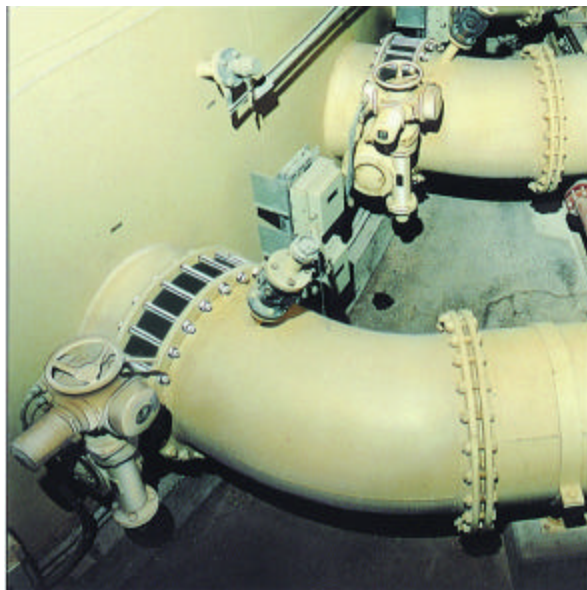


Saunders Butterfly Valves - Type RS

- Saunders Type RS Butterfly Valves are used in demanding service applications.
- Saunders Type RS Butterfly Valves are reliable, low maintenance shut-off and control valves.
- Designed for use in gas and liquid pipelines, to a maximum working pressure of 230psi.
- Equipped to handle an operating temperature range of -30°F to +300°F.
- An economical alternative to plug, gate, and ball valves.

Saunders Type RS Butterfly Valves are extremely adaptable and have numerous application possibilities:

- Water treatment
- Chemical industry
- Waste effluent treatment
- Paper industry
- Sugar processing
- Construction
- Drilling / Production
- HVAC
- Cooling water circulation
- Pneumatic conveyors
- Compressed air
- Gas plants
- Desulpherization





Corrosion Free

- The body lining and disc are the only components of the valve that come into contact with the line medium. These components come in a wide variety of materials which resist degradation from the majority of line media.

Permanently Tight Closure

- Saunders Type RS Butterfly Valves close liquid and gas tight in both flow directions.
- The disc is pressed with a defined constant compression over the entire disc circumference, into the elastic body lining. The power transmission between disc and spindle is effected via a square drive and provides for an axial movement and self centering of the disc, which prevents overstress and wear of the elastomer.

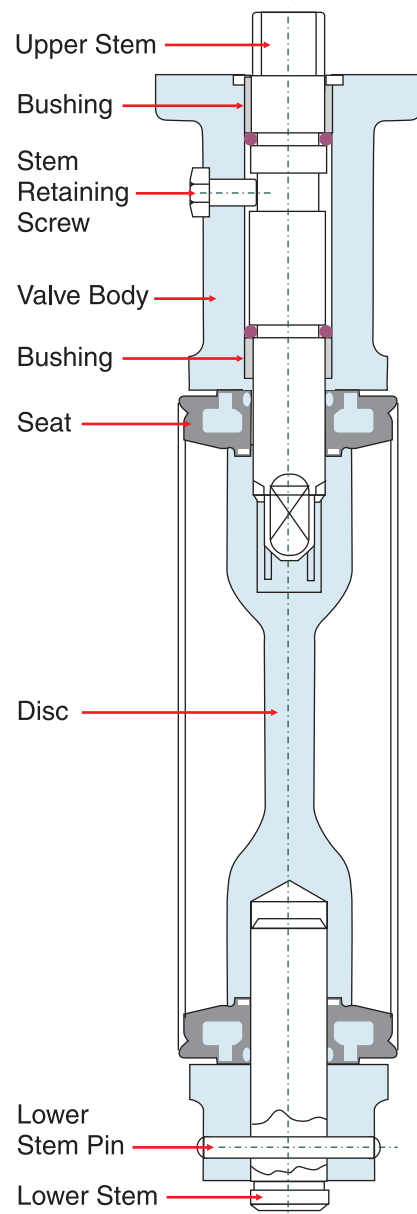
Suitable for Vacuum Service

- The replaceable body lining consists of a firm back-up ring onto which the elastic seating material is vulcanized, thus creating stability of the seat which prevents deformation of the elastomer during closing.
- The bond between elastomer and back-up ring is strong enough to enable the valve to be used with high flow rates and for vacuum service.

Standard Specifications

- ISO 9001
- Pipe diameters 2" to 24", ANSI 150.
- Temperature range -30°F to $+300^{\circ}\text{F}$.
- Face-to-face dimensions according to API 609 and ISO 5752 Series 20.
- Neck flange according to ISO 5211.
- Bubble tight shut-off
ANSI Class VI or better.

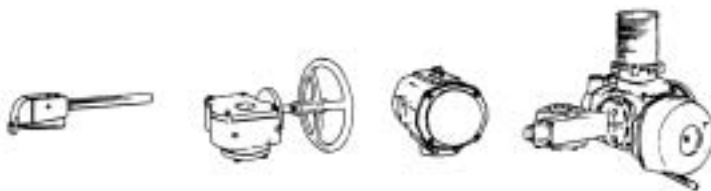
Basic construction







Type RS - Saunders Butterfly Valves

Possible Combinations

Body Type		Material	2" to 12"	14" to 24"
	Wafer Body	Cast Iron	ANSI 150	-
		Ductile Iron	ANSI 150	ANSI 150
		Cast Carbon Steel	ANSI 150	ANSI 150
	Lug Body	Ductile Iron	ANSI 150	ANSI 150
		Ductile Iron A395	ANSI 150	ANSI 150
		Cast Carbon Steel	ANSI 150	ANSI 150

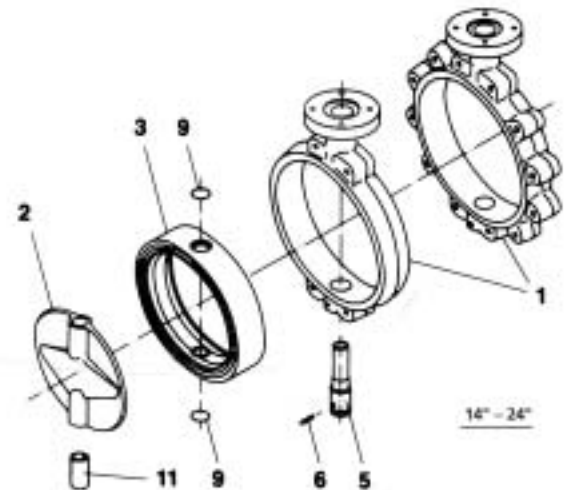
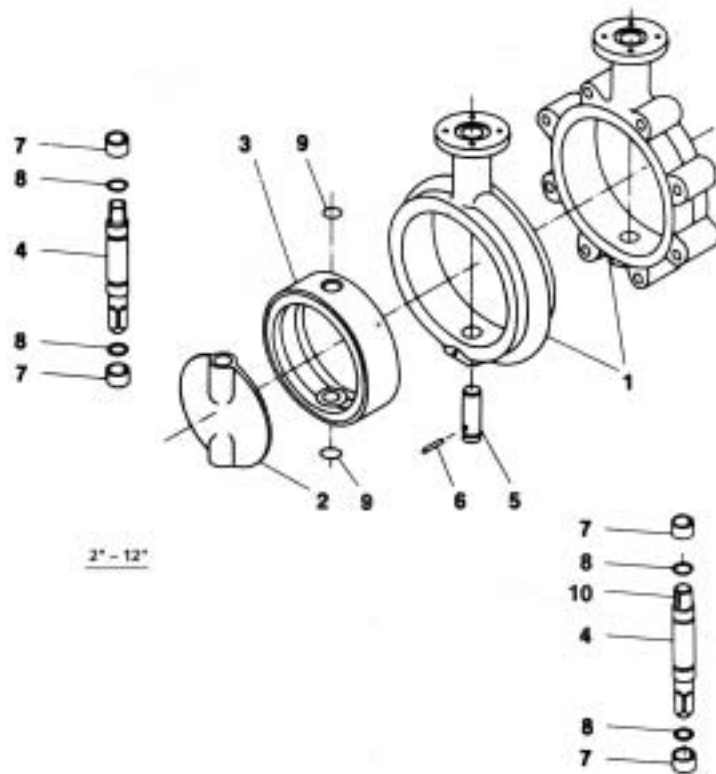
Component	Design	DN
	10 Position Lever	2" to 8"
	10 Position Lever (Lockable)	2" to 8"
	Infinitely Variable Lever	2" to 8"
	Square Nut	2" to 8"
	Gear Operator	2" to 24"
	Pneumatic Actuator	2" to 24"
	Hydraulic Actuator	2" to 24"
	Electric Actuator	2" to 24"



Component	DN	Material
Upper Stem 	2" to 24"	Stainless Steel grade ASTM A477
		Stainless Steel grade ASTM A479
Seat 	2" to 24"	Buna-N
		EPDM
		Fluoroelastomer
		Hypalon
Disc 	2" to 10"	SBR (Copolymer of Styrene + Butadiene ⁽²⁾)
	2" to 20"	HNBR (Hydrogenated Nitrile)
	2" to 24"	Aluminum - Bronze
		Stainless Steel grade ASTM A351 CF-8M
		Ductile Iron - Nickel Plated
		Ductile Iron - Rilsan Coated
		Stainless Steel (Polished) grade ASTM A351 CF-8M
		Ductile Iron - ECTFE Coated
		Hastelloy C 4C ⁽¹⁾ ⁽²⁾
		Duplex Steel ⁽¹⁾ ⁽²⁾
Lower Stem 	2" to 24"	Ductile Iron Hostalen GUR Lined ⁽¹⁾
		Hastelloy C 22C ⁽¹⁾ ⁽²⁾
		Stainless Steel grade ASTM A477
		Stainless Steel grade ASTM A479

(1) Only for shut-off pressure 150psi. (2) Only on inquiry.

Material Specifications



Components in contact with line fluids

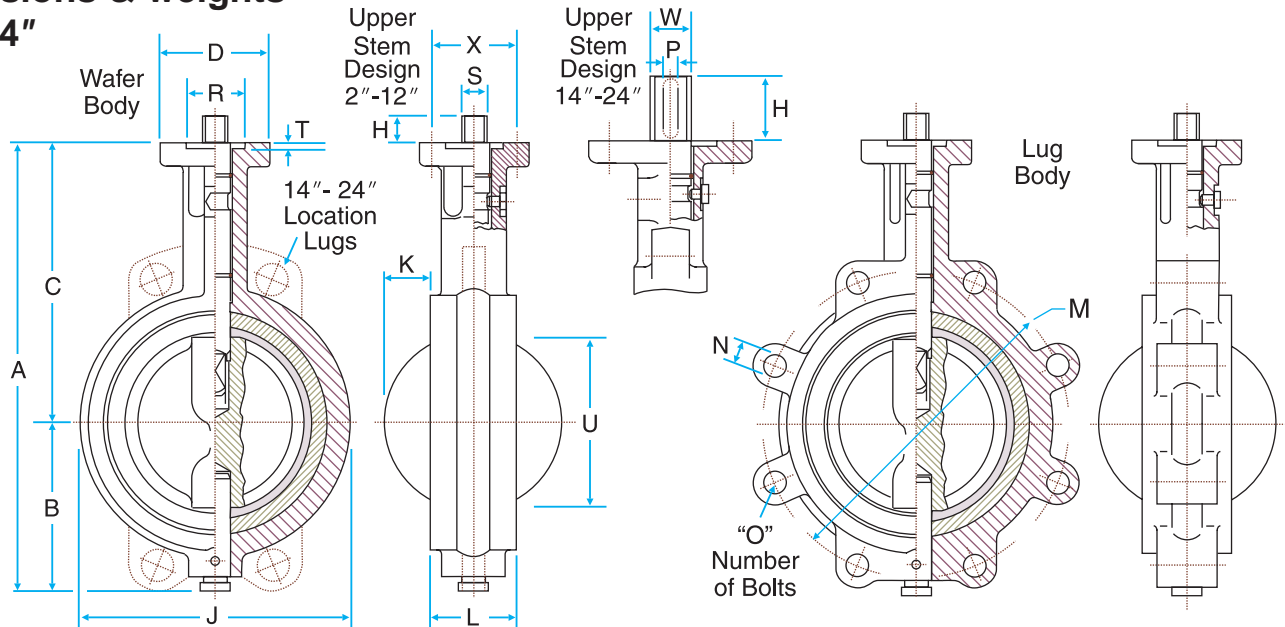
Component	Material Designation	Temperature Range
Disc (2)	Ductile Iron, Nickel Plated	−4°F, Upper temperature limited by seat
	Ductile Iron, Rilsan Coated	−4°F to +176°F
	Ductile Iron, ECTFE Coated	−4°F, Upper temperature limited by seat
	Aluminum Bronze	Limited by seat
	Stainless Steel	Limited by seat
	Duplex Steel	Limited by seat
	Hastelloy C 4C	Limited by seat
	Hastelloy C 22C	Limited by seat
	Ductile Iron, Hostalen GUR Lined	Minus Temperature limited by seat, to +158°F
Seat (3)	Nitrile (Copolymer of Butadiene + Acrylonitrile)	−4°F to +176°F (up to 230°F for intermittent operation)
	Hypalon (Chlorosulphonated Polyethylene)	−4°F to +176°F (up to 212°F for intermittent operation)
	Viton (Copolymer of Vinylidene - Fluoride)	20°F to +300°F
	EPDM (Ethylene-Propylene-Terpolymer)	−31°F to +250°F
	EPDM-H (Ethylene-Propylene-Terpolymer)	−31°F to +284°F
	SBR (Copolymer of Styrene + Butadiene)	−4°F to +176°F
	HNBR (Hydrogenated Nitrile)	−4°F to +248°F

Components not in contact with line fluids

Component	Material
Body (1)	Cast Iron (only 2" to 12")
	Ductile Iron
	Cast Carbon Steel
Upper and lower stem (4) (5)	Stainless Steel A 477 - 420
	Stainless Steel A 479 - 316
Pin (6)	Spring Steel
Bushing (7)	Composite Resin
Circlip (8)	Spring Steel, Zinc Plated
O-Ring (9)	Buna-N
Parallel Key (10)	Steel
Bushing (11)	Bronze

Type RS - Saunders Butterfly Valves

Dimensions & weights 2" to 24"

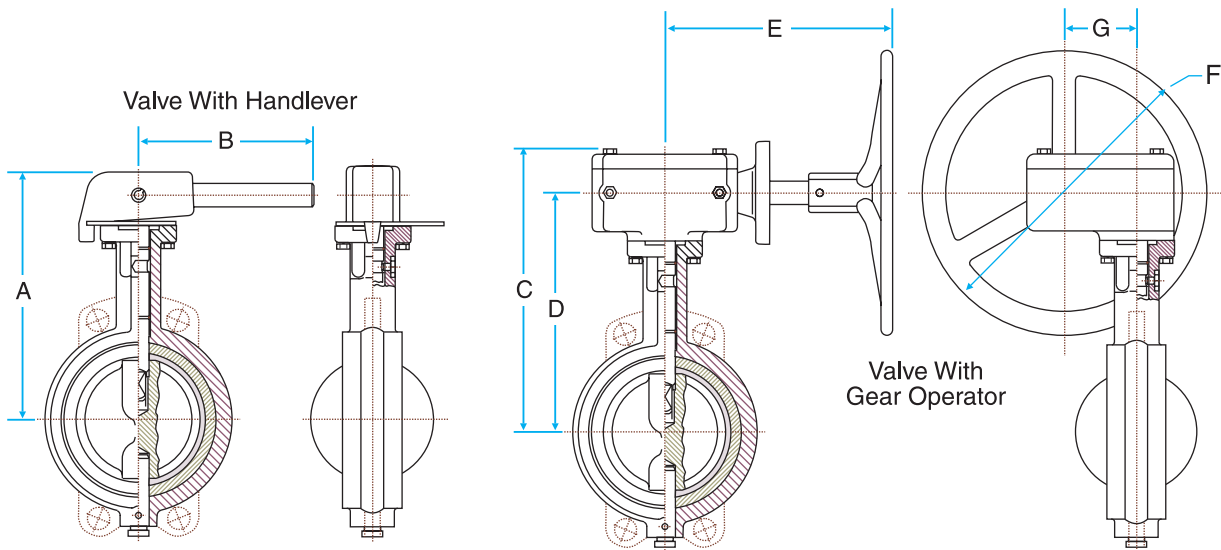


Bare Stem Valves - Dimensions in inches

Nominal Diameter:	2"	2½"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
A ⁽¹⁾	8.03	8.86	9.41	10.55	11.50	12.60	15.20	18.19	21.34	24.69	26.65	29.25	31.22	36.77
A ⁽²⁾	8.03	8.86	9.84	11.26	12.36	13.46	15.79	18.19	21.34	-	-	-	-	-
B	2.91	3.11	3.35	3.98	4.41	4.92	6.14	7.56	9.53	10.91	11.89	13.43	14.41	16.69
C ⁽¹⁾	5.12	5.75	6.06	6.57	7.09	7.68	9.06	10.63	11.81	13.78	14.76	15.83	16.81	20.08
C ⁽²⁾	5.12	5.75	6.50	7.28	7.95	8.54	9.65	10.63	11.81	-	-	-	-	-
D	2.56	2.56	2.56	2.56	3.54	3.54	3.54	4.92	4.29	6.89	6.89	6.89	6.89	8.27
E	0.55	0.55	0.55	0.55	0.59	0.59	0.59	0.71	0.71	0.91	0.91	0.91	0.91	0.98
H	0.63	0.63	0.63	0.63	0.75	0.75	0.75	0.94	0.94	2.56	2.56	2.56	2.56	3.15
J	4.13	4.88	5.43	6.38	7.56	8.58	10.75	12.91	14.88	17.24	19.25	21.22	23.43	27.40
K	0.28	0.51	0.75	1.06	1.46	1.93	2.76	3.54	4.37	5.08	5.55	6.38	7.13	8.70
L	1.69	1.81	1.81	2.05	2.20	2.20	2.36	2.68	3.07	3.07	4.02	4.49	5.00	6.06
M ANSI 150	4.75	5.50	6.00	7.50	8.50	9.50	11.75	14.25	17.00	18.75	21.25	22.75	25.00	29.50
N ANSI 150	5/8"-11 UNC				¾"-10 UNC			7/8"-9 UNC		1"-8 UNC		1⅛"-7 UNC		1¼"-7 UNC
O ANSI 150	4	4	4	8	8	8	8	12	12	12	16	16	20	20
P	-	-	-	-	-	-	-	-	-	0.55	0.55	0.55	0.55	0.79
R	1.38	1.38	1.38	1.38	2.17	2.17	2.17	2.76	2.76	3.94	3.94	3.94	3.94	5.12
S ⁽⁴⁾	0.55	0.55	0.55	0.55	0.67	0.67	0.67	0.87	0.87	-	-	-	-	-
T	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.20	0.20	0.20	0.20	0.28
U	1.54	2.20	2.80	3.66	4.61	5.67	7.52	9.45	11.46	12.87	14.61	16.65	18.58	22.64
W	-	-	-	-	-	-	-	-	-	1.77	1.77	1.77	1.77	2.76
X	Ø 0.28/4 x Ø 1.97				Ø 0.35/4 x Ø 2.76			Ø 0.43/4 x Ø 4.02		Ø 0.71/4 x Ø 5.51				Ø 0.87/4 x Ø 6.5

Weights in pounds - without acuator

Nominal Diameter:	2"	2½"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
Wafer Body	5.3	6.6	7.1	9.9	15.4	17.6	26.7	43.7	68.8	110	159	203	245	430
Lug Body	7.5	8.8	10.6	15.2	23.4	25.1	35.1	57.3	84.2	132	203	238	333	540



Lever & Gear Operated Valves - Dimensions⁽³⁾ in inches

Nominal Diameter:	2"	2½"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
A ⁽¹⁾	7.13	7.76	8.07	8.58	9.09	9.69	11.06	-	-	-	-	-	-	-
A ⁽²⁾	7.13	7.76	8.50	9.29	9.96	10.55	11.65	-	-	-	-	-	-	-
B	7.87	7.87	7.87	7.87	9.45	9.45	9.45	-	-	-	-	-	-	-
C ⁽¹⁾	8.11	8.74	9.06	9.57	10.08	10.67	12.05	13.62	14.80	17.20	18.19	19.25	20.24	24.21
C ⁽²⁾	8.11	8.74	9.49	10.28	10.94	11.54	12.64	13.62	14.80	-	-	-	-	-
D ⁽¹⁾	6.77	7.40	7.72	8.23	8.74	9.33	10.71	12.28	13.46	15.83	16.81	17.87	18.86	21.93
D ⁽²⁾	6.77	7.40	8.15	8.94	9.61	10.20	11.30	12.28	13.46	-	-	-	-	-
E	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06	11.22	11.22	11.22	11.22	17.87
F	7.87	7.87	7.87	7.87	9.84	9.84	9.84	9.84	9.84	15.75	15.75	15.75	15.75	24.02
G	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	3.78	3.78	3.78	3.78	5.39

(1) Standard neck, ductile iron bodies only. (2) Long neck, cast iron bodies only.
 (3) Figures apply to actuator with operating pressure 50psi and 150psi disc. (4) Square drive on 2" - 12" sizes.

Weights in pounds - Wafer Bodied Valve With Operator

Nominal Diameter:	2"	2½"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
Hand Lever	9.0	10.4	10.8	13.7	19.6	21.8	30.9	-	-	-	-	-	-	-
Gear Operator	22.5	23.8	24.3	27.1	32.6	34.8	43.9	60.8	86.0	147	196	240	282	507

Hand Lever / Gear Operator - Recommendations

Key	Shut-off Pressure	2" - 5"	6"	8"	10"	12" - 24"
Hand Lever	230 psi					
	150 psi					
Gear Operator	50 psi					

Hand levers can be supplied up to 8", gear operators from 2" up.

Type RS - Saunders Butterfly Valves

Bolt Dimensions.

DN IMP Inches	ANSI Class	For Wafer Bodies Bolts With Nuts			For Lug Bodies Bolts Without Nuts		
		No.	Thread	Length	No.	Thread	Length
2	150	4	5/8-11 UNC	4"	8	5/8-11 UNC	1 1/2"
2 1/2	150	4	5/8-11 UNC	4"	8	5/8-11 UNC	1 3/4"
3	150	4	5/8-11 UNC	5"	8	5/8-11 UNC	1 3/4"
4	150	8	5/8-11 UNC	5"	16	5/8-11 UNC	1 3/4"
5	150	8	3/4-10 UNC	5 1/2"	16	3/4-10 UNC	2"
6	150	8	3/4-10 UNC	5 1/2"	16	3/4-10 UNC	2"
8	150	8	3/4-10 UNC	5 1/2"	16	3/4-10 UNC	2"
10	150	12	7/8-9 UNC	6 1/2"	24	7/8-9 UNC	2 1/2"
12	150	12	7/8-9 UNC	7"	24	7/8-9 UNC	2 1/2"
14	150	12	1-8 UNC	8"	24	1-8 UNC	2 3/4"
16	150	16	1-8 UNC	9"	32	1-8 UNC	2 3/4"
18	150	16	1-1/8"-7 UNC	10"	32	1-1/8"-7 UNC	3"
20	150	20	1-1/8"-7 UNC	10"	40	1-1/8"-7 UNC	3"
24	150	20	1-1/4"-7 UNC	12"	40	1-1/4"-7 UNC	4 1/2"

Chemical Resistance Guide.

The following valve seat materials are recommended subject to user's practical experience. However, the guidelines provided below may be limited by service temperature and

are not to be interpreted as applicable through the entire temperature range of the seat materials indicated on page 13. Also, the resistance can be affected by concentration,

pressure, flow rate, or evaporation of the medium. In case of doubt, the suitability is to be verified by tests under operating conditions.

Valve Seat Material	Resistant Against
Buna - N	Petroleum, grease, alcohol, glycol, propane, butane, diesel-fuel, and many other media.
EPDM	Ozone, phosphate, ester, ketones, alcohols, glycols, concentrated sulphuric acid, bleaching (20%), alkaline solutions in general, treated water(with caustic soda, sodium sulphate, chlorine), hot water and steam <i>(It is attacked by hydrocarbonaceous solutions and oils, chlorinated hydrocarbons, turpentine and all other petroleum based oils.)</i>
Hypalon	Sodium chloride, chromic acid, nitric and hydrofluoric acid, sulphuric acid, hydrocarbon oils, salts, and others.
SBR	Acids and alkalis.

Valve Seat Material	Resistant Against
Viton	Strong and weak mineral acids, aliphatic hydrocarbons, aromatic alcoholic and halogenated hydrocarbons, ester of aromatic acids, interlinked aliphatic acids, phosphoric acids except alkyl and alkylaryl, phosphoric ester, aromatic ethers, aliphatic ethers, except ethers of high molecular weight, such as methyl ether, dioxane and tetrahydrofurane. <i>(It is attacked by ester of low molecular weight, such as ethyl acetate, n-propyl nitrate, ketones, such as acetone and methyl-ethyl-ketone, amino compounds such as n-butylamine, dry ammonia and asymmetric diphenylhydracetin. Viton is not suitable for dry heat and steam)</i>
HNBR	Petroleum, grease, alcohol, glycol, propane, butane, diesel fuel and many other media.

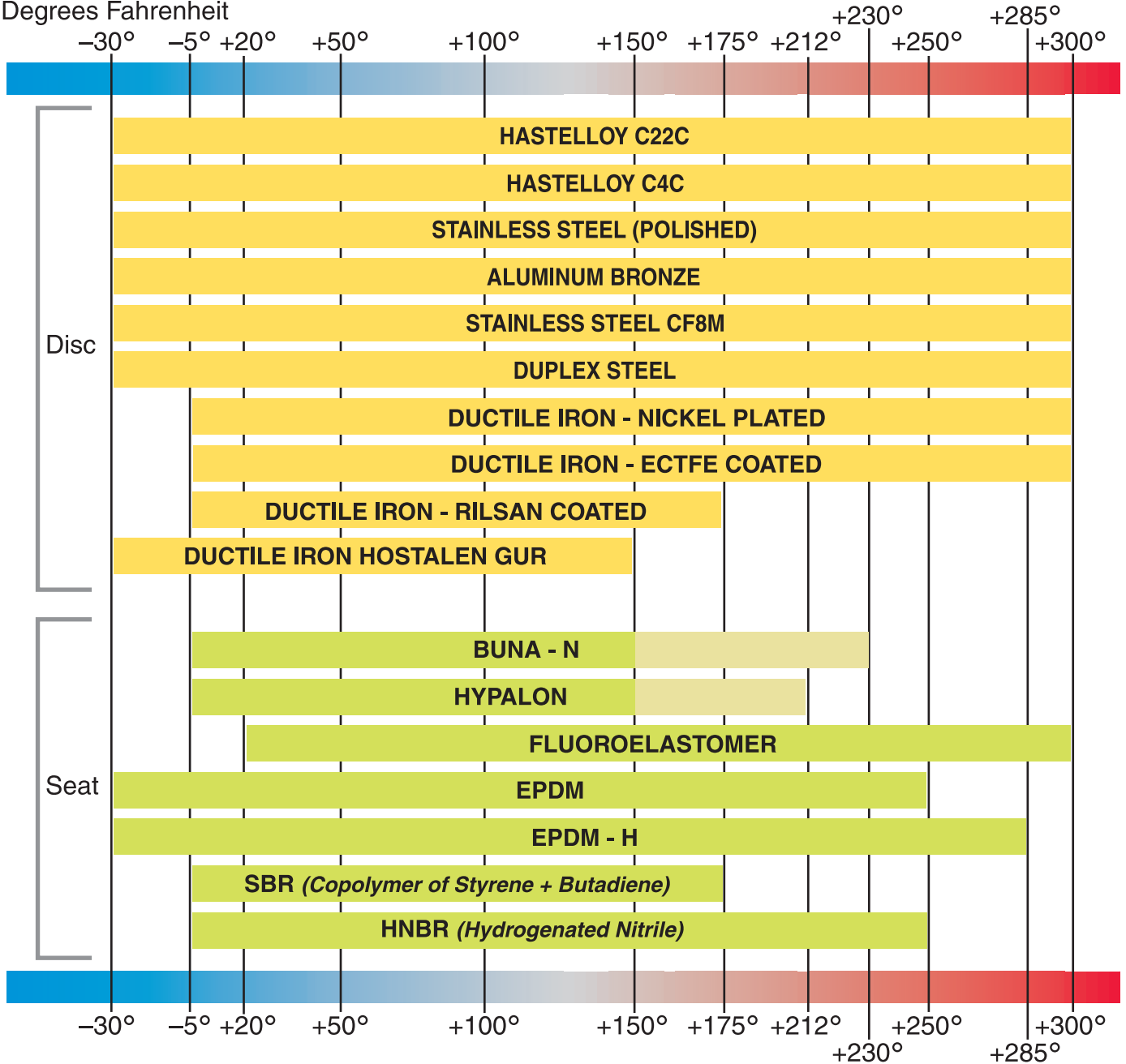
Operating Temperatures

Minimum and maximum operating temperatures of the disc material.
The operating temperature range is limited by the seat material.

Seat Material
Limits

Intermittent
Duty

Degrees Fahrenheit



Type RS - Saunders Butterfly Valves

Valve sizing.

The size of butterfly valve used for control purposes should not be dictated by the nominal diameter of the pipe, but should be calculated on the basis of the operating characteristics, in order to achieve the correct control characteristics.

To determine the size of a control valve the opening angle characteristics need to be considered. Saunders Type RS Butterfly Valves are designed with approximately equal percentage characteristics over an opening angle of 60°.

Nominal Bore Inches	Cross-Section Of Pipe - in ² *	Opening Angle								
		90° Cv	80° Cv	75° Cv	70° Cv	60° Cv	50° Cv	40° Cv	30° Cv	25° Cv
2	3.36	130	104	89	69	53	27	16	8	6
2½	4.79	198	159	130	104	82	41	26	14	9
3	7.39	299	239	204	159	124	62	37	21	14
4	12.7	548	473	398	303	233	119	72	41	27
5	19.7	1,121	996	827	623	488	249	154	88	60
6	28.9	1,944	1,645	1,345	1,027	797	408	249	144	97
8	50	3,240	2,718	2,194	1,744	1,296	698	418	249	169
10	78.9	4,986	4,288	3,589	2,742	2,144	1,146	667	389	259
12	112	7,480	6,033	4,986	4,039	3,091	1,595	996	548	378
14	135	9,973	8,078	6,681	5,085	4,089	2,194	1,296	748	498
16	177	12,466	10,770	8,975	6,482	5,085	2,642	1,694	897	648
18	224	17,453	13,961	11,967	9,175	7,081	3,690	2,293	1,246	897
20	278	21,940	17,453	14,959	11,469	8,676	4,587	2,792	1,595	1,121
24	402	27,924	28,955	20,445	16,455	11,718	6,083	3,789	2,194	1,496

*Based on Schedule 40 commercial wrought steel pipe (ANSI B36-10)

Actuator sizing.

The drive torque required for selecting an actuator is given in the table below. The torques listed are in in-lbs and apply to liquid and most media.

The actuator should be capable of producing the listed torque over the total deflection angle.

Shut-off Pressure psig	Nominal Diameter Of A Butterfly Valve													
	2"	2½"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
230	228	336	528	1,068	1,596	2,304	2,916	4,248	6,108	13,452	17,880	22,044	27,168	50,976
150	144	204	312	624	840	1,128	1,776	2,484	3,540	7,872	10,536	12,924	15,936	30,708
50	120	120	204	276	360	564	1,020	1,860	2,304	3,720	4,872	8,580	11,064	20,448