

Data

Alcon Corrosion Resistance Guide

The information contained in this guide is based on gases and liquids at ambient temperatures (unless stated otherwise). For high temperature applications and duties not stated on the chart please contact ALCON Sales Department.

Material	Alum	Brass	Brz	Cl	Stainless	Nitrile	EPDM	Viton	PTFE	*Notes
Acetic Acid	10%	NR	NR	NR	X	NR	X	NR	X	1
Acetone	X	X	X	X	X	NR	X	NR	X	
Acetylene	NR	X	X	NR	X	NR	X	X	X	2
Air	X	X	X	X	X	X	X	X	X	
Ammonia Gas Anhydrous 20%	NR	NR	NR	X	X	NR	X	NR	X	
Argon Gas	X	X	X	NR	X	NR	X	X	X	
Beer	NR	NR	NR	NR	X	X	X	X	NR	
Benzene	X	X	X	NR	X	NR	NR	X	X	
Bromine (Liquid)	NR	NR	NR	NR	NR	NR	NR	X	NR	6
Butane	X	X	X	X	X	X	NR	X	X	
Carbon Dioxide (Gas)	X	X	X	X	X	X	X	X	X	
Carbon Dioxide (Liquid)	NR	NR	NR	NR	X	NR	NR	NR	X	
Carbon Tetrachloride (Dry)	NR	X	X	NR	X	NR	NR	X	X	
Carbonated water	NR	NR	NR	NR	X	X	X	NR	X	
Caustic Soda 30%	NR	NR	NR	NR	X	NR	X	NR	X	
Chrome Acid 20% - 20C	NR	NR	NR	NR	X	NR	NR	X	X	
Chlorine Gas (Dry)	NR	NR	NR	NR	NR	NR	NR	X	X	6
Chlorine Liquid	NR	NR	NR	NR	NR	NR	NR	X	X	6
Chlorine in Water	NR	X	X	NR	X	X	X	NR	X	3
Coke Oven Gas	X	NR	NR	X	X	X	NR	NR	X	
Coolant	NR	X	X	NR	X	X	NR	X	X	
Creosote	X	NR	NR	NR	X	NR	NR	X	X	
Crude Oil	X	NR	NR	NR	X	X	NR	X	X	
Deionised water	NR	NR	NR	NR	X	X	X	X	X	
Demineralsed Water	NR	NR	NR	NR	X	X	X	X	X	
Detergents	NR	X	X	NR	X	X	X	X	X	
Diesel Oil	X	X	X	X	X	X	NR	X	X	
Distilled Water	NR	X	X	NR	X	X	X	X	X	
Ethyl Alcohol	NR	X	X	NR	X	X	X	X	X	
Ethylene Glycol	X	X	X	NR	X	X	X	X	X	
Ethylene Oxide	NR	NR	NR	NR	X	NR	NR	NR	NR	4
Food products	NR	NR	NR	NR	X	X	NR	X	NR	
Freon 12	NR	X	X	X	X	NR	NR	NR	X	
Freon 22	NR	NR	NR	NR	X	NR	NR	NR	X	
Freon Solvents	NR	X	X	NR	X	X	NR	NR	X	4
Fuel Oil	X	X	X	NR	X	X	NR	X	X	
Gasoline	NR	X	X	NR	X	NR	NR	X	X	
Helium	X	X	X	NR	X	X	X	X	X	
Hydraulic Fluids	NR	X	X	NR	X	NR	NR	X	X	
Hydrochloric Acid	NR	NR	NR	NR	NR	NR	NR	NR	X	6
Hydrogen Gas	X	X	X	X	X	X	X	X	X	5
Hydrogen Sulphide (Dry)	NR	NR	NR	NR	X	NR	X	X	X	
Jet Fuel	X	NR	NR	NR	X	X	NR	X	X	
Kerosene	X	X	X	X	X	X	NR	X	X	

Material Specification

Aluminium:	BS.1490 LM4 + LM25
Brass:	BS.2872 CZ122
DZR Brass:	BS.2872 CZ132
Bronze (Brz):	BS.1400 LG4 + LG2
Cast Iron (Cl):	BS.1452 Grade 220
Stainless Steel:	Cast components, BS.1504 316 C16 Solenoid components, AISI 430F Machined components, BS.970 303 S21
Nitrile (BunaN):	NBR -10°C to +80°C. Resilient seal having tight shut off.
Ethylene Propylene:	EPDM -50°C to +120°C. Resilient seal having tight shut off.
Viton:	FKM -20°C to +150°C. Resilient seal having tight shut off.
PTFE (Teflon):	PTFE -200°C to +180°C. Slight leakage past seat.
Metal:	M/M -50°C to +250°C. Slight leakage past seat.

Please note that this chart is for general recommendation only. When ordering valves for corrosive duty the full applicational details are to be given, particularly, media, % concentration, temperature and ambient temperature.

Material	Alum	Brass	Brz	Cl	Stainless	Nitrile	EPDM	Viton	PTFE	*Notes
LPG	X	X	X	NR	X	X	NR	X	X	
Lubricating Oil	X	X	X	X	X	NR	X	X	X	
Methane Gas	X	X	X	X	X	X	NR	X	X	
Methyl Alcohol	NR	X	X	X	X	X	X	X	X	
Mineral Oil	X	X	X	X	X	X	NR	X	X	
Natural Gas	X	X	X	X	X	X	X	X	X	
Natural Gas Liquid	NR	X	X	NR	X	NR	NR	NR	X	5
Nitric Acid 50% 20C	NR	NR	NR	NR	X	NR	NR	X	X	
Nitrogen Gas	X	X	X	X	X	X	X	X	X	
Nitrogen Liquid	NR	X	X	NR	X	NR	NR	NR	X	5
Nitous Oxide	NR	NR	NR	NR	X	NR	X	NR	X	
Oxygen Gas	NR	X	X	NR	X	NR	NR	X	X	5
Oxygen Liquid	NR	X	X	NR	X	NR	NR	NR	X	5
Paraffin	X	X	X	NR	X	X	X	X	X	
Perchlorethylene 20C	NR	X	X	NR	X	NR	NR	X	X	
Phosphoric Acid 30%	NR	NR	NR	X	NR	NR	X	X	X	6
Photographic Solution	NR	NR	NR	NR	NR	NR	NR	NR	X	6
Potable water	NR	X	X	NR	X	X	X	X	X	
Potassium Sulphate	NR	NR	NR	X	X	X	X	X	X	
Propane	X	X	X	NR	X	X	NR	X	X	
Salt Water	NR	NR	X	NR	X	X	X	X	X	1
Sea Water	NR	NR	X	NR	X	X	X	X	X	1
Soapy Water	NR	X	X	NR	X	X	NR	X	X	
Sodium Hydroxide 70%	NR	NR	NR	NR	X	NR	X	X	X	
Sodium Hypochlorite 5%	NR	NR	NR	NR	X	NR	X	X	X	
Steam 0 - 50 PSI	NR	X	X	NR	X	NR	X	NR	X	
Steam 0 - 125 PSI	NR	X	X	NR	X	NR	NR	NR	X	
Steam Condensate	NR	X	X	NR	X	NR	X	NR	X	
Sulphur Dioxide	NR	NR	NR	NR	X	NR	X	NR	X	
Sulphuric Acid 40%	NR	NR	NR	NR	NR	X	X	X	X	6
Sulphurous Acid 5% - 20C	NR	NR	NR	NR	NR	NR	NR	X	X	6
Toluene	X	X	X	NR	X	NR	NR	NR	X	
Town Gas	X	X	X	X	X	X	NR	X	X	
Trichlorethylene (Dry)	NR	NR	NR	NR	X	NR	NR	X	X	
Turpentine	X	X	X	NR	X	X	NR	X	X	
Vegetable Oil	NR	NR	NR	NR	X	X	NR	X	X	
Vinegar	NR	NR	NR	NR	X	NR	X	NR	X	1
water (Mains)	NR	X	X	X	X	X	X	X	X	
Water 80 - 120°C	NR	X	X	NR	X	NR	X	X	X	
Water 120 - 150°C	NR	X	X	NR	X	NR	NR	X	X	
Water 150 - 180°C	NR	X	X	NR	X	NR	NR	NR	X	
Water Boiler Feed	NR	NR	NR	NR		X	X	NR	X	
Water/Glycol Solutions	NR	X	X	NR	X	NR	X	X	X	
White Spirit	X	X	X	X	X	NR	NR	X	X	

Notes

1. Special grade of stainless must be used
2. Stainless steel flange tube must be used
3. Chlorine must not exceed 5 parts per million
4. Metal to metal seals may also be used
5. All parts degreased
6. Plastic valves recommended, consult ALCON Sales Department.

X = Recommended

NR = Not Recommended, consult ALCON Sales Department

Data

Viscosity Conversion Table

Redwood 1 (seconds)	Redwood 11 (seconds)	Saybolt Universal (seconds)	Saybolt Furol (seconds)	Engler (degrees)	Kinematic (centistokes)
30*	-	-	-	1.05*	1.5
32*	-	34	-	1.15*	2.5
34*	-	37	-	1.25*	3.4
36*	-	40	-	1.3 *	4.2
38	-	42	-	1.4 *	5.0
40	-	45	-	1.45*	5.7
45	-	50	-	1.6 *	7.5
50	-	57	-	1.8 *	9.4
55	-	62	-	1.9	11.0
60	-	68	-	2.1	12.6
65	-	74	-	2.2	14.2
70	-	79	-	2.4	15.5
75	-	85	-	2.6	17.0
80	-	92	-	2.7	18.6
85	-	98	-	2.9	20.0
90	-	103	-	3.0	21.3
95	-	109	-	3.2	22.8
100	-	115	15*	3.4	24.1
110	-	125	16*	3.7	26.7
120	-	137	17*	4.0	29.2
130	-	148	18*	4.3	31.7
140	-	160	20*	4.6	34.2
150	-	171	21*	4.9	36.8
160	-	183	22*	5.2	39
180	-	205	24*	5.9	44
200	-	228	26*	6.5	49
225	-	256	28	7.3	55
250	-	285	31	8.1	62
275	-	313	34	8.9	68
300	-	342	37	9.8	74
325	34	370	40	10.6	80
350	36	399	42	11.4	86
375	38	428	45	12.2	93
400	41	456	48	13.0	99
450	46	513	53	14.7	111
500	51	570	59	16.3	124
550	56	628	65	17.9	136
600	61	684	71	19.5	148
700	71	799	82	22.8	173
800	81	912	94	26.1	198
900	91	1 025	105	29.3	222
1 000	100	1 142	117	32.6	247
1 100	110	1 257	128	35.9	272
1 200	120	1 368	140	39	296
1 400	140	1 599	163	46	346
1 600	160	1 825	186	52	395
1 800	180	2 050	209	59	444
2 000	200	2 280	232	65	493
2 200	220	2 510	255	72	534
2 400	240	2 735	278	78	592
2 600	260	2 965	302	85	642
2 800	280	3 190	325	91	691
3 000	300	3 420	348	98	741
3 500	350	3 990	406	114	864
4 000	400	4 560	464	130	987
4 500	450	5 140	522	147	1 112
5 000	500	5 700	580	163	1 235
5 500	550	6 280	639	179	1 359
6 000	600	6 840	696	195	1 482
6 500	650	7 415	754	212	1 605
7 000	700	7 990	814	228	1 730
7 500	750	8 550	869	244	1 850
8 000	800	9 120	928	261	1 957

Notes

This table is sufficiently accurate for normal commercial requirements, but an asterisk (*) indicates that the conversion figure is only approximate in the low viscosity ranges. Some Saybolt Furol viscosities are quoted below 25 seconds, but only because such figures occasionally appear in specifications. These low conversion figures must therefore be used with caution, as they are not designed to give results below 25 seconds. Similarly, the precision of the Redwood 11 instrument does not justify quoting figures below about 34 seconds.

Note that this table may be used only for conversion of viscosities at the same temperature.

Data

Force & Velocity

	From	To	Multiply by
1.488	kg/m	lb.p.ft.	0.672
0.496	kg/m	lb.p.yd.	2.016
1.575	kg/mm ²	ton p.sq.in (Britain)	0.635
1.406	kg/mm ²	ton p.sq.in (USA)	0.7112
0.07031	kg/cm ²	lb.p.sq.in.	14.223
4.883	kg/m ²	lb.p.sq.ft.	0.2048
0.5425	kg/m ²	lb.p.sq.yd.	1.843
0.0277	kg/cm ³	lb.p.cu.in.	36.1271
16.018	kg/m ³	lb.p.cu.ft.	0.0624
0.5933	kg/m ³	lb.p.cu.yd.	1.6855
0.00508	m/s	ft.p.min.	196.851
1.699	m ² /h	cu.ft.p.min.	0.5885794
0.1383	kgm	ft-lb	7.233
309.7	kgm	ft.ton (Britain)	0.003229
276.5	kgm	ft.ton (USA)	0.003617
107.6	kgm	B.T.U.	9.2956 x 10 ³
0.138255	kgm/s	ft-lb.p.sec.	7.233
76.04	kgm/s	HP	0.013151
1.0139	PS	HP	0.9863
270 000	kgm	PS/h	3.7037 x 10 ⁶
273750	kgm	HP/h	3.6529 x 10 ⁶
75	kgm/s	PS	0.01333
102.03	kgm/s	kW	0.0098013
0.27778	mm/s	m.p.h.	3-6
0.00054	knots	m.p.h.	1 852
1.94386	knots	m.p.s.	0.51444
0.000494	knots	yd.p.h.	2 025-35
0.1781	kcal/s	HP	5.6148
Multiply by	To	From	

General Heat Conversions

	From	To	Multiply by
0.0023425	kcal	kgm	426.9
3.2386 x 10 ⁴	kcal	ft.lb.	3087.8
0.1757	kcal/s	PS	5.692
0.1781	kcal/s	HP	5.6148
0.2390057	kcal/s	kW	4.184
0.7351	kW	PS	1.3604
0.7452926	kW	HP	1.341755
0.0013551	kW	lt.lbp.sec.	737.97
0.0011628	kWh	kcal	860
2.9289 x 10 ⁻⁴	kWh	B.T.U.	3412.74
2.7225 x 10 ⁻⁴	kWh	kgm	367.310
3.7647	kWh	ft-lb	2.656 700
0.252	kcal	B.T.U.	3 9683
0.5556	kcal/kg	B.T.U.p.lb.	1.8
0.0391	kcal/cm ²	B.T.U.p.sq.in.	25.59
2.712	kcal/m ²	B.T.U.p.sq.ft.	0.3686
0.01538	kcal/m ³	B.T.U.p.cu.in.	65.02
8.899	kcal/m ³	B.T.U.p.cu.ft.	0.1124
Multiply by	To	From	

Temperature Conversions

From	To	Substitute in Formula
Degrees Celsius	Degrees Farenheit	(°C x 9/5) + 32
Degrees Celsius	Kelvin	(°C + 273.16)
Degrees Farenheit	Degrees Celsius	(°F - 32) x 5/9
Degrees Farenheit	Degrees Rankin	(°F + 459.69)

Head and Pressure

	kPa (kNm ²)	Water		bar	kgf/cm ²	ibf/in ² (psi)	atmos	Mercury (Hg)	
		m	ft					mm	inch
1kPa	1	0.101	0.335	0.009 93	0.0101	0.145	0.009 81	7.44	0.2953
1 m	9.81	1	3.281	0.098	0.0999	1.422	0.0968	73.55	2.836
1 ft	2.989	0.3048	1	0.029 89	0.0305	0.434	0.0295	22.42	0.882
1 bar	100	10.2	33.445	1	1.0197	14.504	0.987	750	29.530
1 kgf/cm ²	98.1	10.0	32.809	0.981	1	14.223	0.968	735.56	28.959
1 psi	6.895	0.703	2.307	0.069	0.070	1	0.068	51.714	2.036
1 atmos	101.32	10.34	33.9	1.0132	1.0332	14.696	1	760	29.92
1 mm Mercury	13.4	1.36	0.0446	0.1333	0.136	1.94	0.132	1	0.0394
1 inch Mercury	3.3864	0.34534	1.133	0.0338	0.0345	0.491	0.0334	25.4	1

Capacity & Flow Rate

	m ³ /h	l/s	l/m	m ³ /s (cumec)	UK gpm	US gpm	(cusec)	Water	
								UK ton/h	tonne/h
1 m ³ /h	1	0.278	16.66	0.000278	3.666	4.40	0.009 81	0.982	1.000
1 l/s	3.60	1	60	0.001	13.2	15.83	0.0353	3.528	3.60
1 l/m	0.060	0.0167	1	1.666 x 10 ⁻⁵	0.2199	0.264	0.000588	0.059	0.060
1 m ³ /s	3600	1000	60,000	1	13,000	15,800	35,315	3532	3600
1 UK gpm	0.272	0.0757	4.546	0.000 0757	1	1.2	0.002 267	0.268	0.272
1 US gpm	0.227	0.0632	3.785	0.0000630	0.833	1	0.002 23	0.223	0.227
1 ft ³ /s	101.9	28.32	1698	0.0283	374	449	1	100	101.9
1 UK ton/h	1.02	0.283	17	0.000283	3.73	4.48	0.010	1	1.02
1 tonne/h	1.005	0.278	16.7	0.000 278	3.666	4.41	0.0098	0.980	1

Volume Conversions

To Obtain	Cubic Decimetres (Litres)	Cubic Inches	Cubic Feet	U.S. Quart	U.S. Gallon	Imperial Gallon	U.S. Barrel (Petroleum)
Multiply by	1	61.0234	0.03531	1.05668	0.264178	0.220083	0.00629
Number of	0.01639	1	5.787x10	0.17332	0.004329	0.003606	0.000003
Cubic Feet	28.317	1728	1	29.9221	7.48055	6.22888	0.1781
U.S. Quart	0.94636	57.75	0.03342	1	0.25	0.2082	0.00595
U.S. Gallon	3.78543	231	0.13368	4	1	0.833	0.02381
Imperial Gallon	4.54374	277.274	0.16054	4.80128	1.20032	1	0.02877
U.S. Barrel (Petroleum)	158.98	9702	5.6146	168	42	34.973	1

1 cubic metre = 1,000,000 cubic centimetres
1 litre = 1,000 millilitres = 1,000 cubic centimetres

Length Conversions

To Obtain	Metres	Inches	Feet	Millimetres	Miles	Kilometres
Multiply by	1	39.37	3.2808	1000	0.0006214	0.001
Number of	0.0254	1	0.0833	25.4	0.00001578	0.0000254
Inches	0.0254	1	0.0833	25.4	0.00001578	0.0000254
Feet	0.3048	12	1	304.8	0.0001894	0.0003048
Millimetres	0.001	0.03937	0.0032808	1	0.0000006214	0.000001
Miles	1609 35	63.360	5.286	1,609,350	1	1.60935
Kilometres	1000	39.370	3280.83	1,000,000	0.62137	1

1 metre = 100 centimetres = 1000 millimetres = 0.001 kilometres = 1,000,000 micrometres
To convert metric units merely adjust the decimal point.
1 millilitre = 1,000 microns = 0.03937 inches = 3937 miles

Data

Pressure Conversions

To Obtain Multiply Number of by	Pounds per Square Inch	Inches of Water Column	Feet of Water Column	Inches of Mercury	Ounces per Square Inch	Bar	Millibar	Kilopascals	Kilograms per Square Centimetre
Pounds Per Square Inch	1	27.68	2.307	2.036	16	0.06895	68.95	6.895	0.0703
Inches of Water Column	0.0361	1	0.8333	0.7355	0.5776	0.002491	2.491	0.2491	0.00254
Feet of Water Column	0.4336	12	1	0.8826	6.936	0.02989	29.89	2.989	0.0305
Inches of Mercury	0.4911	13.60	1.133	1	7.858	0.03386	33.86	3.386	0.03453
Ounces per Square Inch	0.9625	1.73	0.144	0.127	1	0.00431	4.309	0.4309	0.0044
Bar	14.50	401.5	33.45	29.53	232	1	1000	100	1.020
Millibar	0.0145	0.4015	0.03345	0.02953	0.232	0.001	1	0.100	0.00102
Kilopascals	0.1450	4.015	0.3345	0.2953	2.32	0.01	10	1	0.0102
Kilograms per Square Centimetre	14.22	393.7	32.81	28.96	227.5	0.9807	980.7	98.07	1

Volumetric Rate of Flow Conversions

To Obtain Multiply Number of by	Litres per Second	Litres per Minute	Cubic Metres per Hour	Cubic Feet per Hour	Gallons per Minute	Imperial Gallons per Minute	U.S. Gallons per Minute	U.S. Barrels per Day (42 U.S. Gal)
Litres per Second	1	60	3.600	127.1	21.19	13.20	15.85	543.4
Litres per Minute	0.1667	1	0.06000	2.119	0.03532	0.2200	0.2642	9.057
Cubic Metres per Hour	0.2778	16.67	1	35.31	0.5886	3.666	4.403	150.9
Cubic Feet per Hour	0.007865	0.4719	0.02832	1	0.01667	0.1038	0.1247	4.275
Cubic Feet per Minute	0.4719	28.32	1.6999	60.00	1	6.229	7.481	256.5
Imperial Gallons per Minute	0.07577	4.546	0.2727	9.633	0.1606	1	1.201	41.17
U.S. Gallons per Minute	0.06309	3.785	0.2271	8.021	0.1337	0.8327	1	34.29
U.S. Barrels per Day	0.001840	0.1104	0.006624	0.2339	0.003899	0.02428	0.02917	1

Velocity Conversions

To Obtain Multiply Number of by	Feet per Second	Feet per Minute	Miles per Hour	Metres per Second	Metres per Minute	Kilometres per Hour
Feet per Second	1	60.00	0.6818	0.3048	18.29	1.097
Feet per Minute	0.01667	1	0.01136	0.005080	0.3048	0.01829
Miles per Hour	1.467	88.00	1	0.4470	26.82	1.609
Metres per Second	3.280	196.9	2.237	1	60.00	3.600
Metres per Minute	0.05468	3.281	0.03728	0.01667	1	0.06000
Kilometres per Hour	0.9113	54.68	0.6214	0.2778	16.67	1

Area Conversions

To Obtain Multiply Number of by	Square Metres	Square Inches	Square Feet	Square Miles	Square Kilometres
Square Metres	1	1549.99	10.7639	3.861×10^7	1×10^6
Square Inches	0.0006452	1	6.944×10^3	2.491×10^{10}	6.452×10^{10}
Square Feet	0.0929	144	1	3.587×10^6	9.29×10^6
Square Miles	2.589,999		27,878,400	1	2.59
Square Kilometres	1,000,000		10,763,867	0.3861	1

1 square metre = 10,000 square centimetres
1 square millimetre = 0.001 square centimetre = 0.00155 square inches

Torque Conversions

To Obtain Multiply Number of by	Newton Metres	Kilogram Force Metres	Foot Pounds	Inch Pounds
Newton Metres	1	0.1020	0.7376	8.851
Kilogram Force Metres	9.807	1	7.233	86.80
Foot Pounds	1.356	0.1383	1	12.00
Inch Pounds	0.1130	0.01152	0.8333	1

Density Conversions

To Obtain Multiply Number of by	Grams per Millilitre	Kilogram per Cubic Metre	Pounds per Cubic Foot	Pounds per Cubic Inch
Grams per Millilitre	1	1000	62.43	0.03613
Kilograms per Cubic Metre	0.001000	1	0.06243	0.00003613
Pounds per Cubic foot	0.01602	16.02	1	0.0005787
Pounds per Cubic Inch	27.68	27,680	1728	1

Force Conversions

To Obtain Multiply Number of by	Kilonewtons	Kilogram Force	Pound Force	Poundals
Kilonewtons	1	102.0	224.8	7233
Kilogram Force	0.009807	1	2.205	70.93
Pound Force	0.004448	0.4536	1	32.17
Poundals	0.0001383	0.01410	0.03108	1

Orifice Sizes -

Common ORIFICE sizes and ISOS equivalents in mm.

Inches	mm	Inches	mm
3/64 (0.0469)	1.19	7/16 (0.4375)	11.11
1/8 (0.0625)	1.59	1/2 (0.5000)	12.70
5/64 (0.0781)	1.98	5/8 (0.6250)	15.88
3/32 (0.0937)	2.38	11/16 (0.6875)	17.46
1/8 (0.1250)	3.18	3/4 (0.7500)	19.05
5/32 (0.1562)	3.97	1 (1.0000)	25.40
11/64 (0.1719)	4.37	1 1/8 (1.1250)	28.58
3/16 (0.1875)	4.76	1 1/4 (1.2500)	31.75
7/32 (0.2187)	5.55	1 1/2 (1.5000)	38.10
1/4 (0.2500)	6.35	1 3/4 (1.7500)	44.45
9/32 (0.2812)	7.14	2 (2.0000)	50.80
5/16 (0.3125)	7.94	3 (3.0000)	76.20

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Alcon are continually seeking to improve their range of products and therefore reserve the right to make alterations to specification without prior notice.