



# Delo XLI Corrosion Inhibitor – Concentrate

## Premium performance extended life corrosion inhibitor

### Product description

Delo® XLI Corrosion Inhibitor - Concentrate is a premium performance extended life corrosion inhibitor. Delo XLI Corrosion Inhibitor - Concentrate is formulated with patented advanced carboxylate additive technology, designed to offer long-life, low maintenance corrosion protection.

Delo XLI Corrosion Inhibitor - Concentrate has been extensively field tested and the synergistic combination of mono- and di-carboxylic additives has been proven to promote effective protection for over 8000 hours or 650,000 km in off-road, truck and bus applications, and 32,000 hours in marine and stationary engines. The product is compatible with a range of glycol-based engine coolants.

### Customer benefits

- Advanced synergistic additive technologies offer extended, low maintenance corrosion protection, helping increase uptime
- Promotes high performance protection in thermostats, radiators, water pumps and other vulnerable cooling system components
- Offers reliable protection to a wide range of metals including aluminium, iron, copper and solder alloys
- Aids performance and cooling system protection in modern high temperature aluminium engine environments
- Reliable, high technology non-depleting inhibitors aid consistent long-life performance and protection
- Silicate and phosphate-free technology offers reliable, stable dilution in harder waters

### Product highlights

- **Extended low maintenance service life**
- **Advanced non-depleting inhibitor technology**
- **Formulated to protect vulnerable components**
- **Reliable hard water stability**
- **Designed to provide high temperature aluminium corrosion resistance**

#### Selected specification standards include:

Jenbacher	MAN Energy Solutions
MAN Truck & Bus	MaK
MWM	MTU
Wartsila	

## Applications

- Mixed with the appropriate amount of water, Delo XLI Corrosion Inhibitor - Concentrate is recommended as a coolant, flushing fluid or hot test fluid for engine blocks and cooling systems. During extensive field testing, the synergistic combination of mono- and di-carboxylic additives has proven to offer protection for at least 32,000 hours in marine and stationary applications.
- Delo XLI Corrosion Inhibitor - Concentrate promotes long-life protection against corrosion through the use of optimised and patented organic corrosion inhibitors. Delo XLI Corrosion Inhibitor - Concentrate offers long-life protection to aluminium heat transfer surfaces contained in modern engines. The inhibitor package of Delo XLI Corrosion Inhibitor – Concentrate aids cavitation protection without the need for nitrite additives, either within the product itself or by the addition of nitrite-based supplemental coolant additives (SCA's).
- Delo XLI Corrosion Inhibitor - Concentrate promotes long-life corrosion protection. Depending on the actual application the dosage may vary from 5 - 10 vol%, but a minimum of 5 vol% of Delo XLI Corrosion Inhibitor - Concentrate in water should be used. Delo XLI Corrosion Inhibitor - Concentrate may be used in engines manufactured from cast iron, aluminium or combinations of the two metals, and in cooling systems made from aluminium or copper alloys. The dosage of Delo XLI Corrosion Inhibitor - Concentrate may be checked with a refractometer .
- Delo XLI Corrosion Inhibitor - Concentrate is recommended for hi-tech engines such as racing cars and heavy-duty off-road equipment, where high temperature aluminium protection is important.
- In marine applications, the concentration of Delo XLI Corrosion Inhibitor - Concentrate should not be lower than 5 vol%. At this dosage the recommended life-time is at least 32,000 hours. If Delo XLI Corrosion Inhibitor - Concentrate is replenished regularly to compensate for leakage, the cooling water can be considered as fill for life.
- Small marine engines sometimes require limited frost protection. This can be obtained by adding an appropriate amount of Delo XLC Antifreeze/Coolant - Concentrate to a 5 vol% dilution of Delo XLI Corrosion Inhibitor - Concentrate. For frost protection of -10 °C and -15 °C, the required XLC dosages are respectively 22 and 29 vol%.
- For off-road, truck and bus applications the recommended lifetime is 8000 hours or 650,000 km, provided that a concentration of 7.5 vol% Delo XLI Corrosion Inhibitor - Concentrate is used
- At 7.5 vol%, Delo XLI Corrosion Inhibitor - Concentrate will provide corrosion protection in stationary engines for at least 32,000 hours

- Delo XLI Corrosion Inhibitor - Concentrate can also be used at 10 vol% as a hot test liquid for new engine blocks. Newly manufactured engines are tested for a duration of approximately 5 to 10 minutes, after which the fluid is drained and usually reused. If the engine blocks are not immediately built into vehicles, Delo XLI Corrosion Inhibitor - Concentrate will provide corrosion protection for the engine for up to two months
- At 5 vol%, Delo XLI Corrosion Inhibitor - Concentrate performs as a flushing fluid to clean cooling systems that were filled with other inhibitor packages. In most cases it is required to flush the system twice. For a good result it is important that the engine has reached normal operating temperatures and all thermo-valves are opened
- Delo XLI Corrosion Inhibitor - Concentrate can also be used as an inhibitor package for central heating systems, as a hydraulic safety and mining fluid
- The use of soft water is preferred for dilution. Laboratory testing has shown that acceptable corrosion results are still obtained with water of 20°dH, containing up to 500 ppm chlorides or 500 ppm sulphates. The water used for dilution should be free of zinc, as the presence of zinc will result in the formation of a precipitate
- This product is compatible with glycol-based engine coolants. It is recommended to change the coolant every five years or at the above operating times, whichever comes first

## Approvals, performance and suitable for use

### Approvals

- Jenbacher TA 1000-0200
- MAN Energy Solutions
  - MAN 175D engines
  - MAN 4-stroke medium speed engines
  - MAN 28/33D engine
- MWM TR 0199-99-2091
- MTU 2000 and 4000 series engines (cooling systems free of light metal)

	2000	4000-1	4000-2	4000-3	4000-5
Construction & Industrial	x	x	x	x	—
Oil & Gas	x	—	x	x	—
Genset	—	x	x	x	x
Marine	—	—	—	x	x
Rail			R41 and R43		

**Performance**

Delo XLI Corrosion Inhibitor - Concentrate meets the requirements of:

- MAN B&W (MAN Energy Solutions) D36 5600
- MAN Truck & Bus: MAN 248
- MaK
- Wärtsilä 32-9011

**Product maintenance and handling**

- The product should be stored above -5 °C and preferably at ambient temperatures. Periods of exposure to temperatures above 35 °C should be minimised. Further, it is strongly advised to use new dark containers and not recycled ones. Exposure to direct sunlight might cause discoloration, although the product itself and the properties remain stable.
- Delo XLI Corrosion Inhibitor - Concentrate can be stored for approximately 1 year in unopened containers without any effect on the product quality or performance. This may be extended to 3 years (36 months) if the product is stored in opaque containers. As with any antifreeze coolant, the use of galvanized steel is not recommended for pipes or any other part of the storage/mixing installation (the copper inhibitor may react with the zinc from the galvanized parts, reducing its effectiveness in protecting red and yellow metals).

**RESTRICTED TO PROFESSIONAL USERS ONLY.**

Typical test data			
Test	Test methods	Results	
Dilution		Concentrate	5 vol%
<b>Shelf Life: 12 months from date of filling indicated on the product label. Extended to 36 Months if stored in opaque containers</b>			
Density at 20 °C, Kg/L	ASTM D1122	1.058 Typ	
Colour		Green fluorescent	Green fluorescent
pH at 20 °C, NUOM	ASTM D1287	9.4 Typ	8.1 Typ
Inhibitor content, %w/w		32	
Water content, %w/w	ASTM 1123	68	
Effect on non-metals	GME 60 255		No effect
Hard water stability	VW PV 1426		No precipitate

## Corrosion Protection

### Modified ASTM D1384 glassware corrosion tests - 300ppm chloride

	Weight loss in mg/coupon <sup>1</sup>						
	Brass	Copper	Solder	Steel	Cast Iron	Aluminium	AlMn
ASTM D3306 (max)	10	10	30	10	10	30	-
5 vol% Delo XLI	0.6	0.6	4.5	0.0	0.7	9.8	4.8

(1) Weight loss AFTER chemical cleaning acc. to ASTM procedure. Weight gain is indicated by a – sign.

### Modified MTU High Temperature corrosion test (2000 W)

Test duration, 116hrs	Weight loss in mg/coupon <sup>2</sup>		
	Cast Iron	Aluminium	
		SAE 329	AlMgSil
5 vol% Delo XLI in deionised water - hot coupon	-1.3	9.3	1.8
5 vol% Delo XLI in FVV water - hot coupon	-9.0	-16.4	40.7

(2) Weight loss AFTER chemical cleaning acc. to (shortened) MTU procedure. Weight gain is indicated by a – sign.

## Aging test

To emphasise the corrosion protection offered by Delo XLI Corrosion Inhibitor - Concentrate, the aging test is conducted under more severe conditions compared to those commonly used in the industry

Test	Typical Industry	Delo XLI Corrosion Inhibitor - Concentrate
Dilution	169 h	504 h
Fluid content	5.0 l	6.0 l
Pressure	1.5 bar	2.5 bar
Flow	3.0 l/min	3.5 l/min
Heat input	5500 W	5000 W
Temperature in heating vessel	95 °C	115 °C
Temperature in cooling vessel	75 °C	95 °C
Concentration of coolant in water	40 vol%	20 vol%

Weight loss in g/m <sup>2</sup> (using Chevron test parameters) <sup>(1)</sup>							
	Al <sup>(2)</sup>	AlMn	Cast Iron	Steel	Cu	CuZn	Solder CB
<b>Reference Coolant <sup>(3)</sup></b>							
after initial cleaning	82.10	64.02	-2.19	-1.68	3.62	2.90	21.45
after final cleaning	125.01	94.33	-0.36	0.11	4.99	5.66	25.83
<b>Delo XLI Corrosion Inhibitor - Concentrate</b>							
after initial cleaning	23.91	27.05	0.52	0.36	1.03	1.13	0.27
after final cleaning	60.16	63.15	0.69	0.40	1.46	1.76	0.52

<sup>(1)</sup> Weight loss AFTER chemical cleaning acc. to (shortened) MTU procedure. Weight gain is indicated by a – sign.

<sup>(2)</sup> Aluminium SAE 329.

<sup>(3)</sup> Reference coolant is a conventional, high quality, silicate-based MEG coolant.

The typical test data set out above does not constitute a specification. It is indicative only and can be affected by allowable production tolerances. Chevron may modify this test data. Modified data will supersede all previous data, so please ensure you refer to the latest version of this Product Data Sheet (PDS).

**Disclaimer: Data provided in this Product Data Sheet (PDS) is based on standard tests under laboratory conditions and is indicative only. This product should not be used for any purpose other than those expressly set out in this PDS. The user has sole responsibility for verifying that this product is suitable for the user's intended application. Neither Chevron nor its subsidiaries (i) make any warranty or representation as to the accuracy or completeness of this PDS; and/or (ii) accept liability for any loss or damage suffered as a result of the use of this product other than in accordance with the terms of this PDS.**

When disposing of used product, take care to protect the environment and follow local legislation.

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