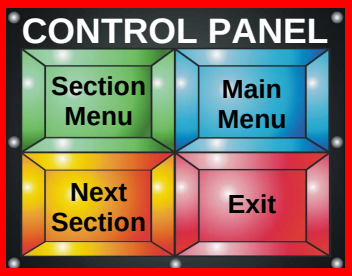
Technical Data



Ball Valve Sealing Pressures

Equivalent Valve Working Pressure

Lb / in ^{2}	Bar	Kpa	Kgf / Cm ^{2}	N / mm ^{2}
0.0145 psi	0.001	0.1	0.001019	0.0001
1 psi	0.0689	6.89	0.0703	0.00689
750 psi	51.7	5170	52.7	5.17
1,000 psi	68.9	6890	70.3	6.89
2,000 psi	138	13800	141	13.8
3,000 psi	207	20700	211	20.7
5,000 psi	345	34500	352	34.5
6,000 psi	414	41400	422	41.4
10,000 psi	690	69000	704	69

Units are Appx.

Seat Sealing Pressures at Different Temperatures (Ball Valves)

Material	0°C	100°C	200°C	300°C
Acetal	3,000 PSI	95°C max		
Nylon 12	6,000 PSI	100°C max		
PEEK® & O Ring	6,000 PSI	6,000 PSI	170°C max	
PVDF	6,000 PSI	5,000 PSI	150°C max	
PTFE	1,000 PSI	900 PSI	500 PSI	230°C max
RTFE	2,000 PSI	1,700 PSI	1,000 PSI	230°C max
PEEK®	10,000 PSI	10,000 PSI	7,500 PSI	250°C max

Note 1: This table shows the seat sealing performance obtainable with the valve standard operating torque of 8lbf – ft (10.8Nm) for a 19mm size ball valve with Delrin seats. Improved seat sealing, up to the maximum temperatures given can be obtained at increased torque load values. Consult the Alco Valves technical department for details.
Note 2: Temperatures shown are those of the line fluid, and the maximum which can be used for the application.

Pressure ratings for valves

All handles can be colour coded. The colour of the handle or sleeve offers a good visual indication of the pressure rating of the valves to which they are fitted according to the following:-

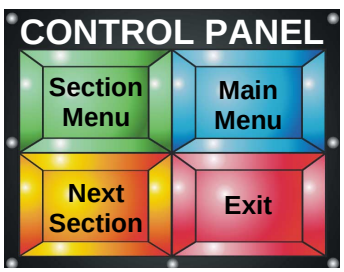
Handle Colour	Pressure Ratings	Bar	KPa	Kg/Cm²
Black	1,000 psi	69 BAR	6,890	70.3
Blue	2,000 psi	138 BAR	13,800	141
Red	3,000 psi	207 BAR	20,700	211
Yellow	6,000 psi	414 BAR	41,400	422
Black	10,000 psi	690 BAR	69,000	704
Black / Stainless	15,000 psi	1030 BAR	103,000	1050
Black / Stainless	20,000 psi	1360 BAR	138,000	1410

Valve pressure ratings are cold working, non-shock.

The above temperature figures include a 10% safety factor subject to the non-oxidisation of the line fluid

For other seat materials consult factory

NOTE: It is always advisable to refer to specific product literature or contact our technical sales department when ordering valves as some of these options are available only on certain styles of valves. Any special end connections such as compression ends or butt / socket weld may limit the rated working pressure of the valve or component supplied in accordance with the relevant specification of design or use of that method of connection. The valve or component will still carry the maximum working pressure markings in accordance with the valve or component design not the connection method.



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REF: AVCAT2K118
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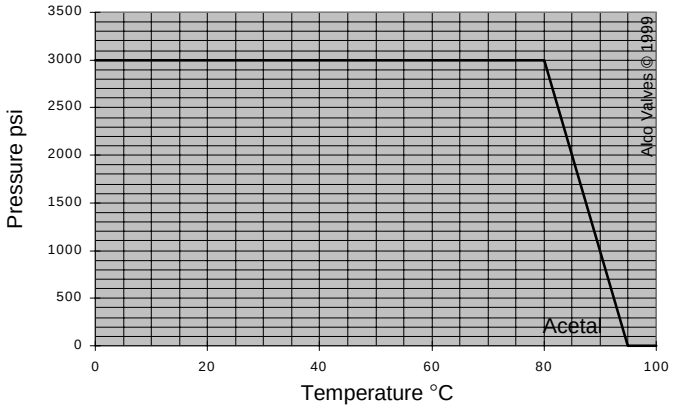
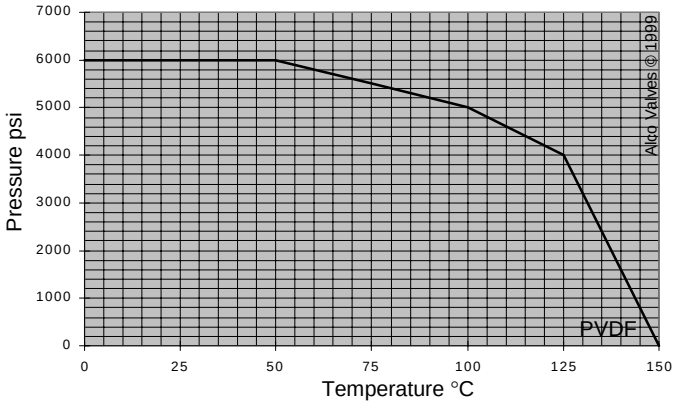
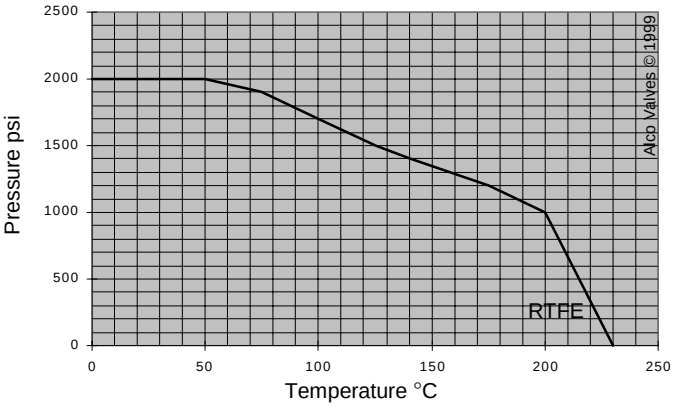
Ball Valve Sealing Pressure / Temp Data

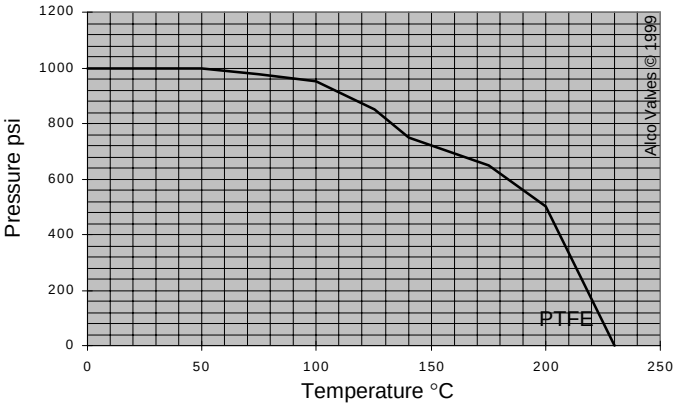
Acetal / PVDF



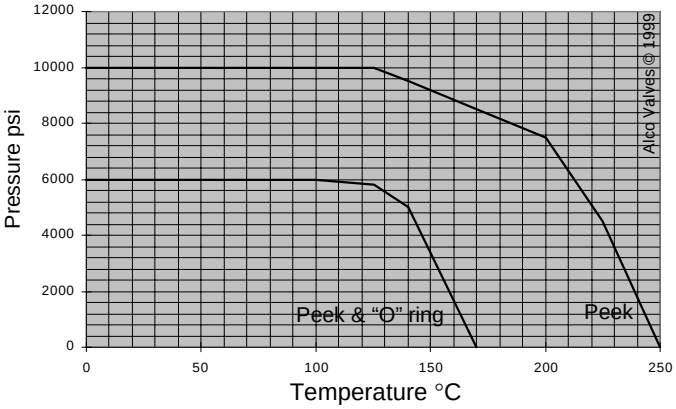


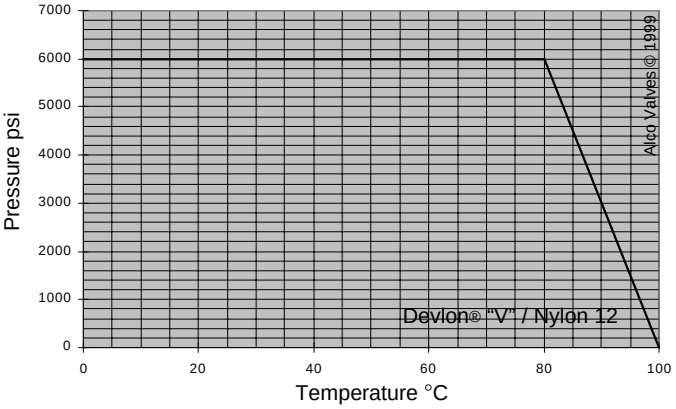
RTFE (25% glass filled) / PTFE





Peek® / Peek® & Viton "O" Ring / Nylon 12 / Devlon® "V"





The above figures include a 10% safety factor subject to the non-oxidisation of the line fluid
Fahrenheit = 9/5°C + 32 (Appx)

For other seat materials consult factory

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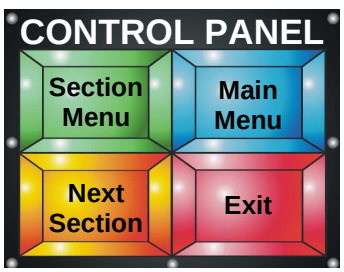

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Ball Valve Flow Formulae

Valve Flow Coefficients

All valve products manufactured by Alco valves are sized using the flow coefficients Cv and Kv.

Flow Coefficient Cv

The amount of water in U.S. gallons per minute at a temperature of 60°F, which will flow through the valve with a differential pressure of one lbs f / in^2.

Flow Coefficient Kv

The amount of water in cubic metres per hour at a temperature of 15°C which will flow through the valve with a differential pressure of one bar.
The two flow coefficients are related by the expression
Cv = 1.156 Kv
The Cv or Kv shown in the technical data sections for individual valves and should be used for calculating flow through the valve for maximum capacity.

Sub Critical Flow Formulae for liquids - (No cavitation or flashing taking place.)

Imperial Units		Metric Units	
Flow coefficient formulae	$C_V = Q\sqrt{\frac{SG}{\Delta P}}$	Metric flow coefficient formulae	$K_V = Q\sqrt{\frac{\rho}{\Delta P}}$
Liquid flow rate	$Q = C_V\sqrt{\frac{\Delta P}{SG}}$	Liquid flow rate	$Q = K_V\sqrt{\frac{\Delta P}{\rho}}$
Differential pressure	$\Delta P = \frac{Q^2}{C_V^2} \times SG$	Differential pressure	$\Delta P = \frac{Q^2}{K_V^2} \times \rho$

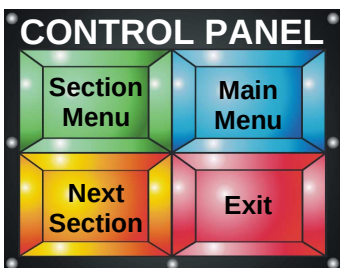
Where:

Cv	=	US flow coefficient
Q	=	Liquid flow in U.S. gallons per minute
ΔP	=	Differential pressure lbf / in^2
SG	=	Liquid specific gravity

Where:

Kv	=	Metric flow coefficient
Q	=	Liquid flow rate m^3 / hr
ΔP	=	Differential pressure
ρ	=	Liquid density kg / dm^3

NB. The above is to be used as a guide only



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Operating Torque Requirements For Ball Valves.

Table of Break Out Torques for Full Differential & Zero Pressure Conditions

Seat Materials	Break Out Torques	Valve Sizes							
		1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
PTFE 1,000 psi	Full Differential	1	1	1	4	7	16	20	29
	0 pressure	1	1	1	2	5	9	12	15
RTFE 2,000 psi	Full Differential	1	1	1	4	7	14	21	32
	0 pressure	1	1	1	2	5	9	12	15
Acetal® 3,000 psi	Full Differential	3.5	3.5	3.5	9	14	51	64	72
	0 pressure	1	1	1	3	5	15	18	23
Nylon 12® 5,000 psi	Full Differential	-	-	-	-	-	76	76	76
	0 pressure	-	-	-	-	-	28	28	28
Peek® 6,000 psi	Full Differential	7	7	7	14	28	-	-	-
	0 pressure	3	3	3	5	8	-	-	-
Peek® 10,000 psi	Full Differential	12.5	12.5	12.5	19	31	-	-	-
	0 pressure	7	7	7	5	8	-	-	-

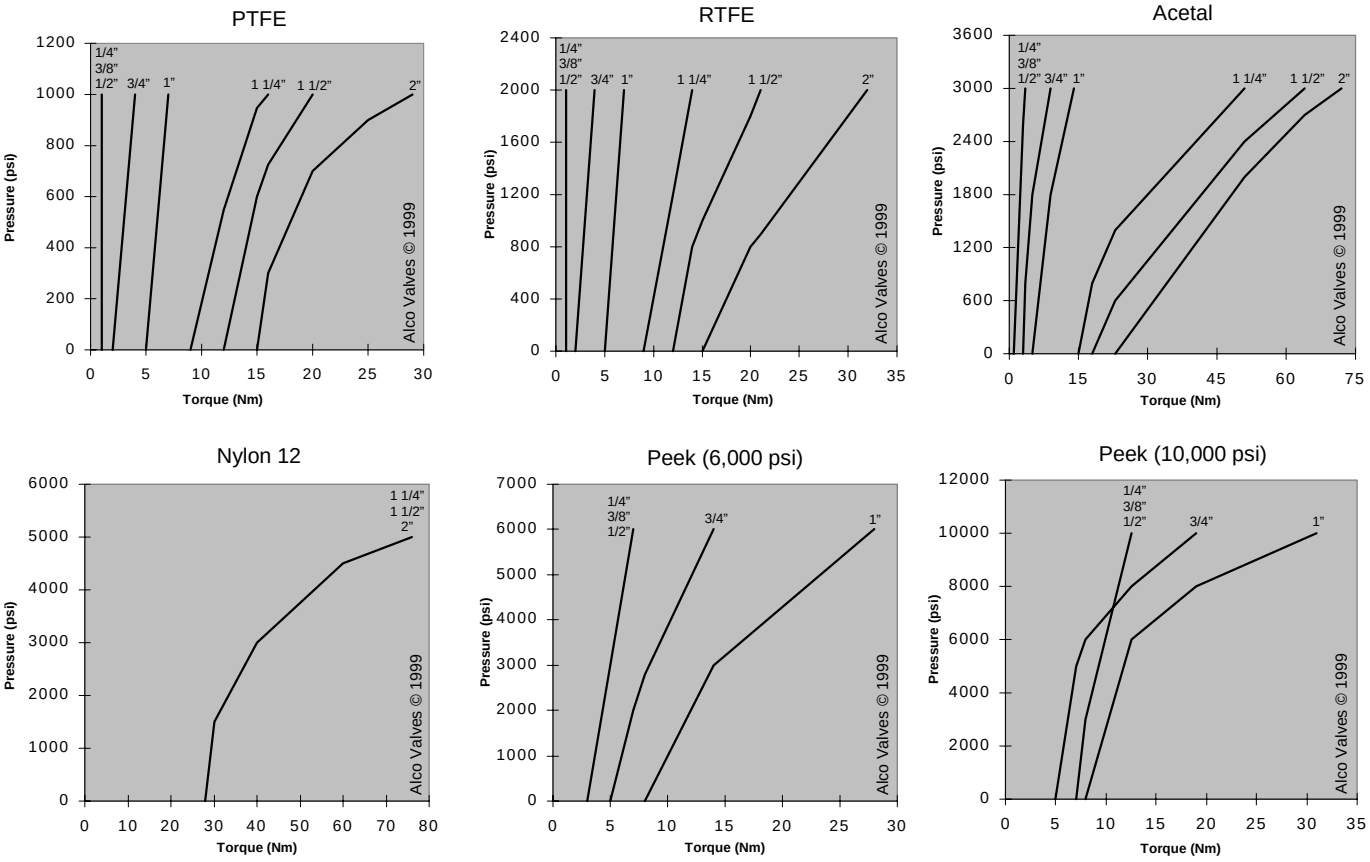
Torque values given in Newton metres.

*** Test medium oil**

*** The above figures are mean torques subject to -/+ 20%**

Graphs of Break Out Torques for Full Differential & Zero Pressure Conditions

Sizes shown are valve bore sizes



Note: The above is to be used as a guide only, a more detailed version of the above graphs is available from our technical department if required.

CONTROL PANEL

Section Menu | Main Menu | Next Section | Exit

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Technical Flow Formulae

Sub Critical Flow Formulae For Gas and Vapour

To be used when P < 0.38P, for needle valves and Δ P < 0.18P, for ball valves.

For valve sizing outside these parameters consult the factory.

English Units

Flow by weight

$$Cv = \frac{W}{3.22\sqrt{\Delta P(P_1 + P_2)G_F}}$$

Volumetric Flow

$$Cv = \frac{Q}{963}\sqrt{\frac{GT}{\Delta P\,(P_1 + P_2)}}$$

Metric Units

Flow by weight

$$Kv = \frac{0.0408W}{\sqrt{\Delta P(P_1 + P_2)G_F}}$$

Volumetric Flow

$$Kv = \frac{Q}{341}\sqrt{\frac{GT}{\Delta P\,(P_1 + P_2)}}$$

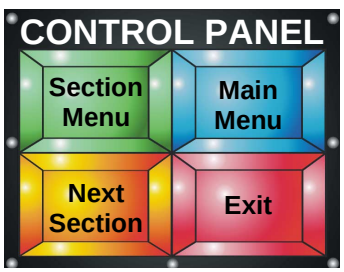
Where:

Cv	=	US flow coefficient
G	=	Gas specific gravity (air = 1.0)
G_F	=	Specific gravity @ flowing temperature
P_1	=	Upstream pressure, lbf / in^2 A
P_2	=	Downstream pressure, lbf / in^2 A
ΔP	=	Differential pressure P_1 - P_2 psi
Q	=	Gas flow rate at 14.7 psia and 60 °F SCFH
T	=	Flowing temperature, °R, (460 + °F)
W	=	Mass flow, lb / h

Where:

Kv	=	Metric flow coefficient
G	=	Gas specific gravity (air = 1.0)
G_F	=	Specific gravity @ flowing temperature
P_1	=	Upstream pressure, bars absolute
P_2	=	Downstream pressure, bars absolute
ΔP	=	Differential pressure P_1 - P_2 bar
Q	=	Gas flow rate at 15 °C & 1013 milibars abs., m^3 / h
T	=	Flowing temperature, °K, (273 + °C)
W	=	Mass flow, kg / h

NB. The above is to be used as a guide only



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Testing Options / Testing Data / Procedures

At Alco, all of our valves are tested in accordance to internationally recognised standards or our own more stringent internal test procedures. In addition to this we also offer specialist testing to our clients requirements.

Shown below are typical test pressures for Alco's valve ranges:

Valve Rating	Seat Test	Body / Shell Test
1,000 psi	1,100 psi	1,500 psi
2,000 psi	2,200 psi	3,000 psi
3,000 psi	3,300 psi	4,500 psi
6,000 psi	6,600 psi	9,000 psi
10,000 psi	11,000 psi	15,000 psi
15,000 psi	16,500 psi	22,500 psi
20,000 psi	22,000 psi	30,000 psi

NB. We reserve the right to change design ratings at any time. The above ratings are based on valves constructed from 316ss, other materials may be lower rated. If you have any queries contact our technical department.

Hydrostatic testing with Air, Oxygen free Nitrogen of Water / Oil mixture at room temperatures (18°C).

Please Note: Where compressed gases are used ensure valves and fittings are free from all contamination i.e. oil. You can have our products degreased and cleaned for special gas service at extra cost when specified. Specifying degreased and cleaned option must be done at the time of order.

Other special testing is available, should you or your client wish to seek specific testing data Alco Valves can accommodate most recognised tests "in-house".

In House Testing Options:

Gas Testing up to 15,000 psi

Gas mediums used - Air, Oxygen free Nitrogen, Helium (1% - 99%). Other gases by request.

Hydraulic Testing up to 60,000 psi

Liquid mediums used – Water, Oil, Emulsion or client approved hydraulic medium.

Temperature Tests from -196° Celsius

(cooled enclosure using liquid nitrogen) to +950° Celsius (heated enclosure gas fired), also hot oil facility available up to 500°C

Cycle Testing

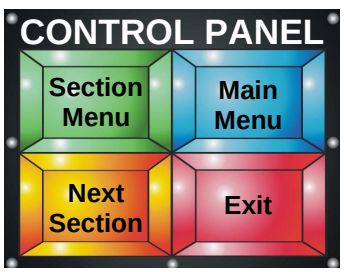
Many thousands even over 1,000,000 cycles can be performed. Client to specify number of cycles and conditions of test.

Fire Testing

In house fire testing in accordance with BS6755 part 2 (API607)

All of the above can be witnessed and certified by our own Q.C. representative or by an internationally recognised third party inspection company of your choice.

Note: Testing up and above our standard procedures normally incurs additional cost at a set-up charge then per hour rate and part thereof. There are also costs relating to third party inspection and tests that can be negotiated at the time.



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Chemical Resistance Chart

The information given in the following tables is a general guide to the chemical resistance of the materials used by Alco Valves.

Note 1: It should be noted that many factors affect the media, i.e. ;- temperature, concentration, pressure and a degree of contamination etc which may change the suitability of the materials given.

Note 2: We therefore advise that the information given be used as a guide only for your choice of materials and not as the absolute answer. If in doubt consult an industrial metallurgist / chemist, who will advise you.

Chemical Test Results

A = Excellent

B = Good

C = Fair, probably unsuitable

D = Not recommended

Blank = No information

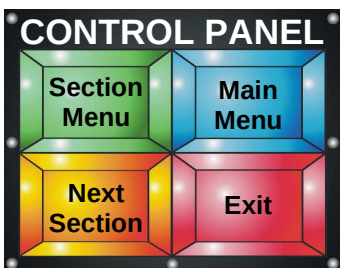
Note: Ratings are based on media at ambient temperatures unless otherwise stated.

	BODY MATERIAL								SEATS			
MEDIA	Carbon Steel	316 St. Steel	Monel 400	Incoloy Alloy 825	Hastelloy B	Hastelloy C	Aluminium bronze	Titanium	PTFE	Delrin	Nylatron	Peek®
Acetaldehyde	C	A	B	A	-	A	D	A	A	A	B	-
Acetate Solvents	B	A	A	A	A	A	A	A	A	B	A	-
Acetic Acid 10%	C	A	B	A	A	A	A	A	A	B	C	A
Acetic Acid 60%	C	A	B	A	A	A	A	A	A	-	-	A
Acetic Acid, Glacial	C	A	B	A	A	A	A	A	A	B	C	B
Acetic Acid Vapours	D	A	B	-	-	A	B	-	A	-	-	-
Acetic Anhydride	D	A	B	A	B	A	B	A	A	-	-	A
Acetone	A	A	A	A	A	A	A	A	A	B	A	-
Acetylene	A	A	A	A	A	A	D	-	A	-	-	-
Acrylonitrile	C	A	A	A	A	A	B	A	A	-	A	A
Adipic Acid 15 25%	-	A	-	-	-	-	-	A	A	-	-	-
Alcohols	C	A	A	A	A	A	A	A	A	A	-	-
Aliphatic Esters	-	A	A	A	B	B	A	A	A	A	-	-
Aliphatic Hydrocarbons	-	A	A	A	A	A	B	A	A	-	-	-
Alkyl Chlorides, Pure	-	B	A	A	A	B	A	-	A	-	-	-
Alum	-	A	B	A	-	B	B	A	A	-	-	-
Aluminium Chloride	C	B	B	A	A	B	B	A	A	-	-	A
Aluminium Sulphate	C	A	A	A	A	A	B	A	A	-	-	A
Amines	B	A	B	A	A	A	D	-	A	-	-	-
Ammonia (gas)	B	A	D	A	A	A	D	A	A	-	B	-
Ammonium Bicarbonate	B	A	D	A	A	A	D	A	A	-	-	-
Ammonium Carbonate	B	A	B	A	A	A	D	A	A	-	A	-
Ammonium Chloride	D	B	A	A	A	A	D	A	A	-	-	-
Ammonium Hydroxide	C	A	C	A	A	A	D	A	A	-	-	B
Ammonium Nitrate 10%	D	A	-	A	B	A	D	A	A	-	-	B

	BODY MATERIAL								SEATS			
MEDIA	Carbon Steel	316 St. Steel	Monel 400	Incoloy Alloy 825	Hastelloy B	Hastelloy C	Aluminium bronze	Titanium	PTFE	Delrin	Nylatron	Peek®
Ammonium Sulphate	C	A	A	A	A	A	A	A	A	-	-	A
Amyl Acetate	C	A	A	A	A	A	A	A	A	-	A	A
Amyl Chloride	-	A	A	A	A	A	B	-	A	-	-	-
Aqua Regia	D	D	D	D	D	D	D	A	A	-	-	-
Aromatic Hydrocarbons	-	A	A	A	A	A	A	A	A	-	-	-
Barium Chloride	C	A	A	A	A	A	B	A	A	-	A	A
Barium Hydroxide	B	A	A	A	A	A	A	A	A	-	-	-
Barium Nitrate	-	A	-	A	A	A	D	A	A	-	-	-
Beer at 71 °C	D	A	A	A	A	A	B	-	A	-	-	-
Benzene	B	A	A	A	A	A	A	A	A	A	A	-
Benzoic Acid	D	A	A	A	A	A	B	A	A	-	C	-
Boric Acid	D	B	B	A	A	A	B	A	A	-	A	-
Brines	C	C	A	A	A	A	A	A	A	-	-	-
Bromine (dry)	D	D	A	A	A	A	B	D	B	-	-	A
Bromine (wet)	D	D	C	D	-	B	D	D	B	-	-	A
Butadiene	C	A	A	A	A	A	A	A	A	-	-	-
Butane	B	A	A	A	A	A	A	A	A	-	-	-
Butyl Acetate	C	A	A	A	A	A	A	A	A	-	B	A
Butyl Alcohol	-	A	A	A	A	A	A	A	A	-	-	-
Butyric Acid	D	A	A	A	A	A	B	A	A	-	B	-
Calcium Bisulphate	D	A	D	A	-	A	B	A	A	-	-	-
Calcium Chloride	C	B	A	A	A	A	A	A	A	-	A	A
Calcium Hydroxide	C	A	A	A	A	A	B	A	A	-	-	-
Calcium Hypochlorite	D	B	C	B	-	A	D	A	A	-	-	-
Calcium Nitrate	-	A	A	A	A	A	A	-	A	-	-	A

See Note 1 & 2

Note: The above is to be used as a guide only.



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REF: AVCAT2K124
REV: 00

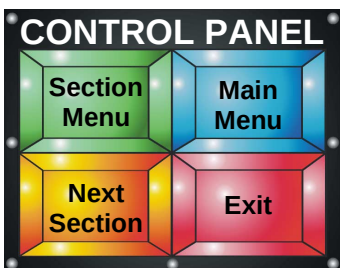
Chemical Resistance Chart

MEDIA	BODY MATERIAL								SEATS			
	Carbon Steel	316 St. Steel	Monel 400	Incoloy Alloy 825	Hastelloy B	Hastelloy C	Aluminium bronze	Titanium	PTFE	Delrin	Nylatron	Peek®
Carbolic Acid	D	A	A	A	A	A	B	A	A	-	-	-
Carbon Disulphide	D	A	A	A	-	-	B	A	A	-	A	-
Carbonic Acid	D	A	A	A	A	A	B	-	A	A	-	-
Carbon Tetrachloride (dry)	B	A	A	A	A	A	B	A	A	A	A	A
Castor Oil	B	A	A	A	A	A	A	-	A	-	-	-
Chloric Acid	-	D	D	B	D	A	D	-	A	-	-	-
Chlorinated Hydrocarbons	B	B	A	B	B	A	B	A	A	-	-	-
Chlorinated Water (saturated)	-	C	C	B	-	A	C	A	A	-	-	-
Chlorine (dry gas)	B	B	A	C	-	A	B	C	A	-	C	-
Chlorine (wet gas)	D	D	C	D	D	B	D	A	A	-	C	-
Chlorine Dioxide	-	D	C	D	B	A	D	A	A	-	-	-
Chloroacetic Acid	D	D	B	D	A	A	D	A	A	-	-	-
Chloro-Benzene (dry)	B	A	A	A	A	A	A	A	A	-	A	A
Chloroform (dry)	B	A	A	A	A	A	A	A	B	-	C	A
Chloro-Sulphonic Acid	D	C	B	B	A	B	C	-	A	-	C	-
Chromic Acid Dilute	D	A	C	A	A	A	D	A	A	-	B	-
Chromic Acid 50%	D	C	C	B	D	B	D	A	A	-	-	A
Citric Acid	D	A	A	A	A	A	B	A	A	-	B	-
Copper Chloride	D	D	D	D	D	A	D	A	A	-	-	-
Copper Nitrate	D	A	D	A	-	A	D	A	A	-	-	-
Copper Sulphate	D	A	C	A	-	A	D	A	A	-	-	-
Creosote (hot)	B	A	A	A	A	A	B	-	A	-	-	-
Cresol	-	A	B	A	A	A	B	-	A	-	D	-
Cresylic Acid	D	A	B	A	A	A	B	-	A	-	-	-
Cyanide Solutions	-	A	D	A	-	B	D	-	A	-	-	-
Cyclohexane	A	A	A	A	A	A	A	-	A	-	A	A
Detergents Synthetic	A	A	B	A	A	A	A	-	A	-	-	-
Diacetone Alcohol	A	A	A	A	A	A	A	-	A	-	-	-
Dichloro-Benzene	-	B	A	A	A	A	A	-	A	-	-	-
Dichlorethylene	-	A	A	A	A	A	B	-	A	-	A	-
Diesel Oil	A	A	A	A	A	A	A	A	A	-	A	A
Diethylamine	A	A	D	A	-	A	D	A	A	-	-	-
Diethylene Glycol	-	A	A	A	A	A	B	A	A	-	-	-
Esters	B	A	A	A	A	A	B	-	A	-	-	-
Ethers	C	A	A	A	A	A	A	A	A	A	A	A
Ethyl Acetate	B	A	A	A	A	A	A	A	A	-	-	-
Ethyl Alcohol	B	A	A	A	A	A	A	A	A	-	-	-
Ethyl Chloride (dry)	B	A	A	A	A	A	B	A	A	-	A	-

MEDIA	BODY MATERIAL								SEATS			
	Carbon Steel	316 St. Steel	Monel 400	Incoloy Alloy 825	Hastelloy B	Hastelloy C	Aluminium bronze	Titanium	PTFE	Delrin	Nylatron	Peek®
Ethyl Chloride (wet)	D	B	B	A	A	A	C	A	A	-	A	-
Ethylene Glycol	B	A	A	A	A	A	B	A	A	-	B	A
Fatty Acids	D	A	B	A	A	A	B	A	A	-	-	-
Ferric Chloride	D	D	C	D	D	B	D	A	A	-	C	A
Ferric Nitrate	D	A	D	A	C	A	D	A	A	-	-	-
Ferric Sulphate	D	A	D	A	D	A	D	A	A	-	-	-
Ferrous Sulphate	D	B	B	A	A	A	B	A	A	-	-	-
Fluorinated Hydro Carbons (freons)	B	B	A	B	A	A	B	-	A	-	-	-
Fluorine (dry gas)	-	A	A	A	B	A	B	D	A	-	D	-
Fluorine (wet gas)	B	D	A	-	B	A	D	-	A	-	D	-
Fluosilicic Acid	D	B	B	B	A	A	D	D	A	-	D	-
Formaldehyde 40%	C	B	A	A	B	B	B	A	A	A	B	A
Formic Acid 50%	D	A	A	A	B	A	B	C	A	D	C	C
Fruit Juices	D	A	B	A	A	A	B	-	A	-	B	-
Fuel Oil	B	A	A	A	A	A	B	A	A	-	-	-
Furfural	B	A	A	A	A	A	B	A	A	-	A	B
Gallic Acid 25%	D	A	-	-	A	A	-	-	A	-	-	-
Gelatine	D	A	A	A	A	A	B	A	A	-	-	-
Glucose	B	A	A	A	A	A	A	A	A	-	-	-
Glycerine	B	A	A	A	A	A	B	A	A	-	-	-
Glycols	B	A	B	A	A	A	A	A	A	-	-	-
Hydrobromic Acid	D	D	C	C	A	B	D	A	A	-	D	-
Hydrochloric Acid 10% (Hot)	D	D	C	D	A	B	D	B	A	-	D	A
Hydrochloric Acid 10%	D	D	D	D	A	C	D	D	A	D	D	B
Hydrocyanic Acid	C	A	C	A	-	A	D	-	A	-	-	-
Hydrofluoric Acid 40%	D	D	A	C	A	A	D	D	A	D	D	-
Hydrogen Chloride (dry)	D	A	A	A	A	A	B	-	A	-	-	-
Hydrogen Chloride (wet)	D	D	C	D	A	A	D	-	A	-	-	-
Hydrogen per Oxide	D	B	B	A	C	A	D	D	A	D	D	-
Hydrogen Sulphide (dry)	B	A	B	A	B	A	B	A	A	-	-	-
Hydrogen Sulphide (wet)	D	A	D	A	A	A	C	A	A	C	B	-
Hypochlorites	D	D	D	D	C	A	D	A	A	-	-	-
Hypochlorous Acid	-	D	D	D	C	A	D	A	A	-	-	-
Iodine (wet)	D	D	D	D	-	B	D	-	A	-	D	-
Ketones	A	A	A	A	A	A	A	A	A	-	-	-
Lactic Acid 10%	D	A	C	A	A	A	D	A	A	B	C	A
Lead Acetate	D	A	B	A	A	A	D	A	A	-	B	-
Lead Nitrate 50%	D	A	A	A	A	A	-	-	A	-	-	-

See Note 1 & 2

Note: The above is to be used as a guide only.



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REF: AVCAT2K125

REV: 00

Chemical Resistance Chart

MEDIA	BODY MATERIAL								SEATS			
	Carbon Steel	316 St. Steel	Monel 400	Incoloy Alloy 825	Hastelloy B	Hastelloy C	Aluminium bronze	Titanium	PTFE	Delrin	Nylatron	Peek®
Lime	-	A	A	A	A	A	B	A	A	-	-	-
Linseed Oil	A	A	B	A	A	A	B	-	A	A	A	-
Lithium Bromide	-	B	A	A	A	A	A	A	A	-	D	-
Lithium Chloride	-	B	A	A	A	A	A	A	A	A	A	-
Lubricating Oils	A	A	A	A	A	A	A	A	A	A	A	-
Magnesium Carbonate	D	A	A	A	A	A	B	A	A	-	-	-
Magnesium Chloride	D	B	B	A	A	A	A	A	A	A	A	A
Magnesium Hydroxide	B	A	A	A	A	A	B	A	A	A	A	-
Magnesium Nitrate	D	A	B	A	D	A	B	A	A	-	-	-
Magnesium Sulphate	B	A	A	A	A	A	B	A	A	A	A	-
Maleic Acid	B	B	A	A	A	A	B	A	A	-	-	-
Mercuric Chloride	D	C	C	C	D	A	D	A	A	B	C	-
Mercuric Cyanide 5%	D	A	C	A	A	A	D	A	A	-	-	-
Mercuric Iodine	D	-	C	C	-	A	-	C	A	-	-	-
Mercuric Nitrate 5%	-	A	B	A	C	A	D	-	A	-	-	-
Mercurous Nitrate 5%	-	A	C	A	-	A	D	A	A	-	-	-
Mercury	A	A	B	A	B	A	D	A	A	A	A	-
Methyl Alcohol	B	A	A	A	A	A	A	A	A	-	-	-
Methyl Chloride (dry)	B	B	A	A	A	A	B	-	A	-	-	-
Methylene Chloride (dry)	B	A	A	A	A	A	A	-	A	C	C	-
Methol Ethyl Ketone	B	A	A	A	A	A	A	A	A	B	A	A
Methyl Isobutyl Ketone	-	A	A	A	A	A	A	A	A	-	-	-
Methyl Methacrylate	-	A	-	-	-	-	-	A	A	-	-	-
Milk	D	A	A	A	-	-	C	A	A	A	A	-
Mixed Acids (nitric & sulphuric)	C	B	D	A	D	B	D	B	A	-	-	-
Molasses	D	A	A	A	A	A	A	A	A	-	-	-
Naphtha	B	A	A	A	A	-	B	A	A	-	-	-
Naphthalene	B	B	A	A	-	A	B	A	A	-	A	-
Nickel Chloride	D	C	A	A	A	A	D	A	A	-	-	-
Nickel Nitrate 5 10%	D	A	C	A	B	A	D	A	A	-	-	-
Nickel Sulphate	D	A	A	A	-	A	B	A	A	-	A	-
Nitric Acid 25%	D	A	C	A	D	A	D	A	A	D	C	-
Nitric Acid 70%	D	A	C	A	D	A	D	A	A	D	D	-
Nitric Acid 100%	C	A	C	A	D	C	D	C	A	D	D	-
Nitrobenzene	B	A	A	A	D	A	B	A	A	B	C	A
Nonylphenol	-	A	-	-	-	-	-	-	A	-	-	-
Oils, Essential	B	A	A	A	-	-	A	A	A	A	A	-
Oils, Mineral	B	A	A	A	A	A	B	A	A	A	A	A

MEDIA	BODY MATERIAL								SEATS			
	Carbon Steel	316 St. Steel	Monel 400	Incoloy Alloy 825	Hastelloy B	Hastelloy C	Aluminium bronze	Titanium	PTFE	Delrin	Nylatron	Peek®
Oils, Vegetable & Animal	A	A	A	A	A	A	B	A	A	-	-	-
Oleic acid	C	B	A	A	B	A	B	A	A	C	A	-
Oleum	C	B	C	A	A	A	D	A	A	D	D	-
Oxalic acid 10%	D	B	A	A	A	A	B	B	A	C	C	-
Oxalic Acid 50% Boiling	D	C	A	-	A	A	B	-	A	D	D	-
Palmatic Acid	C	A	B	A	B	B	B	-	A	-	-	-
Paraffins	B	A	A	A	A	A	A	A	A	A	A	-
Petrol	C	A	A	A	A	A	A	A	A	A	A	-
Phenol	D	A	A	A	A	A	B	A	A	D	-	-
Phosphoric Acid 10%	D	A	B	A	A	A	C	E	A	C	D	A
Phosphoric Acid 30%	D	A	A	A	A	A	D	C	A	D	D	A
Phosphoric Acid 50%	D	A	A	A	A	A	D	C	A	D	D	B
Phosphoric Acid 10% Boiling	D	B	A	A	A	A	D	-	A	-	-	C
Phosphorus Trichloride, (dry)	-	B	B	-	A	-	C	A	A	-	-	-
Phathalic Acid	C	A	B	-	A	-	D	-	A	-	B	-
Picric Acid	D	A	C	A	B	A	D	-	A	-	-	-
Potassium Bromide	D	A	B	A	-	A	B	A	A	-	A	-
Potassium Carbonate	B	A	A	A	A	A	B	A	A	-	A	-
Potassium Chlorate	B	B	A	A	C	A	B	A	A	-	-	-
Potassium Chloride	B	B	A	A	A	A	B	A	A	-	A	-
Potassium Chromate	-	A	A	A	A	A	C	A	A	-	-	-
Potassium Cyanide	B	A	B	B	A	-	D	B	A	-	-	-
Potassium Dichromate	C	A	A	A	C	A	C	B	A	-	C	-
Potassium Ferricyanide 25%	C	A	A	A	B	A	B	B	A	-	A	-
Potassium Hydroxide 10%	B	A	A	A	A	A	B	A	A	-	A	-
Potassium Hydroxide 50%	B	B	A	B	A	B	C	B	A	-	C	-
Potassium Nitrate	B	A	A	A	D	A	B	A	A	B	A	-
Potassium Permanganate Dilute	B	A	B	A	-	A	B	A	A	A	D	A
Potassium Silicate	C	A	A	A	A	A	B	A	A	-	-	-
Potassium Sulphate	C	A	A	A	A	A	B	A	A	-	A	-
Propane	B	A	A	A	A	A	A	A	A	-	A	-
Propyl Acetate	B	A	A	A	A	A	A	-	A	-	-	-
Propyl Alcohol	B	A	A	A	A	A	A	A	A	-	-	-
Pyridine	B	A	A	A	A	A	C	-	A	A	A	C
Pyrogallic Acid	C	A	B	A	A	A	B	-	A	-	-	-
Salicylic Acid	D	A	A	A	B	A	B	-	A	-	A	-
Sea Water	D	B	A	A	A	A	A	A	A	-	-	-
Siliconers	B	A	A	A	A	A	A	A	A	-	A	-

See Note 1 & 2

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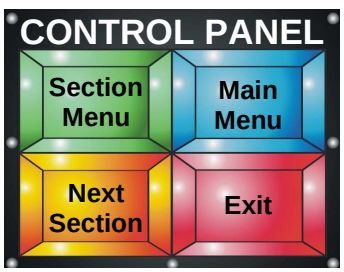

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REF: AVCAT2K126
REV: 00

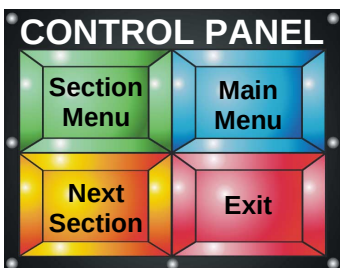
Chemical Resistance Chart

MEDIA	BODY MATERIAL								SEATS			
	Carbon Steel	316 St. Steel	Monel 400	Incoloy Alloy 825	Hastelloy B	Hastelloy C	Aluminium bronze	Titanium	PTFE	Delrin	Nylatron	Peek®
Silver Bromide	-	D	A	B	B	A	D	-	A	-	-	-
Silver Chloride	-	D	B	B	B	A	D	-	A	-	-	A
Silver Nitrate	D	B	C	A	A	B	D	A	A	A	A	-
Soaps	A	A	A	A	A	A	A	A	A	A	A	-
Sodium Acetate	B	A	A	A	-	A	B	A	A	-	B	-
Sodium Aluminate	C	B	B	A	A	A	B	A	A	-	-	-
Sodium Bicarbonate	C	A	A	A	A	A	A	A	A	A	A	A
Sodium Bisulphate	D	B	A	A	A	A	B	B	A	-	-	-
Sodium Bisulphite	D	A	B	-	-	A	B	-	A	-	A	-
Sodium Borate (hot)	C	A	A	A	A	A	B	A	A	-	-	-
Sodium Bromide	D	B	A	B	A	A	B	B	A	-	A	-
Sodium Carbonate	B	A	A	A	A	A	B	B	A	A	A	A
Sodium Chloride	C	B	A	A	B	A	A	A	A	A	A	A
Sodium Chromate	B	A	B	A	A	A	C	A	A	-	-	A
Sodium Cyanide	B	A	C	A	-	-	D	A	A	A	A	-
Sodium Dichromate	-	B	C	A	D	B	C	A	A	-	-	-
Sodium Hydroxide 30%	B	A	A	A	A	A	B	A	A	C	A	C
Sodium Hypochlorite	D	C	D	D	C	A	D	A	A	C	D	A
Sodium Metaphosphate	B	A	A	A	A	A	B	A	A	-	-	-
Sodium Metasilicate	C	A	A	A	A	A	B	-	A	-	-	-
Sodium Nitrate	B	A	B	A	-	A	C	A	A	A	A	-
Sodium Perborate	B	A	A	A	A	A	B	-	A	-	B	-
Sodium Peroxide 10%	C	A	A	A	A	A	D	-	A	-	-	-
Sodium Phosphate Tribasic	C	B	A	A	A	A	C	A	A	-	A	-
Sodium Sulphate	B	A	A	A	A	A	B	A	A	-	A	A
Sodium Sulphide	B	B	B	A	A	C	D	A	A	-	A	B
Sodium Sulphite	B	A	B	A	-	A	C	A	A	-	-	A
Sodium Thiosulphate	B	A	B	-	A	A	B	-	A	A	A	-
Stannic Chloride	D	B	C	B	B	A	D	-	A	-	C	-
Stannous Chloride	D	B	C	B	B	A	D	-	A	-	-	-
Starch	C	A	A	A	A	A	B	A	A	-	-	-
Steam	A	A	A	A	A	A	B	A	A	-	-	-
Stearic Acid	C	A	C	A	A	A	C	A	A	-	A	-
Sugar Liquors	B	A	A	A	A	A	B	A	A	-	-	-
Sulphonic Acids	-	B	-	A	B	A	-	B	A	-	-	-
Sulphur (fused)	C	A	A	A	A	A	D	A	A	A	A	-
Sulphur Dioxide (dry)	C	A	B	B	B	A	B	B	A	B	B	-
Sulphur Dioxide (wet)	C	B	D	B	C	A	D	B	A	C	C	-

MEDIA	BODY MATERIAL								SEATS			
	Carbon Steel	316 St. Steel	Monel 400	Incoloy Alloy 825	Hastelloy B	Hastelloy C	Aluminium bronze	Titanium	PTFE	Delrin	Nylatron	Peek®
Sulphuric Acid 5%	D	B	A	A	A	A	C	B	A	D	C	A
Sulphuric Acid 5 20%	D	C	A	A	A	A	C	C	A	D	D	A
Sulphuric Acid 20 80%	D	D	B	B	A	B	C	C	A	D	D	C
Sulphuric Acid 80%	D	B	C	A	A	B	D	C	A	D	D	C
Sulphuric Acid, Fuming	D	B	D	B	B	A	D	D	A	-	-	-
Sulphurous Acid	D	B	-	A	D	A	C	-	A	C	D	-
Sulphur Trioxide (dry)	C	B	B	A	B	A	C	-	A	-	-	-
Tannic Acid	C	B	B	B	B	B	B	B	A	-	-	-
Tar (hot)	C	A	B	A	A	A	B	-	A	-	B	-
Tartaric Acid	D	A	A	A	B	B	B	B	A	-	B	-
Tetrahydrofuran	-	B	B	A	A	A	-	-	A	A	A	-
Toluene	A	A	A	A	A	A	A	A	A	A	A	A
Trichlorethylene (dry)	B	B	A	A	B	A	B	B	A	B	B	-
Triethanolamine	B	A	-	A	A	A	D	-	A	-	A	-
Turpentine	B	A	A	A	B	B	B	A	A	A	A	-
Urea	C	A	B	A	-	A	B	-	A	A	A	-
Varnish (hot)	C	A	A	A	A	A	A	-	A	-	-	-
Vinegar	D	A	A	A	A	-	D	A	A	B	C	-
Vinyl chloride	-	B	A	A	A	A	-	-	A	-	A	-
Water, Distilled	D	A	A	A	A	A	B	A	A	A	A	A
Water, Porable	C	A	A	A	A	A	A	A	A	A	A	A
Whiskey	D	A	B	A	A	A	B	-	A	-	B	-
Wine	D	A	B	A	A	A	B	-	A	-	B	-
Xylene	B	A	A	A	A	A	A	A	A	-	A	A
Zinc Chloride	C	B	A	A	B	B	C	A	A	-	C	-
Zinc Nitrate	-	B	C	A	C	A	C	-	A	-	-	-
Zinc Sulphate	D	A	B	A	B	A	B	B	A	-	A	-

See Note 1 & 2

Note: The above is to be used as a guide only.



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REF: AVCAT2K127

REV: 00

Some terms used in this catalogue

A		
Actuated	=	A method of opening & closing a valve.
Alco	=	Alco Valves Ltd. Mission Works, Birds Royd Lane, Brighouse, West Yorkshire.
API	=	American Petroleum Institute.
ANSI B16.34	=	(American National Standards Institute) e.g. designed to satisfy the requirements of ANSI / ASME B16.34.
Anti-tamper	=	Cannot be operated without specific attachment or key.
B		
Ball valve	=	An isolation valve with a spherical closure member.
Bar	=	A unit of pressure which equals 14.5 psi.
Bar handle	=	Used to assist manual actuation of valves.
Barstock	=	Form of metal.
Bi-directional	=	Valve can be used with flow from either direction.
Butt weld	=	Lips formed on the ends of the valve to butt against the connecting pipes.
BS 5750	=	Now equal to ISO 9000 Series Q.A. systems.
BS6755 Pt. 2	=	A British Standard relating to fire testing.
C		
Cracking pressure	=	Typically pressure at which a check valve or similar device begins to open.
Cavitation	=	A localised gaseous condition in a liquid stream caused by sudden expansion in which pressure falls below the critical pressure.
Cavity filled seats	=	Seat whereby any cavity normally existing within a ball valve using standard seats, is eliminated by extra material.
Compression	=	An increase in the pressure at an interface.
Compression ends	=	A mechanical method of mating tubes or valves normally utilising rings / olives.
Cv	=	Flow co-efficient in US units.
D		
De-greased	=	Removal of contamination to a specific standard.
DP or ΔP	=	Differential pressure.
Drop Tight	=	A valve that will not pass fluid droplets when closed.
Duplex	=	Corrosion resistant steel. Strong mechanical properties.
Dynamic seats	=	Seat used to provide a seal around a moving element such as a valve ball.
E		
Elastomer	=	A seal consisting of base polymers.
Energise	=	To become active.
Equalise valve	=	A valve position to equalise between two lines - normally within a manifold.
Equilibrium	=	A balance condition.

F		
Fire safe	=	See BS 6755 Pt. 2 for testing procedure.
Floating ball	=	Normally pressure pushes a ball to a seat to effect a seal.
Fire safe design	=	A valve which is designed to be fluid tight in a fire after any polymers in its construction have disintegrated.
Flow	=	Fluid movement in a pipe.
Fluid	=	Liquid or gas or vapour state.
G		
Gall	=	Normally when threads begin to fail.
Galvanise	=	Zinc or similar coating, normally applied as corrosion protection.
Gasket	=	A material used for sealing a joint in a piping system.
Gauge	=	Device to measure pressure or vacuum.
H		
Hard Facing	=	A hard material normally cobalt or Nickel based that is applied to the valve trim.
Hastalloy®	=	Exotic super alloy known for corrosion resistance.
High pressure	=	In this catalogue pressures over 3,000 psi.
HT/HP	=	High temperature and high pressure.
Humidity	=	A degree of water contained in a gas - normally air measured in % content.
Hydro-static testing	=	Testing with liquid at a pressure normally 1.5 x the maximum working pressure.
I		
Imperial	=	British based system for units of measurement.
Inconel®	=	High nickel content super alloy.
Installation	=	Act of connecting the valve into the pipeline system.
Instrument	=	A device with the ability to measure, record, indicate or control.
Insulation	=	Material applied to a piping system to reduce noise or heat transfer.
J		
Joint	=	The point at which two or more components meet / make a pressure tight seal / are held together.
K		
Kg	=	Kilogram, mass approximately equal to the international measure known as Kg. (=2.204 lbs / 35.3 ounces / 1000 g).
Kv	=	Flow co-efficient in metric units.
L		
Leak path	=	A joint or area where corruption is most likely to occur
Live Loading	=	A gland assembly where a load is continuously applied to prevent leakage.
Low pressure	=	In this catalogue pressures below 3,000 psi.
LPI	=	A non destructive examination by liquid penetrant inspection.

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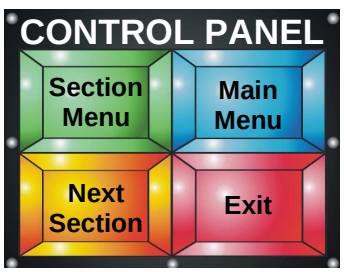

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REV: 00

Some terms used in this catalogue

M		
Manifold	=	A series of valves in a common housing.
Mazak	=	Zinc based alloy incandescent.
Manometer	=	A device used for measuring pressure by displacing a liquid in a column or tube
MSS	=	Manufacturers Standardisation Society (of the valve and fitting industry of America).
Monel®	=	A group of Alloys comprising mainly of Nickel & Copper
MPI	=	A non-destructive examination of magnetic particle inspection.
N		
NACE	=	MR - 01 - 75 National Associate corrosion Engineers.
Needle valve	=	An isolation valve with a number of rotations to close, also used for flow control.
Nickel Alloy	=	An alloy used for valve trim to resist the effects of steam.
O		
Oblique valve	=	A valve with near clear bore - often rod-able to some degree.
Orifice	=	A restriction who's length is short to its diameter.
Orifice valve	=	A valve for use at an orifice plate.
P		
Panel mount	=	A valve suitable for mounting within a panel containing other instruments.
Peek®	=	An engineered plastic with good chemical resistance & high temperature characteristics.
PTFE	=	A polymer which is almost chemically inert in the temperature range -195 to +232.
Q		
Quarter turn	=	A valve or device that operates through 90°
R		
Remote mounted	=	A remotely located valve.
Resilience	=	The ability of a seal to return to its original shape after deformation.
Rhino Valve	=	See section 6 page 1.
S		
Salt Spray Environment	=	A corrosion test or splash zone on an oil rig
Security handle	=	Normally low to medium level of security locking device.
Shear Action, Ball	=	A type of valve action in which the flow is controlled by a ported ball.
Soft seat	=	A valve seat usually made from a polymer.
Socket weld	=	Where a pipe is inserted into a bore and welded to form a permanent joint.
Stellite®	=	A cobalt based material used to protect valve wear surfaces.
T		
"T" bar	=	A form of handle used on ball or needle valves for manual operation.
Testing	=	The process of physical or mechanical inspection of a valve or its components.
Titanium	=	A strong light-weight material used in valve applications to resist corrosion & wear.
Traceable material	=	Materials which can be traced back to the original manufacturers base production process.
Torque	=	Rotational effort applied to the valve operator.
Trim	=	The internal valve components exposed to the flowing fluid.
Trunion ball	=	A valve in which the operating ball is supported on integral bearings in order to prevent lateral movement.
U		
Up stream pressure	=	Pressure on the inlet side of a valve.
V		
Vacuum	=	A pressure below that of the atmosphere.
Velocity	=	Speed of flow in a valve or pipe.
Vent	=	Normally a method of relieving pressure.
Virtually free	=	Less than normally expected.
Viscous media	=	Fluids with high viscosity.
Vital components	=	Valve parts the failure of which would render the valve useless.
Viton®	=	A fluoroelastomer with excellent resistance to petroleum products.
W		
Wafer style	=	A valve that usually fits between flanges.
Wall mounting	=	See panel mounting.
Wire Drawing	=	Erosion of a valve seat under high velocity whereby thin wire-like gullies are eroded away.
W.O.G	=	Water - Oil - Gas.
XYZ		
Zero-ing	=	Calibration of an instrument to a predetermined datum - normally zero pressure 0 psi gauge.
Zirconium	=	Used in partially stabilised form as a trim material to offset the effects of erosion and wear.
Others		
0 psia	=	Absolute zero pressure
2 piece body	=	A valve with two major body components.

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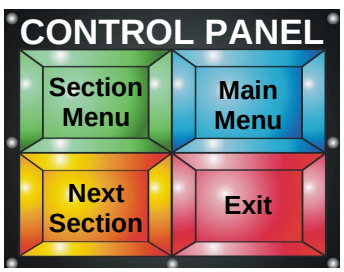

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General terms

A		
Absolute Pressure	=	The total pressure measured from an absolute vacuum.
Absolute Temperature	=	Temperature measured from absolute zero in °Kelvin or °Rankine.
Angle Valve	=	A style of Globe Valve where the inlet and outlet ports are at 90° to one another.
ANSI	=	American National Standards Institute.
ASME	=	American Society of Mechanical Engineers.
ASTM	=	American Society for Testing Materials.
B		
Bleed Valve	=	A valve used to vent a system.
Block & Bleed Valve	=	An isolating valve fitted with an integral bleed connection.
Body	=	The main part the pressure envelope for a valve. It contains the seats, the inlet, the outlet and the flow passages.
Bonnet	=	The part of the valve that forms the upper pressure envelope and seals the top of the body.
BSPP	=	British Standard Pipe Parallel thread.
BSPT	=	British Standard Pipe Taper thread.
BVAMA	=	British Valve and Actuator Manufacturers Association.
C		
Capacity	=	The mass flow rate through a valve under the specified conditions.
Certification	=	Documents that may be supplied with valves detailing the results of chemical, mechanical, physical properties, and / or pressure tests.
Check Valve	=	An automatic valve which is designed to prevent reverse flow, also known as a Non Return Valve.
Cock	=	A form of valve possessing a hole in a taper plug which can be rotated to provide a flow path for fluid.
Cold rating	=	The maximum pressure that a valve or fitting is designed to withstand at room temperature.
Compression Ends	=	A socket connection made between a fitting and a pipe, where a metal ring or olive fits over the pipe.
Compressible fluid	=	A gaseous fluid that has a significant change in volume & density as pressure increases.
Control Valve	=	A valve designed for finely regulating, or controlling fluid.
D		
Density	=	Mass per unit volume.
Design Conditions	=	All conditions that are present in a system which must be taken into account when designing a component of that system.
Design pressure	=	The pressure in a system used to design pressure vessels and other equipment.
Differential Pressure	=	The maximum difference in pressure measured between the valve inlet and outlet, against which the valve is expected to operate.
Direct Acting	=	A mode of operation of a valve.
Dry Saturated Steam	=	Saturated steam that does not contain any droplets of water.
E		
Emergency shut down Valve	=	A valve that uses energy which is stored in an actuator, in order to rapidly close in an emergency.
End to End Dimension	=	The distance, on a butt weld end straight pattern valve, between the extremities.
Equalising connection	=	A pipe which connects the body chamber of the Parallel Slide Valve to a Bypass Valve.
Equivalent Length	=	The pressure drop through a valve expressed as a straight length of pipe (measured in feet or metres), which would give the same pressure drop under the same conditions.
Erosion	=	A loss of material which occurs due to the action of a fluid flowing over it .
Explosion proof	=	Electrical equipment which is designed to operate in extremely hazardous areas.
F		
Female Thread	=	An internal thread used on fittings and fasteners to make a screwed connection.
Fire Safe Valves	=	A valve which is designed to be fluid tight in a fire.
Flange	=	A connection (often circular) used to bolt either two components together, or a valve or fitting to a pipe work system.
Flow characteristics	=	The relationship between flow, or pressure loss co-efficient, and the valve opening position.
Full Bore	=	A valve where the flow area through the seat is equal to the flow area through the inlet outlet.
G		
Galling	=	An action which can occur when unsuitable materials, particularly stainless steels, rub together.
Gauge Pressure	=	The pressure measured above atmospheric pressure and suffixed with the letter g.
Gland	=	The component that is used to compress the gland packing.
Gland Nut	=	The nut(s) which is (are) used to exert force on the gland.
Gland Packing	=	A soft compressible material fitted to a valve stuffing box, in order to seal between the spindle and cover.
Graphite	=	A form of Carbon which has excellent temperature and chemical resistance.
H		
Hand wheel	=	The manual input device used to open and close the valve.
Head	=	A measure of pressure as would be exerted by a vertical column of liquid.
Head Loss	=	The pressure that fluid looses as it flows through a valve or fitting.
Hose	=	A flexible line used to conduct a fluid.
Hot Tapping	=	An operation carried out where a live pipeline is safely cut into without shutting down a process.
Hysteresis	=	The failure to follow the same path in the forward direction as in the backward direction
I		
Incompressible Flow	=	A fluid such as water, which has no significant change in volume and density as the pressure increases.
Indicator	=	A device fitted to valves (and actuators) in order to show the degree of valve opening.
Inhibitor	=	A substance which prevents chemical reaction such as oxidation corrosion etc.
Inlet Port	=	The part of a valve or fitting connected to the upstream side of a fluid system.
Input	=	An incoming signal of pressure etc. in a control system.
Inspection	=	A means of quality control to ensure that the valve conforms to specification.
J		
Joule	=	A unit of energy in SI units. One joule is one Newton metre.
Junction Valve	=	See angle valve.
K		
K	=	Resistance Coefficient. A constant for particular valve or fitting, which is used in fluid flow calculations.
Kj	=	Kilojoule, i.e. 1 x 10^3 joule.
L		
Lapping	=	The process of "polishing" the mating faces of seats and discs.
Leakage	=	The amount of fluid passing a valve seal. Although this normally is used in reference to the seat and disc seal, it can also apply to gland and gasket seals.
Limit Switch	=	A small electrical switch fitted to a valve, usually at the limits of its travel, in order to produce a signal indicating whether the valve is opened or closed.
Locked Bonnet	=	A screwed bonnet or cover which is secured to the body in order to prevent it unscrewing in service.
Locking Device	=	A device or mechanism incorporated into a valve in order to prevent unauthorised operation.
Low Carbon Steel	=	A grade of casting or forging steel where the carbon content is closely controlled at a low level.
Lox	=	Abbreviation for Liquid Oxygen
Lubricator	=	A devise used to add lubricants into a fluid power system.

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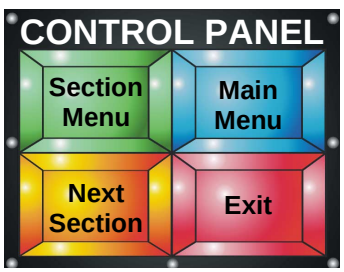

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General terms

M

Maintenance	=	The process of inspection, adjustment, and / or replacement of parts as necessary in order to ensure reliable and efficient operation.
Male Thread	=	An external thread used on fittings and fasteners to make a screwed connection.
Manometer	=	A devise used for measuring pressure by displacing liquid in a column or tube.
Maximum Pressure Differential	=	The maximum difference between the upstream pressure and the downstream pressure at specific locations, often across the inlet and outlet of a valve.
Metal to Metal Seal	=	Where the seal between seat and disc is achieved by metal to metal contact of these components, i.e. no soft seat is used.
Micron	=	A unit of length being 1,000,000th of a meter.

N

Name Plate	=	A circular or rectangular engraved, embossed or painted plate which contains reference details of the valve.
Nipple	=	A short length of tubing or pipe used for jointing piping elements.
Nozzle	=	A devise used to convert pressure energy into velocity energy
NPT	=	National Pipe Thread.
NRS	=	Non Rising Stem. A type of spindle and cover design, where, as the valve is operated and the obturator rises and falls, the spindle only rotates.

O

Operating Conditions	=	The pressure and temperature that a system operates at, together with any other requirements, e.g. valve closing time.
“O”-Ring	=	A type of seal in the shape of a torus or ring with a circular cross section. These seals are available in a wide range of synthetic materials.
OS & Y	=	Outside Screw and Yoke. A type of spindle and cover design where the spindle actuating thread is not in contact with the system fluid, and is supported by two arms that extend from the cover (also see yoke).
Outlet Port	=	That part of a valve or fitting which is connected to the downstream part of a piping system.
Overpressure	=	The pressure increase above the set pressure of a safety valve. Normally expressed as a percentage of the set pressure.

P

Packing	=	A deformable material used to seal a valve or other components.
Perfect Vacuum	=	0 psi, 0 bar.
Plug Valve	=	A valve where the fluid passes through a hole in a tapered or parallel plug. The flow is stopped by rotating the plug through 90°.
Pressure	=	Force per Unit Area. Units may be bar, Pa, Mpa, lb/in^2, etc.
PSI	=	Pounds per Square Inch, (lb/in^2). The unit of pressure used in British Units.

Q

Quality Assurance	=	Is a management system to ensure that quality control procedures are implemented, and that they are effective in ensuring that the specified standards and requirements are met.
Quality Control	=	The process of ensuring that the specified quality of materials, components, and finished products are supplied. This is achieved by inspection and process control.
Quarter Turn Valve	=	A valve which can be moved from open to closed, or closed to open by moving a lever through 90°.
Quick acting Valve	=	A valve which can be moved from open to closed, or closed to open in one movement of short duration.
Quick closing Valve	=	A valve which can be moved from open to closed in one movement of short duration.

R

Rating	=	An alpha numeric classification used to define the pressure capability of a pipe-work system and its components.
Relief Valve	=	A term used to describe a type of safety valve which prevents safe pressures being exceeded in a fluid system.
Re-seating	=	When the valve head in a safety or relief valve remakes contact with the seat after opening, and seals the flow of fluid.
Reverse Acting	=	A mode of operation of a valve, where it is normally closed, and uses force generated by the fluid to open.
Rising Stem	=	A valve spindle which rises and falls with the obturator as the valve is operated.
RTJ	=	Ring Type Joint. A type of flange seal that is produced by compressing a solid metal ring into machined groves in matching flange faces.

S

Screwed End	=	An end connection on a valve or fitting which is used to attach it to a system. The thread is usually female on a valve.
Seal	=	That which prevents fluid from passing between two parts, eg packing, gasket, seat & disc, etc.
Seat	=	That part of a valve with which the disc or valve plug makes contact and effects a seal.
Set Pressure	=	The pressure at which a safety or relief valve starts to open, allowing fluid to flow.
Socket Weld	=	A connection which is made by entering a pipe into a matching socket in the end of a valve or fitting, and welding the two together.

T

Tag	=	A rectangular strip of stainless steel/ Brass, aluminium or plastic, which is engraved or embossed with reference details.
Temperature	=	A measure of hotness or coldness of a material or fluid.
Testing	=	The process of physical and / or mechanical inspection of a valve or its components.
Thermocouple	=	A temperature sensitive devise consisting of two dissimilar metals between which an EMF is established.
Tongue & Groove Joint	=	A type of joint used on high pressure / high temperature installations where a tongue fits into a groove to assure alignment.

U

Union Bonnet	=	A connection between cover and body, which is produced by a nut passing over the cover, screwing onto the body and clamping both together.
Units	=	Two systems of units are commonly used in the valve industry, Metric and Imperial.

V

Valve	=	A device which is used to control the flow of fluids
Valve Application	=	The full system operating conditions which are applicable to the valve installation
Valve Head	=	That part of a valve (obturator) which stops the fluid flow.
Vapour Pressure	=	The pressure at which, for a given temperature, vapour bubbles form liquid.
Vena Contracta	=	The region of smallest cross section in a fluid stream.

W

Water Hammer	=	Vibration in a fluid system due to a rapid decrease in a the velocity of a liquid such as closing a valve.
Weatherproof	=	A term used to describe pieces of equipment which can withstand certain atmospheric conditions.
Weber Number	=	The ratio of inertia forces to surface tension
Wet Saturated Steam	=	Saturated steam that contains droplets of water.
WSP	=	Working Steam Pressure.

XYZ

Yoke	=	The part of the valve which connects the valve actuating mechanism to the valve body (see OS&Y).
Zero Leakage	=	The minimum leakage rate as specified in BS 6755 Part 1.

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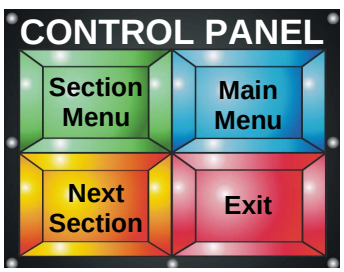

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ALCO VALVES CONDITIONS OF SALE

1. PARTIES
In these conditions the above named Company is referred to as "the Company" and the person, firm or Company placing the order of otherwise dealing with the Company as "the Customer" and reference to any control or terms or conditions is a reference solely to the conditions set out below.

2. BASIS AND APPLICATION OF CONDITIONS
(i) All prices quoted by the Company are based upon these conditions and are fixed by reference to the scope of the Company's rights and liabilities in the contract. In the event of any Customer wishing to Contract with the Company otherwise than on the basis of such conditions, special arrangements can be made and a revised price quoted by the Company.
(i) In the absence of any such special arrangement, (which shall not bind the Company unless made in writing and signed on the Company's behalf by a person duly authorised for that purpose) all quotations given and all contracts made by the Company and any additions or amendments thereto shall be subject to these conditions which supersede and shall override any terms or conditions proposed or stipulated or relied upon by the Customer.
(iii) No order from the customer shall be binding upon the Company until the customer has received from the Company an appropriate acknowledgement of order on the Company's printed form duly signed on the Company's behalf by a person authorised for that purpose, which shall constitute the Company's acceptance of the order.

3. PRICES
(I) Prices are subject to alteration without notice by the Company at any time.
(ii) Unless otherwise agreed in writing, orders are accepted by the Company on condition that delivery will be made at the price current at the date of despatch.
(iii) All prices quoted by the Company are exclusive of Value Added Tax, unless otherwise stated.
(iv) Unless otherwise agreed in writing, all goods are despatched by the Company on an "ex-works" basis. The Company reserves the right to charge carriage and packing as extra.

4. QUOTATIONS
(i) Unless otherwise agreed in writing, all quotations given by the Company shall be valid for a period of 30 days only from the date thereof.
(ii) The Company reserves the right to0 accept the order at the current price should a price change have occurred during the 30 day period.
(iii) All goods quoted "ex-stock" are subject to prior sale.
(iv) The Company reserves the right to correct at any time stenographic or clerical errors contained in any quotation.

5. DELIVERY AND COMPLETION
The Company will use its best endeavours to adhere to any time or date given for the despatch or delivery of goods or for the commencement or completion of work but any such time or date whether specified in the contract or otherwise given by the Company shall be taken only as an estimate made in good faith and shall not be binding upon the Company either as a term of the contract or otherwise. In no circumstances shall the Company be liable for any loss damage, however caused, sustained by the Customer in consequence of any failure by the Company to adhere to such times or dates, or in consequence of any other delay in despatch, delivery, commencement or completion. Delivery may be made by instalments at the sole discretion of the Company.

6. DRAWINGS AND DESCRIPTIONS
(I) Under no circumstances shall any contract
be deemed to be a contract description.
(ii) All illustrations drawings or other representations accompanying any quotation from the Company or contained in the Company's price lists, advertisements or other
literature shall be regarded as approximate representations only.
(iii) All specifications, descriptions or particulars of goods offered by the Company are stated in good faith as being approximately correct but the Company shall not be liable for deviations there from however arising, nor shall deviations in any way invalidate any contracts between the Company and the Customer in respect of such goods.
(iv) All drawings and copies of drawings are the Company's copyright and may not be copied or distributed without the express permission of the Company in writing given by a person authorised for that purpose.
(v) The Company reserves the right to up date and amend any specification of goods without notice to the purchaser.
(vi) If the goods are supplied according to the Customer's drawings or specifications, the Customer shall indemnify the Company against any claims and any costs, expenses or liability of the Company or action or infringement of any patent, trade mark, registered design, copyright or other industrial property, right of any third party in respect of their manufacture or repair by the Company.

7. CANCELLATIONS
The Customer shall indemnify the Company for all storage and other costs incurred by the Company as a result of the Customer's failure to accept delivery of the goods delivered at the Customer's premises during normal business hours at a time previously agreed by the Customer. The Company may dispose of any goods after 30 days from the date of delivery should the customer fail or refuse to take delivery of goods.

8. GOODS RETURNED FOR CREDIT
Returned goods will only be accepted by the Company after agreement and subject to a minimum handling charge of 10% of the sale price and by the allocation of a returned goods number, to ensure identification of goods at all stages of receipt and inspection. If such agreement is reached, the Company will accept the return of standard, current products in a clean, re-saleable condition, subject to these goods being returned to us delivered free to our works. The goods will be Inspected upon receipt and credit will be allowed depending upon the condition as received, such credit being entirely at our discretion.

9. PASSING OF PROPERTY AND RISK
(I) Until all monies due to the Company have been paid by the Customer, the goods shall remain the sole and absolute property of the Company as legal and equitable owner.
(ii) In the event of delivery of the goods being made to the customer prior to the passing of title, the Customer shall be in possession of the goods solely as bailee for the Company until such time as the title has passed pursuant to Clause (I) above.
(iii) Notwithstanding that title to the goods shall remain with the Company, the goods shall be at the risk of the Customer as soon as they are delivered by the Company to the premises or otherwise to the order of the Customer. The Customer will insure to their full value any goods wherein the risk, but not the title, has passed to it and indemnify the Company for loss, damage to or destruction of any such goods. Or any insurance monies payable in respect of such goods shall be held in trust for the Company.
(iv) Until the title to the goods shall pass as aforesaid:
(a) The Customer shall store and label the goods in such a manner that they shall at all times remain separate from the other goods in the Customer's possession and be readily identifiable as the Company's goods.
(b) The Company agrees to permit the Customer to dispose of the goods in the course of its business as agent of the Company and to
pass title to the goods to its Customer, being a bona fide purchaser for the value without notice of the Company's rights provided that such permission may be revoked at any time by notice by the Company.
(c) Without prejudice to the provisions of sub-clause (I) above, the Company consents to the use of the goods by the Customer in the assembly of some other goods incorporating the goods, notwithstanding that title in the goods shall not have passed to the Customer, provided that such assembly does not result in the goods being changed by any manufacturing process and the goods may be recovered by disassembly of the goods assembled. In the event of the goods becoming incorporated in assembled goods, the provisions contained in clauses (I), (ii) and (iii) of this clause shall apply to the storage the re-taking and the sale and proceeds of sale of the assembled goods so that the Company's rights shall not in any event be extended beyond the ownership of the goods forming a part of the assembled goods and the right to re-take the goods (without liability for any loss to the Customer resulting from the disassembly of the assembled goods) and to so much of the proceeds of sale thereof as is attributable to the goods.
(v) If the Customer has not received payment for a disposal under sub-clause (iii) above, the Customer shall upon notice in writing by the Company, assign to the Company all its rights against its Customer in respect of that disposal.

10. DIVERSION
The Company reserves the right to divert orders to its official stockists or distributors without prior notification of the Customer.

11. TERMS OF PAYMENT
(I) Unless otherwise agreed in writing, all accounts are monthly and strictly nett, and are due for payment by the end of the month following the month of despatch. If despatch is delayed as a result of a Customer's inability to take delivery or otherwise at the request of the Customer, payment shall be made by the end of the month following that in which the Customer is notified that the goods are ready for despatch.
(ii) If the price of any part thereof remains unpaid after the date of payment, the amount unpaid shall bear interest at the rate of 4% over the Bank of England Base Rate for each month or part thereof during which the same amount remains unpaid.
(iii) Unless otherwise agreed in writing, goods for delivery abroad must be paid for in full before shipment.
Notice of (iv) Notice of all payments made by Trader's Credit must be given to the Company within two days of the date of payment. (v) Where any sum I owed by the Customer to the Company, the Customer shall not be entitled to exercise any right of set-off or lien against the Company.

12. LOSS OR DAMAGE IN TRANSIT
(i) In the event of its assuming responsibility for all or part of the carriage of goods the Company shall not be liable for any loss of, or damage to such goods while in transit unless written notice thereof is given to the Company by the Customer.
(a) In the case of loss from or damage to goods delivered to the Customer within three days of the date of delivery.
(b) In the case of non-delivery of goods, within 21 days of the date upon which the Customer is notified that the goods have been consigned for delivery.
Provided that if the Customer proves:
(a) That it was not reasonably possible for him to give such notice to the Company within the appropriate period and
(b)Notice was given within a reasonable period, the Company shall not be entitled to rely upon the time limits stipulated by this condition.
(ii) Any liability which the Company may incur for the loss or damage to goods while in transit shall in any event be limited to the invoice value of the goods and in no circumstances shall the Company be liable for any indirect or consequential loss, however caused.
(iii) The customer shall inspect the goods immediately on delivery. If the Customer shall not give notice in accordance with sub-clause (I)(a) above, the goods shall be conclusively presumed to have been accepted by the purchaser.

13. TESTING
The Company will provide facilities to the Customer for the inspection and testing of goods at the Company's works prior to despatch, normally such facilities will be provided free of charge. Special test or test/inspection in the absence of the buyer or his representative, unless otherwise agreed, must be made at our works and will be charged for, as will test/inspection made of necessity by independent organisations.

14. GUARANTEE
(i) GOODS: The Company will, at its option, replace, repair or refund the full purchase price upon the return of goods which are, or within twelve months of delivery become defective by reason of provable faulty materials or workmanship, provided that the customer has notified the Company in writing of the defect within one month of the occurrence of the defect.
(ii) WORK: Where the contract provides for the execution of work, the Company will at its own expense make good any defect in such work, attributable to provable bad workmanship or the use of unsatisfactory materials which occurs and becomes apparent within twelve months of the completion thereof, provided that the Customer has notified the Company in writing of the defect within one month of the defect becoming apparent.

15. EXCLUSION OF LIABILITY
(i) The above guarantee is given by the Company and accepted by the Customer in substitution for any rights which the Customer might otherwise become entitled to assert against the Company, its servants or agents;
(a) By virtue of any express or implied representation, condition or warranty, statutory or otherwise as to
(i) the quality of the goods and
(ii) the standard of the Company's workmanship and the quality of any material supplied in connection therewith and all such conditions are hereby expressly excluded.
(b) In negligence or otherwise in tort arising out of or in connection with the supply of any goods or materials to or to the order of the Customer or for the execution of any work for the Customer and all such liability however arising is hereby expressly excluded. Provided that nothing in this condition shall excuse the Company from any liability which it may incur for death or personal injury resulting from negligence.
(ii) Except for any such liability as it may incur for death or personal injury resulting from negligence, the Company shall not be liable in any manner whatsoever, whether under this contract or in tort, in
misrepresentation or otherwise for any indirect or consequential loss, damage or injury however caused which may arise out of or in connection with the supply of goods or materials to or to the order of the Customer or the execution of any work for the Customer.
(iii) The Company shall not be liable for any injury or damage arising out of any non-compliance with any requirement imposed by or under enactment or with any obligation arising under the Treaty of Rome or from any of the organs of the European Community, save insofar as this provision expressly contradicts Section 7 Consumer Protection Act 1987.
(iv) In no case shall the Company's liability exceed £1,000.00.
(v) The Company shall be entitled to the benefit in full of the defences and protections provided by Sections 4 and 5 Consumer Protection Act 1987 or to any extension or variation of that legislation.
(vi) Notwithstanding Section 7 Consumer Protection Act 1987, the Company reserves the right to claim an indemnity or contribution against the Customer in respect of any liability which may accrue to it under the Consumer Protection Act 1987.
(vii) In this condition the works "goods" "material" and "work" shall include goods and materials supplied and work executed under the guarantee.

16. ADVICE
The Company shall be under no liability whatsoever in respect of any advice given or views expressed to the Customer whether or not such advice or such views are expressed at the Customer's request.

17. DEFAULT OF THE CUSTOMER
If the Customer shall make default in the punctual payment of any sum due to the Company under the contract or if any distress or execution may be levied upon the Customer's assets or if the Customer shall make or offer to make any arrangement or composition with creditors or commit any act of bankruptcy or if any petition or receiving order in bankruptcy is made or presented against the Customer or if the Customer is a limited Company and resolution or petition to wind-up its business (other than for the purposes of amalgamation or reconstruction) shall be passed or presented or if a receiver or administrator of such Company's assets or any part thereof shall be appointed, the Company shall be entitled to determine the contract with the Customer without prejudice to any other claims or rights which the Company might possess.
(ii) Upon the determination of the contract by the Company and in the event of the Customer defaulting in the punctual payment of any sum due to the Company thereunder or upon the occurrence of any of the events specified in paragraph
(I) of this condition the Customer's right under condition 9 hereof to sell goods for which full payment has not been made shall forthwith cease and the Company shall be entitled to take possession of all such goods in the possession or under the control of the Customer for which purpose the Customer authorises the Company, its servants or agents to enter upon any land or premises on or in which such goods may be situated.

18. LIEN
The Company shall have a lien over all goods of the Customer in the Company's possession not only for monies due in respect of such goods but also for any other monies due from the Customer to the Company, if any monies due from the Customer to the Company remain unpaid at the expiry of six months after notice has been given that such goods are being detained the Company shall thereupon have the irrevocable authority of the Customer to sell the goods by public auction or otherwise and to apply the proceeds of sale (after deducting the expense thereof) in discharge of the Customer's indebtedness and thereafter account to the Customer for any balance remaining.

19. FORCE MAJEURE
The Company shall be relieved of all or any of its obligations under the contract to the extent that performance of such obligations is affected as a result of any statue, regulation or order of any Government, Council or other authority or any strike, lock-out or trade dispute (whether involving the Company's employees or other parties) or any other cause whether or not of a like or similar nature beyond the Company's control.

20. DISPUTES
Should any question arise as to the interpretation of this agreement and/or the parties rights thereunder or as to any order placed by the Customer with the Company, the same shall be subject to and constructed in accordance with English law. The parties hereto submit to the jurisdiction of the English Courts. At its own option, the Company may elect to refer such question to arbitration by a Judge of the Commercial Court as an arbitrator sitting with or without assessors as he shall direct.

21. EXPORT SALES
It is hereby agreed between the parties that the uniform law on international sales and the United Nations Convention on international sale of goods shall not apply to any contract pursuant to these conditions.

22. GENERAL
(I) Any notice required or permitted to be given by either party to the other under these Conditions shall be in writing, addressed to the Company at its Registered Office marked for the attention of the Company Secretary and the purchaser at its Registered Office or principal place of business or such other address as may at the relevant time have been notified to the Company pursuant to this provision.
(ii) If any provision of these conditions is held by any competent authority to be invalid or unenforceable in whole or in part the invalidity of these conditions and the remainder of the provisions in question shall not be affected thereby.
(i) No granting of time by the Company or any other failure by the Company to enforce any of these terms and conditions shall be constructed as a waiver to any extent of its rights hereunder.