
Rust Inhibitors,
Exhibiting Excellent Rust Preventive Properties to Various Metals

SANHIBITOR Products

Preface

SANHIBITOR products are organic rust inhibitors which prevent the generation of rust by forming lubricating films on metal surfaces, and are classified into two types, the water-soluble type (including water dispersible type) and the oil-soluble type. Water-soluble type products can be used for rust prevention of metal surfaces following dilution with water, or for corrosion inhibition of metal parts through their addition in coolant, metal working oil, etc.

Moreover, oil-soluble type products are generally added to lubricating oil (engine oil, turbine oil, lubricating oil for sliding surfaces, hydraulic oil, gear oil, etc.), fuel oil (gasoline, gas oil, etc.) or metal working oil (cutting oil, drawing oil, rolling oil, press forming oil, etc.) as rust inhibitors for metal parts.

We offer the following range of SANHIBITOR products:

Product Name	Type		Metal to which Rust Preventive Properties are Imparted				
	Water-Soluble	Oil-Soluble	Iron	Copper	Brass	Aluminum	Zinc Alloy
SANHIBITOR No.2-1	✓	✓	✓	✓	✓	✓	✓
SANHIBITOR No.50	✓		✓				
SANHIBITOR OMA-10	✓		✓			✓	
SANHIBITOR 102		✓	✓			✓	✓
SANHIBITOR 150		✓	✓			✓	

Value of symbols ✓: Fulfilled (annotation: Even SANHIBITOR products that are NOT marked with a ✓, exhibit some rust preventive properties.)

Typical Property

1. Typical Properties

The typical properties and features of SANHIBITOR products are shown in Table 1. The values are representative.

Table 1-a. Typical Properties

Product Name	Appearance at 20°C	Color (Gardner)	pH *	Acid Value (KOH Method)
SANHIBITOR No.2-1	Brown liquid	9	7.0	–
SANHIBITOR No.50	Colorless liquid	<1	11.0	–
SANHIBITOR OMA-10	Dark brown liquid	<12	9.0	–
SANHIBITOR 102	Pale yellow liquid	6	–	195
SANHIBITOR 150	Pale straw-colored liquid	7	–	159

* 1 wt % aqueous solution

Table 1-b. Typical Properties and Features

Product Name	Specific Gravity (15°C /4°C)	Kinematic Viscosity mm ² /s (40°C)	Solubility **	Feature
SANHIBITOR No.2-1	–	–	Dispersible water, Soluble in oil being transparent	Available as both a water and oil soluble inhibitor.
SANHIBITOR No.50	1.036	144	Soluble in water being transparent.	Produces less foam. Soluble even in mineral oil of aniline point under 70, and also in acid water.
SANHIBITOR OMA-10	1.088	278	Soluble in water being slight turbid	Excels in rust preventive property in the atmosphere.
SANHIBITOR 102	0.930	1,467	Soluble in oil being transparent	Has demulsibility.
SANHIBITOR 150	0.965	1,250	Soluble in oil being transparent	Particularly excels in demulsibility.

** Solubility was checked using water or mineral oil (#150 spindle oil) at 25°C.

Application

Typical applications and the methods for SANHIBITOR products are shown below.

1. Applications and Methods for Water-Soluble Rust Inhibitors

a. Inhibitors against rust on metal parts in which iron is a main component

The metal parts should be immersed in any of the following solutions for 20 to 120 seconds, and then blow-dried using air.

SANHIBITOR No.2-1: 0.20 - 0.5 wt % aqueous solution (bath temperature: 20°C - 60°C)

SANHIBITOR No.50: 0.50 - 1.0 wt % aqueous solution (bath temperature: 20°C - 80°C)

SANHIBITOR OMA-10: 0.25 - 3.0 wt % aqueous solution (bath temperature: 20°C - 80°C)

b. Inhibitors against rust on metal exposed to water in cooling water pipes

Each of the following products should be added to water.

SANHIBITOR No.50: 0.5 wt %

SANHIBITOR OMA-10: 0.3 wt %

c. Preparation of water-soluble metal working oil (cutting oil, rolling oil, forging oil, etc.)

Each of the following products should be added to water while it is prepared.

SANHIBITOR No.2-1: 1 - 5 wt %

SANHIBITOR No.50: 5 - 10 wt %

SANHIBITOR OMA-10: 2 - 5 wt %

2. Applications and Methods for Oil-Soluble Rust Inhibitors

a. Inhibitors against rust on metal parts in which iron is a main component

The metal parts should be immersed in any of the following solutions for 30 to 120 seconds, and then the solution should be drained off.

SANHIBITOR 102: 1 - 5 wt % mineral oil solution (bath temperature: 20°C - 60°C)

SANHIBITOR 150: 1 - 5 wt % mineral oil solution (bath temperature: 20°C - 80°C)

b. Preparation of lubricating oil (turbine oil, lubricating oil for sliding surfaces, hydraulic oil, gear oil, etc.)

Each of the following products should be added to lubricating oil when it is prepared.

SANHIBITOR 102: 0.3 - 1.0 wt %

SANHIBITOR 150: 0.2 - 1.0 wt %

c. Preparation of metal working oil (cutting oil, drawing oil, rolling oil, press forming oil, etc.)

The following product should be added to metal working oil when it is prepared.

SANHIBITOR 102: 1 - 5 wt %

Precaution Against Mishandling

· Rust preventive properties, foaming properties and demulsibility, etc, are changed depending on the qualities of the service water and base oil, etc. Test these performances under the conditions for use beforehand to ensure that there are no problems.

Performance

1. Performances of Water-Soluble SANHIBITOR Products

1-1) Rust Preventive Properties for Iron

As shown in Table 2, water-soluble SANHIBITOR products exhibit excellent rust preventive properties for iron.

Table 2. Rust Preventive Properties for Iron

Rust Inhibitors		Rust Preventive Properties for Iron	
Product Name	Concentration wt %	Iron was Immersed in a Sample at 20°C for 30 days	Iron was Kept at 40°C and 80%R.H. for 20 days after it was Immersed in a Sample.
SANHIBITOR No.2-1	0.2	A	A - B
	0.5	–	A
SANHIBITOR No.50	0.2	A	A - B
	0.5	–	A - B
SANHIBITOR OMA-10	0.2	A	A
	0.5	–	A
None (Kyoto tap water)		E	E

Materials and Method:

Materials:

Each sample was prepared by adding a rust inhibitor described in Table 2 to the tap water of Kyoto City.

Method:

Test pieces made of iron were treated under the following conditions (a and b). Then, they were taken out of the sample and the number of rusted sections on the surface of each sample was counted, and the rate of occurrence was evaluated under the following standard according to the testing method, [5.4. Rust growth test], described in JIS K 2246.

- a. A test piece was immersed in the sample at room temperature for 30 days.
- b. A test piece was kept for 20 days at 40°C and 80% R.H. using a thermohygrostat after it was immersed in the sample for 1 minute.

<Test Piece>

A test piece (material: see SPCC-SB prescribed in JIS G 3141, dimensions: 1.3×80×60 mm) was polished and washed according to JIS K 2246, [rust preventive oil].

<Standard for Evaluating Rust Preventive Properties>

Class:	Rate of Occurrence
A:	0%
B:	1 – 10%
C:	11 – 25%
D:	26 – 50%
E:	51 – 100%

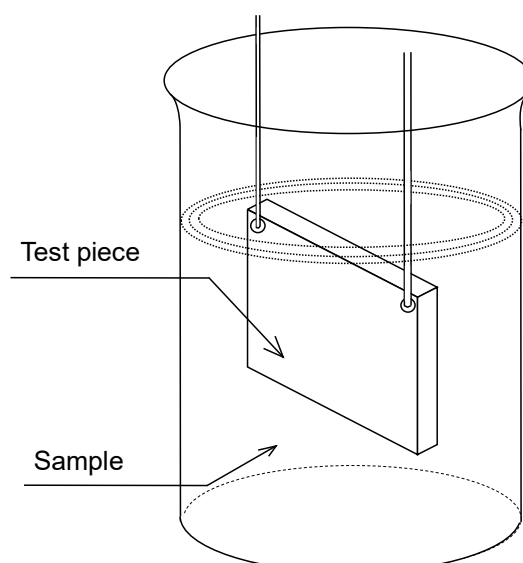


Figure 1. Rust Growth Test

1-2) Rust Preventive Properties to Nonferrous Metal

As shown in Table 3, water-soluble SANHIBITOR products exhibit excellent rust preventive properties to nonferrous metal such as copper, brass, aluminum and solder.

Table 3. Rust Preventive Properties to Non-ferrous Metal

Rust Inhibitors		Change of Primary Metal Surfaces and Weight mg/cm ²			
Product Name	Concentration wt %	Copper	Brass	Aluminum	Solder
SANHIBITOR No.2-1	0.2	No change + 0.003	No change - 0.005	No change - 0.002	No change - 0.028
SANHIBITOR No.50	0.2	No change - 0.063	No change + 0.001	Turned black - 0.069	No change - 0.034
SANHIBITOR OMA-10	0.2	No change + 0.005	No change - 0.009	No change - 0.003	Slight change in color - 0.035
None (Kyoto tap water)		Slight change in color 0	Turned slightly black - 0.206	Turned slightly black - 0.230	No change - 0.086

Materials and Method:

Materials:

Each sample was prepared by adding a rust inhibitor described in Table 3 to the tap water of Kyoto City.

Method:

After each of the following test pieces was immersed at 20°C for 10 days, moisture on the surfaces of the test piece was wiped off and appearance was visually evaluated. Then, the test piece was washed and measured by mass according to the metal corrosion testing method described in JIS K 2234 (refer to ASTM D 1384). The change of weight was calculated using the following equation.

<Test Piece>

Each of the following materials with a hole (Diameter of the hole: 6.5 mm) was polished and washed according to the corrosion testing method described in JIS K 2234 and used as a test piece.

Copper plate: C1100P prescribed in JIS H 3100 (Dimension: 1.6×50×25 mm)

Brass plate: C2680P prescribed in JIS H 3100 (Dimension: 1.6×50×25 mm)

Aluminum alloy casting: AC2A-F prescribed in JIS H 5202 (Dimension: 3.0×50×25 mm)

Solder: H30A prescribed in JIS Z 3282 (Dimension: 3.0×50×25 mm)

<Equation for Change of Weight>

$$C = \frac{W - W'}{S}$$

C : Change of mass (mg / cm²)

W : Mass of the test piece before testing (mg)

W' : Mass of the test piece after testing (mg)

S : Total surface area of the test piece (cm²)

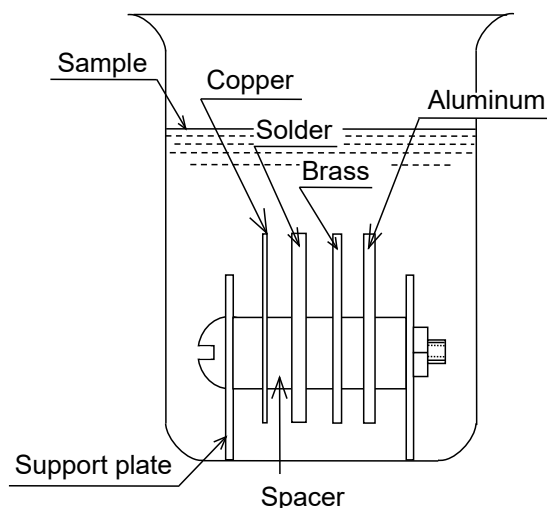


Figure 2. Metal Corrosion Test

2. Performances of Oil-Soluble SANHIBITOR Products

2-1) Rust Preventive Properties for Iron and Copper

As shown in Table 4, oil-soluble SANHIBITOR Products exhibit excellent rust preventive properties for iron and copper.

Table 4. Rust Preventive Properties for Iron and Copper

Rust Inhibitors		Rust Preventive Properties for	
		Iron	Copper
Product Name	Concentration wt %	Iron was kept at 50°C and 95% R.H. for 5 days after being immersed	Rust preventive property (JIS K 2513)
SANHIBITOR 102	1.0	A	1
	3.0	A	–
SANHIBITOR 150	1.0	A	1
	3.0	A	–
None (spindle oil)		E	1

Materials and Method:

Materials:

Each sample was prepared by adding a rust inhibitor described in Table 4 to JIS No.1 spindle oil.

Methods:

Rust preventive property for iron

Test pieces were immersed in the sample for 1 minute. They were then taken out of the sample, and kept for 5 days at 50°C and 95% R.H. using a thermohygrostat. They were evaluated under the following standard according to the testing method, [6.4. Rust growth test], described in JIS K 2246.

<Test Piece>

A test piece (material: see SPCC-SB prescribed in JIS G 3141, dimensions: 1.3× 80× 60 mm) was polished and washed according to JIS K 2246, [rust preventive oil].

<Evaluation for Rust Preventive Properties>

See Table 2.

Rust preventive property for copper

Measured according to JIS K 2513 (ISO 2160).

<Test Piece>

Copper plate: C1100P prescribed in JIS H 3100 (Dimension: 1.5×75×12.5 mm), corresponds to ASTM D130-94.

<Standard for Evaluating Petroleum Products – Corrosiveness to Copper>

- 1: Slight change in color
- 2: Moderate Change in color
- 3: Strong Change in color
- 4: Corrosion

2-2) Performance When Used as a Rust Inhibitor for Lubricating Oil

As shown in Table 5, mineral oil containing oil-soluble SANHIBITOR products exhibit excellent rust preventive properties for iron even when seawater is mixed in. Furthermore, these products exhibit excellent demulsibility.

Table 5. Performance When Used as Rust Preventive Agent for Lubricating Oil

Rust Inhibitors		Rust Preventive Properties for Iron			
Product Name	Concentration wt %	Rust Preventive Property for Lubricating Oil	Demulsibility mL (min)*		
			Oil Layer	Water Layer	Emulsified Layer
SANHIBITOR 102	0.06	No rust existed	40-40-0 (10)		
SANHIBITOR 150	0.06	No rust existed	37-40-3 (10)		
None (#90 turbine oil)		Rust existed	40-40-0 (10)		

* The two-digit number between parentheses shows the time required for the emulsified layer to become 3 mL or less.

Materials and Method:

Materials:

Each rust inhibitor described in Table 5 was added to #90 turbine oil, and used as a sample.

Methods:

Lubricating oil – rust preventive property

The following test pieces were immersed in a sample at 60°C for 24 hours while being agitated, and then the growth of rust on the iron surfaces was visually evaluated according to the testing method using artificial seawater described in JIS K 2510.

< Test Piece >

Iron: SGD 3M prescribed in JIS G 3108, (diameter: 13 mm, length: 81 mm)

Demulsibility

According to JIS K 2520 (ISO 6614), a mixture of 40 mL sample and 40 mL pure water was agitated at a rate of 1500 rpm at 54°C for 5 minutes to emulsify it. Demulsibility was evaluated when the volume of the emulsified layer was 3 mL or less after it was finished.

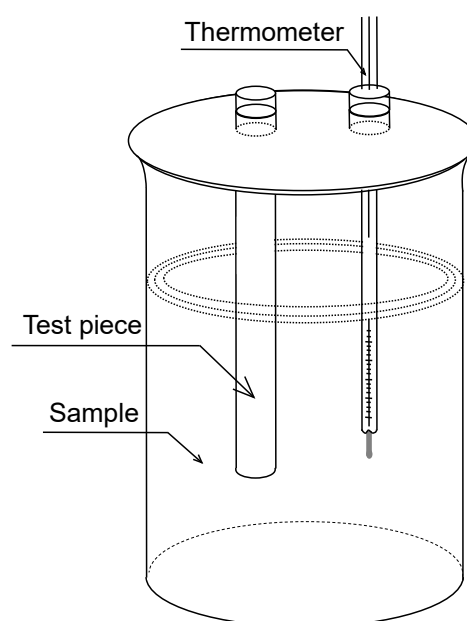


Figure 3. Rust Preventive Property

Hazards Description

UN dangerous goods regulations are not applied to SANHIBITOR products.
These products may cause irritation to the skin and eyes.
These products are for industrial use only.

Important :

Before handling these products, refer to the Safety Data Sheet for recommended protective equipment, and detailed precautionary and hazards information.

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