

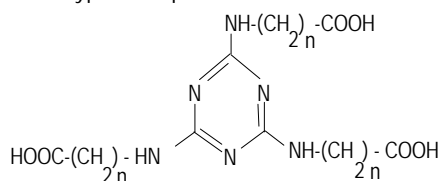
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IRGACOR® L 190

Water soluble Corrosion Inhibitor

Typical chemical and physical properties

IRGACOR L 190, organic polycarboxylic acid, is an ashless corrosion inhibitor for all types of aqueous fluids



		IRGACOR L 190
Appearance		White wet cake
Average assay		50 % free acid 50 % water
Molecular weight		468.6
Density at 20 °C	(g/cm ³)	1.1 ⁽¹⁾
Solubility		
Water	(%)	< 0.01 ⁽²⁾
Mineral oil	(%)	< 0.01
Oleic acid equivalent		0.83

- ⁽¹⁾ Density reported for solid product at 25 °C (method ASTM D 2638 - helium pycnometer)
⁽²⁾ If the pH is adjusted with triethanolamine (TEA) or another base to pH > 8 then the solubility in water increases to > 5.0%
⁽³⁾ TEA > 99% pure is recommended to meet requirement of German TRGS 611.

Applications and typical treat levels recommended

All types of water based systems :
 metal working fluids (semi-synthetic and synthetic) IRGACOR L 190: 0.25 - 1.1%
 high water based hydraulic fluids (HFC)
 engine coolants (Na salt of IRGACOR L 190)

Benefits

Does not form resinous films or gums on metals
 Offers an extremely low foaming tendency and an excellent air release
 Compatible with hard water
 IRGACOR L 190 may be used for corrosion inhibition of multimetal systems.
 This inhibitory effect can be improved by a combination with IRGAMET 42
 No tendency to form nitrosamine

Performance benefits: **Metal surface protection**

Corrosion inhibition IRGACOR L 190 provides good rust protection of HFC fluids.

Test fluids	IRGACOR L 190	(%)	-	0.055
	Base fluid ⁽¹⁾		neat	balance
	pH adjusted with triethanolamine		8.5	8.5

(ASTM D 665 modified)
60 °C, 24 hrs

Metal protection	(rating)	fail (2)	pass (0)
Iron rod			

⁽¹⁾ Base fluid Ethylene glycol 40 %
 Polyethylene glycol 40 %
 Water 20 %

Corrosion inhibition
and hard water compatibility

Aqueous solutions of IRGACOR L 190 neutralised with triethanolamine show good rust prevention with waters of different hardness. The solutions remain clear indicating good hard water compatibility.

Test fluids	IRGACOR L 190 pass conc.	(%)	0.3	0.6	1.7
	Deionised water		balance	-	-
	IP 287 water (12° dH) ⁽¹⁾		-	balance	-
	DIN 51 360 water (21° dH) ⁽²⁾		-	-	balance
	pH adjusted with triethanolamine		8.5	8.5	8.5

Metal protection (IP 287 test)
Cast iron chips on filter paper

Cast iron chips	(rating)	pass	pass	pass
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Compatibility

Solution appearance	(visual)	clear	clear	clear
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⁽¹⁾ IP 287 water contains 0.3449 g/l CaSO₄ · 2 H₂O = 11.7° dH (German hardness) = corresponds to 200 ppm CaCO₃.

⁽²⁾ DIN 51 360 water contains 680 mg/l CaCl₂ · 6H₂O and 120 mg/l MgSO₄ · 7H₂O = 21° dH (German hardness) = corresponds to 358 ppm CaCO₃.

Corrosion inhibition

The pass concentration of IRGACOR L 190 appears to be independent of the buffer neutralising agent used to adjust the pH (this needs to be > 8 to obtain solubility).

Borax is one possible buffer system, another alternative is e.g. phosphate buffer.

Test fluids

IRGACOR L 190	(%)	1.4	1.7
Na ₂ B ₄ O ₇ 10 H ₂ O (borax)	(%)	1.7	-
DIN 51360 water (21°DH) ⁽¹⁾		balance	balance
pH		8.5	8.5 ⁽²⁾

(IP 287 modified test)
IP 287 chips; DIN water

Cast iron chips	(rating)	pass	pass
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- (1) DIN 51360 hard water contains 680 mg/l CaCl₂·6H₂O, 120 mg/l MgSO₄·7H₂O. This is equivalent to 358 ppm CaCO₃ which is 21° dH (degree German hardness)
- (2) Adjusted with triethanolamine

Multimetal protection

IRGACOR L 190 and IRGAMET 42 provide a basis for formulating nitrate/nitrite free engine coolants with good multimetal protection

Engine coolant concentrate		
IRGACOR L 190	(%)	1.0
IRGAMET 42	(%)	0.1
Borax	(%)	1.2
Caustic soda, NaOH (30%)	(%)	1.2
Sodium silicate (40° Bé) ⁽¹⁾	(%)	0.05
Ethylene glycol		balance

Test fluids

Engine coolant concentrate ⁽²⁾	(%)	50	FORD
Water according to ASTM D 1384		balance	norm MB-BL1-1

FORD glassware test
(ASTM D 1384)

Metal specimen weight loss	(mg/cm ²)		max.
Copper		0.16	0.3
Solder		0.28	0.6
Brass		0.16	0.3
Cast iron		0.03	0.3
Steel		0.08	0.3
Aluminium alloy		0.33	1.1

⁽¹⁾ Density in degree Baumé

⁽²⁾ Note that 50 % dilution was used instead of 33 % as defined in ASTM D 1384

Corrosion inhibition

Mixtures of IRGACOR L 190 and IRGAMET 42 are very effective in providing iron protection.

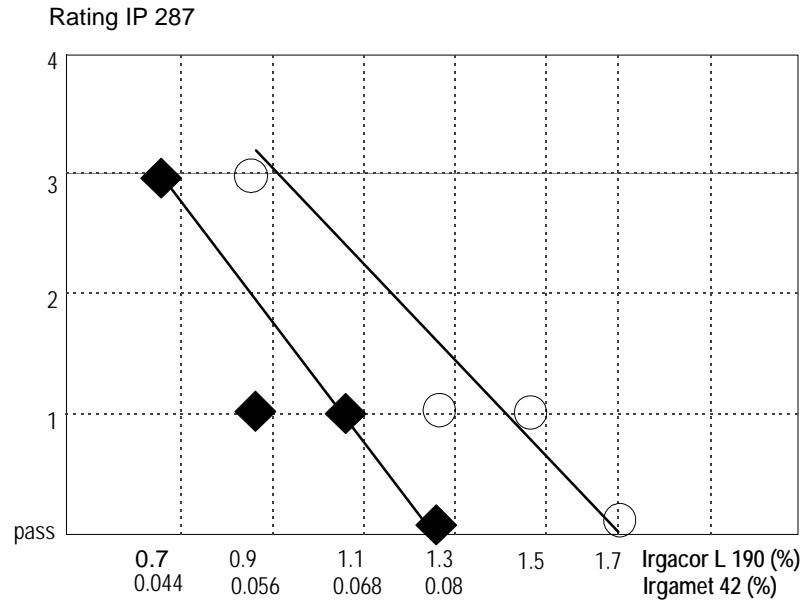
Test fluids

pH 8.5 adjusted with triethanolamine
water DIN 51 360 hard water

○ IRGACOR L 190

◆ IRGACOR L 190 / IRGAMET 42
(ratio of concentration IRGACOR L 190 : IRGAMET 42 = 15 : 1)

(IP 287 test)
Cast iron chips on filter paper



Rust preventive fluids

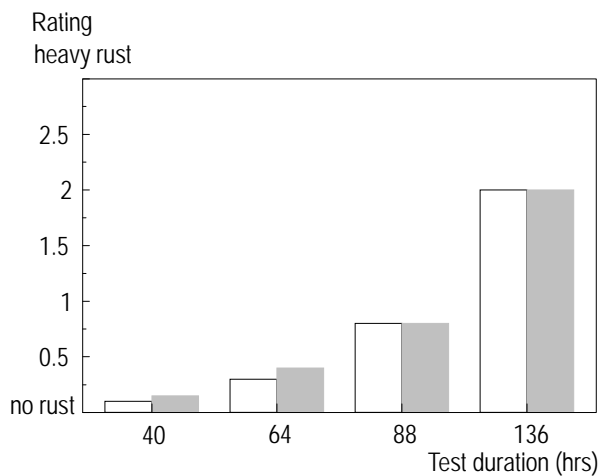
IRGACOR L 190 and Amine O can replace sodium nitrite in water based fluids.

Test fluids

IRGACOR L 190	(%)	-	0.5
Amine O	(%)	-	0.5
NaNO ₂	(%)	6.0	-
Deionised water		balance	balance
pH		8.3	8.5 ⁽¹⁾

⁽¹⁾ Adjusted with triethanolamine (TEA)

Humidity cabinet test
Air flow 875 l/hr, 50 °C,
humidity: 100 %
Steel panels: US
specification QQ-S-698
grade 1009.
Average of 3 tests



NaNO₂



IRGACOR L 190/ Amine O



Multimetal protection

The combination of IRGACOR L 190 and IRGAMET 42 neutralised with triethanolamine is very effective in providing multimetal protection

Test fluids

IRGACOR L 190	(%)	-	0.95	-	1.40
IRGAMET 42	(%)	-	0.10	-	0.25
Distilled water		neat	balance	-	-
HFC test fluid ⁽¹⁾		-	-	neat	balance
pH adjusted with triethanolamine		8.5	8.5	8.5	8.5

Corrosion test (IP 329)
50 °C, 330 hrs

Metal weight change	(mg)				
Copper		- 1.6	- 0.3	- 2.5	0
Cadmium		- 85	- 2.8	- 120	- 7.6
Brass		- 1.4	- 0.1	- 2.2	- 0.3
Cast iron		- 79	- 0.5	- 27	- 0.4
Steel		- 5.7	- 0.2	- 2.9	- 0.1
Aluminium		+ 11	- 0.8	- 0.2	0
Zinc		- 120	- 2.8	- 45	- 4.1

⁽¹⁾ HFC test fluid Ethylene glycol 40 % Polyethylene glycol 40 % Water 20 %

Surface properties

Metal working fluids formulated with IRGACOR L 190 show extremely low foaming tendency.

Test fluids

IRGACOR L 190	(%)	5.0	-	-
CI 1 ⁽¹⁾	(%)	-	5.0	-
CI 2 ⁽²⁾	(%)	-	-	5.0
Deionised water		balance	balance	balance
pH adjusted with triethanolamine		8.5	8.5	8.5

Foaming characteristics (ASTM D 892)

Foam after 5 mins blowing period	(ml)	10	125	450
Foam after 10 mins settling period	(ml)	0	40	50

⁽¹⁾ CI 1 Alkanolammonium salt of a substituted monocarboxylic acid

⁽²⁾ CI 2 Aminoalcohol salt of a carboxylic acid

Wear inhibition

IRGACOR L 190- triethanolamine salt (IRGACOR L 184) has no adverse influence on the performance of EP/AW additives.

A decrease in wear inhibition, from competition between the corrosion inhibitor and the EP/AW additive for the metal surface, was not observed.

Test fluids

IRGACOR L 184	(%)	5.0	-
EP1 ⁽¹⁾	(%)	2.5	2.5
Water at pH 8.5		balance	balance

Load carrying capacity

Four ball test (ASTM D 2783/DIN 51350)

Weld load	(N)	1700	1600
Wear scar diameter after 10 min, 400N, room temp.	(mm)	0.6	0.5

Reichert wear test 15N, 100 m sliding distance, room temperature

Wear scar area	(mm ²)	7.9	8.3
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⁽¹⁾ EP1 Ethoxylated dicarboxylic acid extreme pressure/antiwear additive

Safety and Handling	Please read Material Safety Data Sheet (MSDS) before handling. For customers in USA: This product is subject to a Section 5(f)/6(a) rule.
Product Specification	This information is available on request through our local representative.
Packaging	This information is available on request through our local representative.

Safety

When using this product, the information and advice given in our **Safety Data Sheet** should be observed. Due attention should also be given to the **precautions** necessary for handling chemicals.

Note

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out their own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights, etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed.

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