C	B	D	A
Sulphuric Acid - 50%÷70°F	D	D	B	D	C	D	B
Sulphuric Acid - 50% - Boil.	D	D	D	D	D	D	C
Sulphuric Acid - Conc. - 70°F	B	B	A	A	A	B	A
Sulphuric Acid - 300°F	D	D	C	D	D	D	C
Sulphuric Acid - Fuming	D	D	C	C	B	D	C
Sulphurous Acid - Sat.	D	D	C	C	B	D	D
Sulphurous Acid - Spray	D	D	D	C	C	D	D
Tannic Acid - 10%	C	C	B	A	A	C	B
Tannic Acid - 10% - Boil.	D	D	C	C	C	D	C
Tar	A	A	A	A	A	A	A
Tartaric Acid - 70°C	D	D	B	A	A	C	A
Tartaric Acid - 150°F	D	D	B	B	A	D	B
Trichloroethylene	C	C	B	B	B	C	A
Turpentine	B	B	B	A	A	B	A
Tomato Juice	C	C	C	A	A	B	A
Vinegar	D	D	B	A	A	A	A
Water (Fresh)	C	C	A	A	A	A	A
Water Distilled (Labor. Grade)	D	D	C	A	A	D	C
Water Bistilled (Retum. Cond.)	B	B	B	A	A	B	A
Zinc Chloride	C	D	D	D	D	C	B
Zinc Sulphate	D	D	B	B	B	C	B

A = Good resistance B = Satisfactory C = poor D = Not Recommended

5. WEIGHTS NAD MEASURES

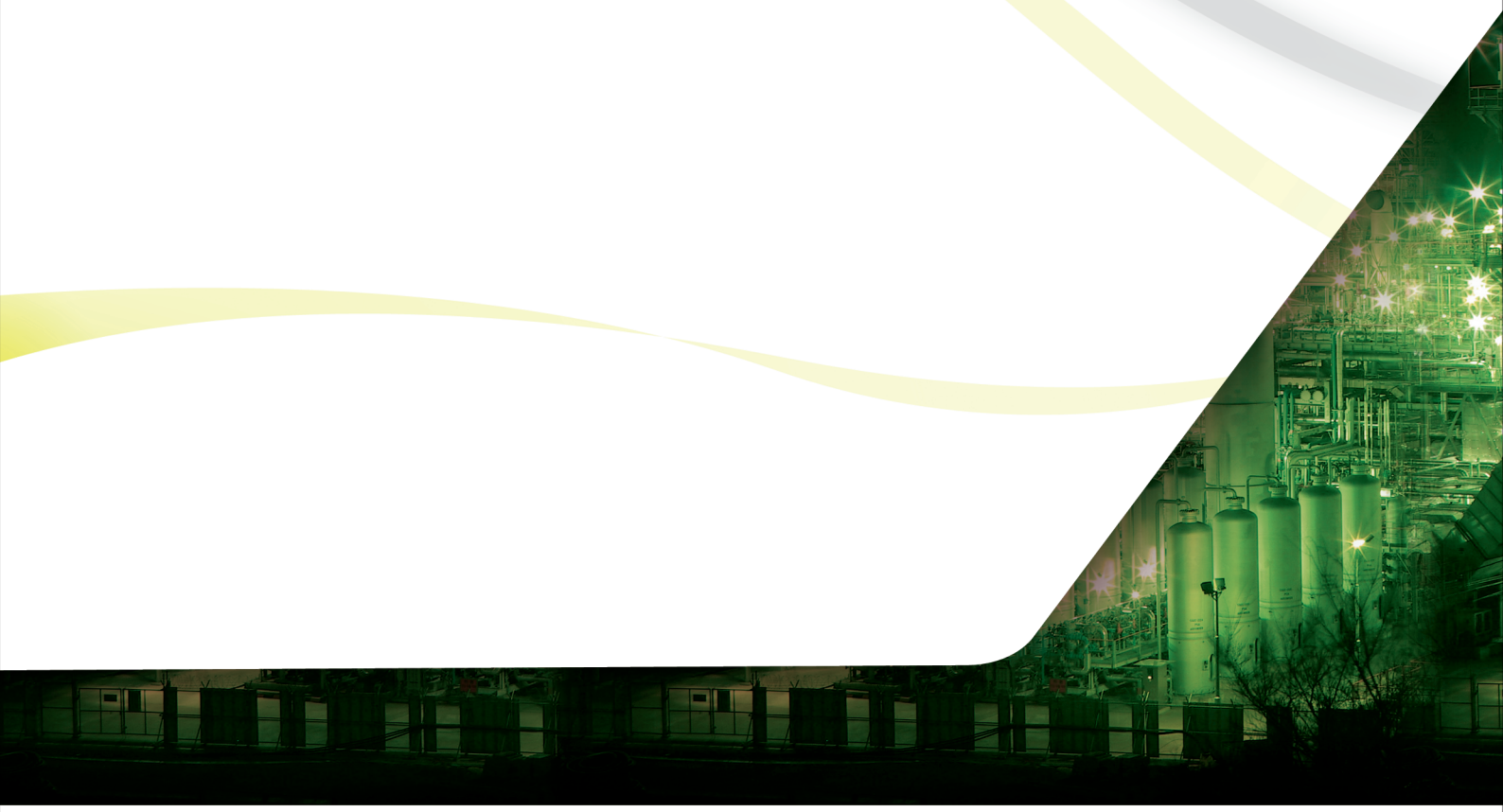
Metric Conversion Factors

Multiply	by	to obtain
LENGTH		
centimetre	0.03281	foot (ft)
centimetre	0.39370	inch
foot	0.3048	metre (m)
foot	304.5	millimetre (mm)
inch	25.4	millimetre
microinch	0.0254	micron (μm)
micron (micrometre)	39.37008	microinch
millimetre	0.039370	inch
VOLUME		
centimetre^2	0.15500	inch^2
centimetre^2	0.00108	foot^2
foot^2	0.09290	metre^2 (m^2)
foot^2	929.0304	centimetre^2 (cm^2)
inch^2	645.16	millimetre^2 (mm^2)
metre^2	1550.003	inch^2
metre^2	10.76391	foot^2
millimetre^2	0.00155	inch^2
AREA		
centimetre^3	0.06102	inch
foot^3	0.02832	metre^3 (m^3)
foot^3	28.31685	litre
gallon (U.K.liquid)	4.54609	litre
gallon (U.S.liquid)	3.78541	litre
inch^3	16.38706	centimetre^3 (cm^3)
litre	0.21997	gallon (U.K.liquid)
litre	0.26417	gallon (U.S.liquid)
VELOCITY and FLOW		
centimetre / minute	0.39307	inch / minute
foot / minute	18.288	metre / hour
foot / minute	0.3048	metre / minute
foot^3 / minute	28.31685	litre / minute
gallons (U.S.liquid) / min	3.78541	litre / minute
litre / minute	0.035315	foot^3 / minute
litre / minute	0.26417	gallon (U.S.) / minute
MASS and DENSITY		
gram (=0.001kg)	0.035274	ounce (avoirdupois)
kilogram	2.20462	pound
kilogram / metre^3	0.06243	pound / foot^3
kilogram / metre^3	0.00835	pound / gallon (U.S.)
ounce (avoirdupois)	28.34952	gram
pound (avoirdupois)	0.45359	kilogram (kg)
ton (long = 2240 Lb)	1016.047	kilogram
ton (short = 2000 Lb)	907.1847	kilogram
FORCE and FORCE/LENGTH		
dyne	0.00001	newton (N)
kilogram-force	9.80665	newton
newton	0.10197	kilogram - force
newton	0.22481	pound - force
newton / metre	0.00571	pound / inch
pound / force	4.44822	newton
pound / inch	175.1268	newton / metre (N/m)
pound / foot	14.59390	newton / metre

Multiply	by	to obtain
BENDING MOMENT or TORQUE		
kilogram - metre	9.80665	newton - metre (N-m)
kilogram - metre	7.23299	pound - foot
newton - metre	0.73756	pound - foot
newton - metre	0.10197	kilogram - metre
pound - foot	1.35582	newton - metre
PRESSURE and STRESS		
atmosphere (atm)	101325	Pascal (Pa)
atmosphere	1.101325	bar
atmosphere	1.0333	kilogram / centimetre^2
bar	0.98692	atmosphere
bar	1.02668	kilogram / centimetre^2
bar	100000	Pascal (or N/m^2)
bar	14.50377	pound / inch^2
kilogram / centimetre^2	0.968	atmosphere
kilogram / centimetre^2	0.98066	bar
kilogram / centimetre^2	98066	Pascal (or N/m^2)
kilogram / centimetre^2	14.22334	pound / inch^2
kilogram / metre^2	9.80665	Pascal
newton / metre^2 (Nm^2)	0.000145	pound / inch^2
newton / metre^2 (or Pa)	0.10197	kilogram / metre^2
newton / metre^2	0.000010197	kilogram / centimetre^2
Pascal (and N/m^2)	0.00000987	atmosphere
Pascal	0.00001	bar
kPa	0.01	bar
MPa	10	bar
pound / inch^2	0.06895	bar
pound / inch^2	6895	Pa
pound / inch^2	0.07031	kilogram / centimetre^2
pound / inch^2	0.06805	atmosphere
ENERGY - WORK and POWER		
Btu (intemat.)	1055.056	joule (J)
caforie	4.19002	joule
food - pound	1.35582	joule
kilogram - metre	9.80665	joule
joule	0.73756	foot - pound
joule	0.101972	kilogram - metre
food - pound / hour	0.0003766	watt (W)
horsepower (550ft - lb/s)	0.7457	kilowatt (kW)
horsepower (eletric)	746	watt
kilowatt	1.34102	horsepower (550ft-lb/s)
MISCELLANEOUS		
atmosphere (atm)	760	mm Hg at 32° F
atmosphere	29.92	inch Hg at 32° F
bar	10330	mm H_2O at 32° F
bar	14.70	pound / inch^2
bar	750	torr
feet of water (at 60° F)	29.53	inch Hg at 32° F
feet of water	0.8843	inch Hg at 60° F
inch of Hg (at 60° F)	0.4331	pound / inch^2
inch of Hg	0.03342	atmosphere
inch of Hg	1.131	feet of water
torr (and mm Hg)	0.4898	pound / inch^2
torr	0.0013116	atmosphere
torr	0.001333	bar (pr 133.6 Pa)
torr	0.00136	kilogram / centimetre^2
torr	0.03937	inch Hg (at 32° F)
torr	13.59	mm H_2O
torr	0.01934	pound / inch^2
torr. l / sec	1.316	atm.cc/sec (or Std.cc/s)
atm. cc / sec	0.76	torr l / sec
torr. l / sec	1000	Lusec
Lusec	0.001	torr l / sec
drop of water or bubble	16	centimetre^2

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