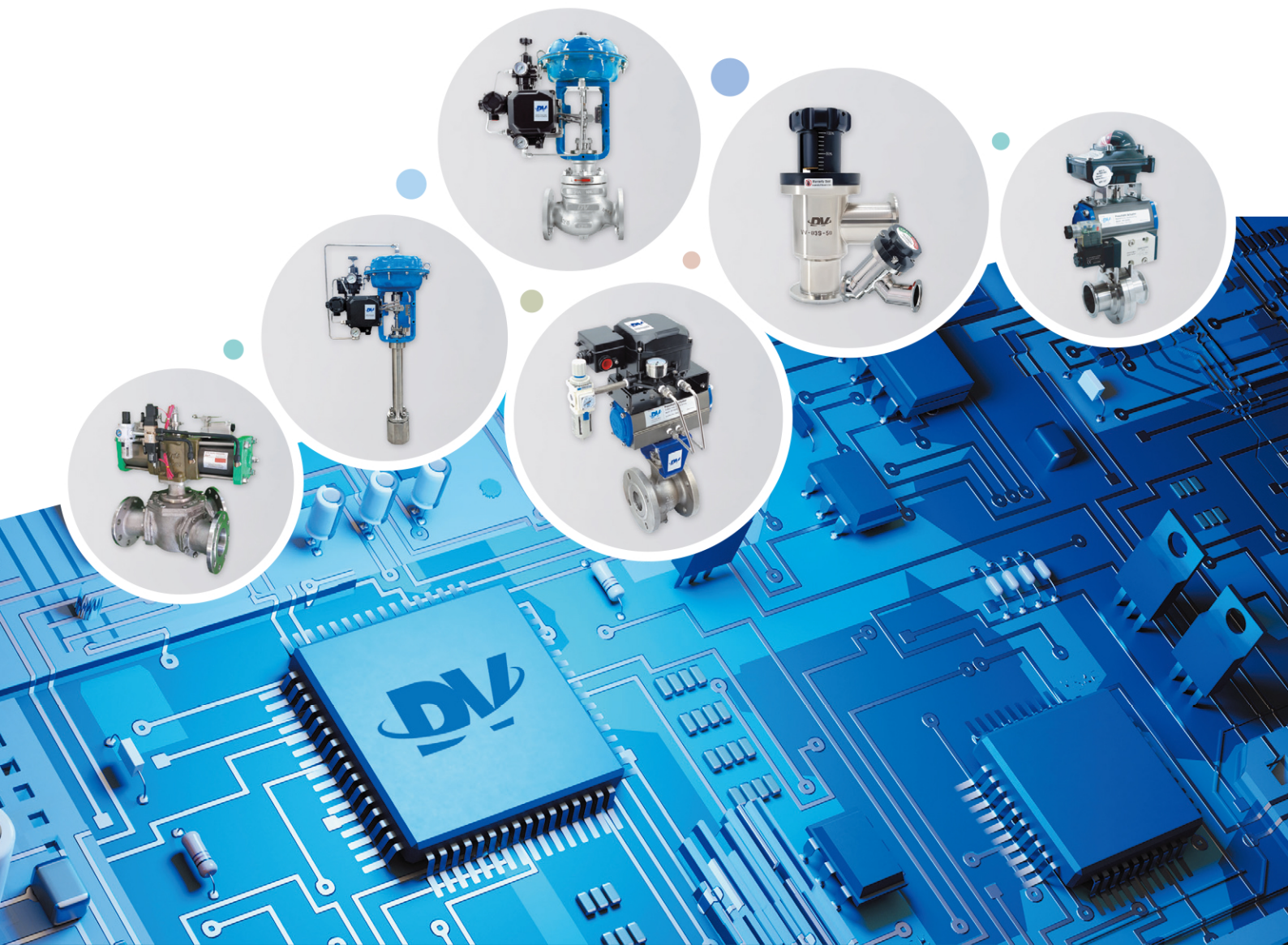




Advanced Fluid System

Valve, Actuator & Fittings



DOW Valve Co., Ltd.



DOW Valve

(주)다우밸브는 1985년 설립된 Stainless Steel 재질로 만들어진 산업용밸브 전문업체로서 생명공학, 식음료, 제약, 약품, 의료, 화장품, 반도체, 태양광, 태양열, 석유화학 및 진공 특수분야에 다양하게 사용되는 밸브로서 작동방식은 수동식, 공압식 및 전동식 밸브를 공급하고 있습니다.

산업용 기계설비와 장치에 필수품인 밸브의 응용범위가 점점 확대되고 고도의 정밀성과 신뢰성을 요하는 시대적요구에 부응하기 위하여 당사는 전직원이 기술 개발과 응용에 대한 연구개발에 정진하고 있으며, 유체제어의 선도자로서 풍부한 경험과 기술을 바탕으로 다양한 유체제어시스템의 최적 솔루션을 제공할 수 있도록 노력하고 있습니다.

앞으로도 지속적인 수출을 통하여 국가발전에 기여하며 끊임없는 연구개발과 재투자 및 인재육성을 통해 보다 향상된 제품으로 고객에게 다가서는 회사가 되겠습니다.

대표이사 : 박 상 기, 박 의 군

Industrial Valve & Actuator

Established in 1985, DOW Valve Co., Ltd is a company specialized in industrial stainless steel valves applied variously to the special fields of biotechnology, food and beverage, pharmaceuticals, medicine, medical treatment, cosmetics, semiconductor, solar cell, solar thermal energy, petrochemicals and vacuum. We are supplying not only manual valves but also pneumatic or electric control valves.

In order to meet the demand of the times requiring the high precision and reliability of a valve as well as the application range of a valve being expanded gradually as a necessity in industrial equipment and system, all staffs of our company have devoted themselves to research and development for new technologies and applications, and furthermore, our company as a leader of fluidic control system, has made efforts to provide optimal solutions for various fluidic control systems based on a wealth of experience and technology.

We promise to be a company contributing to national development through steady growth of export and going closer to customers with more advanced products through research and development, reinvestment and development of human resources.

CEO : Jack, Park

Advanced Fluid System **DOW Valve**



유체제어의 선두주자 **다우밸브**

다우밸브는 유체제어의 선두자로서 풍부한 경험과 실적을 토대로 다양한 분야에 적합한 밸브 선정을 통해서 시스템의 최적화, 안정화 및 에너지 절약을 제1 목표로 매진하고 있습니다.

최근에는 시스템의 정밀 고도화와 안정성 및 신뢰성이 동시에 요구되고 있어 초기 밸브 선정에서 시스템에 맞는 적합한 재질과 사양 선택이 중요하며 또한 부품공급으로 지속적인 유지 보수를 통해서 사고예방과 최적의 시스템이 운영관리 되도록 노력하고 있습니다.

TABLE OF CONTENTS

1	Process Control Valve	4
2	Vacuum Valve & Fitting	5
	2 - 1 Vacuum Fitting	5
	2 - 2 Manual Valve	6
	2 - 3 Automatic Valve	7
	2 - 4 Semiconductor Valve	8
3	Sanitary Valve & Fitting	12
	3 - 1 Sanitary Fitting	12
	3 - 2 Manual Valve	14
	3 - 3 Automatic Valve	15
4	Plumbing Valve	16
	4 - 1 Manual Valve	16
	4 - 2 Direct Mounting Valve	18
	4 - 3 Pneumatic Actuated Valve	18
	4 - 4 Electric Actuated Valve	20
5	Butterfly Valve (Plumbing)	21
	5 - 1 Butterfly Valve (Manual)	21
	5 - 2 Butterfly Valve (Automatic)	22
6	Electric, Pneumatic Actuator & Accessories	23
7	Valve Parts	24
8	Certificate	25
9	Reference Data	27

1 PROCESS CONTROL VALVE

Gate Valve



PV-01

Globe Valve



PV-02

Check Valve



PV-03

Y-Strainer



PV-04

3-way Divert Valve



PV-05

PVC Butterfly Valve



PV-06

Control Valve (2-Way)



PV-07

Control Valve (3-Way)



PV-08

Control Valve (2-Way)



PV-09

Cryogenic Valve



PV-10

Cryogenic Valve



PV-11

Cryogenic Valve



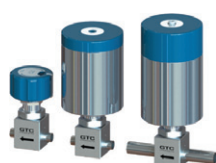
PV-12

Segment Ball Valve



PV-13

UHP Diaphragm Valve (GTC)



PV-14

U-PVC Control Valve (ASAHI)



PV-15

Teflon Lined Valve



PV-16

Blind Valve



PV-17

PVC Ball Valve



PV-18

Two Stage Valve



PV-19

LOK Ball Valve



PV-20

Knife Gate Valve



PV-21

Control Valve (HORA)



PV-22

Control Valve (HORA)



PV-23

PTFE Lined Valve (EBRO)



PV-24

2 VACUUM VALVE & FITTING

2-1

VACUUM FITTING

Hinged Clamp (Al-1P)



VF-01(SA)

Hinged Clamp (Al-2P)



VF-01(DA)

Hinged Clamp (SUS-2P)



VF-01(DS)

KF Flange



VF-02

KF Centering



VF-03

KF O-Ring



VF-04

KF Blank Flange



VF-05

90° Elbow



VF-06

KF Tee



VF-07

KF Conical Reducer



VF-08

T-Body(Bow) *Custom Made



VF-09

KF Cross



VF-10

KF Bellows



VF-11

ISO-LF Bellows



VF-12

ISO Double Claw Clamp



VF-13

ISO Double Wall Clamp



VF-14

ISO Single Wall Clamp



VF-15

Large Flange ISO LF (Claw Clamp)



VF-16

Rotatable Bolt Ring



VF-17

Retaining Ring



VF-18

VACUUM VALVE & FITTING

ISO Large Flange (Bolt)



VF-19

Outer Ring



VF-20

Chain Clamp



VF-21

KF Bored Blank Flange



VF-22

Flexible Tubes



VF-23

High Vacuum Flexible Tubes & Bellows



VF-24

Plastic Flange Cover



VF-25

Bulkhead Clamp



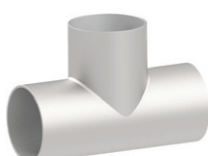
VF-26

90° Short Elbow (Welding)



VF-27

Equal Tee (Welding)



VF-28

Concentric Reducer (Welding)



VF-29

2-2

MANUAL VALVE

2-Way Ball Valve



VV-01

3-Way Ball Valve



VV-02

Right Angle Valve



VV-03

Right Angle Valve



VV-03

Right In-Line Valve



VV-04

Right In-Line Valve



VV-04

Check Valve



VV-05

Butterfly Valve (Lever)



VV-06

Butterfly Valve (Gear)



VV-07

2-3 AUTOMATIC VALVE

Pneumatic 2-Way Ball Valve



D.A

VVP-01

Pneumatic 2-Way Ball Valve



S.A

VVP-02

Pneumatic 3-Way Ball Valve



D.A

VVP-03

Pneumatic 3-Way Ball Valve



S.A

VVP-04

Pneumatic Vacuum Butterfly Valve



VVP-05

KF Right Angle Valve



D.A / S.A

VVP-06

KF In-Line Valve



D.A / S.A

VVP-07

ISO-K Right Angle Valve



D.A / S.A

VVP-08

Electric 2-Way Ball Valve



VVE-09

Electric 3-Way Ball Valve



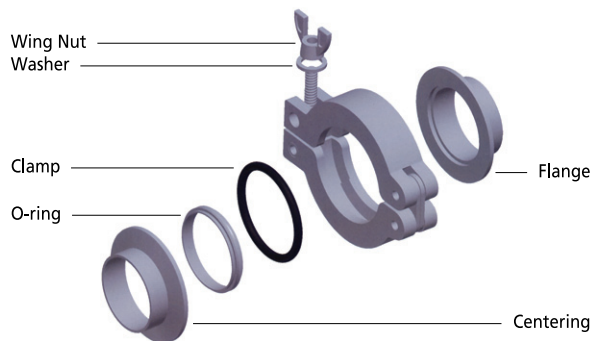
VVE-10

Electric Vacuum Butterfly Valve

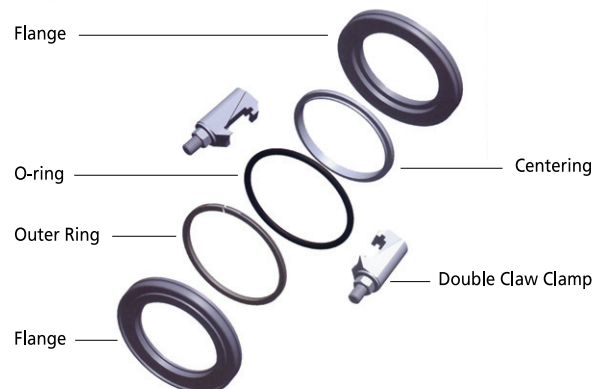


VVE-11

KF FLANGE CONNECTION WITH CLAMP



ISO FLANGE CONNECTION WITH CLAMP



VACUUM VALVE & FITTING

2-4

SEMICONDUCTOR VALVE

VACUUM POPPET VALVE

Angle Valve
(Bellows)



Angle Valve
(O-ring)



Large Angle Valve
(Bellows)



Large Angle Valve
(O-ring)



Y-inline Valve
(Bellows)



Y-inline Valve
(O-ring)



Z-inline Valve
(Bellows)



Z-inline Valve
(O-ring)



Fomed Bellows Seal
Stainless Valve (Bellows)



ALUMINUM BLOCK VALVE

Pneumatic All-in-one
Angle Valve (Bellows)



Pneumatic Aluminum
Angle Valve (Bellows)



Pneumatic Aluminum
Angle Valve (O-ring)



Manual Aluminum
Angle Valve (Bellows)



Manual Aluminum
Angle Valve (O-ring)



BUTTERFLY VALVE

LV Manual Butterfly Valve (O-ring)



HV Manual Butterfly Valve (O-ring)



Pneumatic Butterfly Valve (O-ring)



3-Position Butterfly Valve (O-ring)



APC Butterfly Valve (O-ring)



BALL VALVE

Manual Ball Valve (Teflon-ring)



Pneumatic Ball Valve (Teflon-ring)

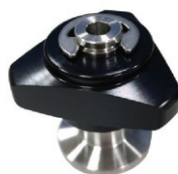


Motor Drive Ball Valve (Teflon-ring)



VENT VALVE

Vent Valve (O-ring)



CHECK VALVE

Check Valve



BAKEABLE ALL-METAL VALVE

Angle Valve (Bellows)



Straight Through Valve (Bellows)



TEFLON COATING VALVE

Manual PTFE Angle Valve (O-ring)



Pneumatic PTFE Angle Valve (O-ring)



Pneumatic PTFE Y-inline Valve (O-ring)



VACUUM VALVE & FITTING

GATE VALVE

**CF Manually
UHV - L type (Bellows)**



**CF Manually
UHV - B type (Bellows)**



**CF Pneumatic
UHV - L type (Bellows)**



**CF Pneumatic
UHV - L type (Bellows)**



**CF Pneumatic
UHV - B type (Bellows)**



**CF 3-position pneumatic
UHV - B type (Bellows)**



**KF Manually
HV - L type (Bellows)**



**ISO Manually
HV - B type (Bellows)**



**KF Pneumatic
HV - L type (Bellows)**



**ISO Pneumatic
HV - L type (Bellows)**



**ISO Pneumatic
HV - B type (Bellows)**



**ISO 3-position pneumatic
HV - B type (Bellows)**



**CF Limit switch
UHV - L type (Bellows)**



**CF Limit switch
UHV - L type (Bellows)**



**CF Limit switch
UHV - B type (Bellows)**



**KF Limit switch
HV - L type (Bellows)**



**ISO Limit switch pneumatic
HV - L type (Bellows)**



**ISO Limit switch pneumatic
HV - B type (Bellows)**



**HV Pneumatic
- Aluminium body (O-ring)**



PENDULUM VALVE

Pneumatic pendulum valve (O-ring)



3-position pneumatic pendulum valve (O-ring)



APC pneumatic pendulum valve (O-ring)



TRANSFER VALVES AND DOORS

Transfer valve EP (Bellows)



Transfer valve Hard anodized (Bellows)



Door valve EP (Bellows)



Note. * L type : Linkage mechanism * B type : Ball groove mechanism

3

SANITARY VALVE & FITTING

3-1

SANITARY FITTING

Heavy Duty Clamp (2-Segment)



SF-01

Heavy Duty Clamp (3-Segment)



SF-02

Ferrule (Welding)



SF-03

Ferrule (Expanding)



SF-04

Blank Ferrule



SF-05

Ferrule Gasket (Flange Type)



SF-06

Ferrule Gasket (Silicone)



SF-07

Ferrule Gasket (Teflon)



SF-08

Hexagon Gasket



SF-09

O-Ring Gasket



SF-10

Sanitary Pipe



SF-11

90° Short Elbow (Welding)



SF-12

90° Short Elbow (Ferrule)



SF-13

90° Long Elbow (Welding)



SF-14

45° Short Elbow (Welding)



SF-15

45° Short Elbow (Ferrule)



SF-16

45° Long Elbow (Welding)



SF-17

Micro Elbow (Welding)



SF-18

Micro Elbow (Ferrule)



SF-19

Micro Tee (Welding)



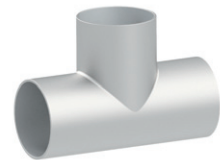
SF-20

Micro Tee (Ferrule)

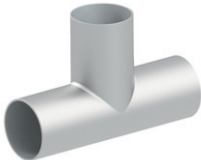
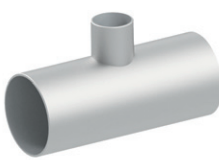
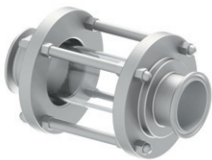


SF-21

Equal Tee (Welding)



SF-22

Equal Tee (Ferrule)  SF-23	Long Tee (Welding)  SF-24	Reducing Tee (Welding)  SF-25	Cross (Welding)  SF-26
Cross Tee (Ferrule)  SF-27	Concentric Reducer (Welding)  SF-28	Eccentric Reducer (Welding)  SF-29	Concentric Reducer (Ferrule)  SF-30
Eccentric Reducer (Ferrule)  SF-31	Hexagon Nut  SF-32	Liner (Welding)  SF-33	Liner (Expanding)  SF-34
Male (Welding)  SF-35	Liner (Expanding)  SF-36	Pipe Hanger  SF-37	Hose Adapter  SF-38
Sight Glass (Ferrule)  SF-39	Tube Strainer (SI Type)  SF-40	Pipe Ferrule (Welding)  SF-41	Ferrule / Nipple Adapter (Male)  SF-42
Ferrule / Nipple Adapter (Female)  SF-43	Sanitary Press Gage  SF-44	Dip Nozzle  SF-45	Multiway Pannel (Custom Made)  SF-46
			90° Elbow (1-Ferrule)  SF-47

SANITARY VALVE & FITTING

3-2

MANUAL VALVE

2-Way Sanitary Ball Valve



SV-01(D)

2-Way Sanitary Ball Valve



SV-01(M)

3-Way Sanitary Ball Valve



SV-02

3-Way Sanitary Ball Valve



SV-03

Sanitary Butterfly Valve



SV-04

Sanitary Check Valve



SV-05

Sanitary Relief Valve



SV-06

Tank Flush Ball Valve



SV-07

Diaphragm Valve



SV-08

Micro Valve



SV-09

3-3 AUTOMATIC VALVE

2-Way Sanitary Ball Valve



D.A

SVP-01

2-Way Sanitary Ball Valve



S.A

SVP-02

3-Way Sanitary Ball Valve



D.A

SVP-03

3-Way Sanitary Ball Valve



S.A

SVP-04

Sanitary Butterfly Valve



D.A

SVP-05

Sanitary Butterfly Valve



S.A

SVP-06

Sanitary Butterfly Valve



S.A

SVP-07

Diaphragm Valve



SVP-08

Diaphragm Valve



SVP-09

Angle Seat Valve (Y-Globe)



SVP-10

Angle Seat Valve (Y-Globe)



SVP-11

2-Way Micro Flow Globe Valve



SVP-12

3-Way Micro Flow Globe Valve



SVP-13

2-Way Sanitary Ball Valve



SVE-14

3-Way Sanitary Ball Valve



SVE-15

Sanitary Butterfly Valve



SVE-16

4 PLUMBING VALVE

4-1

MANUAL VALVE

1-Piece Ball Valve



MV-01

1-Piece Ball Valve



MV-02

1-Piece Ball Valve



2000PSI

MV-03

2-Piece Ball Valve



MV-04

2-Piece Ball Valve



MV-05

2-Piece Ball Valve



2000PSI

MV-06

2-Piece Ball Valve



3000PSI

MV-07

2-Piece Ball Valve



6000PSI

MV-08

3-Piece Ball Valve



MV-09

3-Piece Ball Valve



MV-10

3-Piece Ball Valve



2000PSI

MV-11

3-Piece Ball Valve



3000PSI

MV-12

3-Piece Ball Valve



6000PSI

MV-13

3-Piece Instrumentation Valve



2000PSI

MV-14

3-Way Ball Valve



MV-15

3-Way Ball Valve



6000PSI

MV-16

3/4/5-Way Ball Valve



MV-17

1-Piece Flanged Ball Valve



MV-18

1-Piece Wafer Flanged Ball Valve



MV-19

2-Piece Flanged Ball Valve



JIS

MV-20

2-Piece Flanged Ball Valve



ANSI

MV-21

2-Piece Flanged Ball Valve



MV-22

3-Piece Flanged Ball Valve



MV-23

3/4/5-Way Flanged Ball Valve



MV-24

3-Way Flanged Ball Valve



MV-25

Gate Valve



MV-29

Globe Valve



MV-30

Swing Check Valve



MV-31

Y-Strainer



MV-32

Piston Check Valve



MV-33

Shut Off Valve



MV-34

1-Piece Wafer Disc Check Valve



MV-35

3-Piece Disc Check Valve



MV-36

Needle Valve



MV-37

Tank Bottom Ball Valve



MV-38

Top Entry Ball Valve



MV-39

Top Entry Flanged Ball Valve



MV-40

Jacket Valve



MV-41

PLUMBING VALVE

4-2

DIRECT MOUNTING VALVE

1-Piece Ball Valve



AV-01

2-Piece Ball Valve



AV-02

3-Piece Ball Valve



AV-03

3-Piece Ball Valve



AV-04

3-Piece Ball Valve



AV-05

3-Piece Instrumentation Ball Valve



AV-06

3-Way Ball Valve



AV-07

3/4/5-Way Ball Valve



AV-08

1-Piece Wafer Flanged Ball Valve



AV-09

2-Piece Flanged Ball Valve



AV-10

2-Piece Flanged Ball Valve



AV-11

2-Piece Flanged Ball Valve



AV-12

Jacket Valve



AV-17

4-3

PNEUMATIC ACTUATED VALVE

1-Piece Ball Valve



AVP-01(D)

1-Piece Ball Valve



AVP-01(S)

2-Piece Ball Valve



AVP-02(D)

2-Piece Ball Valve



AVP-02(S)

3-Piece Ball Valve



AVP-03(D)

3-Piece Ball Valve



AVP-03(S)

3-Piece Ball Valve



2000PSI

AVP-04(D)

3-Piece Ball Valve



2000PSI

AVP-04(S)

3-Piece Ball Valve



3000PSI

AVP-05(D)

3-Piece Ball Valve



3000PSI

AVP-05(S)

3-Piece Instrumentation Ball Valve



2000PSI

AVP-06(D)

3-Piece Instrumentation Ball Valve



2000PSI

AVP-06(S)

3-Way Ball Valve



AVP-07(D)

3-Way Ball Valve



AVP-07(S)

3/4/5-Way Ball Valve



AVP-08(D)

3/4/5-Way Ball Valve



AVP-08(S)

1-Piece Wafer Flanged Ball Valve



AVP-09(D)

1-Piece Wafer Flanged Ball Valve



AVP-09(S)

2-Piece Flanged Ball Valve



AVP-10(D)

2-Piece Flanged Ball Valve



AVP-10(S)

2-Piece Flanged Ball Valve



JIS

AVP-11(D)

2-Piece Flanged Ball Valve



AVP-11(S)

2-Piece Flanged Ball Valve



ANSI

AVP-12(D)

2-Piece Flanged Ball Valve



AVP-12(S)

Angle Seat Valve



AVP-17(D)

PLUMBING VALVE

4 - 4

ELECTRIC ACTUATED VALVE

1-Piece Ball Valve



AVE-01

2-Piece Ball Valve



AVE-02

3-Piece Ball Valve



AVE-03

3-Piece Ball Valve



2000PSI

AVE-04

3-Piece Ball Valve



3000PSI

AVE-05

3-Piece Instrumentation Ball Valve



2000PSI

AVE-06

3-Way Ball Valve



AVE-07

3/4/5-Way Ball Valve



AVE-08

1-Piece Wafer Flanged Ball Valve



AVE-09

2-Piece Flanged Ball Valve



AVE-10

2-Piece Flanged Ball Valve



AVE-11

2-Piece Flanged Ball Valve



AVE-12

5 BUTTERFLY VALVE (PLUMBING)

5-1

BUTTERFLY VALVE (MANUAL)

Wafer, Lever



MV-26(L)

Wafer, Lever



MV-26(L)

Wafer, Gear



MV-26(G)

Wafer, Gear



MV-26(G)

Lug, Lever



MV-26

Flanged, Lever



MV-26

Al, Wafer, Lever



MV-27

High-P, Performance, 10K



MV-28

BUTTERFLY VALVE (PLUMBING)

5-2

BUTTERFLY VALVE (AUTOMATIC)

Wafer, Bare



AV-13

Wafer, Bare



AV-13

AI, Wafer, Bare



AV-14

High-p Wafer 10K



JIS

AV-15

High-p Wafer 20K



ANSI

AV-16

Pneumatic



AVP-13(D)

Pneumatic



AVP-13(S)

Electric



AVE-13

AI, Pneumatic



AVP-14(D)

AI, Pneumatic



AVP-14(S)

AI, Electric



AVE-14

High-p, Pneumatic



JIS

AVP-15(D)

High-p, Pneumatic



JIS

AVP-15(S)

High-p, Electric



JIS

AVE-15

High-p, Electric



ANSI

AVP-16(D)

High-p, Pneumatic



ANSI

AVP-16(S)

High-p, Electric



ANSI

AVE-16

6

ELECTRIC, PNEUMATIC ACTUATOR & ACCESSORIES

Electric Actuator



DE-Series

Bulkhead Clamp



RE-Series

Electric Actuator



DE-Series+PCU

Electric Actuator



DE-Series

Pneumatic Actuator (Sotch Yoke)



RP-SD Series

Pneumatic Actuator (Sotch Yoke)



RP-SS Series

Pneumatic Actuator (Rack & Pinion)



RP-RD Series

Pneumatic Actuator (Rack & Pinion)



RP-RS Series

Solenoid Valve



PA-01(E-04)

Solenoid Valve (Explosion)



PA-02(E-05)

Air Filter Regulator



PA-03

Air Filter Regulator



PA-04

Limit Switch Box (IP67)



PA-05(E-06)

Limit Switch Box (Explosion)



PA-06

E-P Positioner



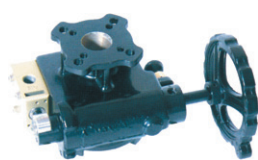
PA-07(E-09)

Smart Positioner



PA-08

Dec clutch Gear Operator



PA-09

Side Handwheel



PA-10

Speed Controller



PA-11

One Touch Fitting



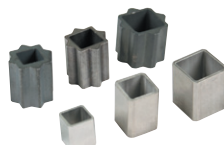
PA-12

Silencer



PA-13

Square Adapter



PA-14, PA-15

Speed & Silencer



PA-16

One Touch Fitting (Elbow)



PA-17

7

VALVE PARTS

PARTS OF BALL VALVE

2-Way Ball



3-Way Ball, L-Position



3-Way Ball, T-Position



V-Port Ball



Stem Ball



Stem



Cavity Filled Seat



Body



End Caps



Teflon Seat



Carbon Filled Seat



PARTS OF BUTTERFLY VALVE

Body



Disc



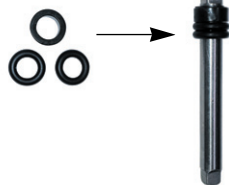
Seat



Stem



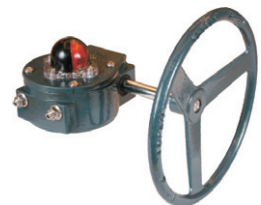
O-Ring



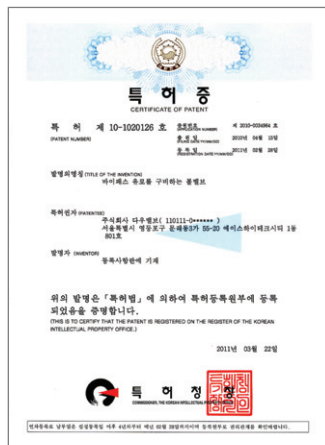
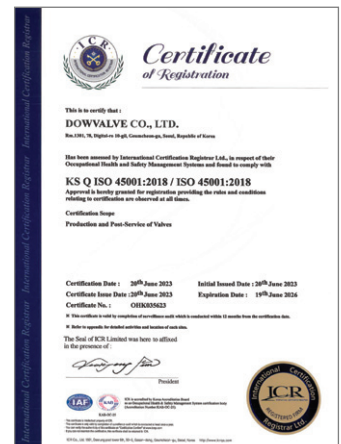
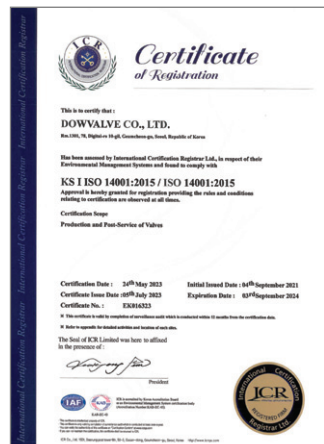
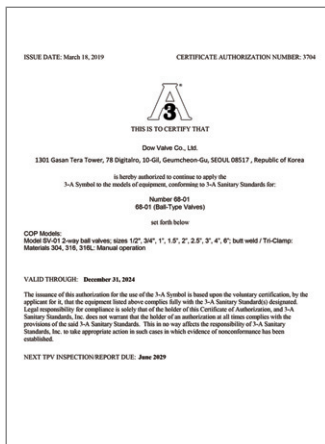
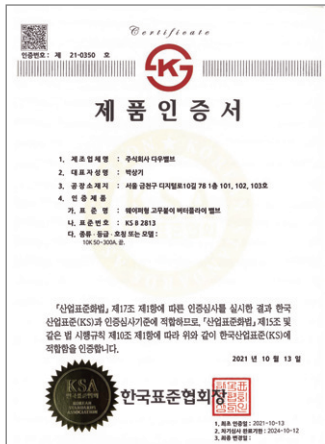
Lever



Worm Gear



8 CERTIFICATE



CERTIFICATE

디자인등록증 CERTIFICATE OF DESIGN REGISTRATION		
등록 Registration Number	제 30-082509 호	
출원일자 Application date	제 2014-0455723 호	
공표일자 Publication	2014년 11월 28일	
등록일자 Registered date	2015년 04월 14일	
출원인명 Applicant's name	심사 등록 (Registered trademark)	
출원분류 Class		
지정상품 Specified goods		
이름(상표) 또는 다른 표식 Name (trademark) or other mark		
디자인설명란 기재 Design description		
발행처 Issued at		
발행일자(DDLHHYYMM*****) Issued date	2015년 04월 14일	
위와 일치한 것으로서 「디자인보호법」에 따라 디자인등록번호를 부여되었음을 증명합니다. This is certified that, in accordance with the Design Protection Act, a design has been registered at the Korean Intellectual Property Office.		
		2015년 04월 14일 특허청장 COMMISSIONER KOREAN INTELLECTUAL PROPERTY OFFICE 히동균

[illegible][illegible]

(문자번호: ko20-0256~ko20-2060)

[발행일자: 2021년 04월 28일]

제 2021112124 호

기업부설연구소 인정서

1. 연 구 소 명: (주)다우웰로 기업부설연구소
[소속기업명: (주)다우웰로]

2. 소 재 지: 서울특별시 관악구 디지털로10길 78
가산디지털단지 10동 10층

3. 신고 등록일: 2021년 04월 28일

과학기술정보통신부

『기초연구용 및 기술개발지출에 관한 법률』 제14조
제1항 및 같은 법 시행령 제27조제1항에 따라 길이 확인
기업부설연구소로 인정함이다.



2021년 4월 28일

한국산업기술진흥유흥청



※ 본인정서(발행일자)는 전자발서시스템을 이용하여 발급되었으며, 위변조 여부를 확인하기 위하여 본인정서 뒷면에 QR코드가 부착되어 있습니다.



제 31154호

소재부품-장비 전문기업확인서

기 업 명 : (주)다우벨티 (116-01-32112)

대 표 자 : 박영기

소재 지 : 서울특별시 공판구 디자인로10길 18 1301호(가산동, 가산4동2가)

유효 기 한 : 2023.03.28 ~ 2026.03.27

이 기 업 은 「소재·부품·장비산업 경쟁력강화를 위한 특별조치법」 제4조 제2항 및 같은 법 시행규칙 제4조 제2항에 따라 전문기업임을 확인합니다.

2023.03.28

한국산업기술평가관 



제 220101-03054 호

경영혁신형 중소기업(Main-Biz) 확인서

업 태 명 : 주식회사 두마케트

대표자명 : 박승기

주 소 : 서울특별시 영등포구 영일로10길 78

주 소 : 1301로 (가산동)

유효기간 : 2022.12.07 ~ 2025.12.06

위 업체는 경영혁신형 중소기업 발굴 육성사업에 의해 선정된 경영혁신형 중소기업(Main-Biz)임을 확인합니다.

2022 년 12 월 07 일

중소벤처기업부장



한국벤처투자 / 2023년 198317-1-2
 한국벤처투자



제R190101-00197호

기술혁신형 중소기업(Inno-Bis) 확인서

업 명 : (주)다케코트
 대표 자 : 박근우, 박희찬
 주 소 : 서울 강남구 테헤란로10길 78
 층 급 : A
 유자일자 : 2025. 03. 20 ~ 2028. 03. 19

위 업체는 기술혁신형 중소기업 한국벤처투자에서
 선정된 기술혁신형 중소기업(Inno-Bis)임을 확인
 합니다.

2025년 3월 20일

중소벤처기업부장





Google 문서에서 https://www.google.com/maps/@37.516917,127.104373,15z 에서 위치를 확인하십시오.



MINISTRY OF TRADE, INDUSTRY & ENERGY

제132105 호

표 창 장

추석회사 다우캠프오

귀사는 2020년도 산업혁신육동 사업의
모범적인 추진을 통하여 국가산업발전에
기여한 공이 크므로 이에 표창합니다.

2020년 12월 18일



산업통상지원부장관

성 문



9 - 1. Conversion Tables	28
9 - 2. Valve Seat Material Selection Guide	30
9 - 3. Super Alloy Ball Valve	31
9 - 4. IP (Ingress Protection) Classification	32
9 - 5. Type Of Electrical Switches	33
9 - 6. Dimension Of Socket Welding (JIS)	34
9 - 7. Dimension Of Socket Welding (ANSI)	34
9 - 8. Material Comparisons Table	35
9 - 9. Chemical & Physical Properties	36
9 - 10. Elastomer General Chart	37
9 - 11. Rubber Seat Materials	37
9 - 12. Valve Leakage Rates	38
9 - 13. Reference Standard & Specification	39
9 - 14. Comparative Pipe Dimensions Table	41
9 - 15. Surface Roughness (Intensity Of Illumination)	41
9 - 16. Surface Roughness For Grit Finishes (Ra)	41
9 - 17. Properties Of Saturated Steam	42
9 - 18. Flange-Dimension	43

REFERENCE DATA

9-1. CONVERSION TABLES

(1) Fahrenheit To Celsius Conversion Table

Celsius °C = (°F - 32) ÷ 1.8 To Fahrenheit °C = (°F × 1.8) + 32

NOTE : The number in the center column refer to the temperature either in degrees Celsius or Fahrenheit when it is desired to convert into either scale. If converting from Fahrenheit degrees to Celsius degrees the equivalent temperature will be found in the column, while if converting from degrees Celsius to degrees Fahrenheit, the answer will be found in the column on the right.

°C	↓	°F	°C	↓	°F	°C	↓	°F	°C	↓	°F	°C	↓	°F
-45.6	-50	-58	-26.1	-15	5.0	-6.67	20	68.0	12.8	55	131.0	32.2	90	194.0
-45	-49	-56.2	-25.6	-14	6.8	-6.11	21	69.8	13.3	56	132.8	32.8	91	195.8
-44.4	-48	-54.4	-25	-13	8.6	-5.56	22	71.6	13.9	57	134.6	32.3	92	196.7
-43.9	-47	-52.6	-24.4	-12	10.4	-5.00	23	73.4	14.4	58	136.4	33.9	93	199.4
-43.3	-46	-50.8	-23.9	-11	12.2	-4.44	24	75.2	15.0	59	138.2	34.4	94	201.2
-42.8	-45	-49	-23.3	-10	14.0	-3.89	25	77.0	15.6	60	140.0	35.0	95	203.0
-42.2	-44	-47.2	-22.8	-9	15.8	-3.33	26	78.8	16.1	61	141.8	35.6	96	204.8
-41.7	-43	-45.4	-22.2	-8	17.6	-2.78	27	80.6	16.7	62	143.6	36.1	97	206.6
-41.1	-42	-43.6	-21.7	-7	19.4	-2.22	28	82.4	17.2	63	145.4	36.7	98	208.4
-40.6	-41	-41.8	-21.1	-6	21.2	-1.67	29	84.2	17.8	64	147.2	37.2	99	210.2
-40	-40	-40	-20.6	-5	23.0	-1.11	30	86.0	18.3	65	149.0	37.8	100	212
-39.2	-39	-38.2	-20	-4	24.8	-0.56	31	87.8	18.9	66	150.8	66	150	302
-38.9	-38	-36.4	-19.4	-3	26.6	0	32	89.6	19.4	67	152.6	93	200	392
-38.3	-37	-34.6	-18.9	-2	28.4	0.56	33	91.4	20.0	68	154.4	121	250	482
-37.8	-36	-32.8	-18.3	-1	30.2	1.11	34	93.2	20.6	69	156.2	149	300	572
-37.2	-35	-31.0	-17.8	0	32	1.67	35	95.0	21.1	70	158.0	177	350	662
-36.7	-34	-29.2	-17.2	1	33.8	2.22	36	96.8	21.7	71	158.8	204	400	752
-36.1	-33	-27.4	-16.7	2	35.6	2.78	37	98.6	22.2	72	161.6	232	450	842
-35.6	-32	-25.6	-16.1	3	37.4	3.33	38	100.4	22.8	73	163.4	260	500	932
-35	-31	-23.8	-15.6	4	39.2	3.89	39	102.2	23.3	74	165.2	288	550	1022
-34.4	-30	-22	15.0	5	41.0	4.44	40	104.0	23.9	75	167.0			
-33.9	-29	-20.2	-14.4	6	42.8	5.00	41	105.8	24.4	76	168.8			
-33.3	-28	-18.4	-13.9	7	44.6	5.56	42	107.6	25.0	77	170.6			
-32.8	-27	-16.6	-13.3	8	46.4	6.11	43	109.4	25.6	78	172.4			
-32.2	-26	14.8	-12.8	9	48.2	6.67	44	111.2	26.1	79	174.2			
-31.7	-25	-13.0	-12.2	10	50.0	7.22	45	113.0	26.7	80	176.0			
-31.1	-24	-11.2	-11.7	11	51.8	7.78	46	114.8	27.2	81	177.8			
-30.6	-23	- 9.4	-11.1	12	53.6	8.33	47	116.6	27.8	82	179.6			
-30.0	-22	- 7.6	-10.6	13	55.4	8.89	48	118.4	28.3	83	181.4			
-29.4	-21	- 5.8	-10.0	14	57.2	9.44	49	120.2	28.9	84	183.2			
-28.9	-20	- 4.0	-9.44	15	59.0	10.0	50	122.0	29.4	85	185.0			
-28.3	-19	- 2.2	-8.89	16	60.8	10.6	51	123.8	30.0	86	186.8			
-27.8	-18	- 0.4	-8.33	17	62.6	11.1	52	125.6	30.6	87	188.6			
-27.2	-17	1.4	-7.78	18	64.4	11.7	53	127.4	31.1	88	190.4			
-26.7	-16	3.2	-7.72	19	66.2	12.2	54	129.2	31.7	89	192.2			

(2) Torque Conversion Ratios

oz · in	lb · in	lb · ft	g · cm	kg · cm	kg · m	mN · m	cN · m	N · m
1	0.0625	0.005	72	0.072	0.0007	7.062	0.706	0.007
16	1	0.083	1152.1	1.152	0.0115	113	11.3	0.113
192	12	1	13826	13.83	0.138	1356	135.6	1.356
0.014	0.0009	0.00007	1	0.001	0.00001	0.098	0.01	0.0001
13.89	0.868	0.072	1000	1	0.01	98.07	9.807	0.098
1389	86.8	7.233	100000	100	1	9807	980.7	9.807
0.142	0.009	0.0007	10.2	0.01	0.0001	1	0.1	0.001
14.16	0.088	0.007	102	0.102	0.001	10	1	0.01
141.6	8.851	0.738	10197	10.20	0.102	1000	100	1

(3) Pressure Conversion Table

Pa	Kpa	Mpa	bar	kgf / cm ²	atm	mmH ₂ O	mmHg (Torr)
1	1×10^{-3}	1×10^{-6}	1×10^{-5}	1.01972×10^{-5}	9.86923×10^{-6}	1.01972×10^{-1}	7.50062×10^{-3}
1×10^3	1	1×10^{-3}	1×10^{-2}	1.01972×10^{-2}	9.86923×10^{-3}	1.01972×10^2	7.50062
1×10^6	1×10^3	1	1×10	1.01972×10	9.86923	1.01972×10^5	7.50062×10^3
1×10^9	1×10^2	1×10^{-1}	1	1.01972	9.86923×10^{-1}	1.01972×10^4	7.50062×10^2
9.80665×10^4	9.80665×10	9.80665×10^{-2}	9.80665×10^{-1}	1	9.67841×10^{-1}	1×10^4	7.35559×10^2
1.01325×10^5	1.01325×10^2	1.01325×10^{-1}	1.01325	1.03323	1	1.03323×10^4	7.60000×10^2
9.80665	9.80665×10^{-3}	9.80665×10^{-6}	9.80665×10^{-5}	1×10^{-4}	9.67841×10^{-5}	1	7.35559×10^{-2}
1.33322×10^2	1.33322×10^{-1}	1.33322×10^{-4}	1.33322×10^{-3}	1.35951×10^{-3}	1.31579×10^{-3}	1.35951×10	1

※ NOTE : 145PSI = 10Bar = 10.2 Kg/cm^2 = 1MPa = 1000KPa
1Bar = 14.503PSI

(4) Vacuum Range & Characteristics

	Rough Vacuum	Midium Vacuum	High Vacuum	UHV
Pressure range (Torr)	atm ~ 1 Torr	1 Torr ~ 10^{-3} Torr	10^{-3} Torr ~ 10^{-7} Torr	$< 10^{-7}$ Torr
Particle number Density (cm ⁻³)	10^{19} - 10^{16}	10^{16} - 10^{13}	10^{13} - 10^9	$< 10^9$
Mean free Path(cm)	$< 10^{-2}$	10^{-2} - 10	10 - 10^4	$> 10^4$
Impingement rate (ea/cm ² /s)	10^{23} - 10^{20}	10^{20} - 10^{17}	10^{17} - 10^{13}	$< 10^{13}$
Monolayer time (second)	$< 10^{-5}$	10^{-5} - 10^{-2}	10^{-2} - 100	> 100
Type of gas flow	Viscous flow	Knudsen flow	Molecular flow	Molecular flow

※ 1 atm (Atomosphere) = 760Torr = 76cmHg = 760mmHg = 1013hPa (Hectopascal)
1 torr = 1mmHg = 133.332N/m² (뉴턴 퍼 제곱미터) = 133.332Pa (파스칼) = 1.333224mbar (밀리바)

(5) Inches To Metric Vacuum Conversion Table

Inches Hg	↓	Kpa	Inches Hg	↓	Kpa	Inches Hg	↓	Kpa	Inches Hg	↓	Kpa	Inches Hg	↓	Kpa
0	0	0	1.481	5	16.88	2.961	10	33.77	11.85	40	135.06	26.65	90	303.9
.2961	1	3.377	1.777	6	20.26	4.442	15	50.65	14.81	50	168.83	29.61	100	337.7
.5923	2	6.754	2.073	7	23.64	5.923	20	67.54	17.77	60	202.6			
.8884	3	10.13	2.369	8	27.02	7.403	25	84.42	20.73	70	236.37			
1.185	4	13.51	2.665	9	30.39	8.880	30	101.30	23.69	80	270.13			

REFERENCE DATA

9-2. VALVE SEAT MATERIAL SELECTION GUIDE

Seat Material		Working Pressure (Kg/cm ²)	Working Temperature (°C)		Description
			Min.	Max.	
PTFE		70	-60	160	torque low/ good elasticity / good in seal up, but no good in high temp. or high pressure
15% GF	5% glass filled + 85% PTFE	100	-60	180	grinding working or high pressure working is better than PTFE, not suit for high temp. fluid
20% GF	20% glass filled + 80% PTFE	100	-60	180	
25% GF	25% glass filled + 75% PTFE	100	-60	180	grinding or high pressure working is good/ good in seal up, but not suit to use low temp.
TFM 4215	25% carbon + 75% PTFE	120	-60	220	heat conduction good/ hardness high, good condition to work high temp.
MG 1241	20% glass filled + 5% graphite	120	-60	200	
GRAFOIL	High temp. graphite	300	-100	600	good in high pressure working / brittle / better for stem packing, seal (as like pcolciy / gasket)
TFM 1600	PTFE+PFA	100	-100	160	better in vapor fluid, but not goods in other high tem. Fluid
MG 2030	15% graphite + 85% PTFE	120	-60	180	
50% S.S.	50% S/S + 50% PTFE	150	-60	220	heat conduction good / hardness high/ good condition to work high temp. & high pressure, but torque high
MG 1431	15% glass filled + 5% MoS ₂ + 80% PTFE	120	-60	180	
5%MOS + 55%S.S			-60	220	
POM	Delrin (ACETAL)	400	-40	95	
PEEK		400	-60	260	good in high temp. or high pressure working, but expensive
NYLON		350	-40	100	
UHMW-PE	Ultra High Molecular Weight Polyethylense	350	-30	80	초고밀도 폴리에틸렌
PCTFE (KEL-F)	Poly Chloro Tri Fluoro Ethylene	150	-204	180	PTFCE
Polyamide	Nylon	350	-40	110	good for high temp. but not suitable in low temp. or high acid or alkali value fluid
ETFE	Ethylene Tetrafluoro Ethylene		-185	150	High Corrosion Resistance and Strength Over a Wide Temperature

9-3. SUPER ALLOY BALL VALVE

(1) Applicable Standard

Valves Design & Thickness		ASME B16.34 / API 608
Material		As per. MATERIALS LIST
Pressure - Temperature Rating		ASME B16.34
Pressure Testing		API 598 / API 6D
Fire Safe		API 607 / API 6FA / BS 5755
End Connection	Threaded	ANSI B1.20.1 (NPT) / ISO 228 / ISO 7-1 / DIN 2999 / BS21(BSPF / BSPT)
	Socket weld	ANSI B16.11
	Butt weld	ANSI B16.25
	Flanged	ANSI B16.5 / EN 1092
Valves Length	Threaded	Mfg. Std. / DIN 3202 M3
	Socket weld	Mfg. Std. / DIN 3202 M3
	Butt weld	Mfg. Std. / DIN 3202 S13 / ANSI B16.10
	Flanged	ANSI B16.10 / DIN 3202 F1 / F4 / F5

(2) Materials List

MATERIAL NAME	CASTING	DIN	UNS
1. Austenitic Stainless Steel Castings			
304L	A351 Gr. CF3	1.4306	J92500
304	A351 Gr. CF8	1.4308	J92600
316L	A351 Gr. CF3M	1.4404	J92800
316LN	A351 Gr. CF3MN	1.4435	S31653
316	A351 Gr. CF8M	1.4408	J92900
347	A351 Gr. CF8C	1.4552	J92710
317L	A351 Gr. CG3M	-	J92999
317	A351 Gr. CG8M	-	J93000
ALLOY 20	A351 Gr. CN7M	1.4536	J95150
904L	No cast grade	1.4539	N08904
2. Super Austenitic Grades Castings			
	A351 CK-3MCuN	-	J93254
3. Nickel Based Alloy Castings			
Nickel CZ100	A494 CZ-100	-	N02100
Alloy 400	A494 M-35-1	2.4365	N24135
Hastelloy B	A494 N-12MV	2.4686	N30012
Hastelloy B2	A494 N-7M	2.4617	N30007
Inconel 600	A494 CY-40	2.4816	N06040
Hastelloy C	A494 CW-12MW	2.4686	N30002
Hastelloy C276	A494 CW-6M	2.4819	N10276
Inconel 625	A494 CW-6MC	2.4856	N26625
Hastelloy C22	A494 CX2MW	2.4602	N26022
4. Duplex Stainless Steel Castings			
329	None	1.4460	S32900
CD4MCu	A995 1A / A744 CD4MCu		
CD4MCuN	A995 1B		
	A995 2A / A351 CE8MN		
2205	A995 4A CD3MN	1.4462	S32205 / S31803
5. Super Duplex Grades			
2507	A890 5A CE3MN	1.4410	S32750
Z100	A995 6A / A351 CD3MWCuN	1.4468	J93380
Ferrallium 255	A995 1C	Ferrallium 255	S32550
6. Titanium Grades			
Titanium C2	B367 C2	3.7035	R50400
Titanium C5	B367 C5	3.7165	R50400

- ※ Any metal materials other than the above listed can be offered upon request.
 ※ Sea Water Material : 4A CD3MN, 5A CE 3MN

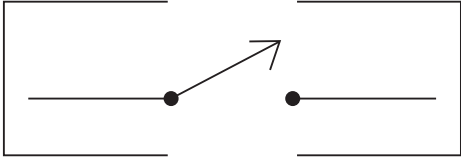
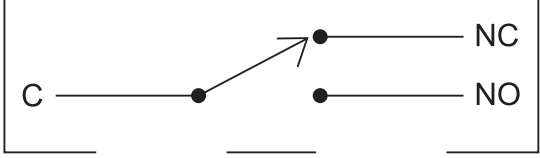
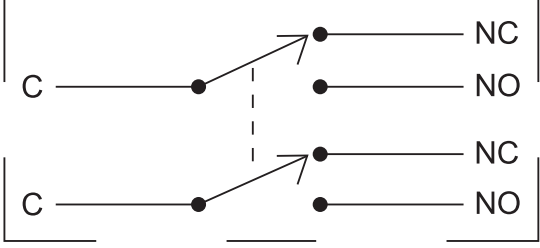
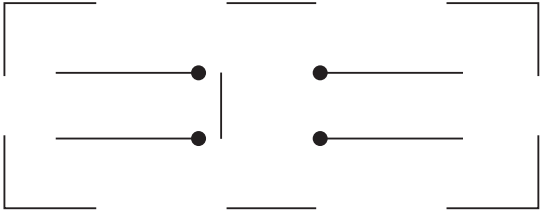
REFERENCE DATA

9-4. IP (INGRESS PROTECTION) CLASSIFICATION

Handy Reference Table For I.P Ratings

First Characteristic Numeral				Second Characteristic Numeral			
Protection against solid foreign objects			Degree of protection for people against access to hazardous parts with :	Protection against harmful ingress of water			Degree of protection from water
I.P	Example	TESTS		I.P	Example	TESTS	
0		Non protection	Non-protected	0		Non protection	Non-protected
1		Full penetration of 50mm diameter of sphere not allowed. Contact with hazardous parts not permitted.	Back of hand	1		Protected against vertically falling drops of water	Vertically dripping
2		Full penetration of 12.5mm diameter of sphere not allowed. The jointed test finger shall have adequate clearance from hazardous parts.	Finger	2		Protected against vertically falling drops of water with enclosure tilted 15° from the vertical.	Dripping up to 15° from the vertical
3		The access probe of 2.5mm diameter shall not penetrate.	Tool	3		Protected against sprays to 60° from the vertical.	Limited spraying
4		The access probe of 1mm diameter shall not penetrate.	Wire	4		Protected against water splashed from all directions - limited ingress permitted	Splashing from all directions
5		Limited ingress of dust permitted (no harmful deposit).	Dust protected	5		Protected against low pressure jets of water from all directions - limited ingress permitted	Hosing jets from all directions
6		No ingress of dust.	Dust tight	6		Protected against strong jets of water eg for use on ship decks - limited ingress permitted	Strong hosing jets from all directions
IP 6 7 Code Letters First Characteristic numeral Second Characteristic numeral				7		Protection against immersion between 15cm-1m deep for 30 minutes.	Temporary immersion
				8		Protected against continuous submersion at a specified depth.	Continuous immersion

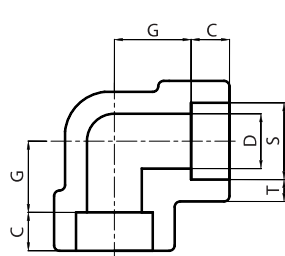
9-5. TYPE OF ELECTRICAL SWITCHES

Type	Description
 SPST (Single Pole, Single Throw)	Make or break one circuit.
 SPDT (Single Pole, Double Throw)	Make one circuit and break one circuit with common terminal.
 DPDT (Double Pole, Double Throw)	Make two circuits and break two circuit with two common terminals.
 SPDB (Single Pole, Double Break)	Make one circuit and break one circuit with no common terminals.

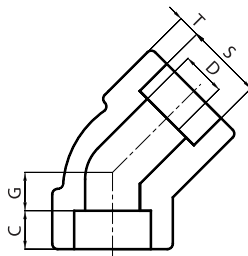
REFERENCE DATA

9-6. DIMENSION OF SOCKET WELDING (JIS)

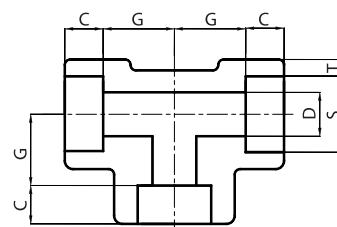
90° Elbow, 45° Elbow, Tee - SCH40, SCH 80, SCH160 ◀▶



90° Elbow



45° Elbow



Tee

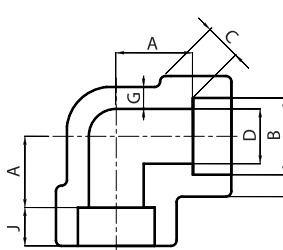
JIS B2316

TOL : Tolerances (UNIT : mm)

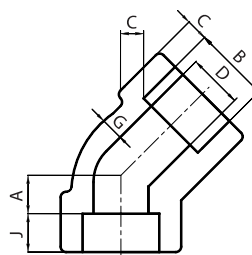
Nom Pipe Size		Socket Bore Dia		Bore Diameter of Fitting D				Socket Wall Thickness Min-T		Depth of Socket
A	B	S	TOL	SCH40	SCH80	SCH160	TOL	SCH40,80	SCH160	Min-C
6	1/8	11.0	+0.3 -0	7.1	5.7	4.0	±0.4	3.2	3.5	9.6
8	1/4	14.3		9.4	7.8	6.5		3.3	4.0	9.6
10	3/8	17.8		12.7	10.9	9.0		3.5	4.4	9.6
15	1/2	22.2		16.1	14.3	12.3		4.1	5.2	9.6
20	3/4	27.7		21.4	19.4	16.2		4.3	6.1	12.7
25	1	34.5		27.2	25.0	21.2		5.0	7.0	12.7
32	1-1/4	43.2		35.5	32.9	29.9		5.4	7.0	12.7
40	1-1/2	49.1	+0.4 -0	41.2	38.4	34.4	±0.8	5.6	7.8	12.7
50	2	61.1		52.7	49.5	43.1		6.1	9.6	15.9
65	2-1/2	77.1		65.9	62.3	57.3		7.7	10.4	15.9
80	3	90.0		78.1	73.9	66.9		8.4	12.3	15.9
100	4	115.5		102.3	97.1	87.3		9.4	18.0	19.0

9-7. DIMENSION OF SOCKET WELDING (ANSI)

90° Elbow, 45° Elbow, Tee- 3000#, 6000#, 9000# ◀▶



90° Elbow



45° Elbow

ANSI B16.11

(UNIT : mm)

Nom Pipe Size	Socket Bore Dia	Bore Diameter of Fitting D			Socket Wall Thickness Min-C			Depth of Socket
A	B	3000	6000	9000	3000	6000	9000	Min-J
1/8	10.65-10.90	6.1-7.6	3.2-4.8	-	3.20	3.45	-	10
1/4	14.10-14.35	8.5-10.0	5.6-7.1	-	3.30	4.00	-	10
3/8	17.55-17.80	11.8-13.3	8.4-9.9	-	3.50	4.35	-	10
1/2	21.70-21.95	15.0-16.6	11.0-12.5	5.6-7.2	4.10	5.20	8.20	10
3/4	27.05-27.30	20.2-21.7	14.8-16.3	10.3-11.8	4.25	6.05	8.55	13
1	33.80-34.05	25.9-27.4	19.9-21.5	14.5-16.0	5.00	6.95	9.95	13
1-1/4	42.55-42.80	34.3-35.8	28.7-30.2	22.0-23.5	5.30	6.95	10.60	13
1-1/2	48.65-48.90	40.1-41.7	33.2-34.7	27.2-28.7	5.55	7.80	11.15	13
2	61.10-61.35	51.7-53.5	42.1-43.6	37.4-38.9	6.05	9.50	12.15	16
2-1/2	73.80-74.20	61.2-64.2	-	-	7.65	-	-	16
3	89.80-90.15	76.4-79.5	-	-	8.30	-	-	16
4	115.45-115.80	100.7-103.8	-	-	9.35	-	-	19

9-8. MATERIAL COMPARISONS TABLE

GENERAL	KS Symbol		JIS Symbol		ASTM Symbol		DIN Symbol	
CLASSIFICATION	Casting	Forging	Casting	Forging	Casting	Forging	Casting	Forging
CAST IRON	KS D 4301 - GC200		G5501 - FC200		A126 Class B		0.6020	
	KS D 4301 - GC250		G5501 - FC250		A126 Class C		0.6025	
CAST BRONZE	KS D 6024 - BC6		BC6		B584 - C836			
DUCTILE IRON	KS D 4302 - GCD450		G5502 - FCD450		A395		0.7040	
	KS D 4302 - GCD550		G5502 - FCD550		A536		0.7050	
CARBON STEEL	KS D 4315 - SCPH21		G5151 - SCPH2	G3201 - SF50	A216 - WCB	A105	1.0619	1.0460
	KS D 4315 - SCPH2		G5151 - SCPH21		A217 - WC6	A182 - F11	1.7357	1.7733
STAINLESS STEEL	KS D 4103 - SSC13	KS D 3214 - SUSF304	G5121 - SCS13	G3214 - SUS F304	A351- CF8	A182 - F304	1.4308	1.4301
	KS D 4103 - SSC14	KS D 3214 - SUSF316	G5121 - SCS14	G3214 - SUS F316	A351- CF8M	A182 - F316	1.4408	1.4401
	KS D 4103 - SSC16	KS D 3214 - SUSF316L	G5121 - SCS16	G3214 - SUS F316L	A351- CF3M	A182 - F316L	1.4409	1.4404
	KS D 4103 - SSC19	KS D 3214 - SUSF304L	G5121 - SCS19	G3214 - SUS F304L	A351- CF3	A182 - F304L	1.4309	1.4306
TITANIUM	KS D 6026 - TCA6400				B367			
ALUMINIUM	KS D 6007 - ALDC12		H5302 - ADC12		A383 UNS A03830			
ALUMINIUM-BRONZE	KS D 6024 - AIBC2		G8120 - CAC702		B148 - C95400			
ALLOY 400 (MONEL)					A494 - M35	B564 - N04400	2.4365	2.436
HASTELLOY C					A494 - CW - 12MW	B462 - N10276	2.4686	2.4819
CARBON STEEL BOLTS	KS D 3755 - SNB7		G4107 - SNB7		-	A193 - B7	-	1.7258
CARBON STEEL NUTS	KS D 3752 - SM45C		G4051 - S45C		-	A194 - 2H	-	
STAINLESS STEEL BOLTS	KS D 3706 - STS304		G4303 - SUS304		-	A193 - B8	-	
STAINLESS STEEL NUTS	KS D 3697 - ST304		G4303 - SUS304		-	A194 - 8	-	1.4301
STAINLESS STEEL (Round Bar)	-	KS D 3706 - STS304B	-	G4303 SUS304	-	A276 - 304	-	1.4301
	-	KS D 3706 - STS316B	-	G4303 SUS316	-	A276 - 316	-	1.4401
	-	KS D 3706 - STS316LB	-	G4303 SUS316L	-	A276 - 316L	-	1.4404
	-	KS D 3706 - STS304LB	-	G4303 SUS304L	-	A276 - 304L	-	1.4306

REFERENCE DATA

9-9. CHEMICAL & PHYSICAL PROPERTIES

(1) Casting Materials

Chemical Properties (화학적 특성)

Description	SS 304	SS 316	SS 304L	SS 316L	Cast Iron	Ductile Iron	Carbon Steel	High Temp	Hastelloy-C	Monel
Symbol	A351	A351	A351	A351	A126	A536	A216	A217	A494	A494
Grade	CF8	CF8M	CF3	CF3M	Class B	65-45-12	WCB	WC6	CW-12M-1	M-35
C% Max.	0.08	0.08	0.03	0.03	-	-	0.30	0.20	0.12	0.35
Mn %	1.50	1.50	1.50	1.50	-	-	1.00 Max.	0.5-0.8	1.00	1.5
P% Max.	0.04	0.04	0.04	0.04	0.75	-	0.040	0.040	0.04	0.03
S% Max.	0.04	0.04	0.04	0.04	0.15	-	0.045	0.045	0.03	0.03
Ni%	8.0-11.0	9.0-12.0	8.0-12.0	9.0-13.0	-	-	0.5 Max.	-	Balance	Balance
Cr%	18.0-21.0	18.0-21.0	17.0-21.0	17.0-21.0	-	-	0.5 Max.	1.0-1.5	15.7-17.5	-
Mo%	-	2.0-3.0	-	2.0-3.0	-	-	0.2 Max.	0.45-0.65	16.0-18.0	-
Cu	-	-	-	-	-	-	0.3 Max.	-	-	26.0-33.0
Si	2.00	1.50	2.00	1.50	-	-	0.6 Max.	0.60	1.00	1.25
Fe	-	-	-	-	-	-	-	-	-	3.5
V	-	-	-	-	-	-	-	-	0.2-0.4	-

Physical Properties

Tensile Strength	70	70	70	70	21	64	70-95	70-95	70	65
Min. Kis MPa	485	485	485	485	145	450	488-655	485-655	485	450
Yield Point	30	30	30	30	-	41	36	40	30	25
Min. Kis MPa	205	205	205	205	-	311	250	275	205	170
Elongation in 2 inch % Min.	35	30	35	30	-	18	22	20	35	25
Reduction of Area % Min.	-	-	-	-	-	-	35	35	-	-

(2) Wrought Materials

Chemical Properties (물리적 성질)

Description	SS 304	SS 316	SS 304L	SS 316L	SS 321	Ductile	Carbon Steel	Hard Facing	Bolts	Nuts
Symbol	A182	A182	A182	A182	A182	A439	ASTM	KLS	A193	A194
Grade	F304	F316	F304L	F316L	F321	D2C	A105	HF-6R	B7	2H
C% Max.	0.08	0.08	0.03	0.03	0.08	0.29	0.35 Max.	1.05	0.37-0.49	0.40
Si% Max.	1.00	1.00	1.00	1.00	1.00	1.0-3.0	0.35	1.11	0.15-0.35	-
Mn %	2.00	2.00	2.00	2.00	2.00	1.8-2.4	0.6-1.05	-	0.75-1.20	-
P% Max.	0.04	0.04	0.04	0.04	0.04	0.08	0.04	-	0.035	0.04
S% Max.	0.03	0.03	0.03	0.03	0.03	-	0.05	-	0.04	0.05
Ni%	8.0-11.0	10.0-14.0	8.0-13.0	10.0-15.0	9.0-12.0	21.0-24.0	-	-	-	-
Cr%	18.0-20.0	16.0-18.0	18.0-20.0	16.0-18.0	17.0 Min.	0.5	-	28.3	0.75-1.20	-
Mo%	-	2.0-3.0	-	2.0-3.0	-	-	-	-	0.15-0.25	-
Ti%	-	-	-	-	C% $\times$ 5-0.7	-	-	-	-	-
Fe%	-	-	-	-	-	-	-	0.3	Balance	Balance
W%	-	-	-	-	-	-	-	4.2	-	-
Co%	-	-	-	-	-	-	-	Balance	-	-

Physical Properties

Tensile Strength	75	75	70	70	75	58	70	-	125	175
Min. Kis MPa	517	517	483	483	517	400	483	-	862	-
Yield Point	30	30	25	25	30	28	36	-	105	-
Min. Kis MPa	207	207	172	172	207	193	248	-	724	-
Elongation in 2 inch % Min.	30	30	30	30	30	20	22	-	16	-
Reduction of Area % Min.	50	50	50	50	50	-	30	-	50	-

9-10. ELASTOMER GENERAL CHART

The following chart should be used as a general guide.

Application suggested derive from recommendation given by elastomer manufacturer.

The resistance can be affected by type of fluid, concentration, temperature, pressure, flow rate or evaporation of the medium.

The final choice us to be taken by the customer based on characteristics and specific application.

Material	General Application	Service Temperature	Not Recommended For
EPDM	Water, Steam Sea Water Brine Ester Alkali Ozone Alcohol Brake Fluid Treated Water With Caustic Soda	-20°C to +120°C (Allowable temperature in continuous use 0°C ~ 100°C)	Hydrocarbon Oils Fats Grease
NBR	Hydrocarbon Natural Gas Oil and Fat Air Gasoline	-10°C to +80°C (Allowable temperature in continuous use 0°C ~ 70°C) (L - NBR -50°C to 70°C)	Solvent Benzene Xylene
SBR	Acids and Alkalis	-20°C to +80°C	
VITON (FKM)	Acid, Oils Hydrocarbon	-20°C to +220°C	Steam, Ester Freon22, Alkalis Solvent, Ketone
SILICONE	Food Beverage	-40°C to +240°C	Steam Solvent Hydrocarbon
PTFE	Solvent Corrosive Products Ketone	-200°C (-400°F) ~ 260°C (500°F)	Fluid Containing Powers Alkaline Gaseous Fluorine
NEOPRENE	Acid, Ozone, Oils Fats Grease Solvent	-20°C to + 60°C	Ketone, Thinner Concentrated Acids

9-11. RUBBER SEAT MATERIALS

Features Of Rubber ◀

The following is general informations and special application shall be referred to the manufacturer's representatives.

Commom Name	ASTM Code	Max. Tempe- rature	Abrasion	Aging	Sun Light Resist- ance	Water Resist- ance	Oil Resist- ance	Solvent	Strong Acid	Weak Acid	Strong Alkali	Weak Alkali
Buna-N	NBR	130°C	◎	◎	○	◎	◎	△	×	○	○	◎
Neoprene	CR	120°C	◎	◎	◎	◎	○	×	×	○	○	◎
Natural Rubber	NR	100°C	◎	○	○	◎	×	×	×	○	○	◎
EPDM	EPT	150°C	○	◎	◎	◎	×	×	○	◎	◎	◎
Silicone	Si	240°C	○	◎	◎	○	×~○	△	×	○	○	◎
Viton	FKM	200°C	○	◎	◎	◎	◎	○	◎	◎	◎	◎

※ Note : ◎ excellent, ○ good, △ fair, × poor

REFERENCE DATA

9-12. VALVE LEAKAGE RATES

Leakage Class ISA RP39.6	Allowable Leakage Rate Air or Water	Valve Types	Remarks
Class I	Category II, III or, IV but no test required by agreement between user and supplier	Valve Types Listed in Category II, III & V	Quality of mfg. implies that these valves do not exceed leakage classes II, III & IV, but on guarantee is stipulated.
Class II	0.5% Rated valve capacity, (maximum Cv)	Globe double seated. Globe single seated, balanced with stepped metal piston seat. Butterfly, metal lined.	
Class III	0.1% of rated valve capacity	High quality globe double seated. Globe single seated, balanced with continuous metal piston seals.	
Class IV	0.01% of rated valve capacity	Globe double seated. Globe single seated, balanced with elastomer piston seals. Rotary eccentric cam type. Ball valves with metal seat.	
Class V diameter per psi	5×10^{-4} cc/min. of water per inch of orifice differential pressure	Globe valves in Class IV with heavy duty actuator to increase seating force.	Few valves continue to remain this tight in service unless the seat plastically deforms to maintain contact with the plug.
Class VI	Maximum permissible leakage associated with resilient seating valves. Expressed as bubbles per min. as per RP39.6*	Globe with resilient seat. Butterfly, elastomer lined. Rotary eccentric cam with elastomer seat. Ball with resilient seat, solid ball type. Diaphragm, Weir type. Plug valves, elastomer seated or sealant injection sealing system.	Elastomer sealed valves remain this tight for many thousands of cycles until the seal is worn or cut.

※ $1 \text{ cm}^3 = 1,000 \text{ mm}^3$, $100 \text{ mm}^3/\text{s} = 0.1 \text{ cm}^3/\text{s} = 0.1 \text{ cm}^3/\text{s}$ (BS 6364)

※ Example - 0.45cc/min for a 2-inch port orifice diameter in globe, butterfly or ball valve with 50 psi differential pressure air.
Equivalent to 3 bubbles per minute from a 1/4- inch O.D., .032- Inch wall tube, 1/4- inch under water surface.

NOTE : The terms bubble tight and drop tight are meaningless unless some leakage rate is specified.
Lack of visible air bubbles using soap solution indicates leakage of less than 1×10^{-3} to 1×10^{-4} cc/sec.

9-13. REFERENCE STANDARD & SPECIFICATION

ISO (International Organization for Standardization) : 국제표준화기구 ◀◀

- ISO 9001 : Quality system. Model of quality assurance in design, development, production, installation and servicing
- ISO 5208 : Industrial valves, pressure testing for valves
- ISO 5211 : Part turn valve actuator attachment
- ISO 7121 : Flanged steel ball valves
- ISO 10631 : Metallic butterfly valve for general purpose

ANSI (American National Standards Institute) : 미국규격협회 ◀◀

- B1.1 : Unified screw threads
- B2.1 : Pipe threads(except dryseal)
- B16.5 : Steel pipe flanges and flange fittings
- B16.10 : Face-to-face and end-to-end dimensions of ferrous valves
- B16.11 : Forged steel fittings, socket welding and threaded
- B16.20 : Ring joint gaskets and grooves for steel pipe flange
- B16.21 : Nonmetallic gaskets for pipe flanges
- B16.25 : Butt welding ends
- B16.34 : Steel valves flanged and butt welding end
- B18.2.1 : Square and hex bolts and screws
- B18.2.2 : Square and hex nuts
- B31.1 : Power piping
- B31.2 : Fuel gas piping
- B31.3 : Chemical plant and petroleum refining piping
- B31.4 : Liquid petroleum transportation piping systems
- B31.5 : Refrigeration piping systems
- B31.7 : Nuclear power piping
- B31.8 : Gas transmission and distribution piping systems
- B36.10 : Wrought steel and wrought iron pipe

BS (British Standard) : 영국표준규격 ◀◀

- BS 1414 : Steel wedge gate valves(flange and butt welding ends)
- BS 1560 : Circular flange for pipe, flanges and fitting
- BS 1868 : Steel check valves(flange and butt welding ends)
- BS 1873 : Steel globe and globe stop and check valves(flange and butt welding ends)
- BS 2080 : Face-to-face, center-to-center, end-to-end and center-to-end dimension of valves
- BS 5146 : Inspection and test of valves
- BS 5351 : Steel ball valves for the petroleum, petrochemical and allied industries
- BS 5352 : Steel wedge gate, globe and check valves(50mm & smaller)
- BS 6364 : Valve for cryogenic service
- BS 6755 PART 2 : Specification for fire type testing requirements

JIS (Japanese Industrial Standard) : 일본공업규격 ◀◀

- JIS B2003 : General rules for inspection of valves
- JIS B2032 : Wafer type rubber seated butterfly valves
- JIS B2064 : Butterfly valve for water works
- JIS B2071 : 10kgf/cm² cast steel flanged globe valves
- JIS B2073 : 10kgf/cm² cast steel flanged gate valves (outside screw type)
- JIS B2074 : 10kgf/cm² cast steel flanged swing check valves
- JIS B2081 : 20kgf/cm² cast steel flanged globe valves
- JIS B2083 : 20kgf/cm² cast steel flanged gate valves (outside screw type)
- JIS B2084 : 20kgf/cm² cast steel flanged swing check valves
- JIS B2201 : Pressure ratings for ferrous material pipe flanges
- JIS B2203 : Tolerances for pipe flanges
- JIS B2210 : Basic dimensions of ferrous material pipe flanges
- JIS B2220 : Basic dimensions of ferrous material pipe flanges
- JIS F2312 : Shipbuilding rubber seat butterfly valves
- JIS F2316 : Shipbuilding rubber seat butterfly valves

REFERENCE DATA

API (American Petroleum Institute) : 미국석유회社 ◀◀

- API 6A : Specification for wellhead equipment
- API 6D : Specification for pipeline valves(steel gate, plug, ball and check valve)
- API Standard 598 : Valve Inspection and test
- API Standard 600 : Steel gate valves, flanged and butt welding ends
- API Standard 603 : Class 150, cast corrosion resistant flanged and gate valves
- API Standard 605 : Large diameter carbon steel flanges
- API Standard 607 : Fire test for soft seated quarter turn valves
- API Standard 609 : Butterfly valve ; double flanged, lug & wafer type
- AP Spec. RP6F : Recommended practice for fire test for valves
- AP Spec. 6FA : Specification for fire test for valves
- AP Spec. Q1 : Specification for quality programs

DIN (Deutsche Industrie Normen / German Industry Standard) : 독일공업규격 ◀◀

- DIN 1691 : Cast iron with lamellar graphite (grey cast iron)
- DIN 2500 : Flanges ; General information
- DIN 2531 ~ 35 : Cast iron flanges ; Nominal pressure 6 ~ 40
- DIN 2543 ~ 45 : Cast steel flanges ; Nominal pressure 16 ~ 40
- DIN 3202 T1 : Face-to-face dimensions of flanged valves
- DIN 3202 T3 : Face-to-face dimensions of weld end valves
- DIN 3210 : Coupling of electric actuators for valve
- DIN 3211 : Valves ; terminology
- DIN 3339 : Valves ; body materials
- DIN 3354 T1 : Butterfly valves ; general information
- DIN 3354 T2 : Flanged cast iron butterfly stop valves with resilient seat
- DIN 3356 T1 : Valves, general requirements
- DIN 3356 T5 : Stainless steel stop valves
- DIN 3358 : Attachment of linear thrust actuators ; mating dimensions
- DIN 17440 : Stainless steels ; quality requirements
- DIN 50049 : Documents on material tests
- DIN EN 19 : Marking of general purpose industrial valves

NACE (National Association of Corrosion Engineers) : 미국부식엔지니어링협회 ◀◀

- NACE materials are optional and must be specified on purchase orders.
- MR-01-75 : Sulfide stress cracking resistant metallic material for oil field equipment
- MT-01-77 : Laboratory corrosion testing of metals for the process industries

ASTM (American Society for Testing Materials) : 미국재료시험협회 ◀◀

ASME (American Society of Mechanical Engineers) : 미국기계학회 ◀◀

AWWA (American Water Works Association) : 미국수도협회 ◀◀

IEC (International Electro Technical Committee) : 국제전기표준회의 ◀◀

AISI (American Iron and Steel Institute) : 미국철강협회 ◀◀

9-14. COMPARATIVE PIPE DIMENSIONS TABLE

JIS G 3447 (KSD 3585)			JIS G 3459★ (KSD 3576)			IDF			3A			ISO			DIN		
Nom. Size	O.D.	t	Nom. Size	O.D.	t	Nom. Size	O.D.	t	Nom. Size	O.D.	t	Nom. Size	O.D.	t	Nom. Size	O.D.	t
1/4"	6.35	1.0	8A	13.8	1.65								12.0	1.0			
3/8"	9.53	1.0	10A	17.3	1.65								17.2	1.0			
1/2"	12.7	1.0	15A	21.7	2.1								21.3	1.0			
3/4"	19.05	1.24															
1.0 ^s	25.4	1.2	20A	27.2	2.1	1.0 ^s	25.4	1.2		25.4	1.25		25.0	1.2	DN25	30.0	2.0
1.25 ^s	31.8	1.2	25A	34.0	2.8	1.25 ^s	31.8	1.2					33.7	1.2	32	36.0	2.0
1.5 ^s	38.1	1.2	32A	42.7	2.8	1.5 ^s	38.1	1.2		38.0	1.25		38.0	1.2			
													40.0	1.2	40	42.0	2.0
2.0 ^s	50.8	1.5	40A	48.6	2.8	2.0 ^s	50.8	1.5		50.8	1.65		51.0	1.2	50	54.0	2.0
2.5 ^s	63.5	2.0	50A	60.5	2.8	2.5 ^s	63.5	2.0		63.5	1.65		63.5	1.6			
													70.0	1.6	65	70.0	2.0
3.0 ^s	76.3	2.0	65A	76.3	3.0	3.0 ^s	76.3	2.0		76.2	1.65		76.1	1.6			
3.5 ^s	89.1	2.0	80A	89.1	3.0	3.5 ^s	89.1	2.0					88.9	2.0	80	85.0	2.0
4.0 ^s	101.6	2.0	90A	101.6	3.0	4.0 ^s	101.6	2.0		101.6	1.65		101.6	2.0	100	104.0	2.0
4.5 ^s	114.3	3.0	100A	114.3	3.0								114.3	2.0	125	129.0	2.0
5.5 ^s	139.8	3.0	125A	139.8	3.4								139.7	2.0			
6.5 ^s	165.2	3.0	150A	165.2	3.4								168.3	2.6	150	156.0	2.0
			200A	216.3	4.0								219.1	2.6			
			250A	267.4	4.0								273.0	2.6			
			300A	318.5	4.5								323.9	2.6			
													355.6	2.6			
													406.4	3.2			

★ Sch 10S

JIS G3447 : < 1 > (KSD 3585) Stainless Steel Sanitary Tubing (새너터리관)

JIS G3459 : < 2 > (KSD 3576) Stainless Steel Pipes (배관용 강관)

IDF : International Dairy Federation (국제낙농연합회)

3A : American Sanitary Standards (미국낙농 및 식품가공기기인증)

ISO : International Organization for Standardization (국제표준화기구)

DIN : Deutsche Industrie Norm (German Industrial Standard) (독일공업규격)

BPE : Bio Processing Equipment

9-15. SURFACE ROUGHNESS (INTENSITY OF ILLUMINATION) : 표준거칠기(조도)

GRADE	AP (Anneal Picked)	BA (Bright Annealed)	EP (Electro Polished)
Inner Surface Roughness	Ry ≤ 25 μm Cut Off Legth : 2.5mm Messuring Legth : 12.5mm	Ry ≤ 3.0 μm 10 μ Inch Ra(Avg.) Cut Off Legth : 0.8mm Messuring Legth : 4mm	Ry ≤ 0.7 μm 5 μ Inch Ra(Avg.) Cut Off Legth : 0.25mm Messuring Legth : 1.25mm

9-16. SURFACE ROUGHNESS FOR GRIT FINISHES (Ra)

Standard Grid	Conversion Chart			
	Ra		RMS	
	μ-in.	μm	μ-in.	μm
150g	27-32	.68-.80	30-35	.76-.89
180g	18-23	.46-.58	20-25	.51-.64
240g	14-18	.34-.46	15-20	.38-.51
320g	8-10	.21-.25	9-11	.23-.28

Grit : Measures the number of scratches per linear inch of abrasive pad. Higher number indicate a smoother finish

RMS : Defined as Root Mean Square roughness, this method measures a sample for peaks and valleys. Lower numbers indicate a smoother finish.

Ra : Known as the Arithmetic Mean, this measurement represents the average value of all peaks and valleys. Lower numbers indicate a smooth finish.

REFERENCE DATA

9-17. PROPERTIES OF SATURATED STEAM

Gauge Pressure, psi	Absolute Pressure, psi	Temperature		Total Heat Above 32°F		Latent Heat L=H-h Heat units	Volume, Cu Ft in 1 Lb of Steam	Weight of 1 Cu Ft steam, Lb	Entropy of the water	Entropy of Evapo-ration
		Celsius °C	Fahrenheit °F	In the Water Heat units	In the Steam H Heat units					
0.0	14.7	100.0	212.0	180.0	1150.4	970.4	26.79	0.03732	0.3118	1.4447
5.3	20	108.9	228.0	196.1	1156.2	960.0	20.08	0.04980	0.3355	1.3965
10.3	25	115.6	240.1	208.4	1160.4	952.0	16.30	0.6140	0.3532	1.3604
15.3	30	121.3	250.3	218.4	1163.9	945.1	13.74	0.0728	0.3680	1.3311
20.3	35	126.3	259.3	227.9	1166.8	938.9	11.89	0.0841	0.3808	1.3060
25.3	40	130.7	267.3	236.1	1169.4	933.3	10.49	0.0953	0.3920	1.2841
30.3	45	134.7	274.5	243.4	1171.6	928.2	9.39	0.1065	0.4021	1.2644
35.3	50	138.3	281.0	250.1	1173.6	923.5	8.51	0.1175	0.4113	1.2468
40.3	55	141.7	287.1	256.3	1175.4	919.0	7.78	0.1285	0.4196	1.2309
45.3	60	144.8	292.7	262.1	1177.0	914.0	7.17	0.1394	0.4272	1.2160
50.3	65	147.8	298.0	267.5	1178.5	911.0	6.65	0.1503	0.4344	1.2024
55.3	70	150.5	302.9	272.6	1179.8	907.2	6.20	0.1612	0.4411	1.1896
60.3	75	153.1	307.6	277.4	1181.1	903.7	5.81	0.1721	0.4474	1.1778
65.3	80	155.6	321.0	282.0	1182.3	900.3	5.47	0.1829	0.4535	1.1665
70.3	85	157.9	316.3	286.3	1183.4	897.1	5.16	0.1937	0.4590	1.1561
75.3	90	160.2	320.3	290.5	1184.4	893.9	4.89	0.2044	0.4644	1.1461
80.3	95	162.3	324.1	294.5	1185.4	890.9	4.65	0.2151	0.4694	1.1367
85.3	100	164.3	327.8	298.3	1186.3	888.0	4.429	0.2258	0.4743	1.1277
91.3	106	166.7	332.0	302.7	1187.4	884.7	4.192	0.2390	0.4798	1.1174
95.3	110	168.2	334.8	305.5	1188.0	882.5	4.047	0.2472	0.4834	1.1108
101.3	116	170.4	338.7	309.6	1189.0	879.3	3.848	0.2599	0.4886	1.1014
105.3	120	171.8	341.3	312.3	1189.6	877.2	3.726	0.2683	0.4919	1.0954
111.3	126	173.9	345.0	316.2	1190.4	874.2	3.556	0.2812	0.4967	1.0865
115.3	130	175.2	347.4	318.6	1191.0	872.3	3.452	0.2897	0.4998	1.0809
121.3	136	177.1	350.8	322.3	1191.7	869.4	3.308	0.3023	0.5043	1.0728
125.3	140	178.4	353.1	324.6	1192.2	867.6	3.219	0.3107	0.5072	1.0675
131.3	146	180.2	356.3	328.0	1192.9	864.9	3.092	0.3234	0.5114	1.0599
135.3	150	181.4	358.5	330.2	1193.4	863.2	3.012	0.3320	0.5142	1.0550
141.3	156	183.1	361.6	333.5	1194.1	860.6	2.902	0.3446	0.5182	1.0477
145.3	160	184.2	363.6	335.6	1194.5	858.8	2.384	0.3529	0.5208	1.0431
151.3	166	185.8	366.5	338.7	1195.1	856.4	2.737	0.3654	0.5245	1.0365
155.3	170	186.9	368.5	340.7	1195.4	854.7	2.675	0.3738	0.5269	1.0321
161.3	176	188.5	371.3	343.7	1196.0	852.3	2.588	0.3864	0.5305	1.0257
165.3	180	189.5	373.1	345.6	1196.4	850.8	2.533	0.3948	0.5328	1.0215
171.3	186	191.0	375.8	348.5	1196.9	848.4	2.455	0.4073	0.5362	1.0154
175.3	190	192.0	377.6	350.4	1197.3	846.9	2.406	0.4157	0.5384	1.0114
181.3	196	193.4	380.2	353.1	1197.8	844.7	2.335	0.4283	0.5416	1.0056
185.3	200	194.4	381.9	354.9	1198.1	843.2	2.290	0.4370	0.5437	1.0019

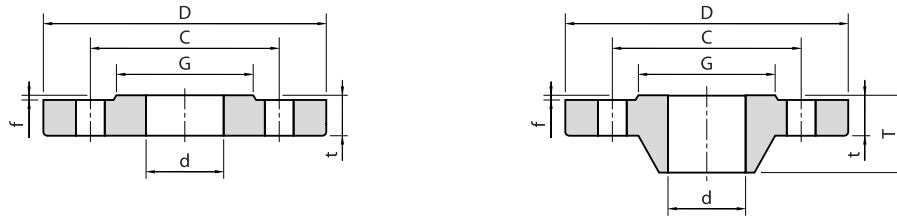
Latent Heat of steam = 970 Btu/Lb

Vacuum Inches of mercury	Absolute Pressure, psi	Temperature		Total Heat Above 32°F		Latent Heat L=H-h Heat units	Volume, Cu Ft in 1 Lb of Steam	Weight of 1 Cu Ft steam, Lb	Entropy of the water	Entropy of Evapo-ration
		Celsius °C	Fahrenheit °F	In the Water Heat units	In the Steam H Heat units					
29.74	0.0886	0	32	0.00	1073.4	1073.4	3294.0	0.000304	0.0000	2.1832
29.56	0.1780	10	50	18.08	1081.4	1063.3	1702.0	0.000587	0.0361	2.0865
29.18	0.3626	21.1	70	38.06	1090.3	1052.3	871.0	0.001148	0.0745	1.9868
28.50	0.696	32.2	90	58.00	1099.2	1041.2	469.3	0.002131	0.1114	1.8944
27.88	1	38.79	101.83	69.8	1104.4	1034.6	333.0	0.00300	0.1327	1.8427
23.81	3	60.84	141.52	109.4	1121.6	1012.3	118.5	0.00845	0.2008	1.6840
19.74	5	72.38	162.28	130.1	1130.5	1000.3	73.33	0.01364	0.2348	1.6084
15.67	7	80.47	176.85	144.7	1136.5	991.8	53.56	0.01867	0.2579	1.5582
11.60	9	86.82	188.27	156.2	1141.1	985.0	42.36	0.02361	0.2756	1.5202
7.52	11	92.08	197.75	165.7	1144.9	979.2	35.10	0.02849	0.2902	1.4895
3.45	13	96.59	205.87	173.8	1148.0	974.2	30.03	0.03330	0.3025	1.4639
1.42	14	98.64	209.55	177.5	1149.4	971.9	28.02	0.03569	0.3018	1.4523

Latent Heat of steam = 970 Btu/Lb

9-18. FLANGE-DIMENSION

FLANGE 규격표 [JIS Code]



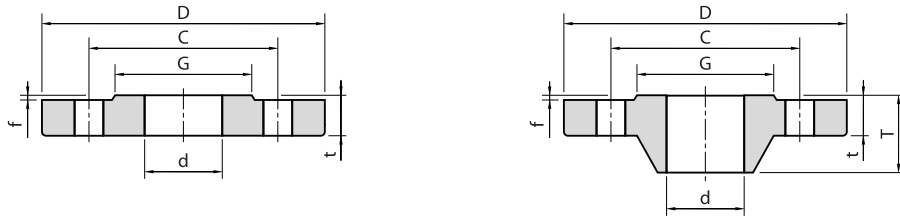
JIS B 2220 ~ 1984

(UNIT : mm)

Class	Size	D	t	f	G	T	T1	d	Bolting			
									C	Number of Holes	Dia. of Holes	Bolt Size
JIS 10K	10	90	12	1	48	-	-	17.8	65	4	15	M12
	15	95	12	1	52	-	-	22.2	70	4	15	M12
	20	100	14	1	58	-	-	27.7	75	4	15	M12
	25	125	14	1	70	-	-	34.5	90	4	19	M16
	32	135	16	2	80	-	-	43.2	100	4	19	M16
	40	140	16	2	85	-	-	49.1	105	4	19	M16
	50	155	16	2	100	-	-	61.1	120	4	19	M16
	65	175	18	2	120	-	-	77.1	140	4	19	M16
	80	185	18	2	130	-	-	90	150	8	19	M16
	100	210	18	2	155	-	-	115.4	175	8	19	M16
	125	250	20	2	185	-	-	141.2	210	8	23	M20
	150	280	22	2	215	-	-	166.6	240	8	23	M20
	200	330	22	2	265	-	-	218	290	12	23	M20
	250	400	24	2	325	36	-	269.5	355	12	25	M22
	300	445	24	3	370	38	-	321	400	16	25	M22
	350	490	26	3	415	42	-	358.1	445	16	25	M22
	400	560	28	3	475	44	-	409	510	16	27	M24
JIS 20K	450	620	30	3	530	48	-	460	565	20	27	M24
	500	675	30	3	585	48	-	511	620	20	27	M24
	600	795	32	3	-	52	-	613	730	24	33	
	10	90	14	1	48	20	-	17.8	65	4	15	M12
	15	95	14	1	52	20	-	22.2	70	4	15	M12
	20	100	16	1	58	22	-	27.7	75	4	15	M12
	25	125	16	1	70	24	-	34.5	90	4	19	M16
	32	135	18	2	80	26	-	43.2	100	4	19	M16
	40	140	18	2	85	26	-	49.1	105	4	19	M16
	50	155	18	2	100	26	-	61.1	120	8	19	M16
	65	175	20	2	120	30	-	77.1	140	8	19	M16
	80	200	22	2	135	34	-	90	160	8	23	M20
	100	225	24	2	160	36	-	115.4	185	8	23	M20
	125	270	26	2	195	40	-	141.2	225	8	25	M22
	150	305	28	2	230	42	-	166.6	260	12	25	M22
	200	350	30	2	275	46	-	218	305	12	25	M22
	250	430	34	2	345	52	-	269.5	380	12	27	M24
	300	480	36	3	395	56	-	321	430	16	27	M24
	350	540	40	3	440	62	-	358.1	480	16	33	M30
	400	605	46	3	495	70	-	409	540	16	33	M30
	450	675	48	3	560	78	-	460	605	20	33	M30
	500	730	52	3	615	84	-	511	660	20	33	M30

REFERENCE DATA

FLANGE 규격표 [JIS Code]

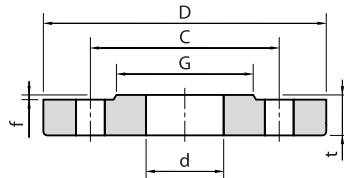


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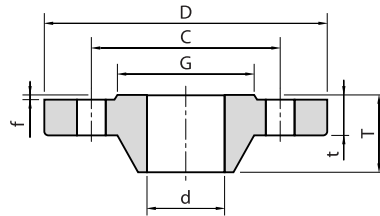
(UNIT : mm)

Class	Size	D	t	f	G	T	T1	d	Bolting			
									C	Number of Holes	Dia. of Holes	Bolt Size
JIS 30K	10	110	16	1	52	24	-	17.8	75	4	19	M16
	15	115	18	1	55	26	45	22.2	80	4	19	M16
	20	120	18	1	60	28	45	27.7	85	4	19	M16
	25	130	20	1	70	30	48	34.5	95	4	19	M16
	32	140	22	2	80	32	52	43.2	105	4	19	M16
	40	160	22	2	90	34	54	49.1	120	4	23	M20
	50	165	22	2	105	36	57	61.1	130	8	19	M16
	65	200	26	2	130	40	69	77.1	160	8	23	M20
	80	210	28	2	140	44	73	90	170	8	23	M20
	100	240	32	2	160	48	76	115.4	195	8	25	M22
	125	275	36	2	195	54	86	141.2	230	8	25	M22
	150	325	38	2	235	58	95	166.6	275	12	27	M24
	200	370	42	2	280	64	102	218	320	12	27	M24
	250	450	48	2	345	72	118	269.5	390	12	33	M30
	300	515	52	3	405	78	127	321	450	16	33	M30
	350	560	54	3	450	84	134	358.1	495	16	33	M30

FLANGE 규격표 [ANSI Code]



SLIP-ON



WELDING NECK

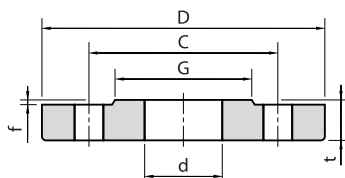
ANSI 150 lbs ANSI B16.5 FORGED FLANGED

(UNIT : mm)

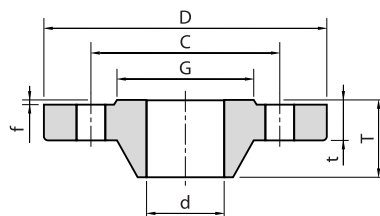
Size (inch)	Size (mm)	D	t	G	T1	T2	B2	C	Number of Holes	Bolting Dia. of holes	Stud Bolt Size
1/2	15	88.9	11.2	35.1	47.8	15.7	22.4	60.4	4	16	1/2-13UNCx65L
3/4	20	98.6	12.7	42.9	52.3	15.7	27.7	69.9	4	16	1/2-13UNCx65L
1	25	108	14.2	50.8	55.6	17.5	34.5	79.2	4	16	1/2-13UNCx70L
1 1/4	32	117.3	15.7	63.5	57.2	20.6	43.2	88.9	4	16	1/2-13UNCx70L
1 1/2	40	127	17.5	73.2	62	22.4	49.5	98.5	4	16	1/2-13UNCx75L
2	50	152.4	19.1	92	63.5	25.4	62	120.6	4	19	5/8-11UNCx85L
2 1/2	65	177.8	22.4	104.6	69.9	28.4	74.7	139.7	4	19	5/8-11UNCx90L
3	80	190.5	23.9	127	69.9	30.2	90.7	152.4	4	19	5/8-11UNCx95L
3 1/2	90	215.9	23.9	139.7	71.4	31.8	103.4	177.8	8	19	5/8-11UNCx95L
4	100	228.6	23.9	157.2	76.2	33.3	116.1	190.5	8	19	5/8-11UNCx95L
5	125	254	23.9	185.7	88.9	36.6	143.8	215.9	8	22	3/4-10UNCx105L
6	150	279.4	25.4	215.9	88.9	39.6	170.7	241.3	8	22	3/4-10UNCx105L
8	200	342.9	28.5	269.7	101.6	44.5	221.5	298.4	8	22	3/4-10UNCx110L
10	250	406.4	30.2	323.8	101.6	49.3	276.4	361.9	12	25	7/8-9UNCx120L
12	300	482.6	31.8	381	114.3	55.6	327.2	431.8	12	25	7/8-9UNCx120L
14	350	533.4	35.1	412.8	127	57.2	359.2	476.2	12	28	1-8UNCx135L
16	400	596.9	36.6	469.9	127	63.5	410.5	539.7	16	28	1-8UNCx140L
18	450	635	39.6	533.4	139.7	68.3	461.8	577.8	16	32	1 1/8-8UNx155L
20	500	698.5	42.9	584.2	144.5	73.2	513.1	635	20	32	1 1/8-8UNx160L
22	550	749.3	46	641.3	149.2	79.4	564.4	692.1	20	35	1 1/4-8UNx165L
24	600	812.8	47.8	692.1	152.4	82.6	616	749.3	20	35	1 1/4-8UNx180L
26	650	870	50.8	723.9	127	85.7	666.8	806.5	24	35	1 1/4-8UNx180L
28	700	927.1	52.4	793.7	128.6	87.3	717.5	863.6	28	35	1 1/4-8UNx180L
30	750	984.3	54	857.3	130.2	88.9	768.4	914.4	28	35	1 1/4-8UNx185L

REFERENCE DATA

FLANGE 규격표 [ANSI Code]



SLIP-ON



WELDING NECK

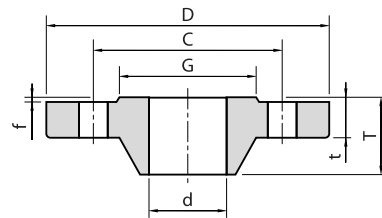
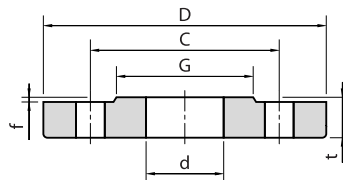
ANSI 300 lbs

ANSI B16.5 FORGED FLANGED

(UNIT : mm)

Size (inch)	Size (mm)	D	t	G	T1	T2	B2	C	Number of Holes	Bolting Dia. of holes	Stud Bolt Size
1/2	15	95.2	14.2	35	52.3	22.4	22.4	66.5	4	16	1/2-13UNCx70L
3/4	20	117.3	15.7	42.9	57.2	25.4	27.7	82.5	4	19	5/8-11UNCx80L
1	25	123.9	17.5	50.8	62	26.9	34.5	88.9	4	19	5/8-11UNCx85L
1 1/4	32	133.3	19.1	63.5	65	26.9	43.2	98.5	4	19	5/8-11UNCx85L
1 1/2	40	155.4	20.6	73.1	68.3	30.2	49.5	114.3	4	22	3/4-10UNCx95L
2	50	165.1	22.3	91.9	69.9	33.3	62	127	8	19	5/8-11UNCx95L
2 1/2	65	190.5	25.4	104.6	76.2	38.1	74.7	149.3	8	22	3/4-10UNCx105L
3	80	209.5	28.4	127	79.2	42.9	90.7	168.1	8	22	3/4-10UNCx110L
3 1/2	90	228.6	30.2	139.7	81	44.5	103.4	184.1	8	22	3/4-10UNCx115L
4	100	254	31.7	157.2	85.9	47.8	116.1	200.1	8	22	5/8-11UNCx115L
5	125	279.4	35.1	185.7	98.6	50.8	143.8	234.9	8	22	3/4-10UNCx120L
6	150	317.5	36.6	215.9	98.6	52.3	170.7	269.7	12	22	3/4-10UNCx130L
8	200	381	41.1	269.7	111.3	62	221.5	330.2	12	25	7/8-9UNCx140L
10	250	444.5	47.7	323.8	117.3	66.5	276.4	387.3	16	28	1-8UNCx160L
12	300	520.7	50.8	381	130	73.2	327.2	450.8	16	32	1 1/8-8UNx175L
14	350	584.2	53.8	412.7	142.7	76.2	359.2	514.3	20	32	1 1/8-8UNx180L
16	400	647.7	57.1	469.9	146.1	82.6	410.5	571.5	20	35	1 1/4-8UNx190L
18	450	711.2	60.4	533.4	158.8	88.9	461.8	628.6	24	35	1 1/4-8UNx200L
20	500	774.7	63.5	584.2	162.1	95.3	513.1	685.8	24	35	1 1/4-8UNx210L
22	550	838.2	66.7	641.3	165.1	101.6	564.4	742.9	24	42	1 1/2-8UNx225L
24	600	914.4	69.8	692.1	168.1	106.4	616	812.8	24	42	1 1/2-8UNx235L
26	650	971.6	79.4	749.3	184.2	184.2	666.8	876.3	28	45	1 5/8-8UNx255L
28	700	1035	85.7	800.1	196.8	196.8	717.5	939.8	28	45	1 5/8-8UNx270L

FLANGE 규격표 [DIN Code]



DIN - PN10

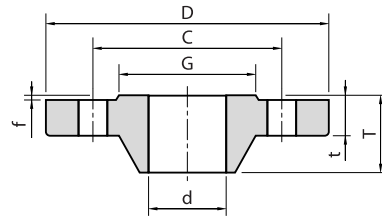
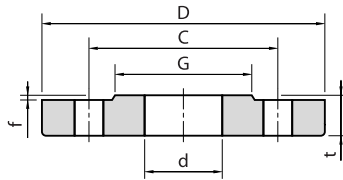
DIN 2543, 2527, 2544, 2545, 2527, 2634 FORGED

(UNIT : mm)

Size	D	t			G	#f	T	d (O.D. of Pipe)	Bolting		
		W.N.	Slip-On	Blind					C	Dia. of Holes	Numbers - Size
10	90	14	14	14	40	2	35	14	60	14	4 - M12
15	95	14	14	14	45	2	35	20	65	14	4 - M12
20	105	16	16	16	58	2	38	25	75	14	4 - M12
25	115	16	16	16	68	2	38	30	85	14	4 - M12
32	140	16	16	16	78	2	40	38	100	18	4 - M16
40	150	16	16	16	88	3	42	44.5	110	18	4 - M16
50	165	18	18	18	102	3	45	57	125	18	4 - M16
65	185	18	18	18	122	3	45	76.1	145	18	4 - M16
80	200	20	20	20	138	3	50	88.9	160	18	4 - M16
100	220	20	20	20	158	3	52	108	180	18	8 - M16
125	250	22	22	22	188	3	55	133	210	18	8 - M16
150	285	22	22	22	212	3	55	159	240	23	8 - M20
200	340	24	24	24	268	3	62	216	295	23	8 - M20
250	395	26	26	26	320	3	68	267	350	23	12 - M20
300	445	26	26	28	370	4	68	318	400	23	12 - M20
350	505	26	28	30	430	4	68	368	460	23	16 - M20
400	565	26	32	32	482	4	72	419	515	27	16 - M24
500	670	28	38	34	585	4	75	521	620	27	20 - M24
600	780	28	-	-	685	5	80	622	725	30	20 - M27
700	895	30	-	-	800	5	80	720	840	30	24 - M27
800	1015	32	-	-	905	5	90	820	950	33	24 - M30
900	1115	34	-	-	1005	5	95	920	1050	33	28 - M30

REFERENCE DATA

FLANGE 규격표 [DIN Code]



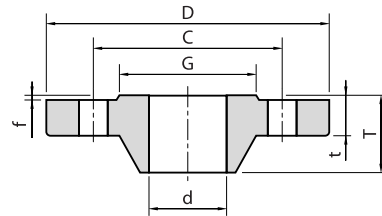
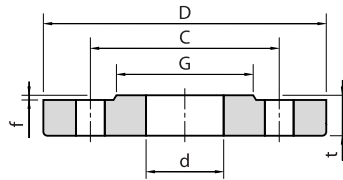
DIN - PN16

DIN 2543, 2527, 2544, 2545, 2527, 2634 FORGED

(UNIT : mm)

Size	D	t			G	#f	T	d (O.D. of Pipe)	Bolting		
		W.N.	Slip-On	Blind					C	Dia. of Holes	Numbers - Size
10	90	14	14	14	40	2	35	14	60	14	4 - M12
15	95	14	14	14	45	2	35	20	65	14	4 - M12
20	105	16	16	16	58	2	38	25	75	14	4 - M12
25	115	16	16	16	68	2	38	30	85	14	4 - M12
32	140	16	16	16	78	2	40	38	100	18	4 - M16
40	150	16	16	16	88	3	42	44.5	110	18	4 - M16
50	165	18	18	18	102	3	45	57	125	18	4 - M16
65	185	18	18	18	122	3	45	76.1	145	18	4 - M16
80	200	20	20	20	138	3	50	88.9	160	18	8 - M16
100	220	20	20	20	158	3	52	108	180	18	8 - M16
125	250	22	22	22	188	3	55	133	210	18	8 - M16
150	285	22	22	22	212	3	55	159	240	23	8 - M20
200	340	24	24	24	268	3	62	216	295	23	12 - M20
250	405	26	26	26	320	3	70	267	355	27	12 - M24
300	460	28	28	28	378	4	78	318	410	27	12 - M24
350	520	30	30	30	438	4	82	368	470	27	16 - M24
400	580	32	32	32	490	4	85	419	525	30	16 - M27
500	715	34	36	34	610	4	90	521	650	33	20 - M30
600	840	36	40	-	725	5	95	622	770	36	20 - M33
700	910	36	-	-	795	5	100	720	840	36	24 - M33
800	1025	38	-	-	900	5	105	820	950	39	24 - M36
900	1125	40	-	-	1000	5	110	920	1050	39	28 - M36

FLANGE 규격표 [DIN Code]



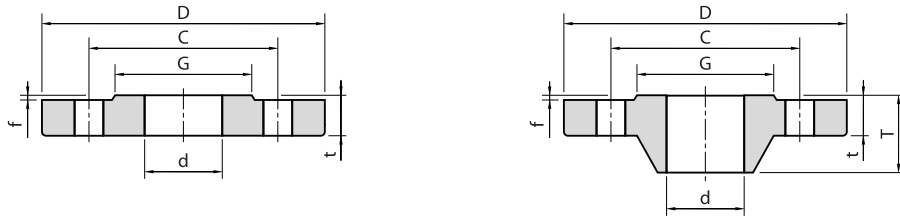
DIN - PN25

DIN 2543, 2527, 2544, 2545, 2527, 2634 FORGED

Size	D	t			G	#f	T	d (O.D. of Pipe)	Bolting		
		W.N.	Slip-On	Blind					C	Dia. of Holes	Numbers - Size
10	90	16	-	16	40	2	35	14	60	14	4 - M12
15	95	16	16	16	45	2	38	20	65	14	4 - M12
20	105	18	18	18	58	2	40	25	75	14	4 - M12
25	115	18	18	18	68	2	40	30	85	14	4 - M12
32	140	18	18	18	78	2	42	38	100	18	4 - M16
40	150	18	18	18	88	3	45	44.5	110	18	4 - M16
50	165	20	20	20	102	3	48	57	125	18	4 - M16
65	185	22	22	22	122	3	52	76.1	145	18	8 - M16
80	200	24	24	24	138	3	58	88.9	160	18	8 - M16
100	235	24	24	24	162	3	65	108	190	23	8 - M20
125	270	26	26	26	188	3	68	133	220	27	8 - M24
150	300	28	28	28	218	3	75	159	250	27	8 - M24
200	360	30	30	30	278	3	80	216	310	27	12 - M24
250	425	32	32	32	335	3	88	267	370	30	12 - M27
300	485	34	34	34	395	4	92	318	430	30	16 - M27
350	555	38	38	38	450	4	100	368	490	33	16 - M30
400	620	40	40	40	505	4	110	419	550	36	16 - M33
500	730	44	44	44	615	4	125	521	660	36	20 - M33
600	845	46	-	-	720	5	125	622	770	39	20 - M36
700	960	46	-	-	820	5	125	720	875	42	24 - M39
800	1085	50	-	-	930	5	135	820	990	48	24 - M45
900	1185	54	-	-	1030	5	145	920	1090	48	28 - M45
1000	1320	58	-	-	1140	5	155	1020	1210	56	28 - M52

REFERENCE DATA

FLANGE 규격표 [DIN Code]



DIN - PN40

DIN 2543, 2527, 2544, 2545, 2527, 2634 FORGED

Size	D	t			G	#f	T	d (O.D. of Pipe)	Bolting		
		W.N.	Slip-On	Blind					C	Dia. of Holes	Numbers - Size
10	90	16	-	16	40	2	35	14	60	14	4 - M12
15	95	16	16	16	45	2	38	20	65	14	4 - M12
20	105	18	18	18	58	2	40	25	75	14	4 - M12
25	115	18	18	18	68	2	40	30	85	14	4 - M12
32	140	18	18	18	78	2	42	38	100	18	4 - M16
40	150	18	18	18	88	3	45	44.5	110	18	4 - M16
50	165	20	20	20	102	3	48	57	125	18	4 - M16
65	185	22	22	22	122	3	52	76.1	145	18	8 - M16
80	200	24	24	24	138	3	58	88.9	160	18	8 - M16
100	235	24	24	24	162	3	65	108	190	23	8 - M20
125	270	26	26	26	188	3	68	133	220	27	8 - M24
150	300	28	28	28	218	3	75	159	250	27	8 - M24
200	375	34	34	34	285	3	88	216	320	30	12 - M27
250	450	38	38	38	345	3	105	267	385	33	12 - M30
300	515	42	42	42	410	4	115	318	450	33	16 - M30
350	580	46	46	46	465	4	125	368	510	36	16 - M33
400	660	50	50	50	535	4	135	419	585	39	16 - M36
500	755	52	52	52	615	4	140	521	670	42	20 - M39



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VALVE PARK

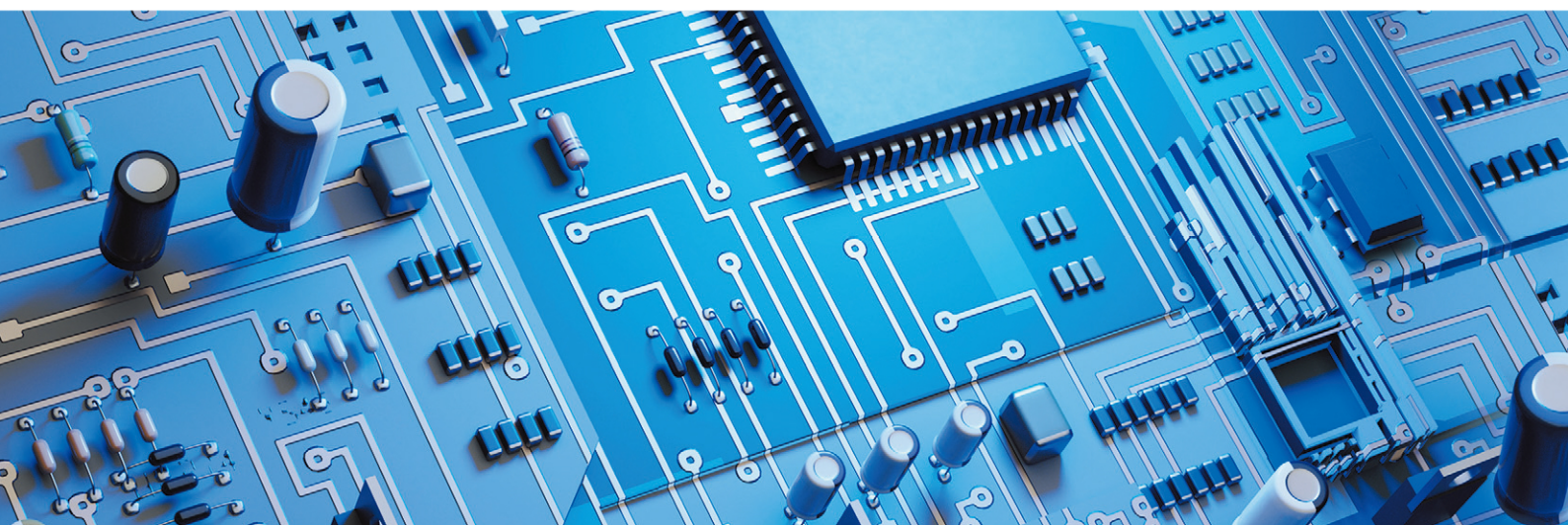
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초록 검색창 - 밸브파크

The Professional Industrial Valve Solution Provider



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