

FLOIXEM® L

Propylene glycol based antifreeze.

Concentrate, dilute before use.

Non-toxic, biodegradable.



Description and applications:

Concentrated propylene glycol based antifreeze should be diluted before use. For applications where a non-toxic and biodegradable product is required.

100% organic formulation (OAT) to guarantee the best protection for all types of metals and is compatible with plastics and elastomers normally present in circuits. Aluminium and its alloys are protected from corrosion.

Additives that are not consumed in action, no need to replenish with supplementary packs and no need to check residuals periodically.

Free of hazardous products such as nitrites, amines, nitrates, borates, benzoates, 2EH.

Technical Data:

Appearance	Transparent Liquid
Colour	Blue
pH 35% in water at 20°C	8.0-9.0

Data has been gathered in specific bibliography and proprietary test. It is not part necessarily of the technical data.

Protection against corrosion:

Results at INTA laboratories belonging to the Spanish Ministry of Defence according to standard ASTM D1384.

Metal	Floixem® L	Limit
Copper	0.5	10
Soft Solder	0.1	30
Brass	-0.5	10
Carbon Steel	-1.0	10
Cast Iron	-3.7	10
Aluminium	2.0	30

Results in mg per control after 336 hours at 88°C with forced aeration and diluted 33% in corrosive water. Negative results indicate a weight gain of the control due to the formation of a stable protective layer.

Results obtained at INIA laboratories depending on Spanish Ministry of Defense according to standard ASTM-D4340

Results	Limit
0.5 mg/cm ² week	1.0 mg/cm ² week

Data after exposure of an aluminium control to a 25% dilution of the product with corrosive water for 168 hours at 135°C and a pressure of 1.93 bar.

Mode of use

Floixem® L is available in concentrated form, to dilute with water according to the desired protection temperature.

% volume Floixem® L	Freezing Temperature °C	Protection Temperature °C	Burst Temperature °C
20%	-8	-9	-10
25%	-9	-11	-13
30%	-12	-16	-18
35%	-16	-20	-22
40%	-20	-25	-29
45%	-25	-32	-38
50%	-30	-40	-49

The freezing temperature is the temperature at which the first ice crystal appears and coincides with those displayed by a refractometer. The breaking temperature is the temperature at which the entire product is frozen and there is an increase in volume and pressure that endangers the integrity of the system. Between the two temperatures above, there is a mixture of ice crystals and unfrozen glycol that flows without increasing in volume; the mid-point between the freezing and breaking temperatures is called the protection temperature.

A minimal proportion of 20% is required to ensure the additives are in an adequate proportion for protecting the system. Dilutions above 55% are not recommended.

In new installations it is recommended to rinse with water to remove particles, grease and flux residues (especially if they contain borax, chlorides or fluorides).

It is recommended to purge the circuit to avoid air pockets.

Teflon tape or hemp is recommended for sealing the threaded joints. Check the compatibility of other products with propylene glycol before use.

Propylene glycol and its dilutions are not compatible with zinc as it dissolves it. If galvanized pipe is present in the system, a whitish solid will appear at the beginning of the operation. Once removed, the resulting carbon steel will be protected by Floixem® L and no further precautions are necessary.

The mixing water must be drinking water with a maximum salt content of 100 ppm chloride.

Temperatures of use:

Maximal recommended temperature for closed circuits is 200°C.

Temperatures above 200°C for prolonged periods of time can shorten the lifetime of the product due to the degradation of propylene glycol.

In open circuits or where there is oxygen intake (valves, automatic fillings, etc.) the maximum temperature is lower. In case of doubt, consult the technical department

Precautions :




Non-hazardous product according to current legislation.
No transport or storage restrictions.

Store in original containers tightly closed and out of direct sunlight.

Homologations:



Presentation

			
5Kg.	4	128	
10Kg.	-	60	
20 Kg.	-	36	
230 Kg.	-	2	
1000 Kg	-	1	

Physical and chemical properties

Dilution 20% by volume

Temperature	Density	Heat Capacity	Thermal conductivity	Dynamic viscosity	Kinematic viscosity	Prandtl number	Thermal Expansion coefficient
°C	ρ (Kg/m ³)	Cp (KJ/KgK)	λ (W/mK)	μ (mPas)	ν (mm ² /s)		β (*10 ⁻⁵ 1/K)
-5	1025,3	3,984	0,485	5,37	5,15	44,52	22,1
0	1023,9	3,986	0,492	4,26	4,09	34,95	27,7
10	1020,7	3,991	0,504	2,83	2,73	22,72	37,0
20	1016,8	3,997	0,515	2,00	1,94	15,71	44,3
30	1012,3	4,003	0,526	1,48	1,45	11,45	50,2
40	1007,4	4,010	0,537	1,15	1,13	8,73	54,8
50	1001,9	4,017	0,546	0,93	0,92	6,92	58,4
60	996,0	4,024	0,556	0,77	0,77	5,67	61,1
70	989,7	4,032	0,565	0,66	0,66	4,78	63,3
80	983,1	4,039	0,573	0,58	0,58	4,13	64,9
90	976,1	4,047	0,581	0,52	0,53	3,65	66,1
100	969,0	4,055	0,589	0,47	0,48	3,28	66,9

Dilution 25% by volume

Temperature	Density	Heat Capacity	Thermal conductivity	Dynamic viscosity	Kinematic viscosity	Prandtl number	Thermal Expansion coefficient
°C	ρ (Kg/m ³)	Cp (KJ/KgK)	λ (W/mK)	μ (mPas)	ν (mm ² /s)		β (*10 ⁻⁵ 1/K)
-9	1032,5	3,916	0,465	8,34	8,08	70,93	22,4
0	1029,7	3,923	0,475	5,30	5,15	44,37	32,5
10	1026,0	3,931	0,485	3,44	3,35	28,27	41,4
20	1021,8	3,940	0,495	2,37	2,32	19,18	48,5
30	1017,1	3,949	0,504	1,72	1,70	13,74	54,0
40	1011,9	3,959	0,513	1,31	1,30	10,31	58,4
50	1006,3	3,968	0,521	1,04	1,03	8,04	61,7
60	1000,2	3,978	0,529	0,85	0,85	6,49	64,3
70	993,8	3,988	0,537	0,72	0,72	5,40	66,3
80	986,9	3,997	0,544	0,62	0,63	4,61	67,8
90	979,7	4,007	0,551	0,55	0,56	4,02	68,8
100	972,2	4,016	0,558	0,49	0,50	3,58	69,5

Dilution by 30% volume

Temperature	Density	Heat Capacity	Thermal conductivity	Dynamic viscosity	Kinematic viscosity	Prandtl number	Thermal Expansion coefficient
°C	ρ (Kg/m ³)	Cp (KJ/KgK)	λ (W/mK)	μ (mPas)	ν (mm ² /s)		β (*10 ⁻⁵ 1/K)
-12	1038,5	3,847	0,447	12,64	12,17	109,57	23,9
0	1035,3	3,860	0,458	6,59	6,37	56,26	37,3
10	1031,7	3,872	0,467	4,17	4,04	35,13	45,8
20	1027,3	3,884	0,475	2,81	2,74	23,40	52,5
30	1022,2	3,896	0,482	2,00	1,96	16,47	57,8
40	1016,5	3,908	0,490	1,49	1,47	12,16	61,9
50	1010,4	3,920	0,496	1,16	1,15	9,34	65,1
60	1003,8	3,932	0,503	0,93	0,93	7,44	67,5
70	997,0	3,944	0,509	0,77	0,77	6,10	69,3
80	990,1	3,955	0,515	0,66	0,66	5,14	70,6
90	983,0	3,967	0,521	0,57	0,58	4,43	71,5
100	976,0	3,978	0,527	0,51	0,52	3,90	72,1

Dilution by 35% volume

Temperature	Density	Heat Capacity	Thermal conductivity	Dynamic viscosity	Kinematic viscosity	Prandtl number	Thermal Expansion coefficient
°C	ρ (Kg/m ³)	Cp (KJ/KgK)	λ (W/mK)	μ (mPas)	ν (mm ² /s)		β (*10 ⁻⁵ 1/K)
-15	1046,1	3,777	0,431	19,60	18,73	172,84	25,3
-5	1043,0	3,791	0,438	10,71	10,27	93,69	37,1
0	1041,2	3,798	0,441	8,18	7,86	71,26	42,0
10	1037,0	3,813	0,448	5,05	4,87	43,63	50,2
20	1032,2	3,828	0,454	3,33	3,23	28,53	56,6
30	1026,9	3,843	0,460	2,32	2,26	19,74	61,6
40	1021,0	3,857	0,466	1,70	1,66	14,33	65,5
50	1014,7	3,872	0,472	1,30	1,28	10,85	68,5
60	1008,1	3,886	0,477	1,02	1,02	8,51	70,7
70	1001,1	3,900	0,482	0,83	0,83	6,89	72,3
80	993,8	3,914	0,487	0,70	0,70	5,73	73,5
90	986,4	3,927	0,491	0,60	0,61	4,88	74,2
100	978,8	3,940	0,496	0,52	0,53	4,24	74,7

Dilution 40% by volume

Temperature	Density	Heat Capacity	Thermal conductivity	Dynamic viscosity	Kinematic viscosity	Prandtl number	Thermal Expansion coefficient
°C	ρ (Kg/m ³)	Cp (KJ/KgK)	λ (W/mK)	μ (mPas)	ν (mm ² /s)		β (*10 ⁻⁵ 1/K)
-20	1052,8	3,701	0,415	35,96	34,16	321,86	23,8
-10	1049,7	3,718	0,420	18,23	17,45	162,55	36,7
0	1045,8	3,736	0,425	10,15	9,75	90,13	46,7
10	1041,3	3,754	0,430	6,12	5,90	54,10	54,6
20	1036,2	3,772	0,434	3,94	3,82	34,73	60,7
30	1030,5	3,790	0,439	2,69	2,62	23,62	65,4
40	1024,4	3,807	0,443	1,93	1,89	16,87	69,1
50	1017,9	3,824	0,447	1,45	1,42	12,58	71,8
60	1011,0	3,841	0,451	1,12	1,11	9,73	73,9
70	1003,8	3,857	0,455	0,90	0,90	7,77	75,4
80	996,4	3,872	0,458	0,74	0,75	6,38	76,4
90	988,8	3,888	0,462	0,63	0,64	5,37	77,0
100	981,1	3,903	0,465	0,54	0,55	4,62	77,3

Dilution by 45% volume

Temperature	Density	Heat Capacity	Thermal conductivity	Dynamic viscosity	Kinematic viscosity	Prandtl number	Thermal Expansion coefficient
°C	ρ (Kg/m ³)	Cp (KJ/KgK)	λ (W/mK)	μ (mPas)	ν (mm ² /s)		β (*10 ⁻⁵ 1/K)
-24	1059,0	3,623	0,402	64,31	60,73	581,13	23,5
-15	1056,1	3,643	0,404	32,58	30,85	294,76	35,9
-5	1052,2	3,664	0,407	16,88	16,04	152,89	46,9
0	1050,1	3,675	0,409	12,57	11,97	113,89	51,4
10	1045,3	3,696	0,411	7,40	7,08	67,02	58,9
20	1040,0	3,717	0,414	4,66	4,48	42,24	64,8
30	1034,2	3,737	0,417	3,12	3,01	28,24	69,2
40	1027,9	3,757	0,420	2,19	2,13	19,85	72,6
50	1021,2	3,776	0,422	1,61	1,58	14,58	75,2
60	1014,1	3,795	0,425	1,23	1,21	11,12	77,1
70	1006,7	3,813	0,428	0,97	0,96	8,77	78,4
80	999,0	3,831	0,430	0,79	0,79	7,11	79,2
90	991,1	3,848	0,432	0,66	0,66	5,91	79,7
100	983,0	3,865	0,435	0,56	0,57	5,03	79,9

Dilution by 50%

Temperature	Density	Heat Capacity	Thermal conductivity	Dynamic viscosity	Kinematic viscosity	Prandtl number	Thermal Expansion coefficient
°C	ρ (Kg/m ³)	Cp (KJ/KgK)	λ (W/mK)	μ (mPas)	ν (mm ² /s)		β (*10 ⁻⁵ 1/K)
-30	1065,6	3,538	0,390	143,67	134,83	1303,00	19,5
-20	1062,7	3,564	0,391	61,36	57,74	560,51	34,8
-10	1059,0	3,589	0,391	29,43	27,78	270,44	46,8
0	1054,7	3,614	0,392	15,56	14,75	143,75	56,0
10	1049,6	3,638	0,393	8,94	8,52	82,95	63,2
20	1044,0	3,662	0,394	5,51	5,28	51,34	68,8
30	1037,8	3,685	0,396	3,61	3,48	33,74	73,0
40	1031,1	3,707	0,397	2,49	2,41	23,34	76,2
50	1024,1	3,729	0,398	1,80	1,75	16,89	78,6
60	1016,7	3,750	0,399	1,35	1,33	12,70	80,3
70	1009,0	3,770	0,400	1,05	1,04	9,88	81,4
80	1001,1	3,790	0,402	0,84	0,84	7,91	82,1
90	993,1	3,809	0,403	0,69	0,69	6,50	82,5
100	984,9	3,828	0,404	0,58	0,59	5,47	82,6