

JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS K 2246 : 2007

(JACC/JSA)

Rust preventive oils

ICS 75.140

Reference number : **JIS K 2246 : 2007 (E)**

PROTECTED BY COPYRIGHT

Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Association of Corrosion Control (JACC)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS K 2246** : 1994 is replaced with this Standard.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

Date of Establishment: 1980-01-01

Date of Revision: 2007-03-20

Date of Public Notice in Official Gazette: 2007-03-20

Investigated by: Japanese Industrial Standards Committee

Standards Board

Technical Committee on Chemical Products

JIS K 2246:2007, First English edition published in 2007-11

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

© JSA 2007

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

Printed in Japan

PROTECTED BY COPYRIGHT

Contents

	Page
1 Scope	1
2 Normative references	1
3 Terms and definitions	3
4 Classification	4
5 Quality and performance	6
6 Testing method	10
6.1 General items	10
6.2 Sampling method	10
6.3 Common items to test piece	10
6.4 Measuring method of rust gathering	13
6.5 Test method for flash point	14
6.6 Test method for pour point	14
6.7 Test method for kinematic viscosity	14
6.8 Calculation method of viscosity index	14
6.9 Test method for viscosity variation	14
6.10 Test method for precipitation number	14
6.11 Test method for solubility in hydrocarbon	15
6.12 Test method for corrosiveness on copper plate	15
6.13 Test method for foamability	15
6.14 Test method for oxidation stability	15
6.15 Test method for melting point	15
6.16 Test method for consistency	15
6.17 Testing method for amount of evaporation	15
6.18 Test method for oxygen absorbability	16
6.19 Test method for film thickness	17
6.20 Test method for drying property	19
6.21 Test method for sagging point	19

6.22	Test method for low-temperature adhesiveness.....	21
6.23	Test method for film removability.....	22
6.24	Test method for abrasiveness.....	24
6.25	Test method for amount of volatile matter	24
6.26	Test method for stability for separation	25
6.27	Test method for sprayability	26
6.28	Test method for corrosiveness.....	27
6.29	Test method for water displacement.....	30
6.30	Test method for acid neutralization.....	31
6.31	Test method for fingerprint removability	32
6.32	Test method for anticorrosiveness on handling	34
6.33	Test method for transparency	35
6.34	Testing method of humidity cabinet test	35
6.35	Test method for neutral salt spray test	37
6.36	Test method for weather resistance	38
6.37	Test method for storability-in-package.....	39
6.38	Test method for immersion in salt solution	42
6.39	Test method for vapour inhibitability	43
6.40	Test method for vapour inhibitability after exposure	45
6.41	Test method for vapour inhibitability after heating	46
7	Designation of products.....	46
8	Marking	46
	Annex (informative) Reference test method	48

Rust preventive oils

1 Scope This Japanese Industrial Standard specifies the rust preventive oils which can be used to temporarily prevent gathering of rust on metal materials or products mainly consisting of iron and steel.

2 Normative references The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

- JIS B 7753 *Light-exposure and light-and-water-exposure apparatus (Open-flame carbon-arc type)*
- JIS B 9809 *Spray guns*
- JIS G 3108 *Rolled carbon steel for cold-finished steel bars*
- JIS G 3141 *Cold-reduced carbon steel sheets and strips*
- JIS G 4305 *Cold-rolled stainless steel plate, sheet and strip*
- JIS G 4308 *Stainless steel wire rods*
- JIS H 3100 *Copper and copper alloy sheets, plates and strips*
- JIS H 4000 *Aluminium and aluminium alloy sheets, strips and plates*
- JIS H 4080 *Aluminium and aluminium alloys extruded tubes and cold-drawn tubes*
- JIS H 4201 *Magnesium alloy sheets, plates, strips and coiled sheets*
- JIS H 4301 *Lead and lead alloy sheets and plates*
- JIS H 4554 *Nickel and nickel alloy wire and drawing stock*
- JIS H 8611 *Electroplated coatings of cadmium on iron or steel*
- JIS H 8617 *Electroplated coatings of nickel and chromium*
- JIS K 1101 *Oxygen*
- JIS K 1503 *Acetone*
- JIS K 2201 *Gasoline for industrial purpose*
- JIS K 2220 *Lubricating grease*
- JIS K 2231 *Liquid paraffin*
- JIS K 2235 *Petroleum waxes*
- JIS K 2249 *Crude petroleum and petroleum products—Determination of density and petroleum measurement tables based on a reference temperature (15 °C)*
- JIS K 2251 *Crude petroleum and petroleum products—Sampling*
- JIS K 2265-1 *Determination of flash point—Part 1: Tag closed cup method*
- JIS K 2265-2 *Determination of flash point—Part 2: Rapid equilibrium closed cup method*

- JIS K 2265-4 *Determination of flash point—Part 4 Cleveland open cup method*
- JIS K 2269 *Testing methods for pour point and cloud point of crude oil and petroleum products*
- JIS K 2283 *Crude petroleum and petroleum products—Determination of kinematic viscosity and calculation of viscosity index from kinematic viscosity*
- JIS K 2435-2 *Benzene • Toluene • Xylene—Part 2: Toluene*
- JIS K 2503 *Testing method of lubricating oil for aircraft*
- JIS K 2513 *Petroleum products—Corrosiveness to copper—Copper strip test*
- JIS K 2514 *Lubricating oils—Determination of oxidation stability*
- JIS K 2518 *Petroleum products—Lubricating oils—Determination of foaming characteristics*
- JIS K 2839 *Glasswares for testing apparatus of petroleum products*
- JIS K 3351 *Glycerines for industrial use*
- JIS K 8150 *Sodium chloride (Reagent)*
- JIS K 8509 *Hydrobromic acid (Reagent)*
- JIS K 8625 *Sodium carbonate (Reagent)*
- JIS K 8726 *Lactic acid (Reagent)*
- JIS K 8731 *Urea (Reagent)*
- JIS K 8891 *Methanol (Reagent)*
- JIS L 3201 *Wool press felts*
- JIS R 1302 *Porcelain basins for chemical analysis*
- JIS R 3202 *Float glass and polished plate glass*
- JIS R 3503 *Glass apparatus for chemical analysis*
- JIS R 3505 *Volumetric glassware*
- JIS R 3703 *Slide glasses for microscope*
- JIS R 6251 *Abrasive cloths*
- JIS R 6252 *Abrasive papers*
- JIS R 6253 *Waterproof abrasive papers*
- JIS Z 0103 *Glossary of terms used in rust and corrosion preventive technology*
- JIS Z 0701 *Silicagel desiccants for packaging*
- JIS Z 1514 *Polyethylene coated paper*
- JIS Z 1522 *Pressure sensitive adhesive cellophane tapes*
- JIS Z 1524 *Pressure sensitive adhesive cloth tapes for packaging*
- JIS Z 2371 *Methods of salt spray testing*
- JIS Z 8401 *Guide to the rounding of numbers*
- JIS Z 8801-1 *Test sieves—Part 1: Test sieves of metal wire cloth*

3 Terms and definitions For the purposes of this Standard, the definitions given in **JIS Z 0103** and the following definitions apply.

- a) **viscosity variation** a variation rate expressing the viscosity of the sample before and after heating by heating the sample under the specified condition and removing volatile matters and examining the viscosity
- b) **precipitation number** a number of ml, which is expressed by an absolute number, of the precipitate produced when the mixture of the sample and the specified solvent is centrifugally separated under the specified condition
- c) **solubility in hydrocarbon** the property expressed by the change of phase or presence of separation when the mixture of the sample and the naphtha for precipitation is centrifugally separated under the specified condition and then left statically for 24 h as it is
- d) **foamability** the amount of foam expressed in the unit of ml when measured immediately after air is blown into the sample maintained at the specified temperature at a definite rate for the specified duration and after it is left for 10 min as it is
- e) **oxidation stability** the antioxidative property of the sample expressed by evaluating the variation of kinematic viscosity and total acid number and the adhering condition of lacquer-like substance or sludge on the varnish stick after catalyzer and a varnish stick are immersed in the sample and it is oxidized by agitating at the specified temperature for the specified duration
- f) **total acid number** the amount of potassium hydroxide expressed in mg which is required for neutralizing all acidic components contained in 1 g of the sample
- g) **consistency** degree expressing the hardness of petrolatum, that is, the penetrated depth counted by 0.1 mm as 1 unit, when the specified cone penetrates vertically into sample under the specified condition
- h) **oxygen absorbability** the property expressing the antioxidative property of the sample by the decrement of oxygen pressure after 100 h elapsed so that a cylinder sealed with the specified pressure of oxygen, in which the sample containing catalyzer is put, is heated at the specified temperature
- i) **film thickness** the thickness of the coated film expressed in μm unit obtained so that the sample is coated on the test piece by the specified method, the test piece is vertically hold for 24 h and the adhering mass of coated film is examined
- j) **drying property** the dry condition of the coated film after the sample is coated on the test piece by the specified method and the test piece is vertically hold for the specified duration
- k) **sagging point** the temperature at which the coated film of the sample is vertically hold at the set temperature for 1 h and the coated film sags down to the reference line
- l) **low-temperature adhesiveness** the property that the coated film of the sample clings on the surface of metal at low temperature

- m) **film removability** the property that the coated film of the sample can be removed by petroleum-base solvent
- n) **abrasiveness** the property that the foreign substances mixed in the sample gives damage on metal products
- o) **amount of volatile matter** the mass of matter which can vaporize when the sample is heated under the specified condition
- p) **stability for separation** the presence of transition or separation of phase observed when the sample is subjected to the specified temperature condition
- q) **sprayability** the property that the spray drops of the sample is uniformly formed when the sample is sprayed under a definite condition
- r) **corrosiveness** the property that the sample corrodes or discolours metal
- s) **water displacement property** the property that the sample can prevent rust by displacing the water adhering to the surface of metal
- t) **acid neutralization property** the property that the sample can prevent rust by neutralizing acidic substance
- u) **fingerprint removability** the property that the sample can remove the artificial fingerprint stuck on the surface of metal and prevent rust owing to the artificial fingerprint
- v) **corrosion proofing property on handling** the property that the coated film of the sample can prevent rust to be produced by the artificial fingerprint put on it
- w) **transparency** the property that the punch mark on metal surface is recognizable from the top of coated film of the sample which has been left under the specified condition as it is after coating
- x) **storability-in-package** the property that the test piece coated with the sample under the specified condition is packaged and rust is prevented while it is stored in an instrument shelter equipped with a water tank
- y) **vapour inhibitability** the property that the rust preventive agent vaporized from the sample prevents the rust gathering on metal surface on which dew has been condensed under the hermetic condition
- z) **purified water** ion-exchanged water or distilled water

4 Classification Rust preventive oils are classified into five classes as, fingerprint removing-type rust preventive oil, solvent cutback-type rust preventive oil, petrolatum-type rust preventive oil, lubricating oil-type rust preventive oil, and volatile rust preventive oil. They are also subdivided into as shown in table 1 to table 5 according to the property and viscosity of their films.

Information : N in symbol NP stands for NIPPON (Japan) and P for Preservative.

Table 1 Fingerprint removing-type rust preventive oil

Class		Symbol	Property of film	Main service
Fingerprint removing-type rust preventive oil	Class 1	NP-0	Low viscous oil film	Removal of fingerprint adhering on general-purpose machine, machine parts and so on

Table 2 Solvent cutback-type rust preventive oil

Class		Symbol	Property of film	Main service
Solvent cutback-type rust preventive oil	Class 1	NP-1	Hard film	Rust prevention for indoor and outdoor
	Class 2	NP-2	Soft film	Rust prevention mainly for indoor
	Class 3	No. 1	NP-3-1	Rust prevention mainly for indoor (water displacement type)
		No. 2	NP-3-2	
	Class 4	NP-19	Transparent and hard film	Rust prevention for indoor and outdoor

Table 3 Petrolatum-type rust preventive oil

Class		Symbol	Property of film	Main service
Petrolatum-type rust preventive oil	Class 1	NP-6	Soft film	Rust prevention for highly machine finished surface like a rolling bearing

Table 4 Lubricating oil-type rust preventive oil

Class			Symbol	Property of film	Main service
Lubricating oil-type rust preventive oil	Class 1	No. 1	NP-9	Low viscous oil film	Rust prevention for metal materials and metal products
		No. 2	NP-8	Low viscous oil film	
		No. 3	NP-7	Medium viscous oil film	
	Class 2	No. 1	NP-10-1	Low viscous oil film	Temporary rust prevention for internal of machine
		No. 2	NP-10-2	Medium viscous oil film	
		No. 3	NP-10-3	High viscous oil film	

Table 5 Volatile rust preventive oil

Class			Symbol	Property of film	Main service
Volatile rust preventive oil	Class 1	No. 1	NP-20-1	Low viscous oil film	Rust prevention in closed space
		No. 2	NP-20-2	Medium viscous oil film	

5 Quality and performance Rust preventive oils, mainly composed of petroleum base material added with corrosion inhibitor, shall have superior property as a rust prevention, contain no sand or other foreign substances, and meet the requirements shown in table 6 to table 10 when tested according to the prescription in clause 6.

Table 6 Quality and performance of fingerprint removing-type rust preventive oil

Item		Testing method	NP-0	
Flash point °C		6.5	38 min.	
Kinematic viscosity mm ² /s (40.0 °C)		6.7	12 max.	
Stability for separation		6.26	No recognized transition and separation of phase.	
Fingerprint removability		6.31	No rust.	
Film removability	After humidity cabinet test	6.23.3 b)	Film is removed.	
Corrosiveness	Variation of mass mg/cm ²	6.28	Steel ± 0.1	Brass ± 1.0
			Zinc ± 3.0	Aluminium ± 0.1
			Lead ± 45.0	
Anticorrosiveness on handling		6.32	No rust.	
Rust preventive performance	Humidity cabinet test	6.34	Grade A (168 h)	

Table 7 Quality and performance of solvent cutback-type rust preventive oil

Item		Testing method	NP-1	NP-2	NP-3-1	NP-3-2	NP-19
Flash point °C		6.5	38 min.	38 min.	38 min.	38 min.	38 min.
Drying property		6.20	Tack free state	Soft state	Soft state	Soft state or oily state	Dry-to-touch state (4 h) Tack free state (24 h)
Sagging point °C		6.21	80 min.	—	—		80 min.
Low-temperature adhesiveness		6.22	No peeling of film.				
Water displacement		6.29	—		No rust, rough surface and dirt.		—
Sprayability		6.27	Continuous film.				
Stability for separation		6.26	No transition and separation of phase.				
Film remov-ability	After weather resistance test	6.23.3 a)	Film is removed (30 times).	—	—		—
	After storability-in-package test	6.23.3 a)		Film is removed (15 times).	Film is removed (6 times).		Film is removed (15 times).
Transparency		6.33	—				Mark is visible.
Corro-siveness	Variation of mass mg/cm ²	6.28	Steel	± 0.2	Brass		± 1.0
			Zinc	± 7.5	Aluminium		± 0.2
			Magnesium	± 0.5	Cadmium		± 5.0
			Chromium	No delustering.			
Film thickness µm		6.19	100 max.	50 max.	25 max.	15 max.	50 max.
Rust pre-ventive performance	Humidity cabinet test	6.34	—	Class A (720 h)	Class A (720 h)	Class A (480 h)	Class A (720 h)
	Neutral salt spray test	6.35	Class A (336 h)	Class A (168 h)	—		Class A (336 h)
	Weather resistance test	6.36	Class A (600 h)	—	—		—
	Storability-in-package test	6.37	—	Class A (360 d)	Class A (180 d)	Class A (90 d)	Class A (360 d)

Table 8 Quality and performance of petrolatum-type rust preventive oil

Item		Testing method	NP-6
Consistency		6.16	200 to 325
Melting point °C		6.15	55 min.
Flash point °C		6.5	175 min.
Stability for separation		6.26	No transition and separation of phase.
Amount of evaporation %		6.17	1.0 max.
Oxygen absorbability kPa (100 h)		6.18	150 max.
Precipitation number		6.10	0.05 max.
Abrasiveness		6.24	No flaw.
Sagging point °C		6.21	40 min.
Film removability		6.23.3 a)	Film is removed (15 times).
Low-temperature adhesiveness		6.22	No recognized peeling of film.
Corrosive-ness	Variation of mass mg/cm ²	6.28	Steel ± 0.2 Brass ± 0.2
			Zinc ± 0.2 Aluminium ± 0.2
			Lead ± 1.0 Magnesium ± 0.5
			Cadmium ± 0.2
			Except lead, no serious rough surface, dirt, or discolouring.
Rust preventive performance	Humidity cabinet test	6.34	Grade A (720 h)
	Neutral salt spray test	6.35	Grade A (120 h)
	Storability-in-package test	6.37	Grade A (360 d)

Table 9 Quality and performance of lubricating oil-type rust preventive oil

Item			Testing method	NP-7	NP-8	NP-9	NP-10-1	NP-10-2	NP-10-3
Flash point °C			6.5	180 min.	150 min.	130 min.	170 min.	190 min.	200 min.
Pour point °C			6.6	−10 max.	−20 max.	−30 max.	−25 max.	−10 max.	−5 max.
Kinematic viscosity mm ² /s			6.7	(40 °C) 100 ± 25	(40 °C) 18 ± 2	(40 °C) 13 ± 2	(−18 °C) 2 500 max.	(100 °C) 9.3 or over to and excl. 12.5	(100 °C) 16.3 or over to and excl. 21.9
Viscosity index			6.8	—	—	—	75 min.	70 min.	
Oxidation stability (165.5 °C, 24 h)			6.14	—	—	—	300 max.	200 max.	
Viscosity variation (40 °C) %									
Increment of total acid number mgKOH/g									
Amount of volatile matter %			6.25	—	—	—	2 max.		
Foam- ability	Amount of foam ml	(24 °C)	6.13	—	—	—	300 max.		
		(93.5 °C)					25 max.		
		(24 °C after 93.5 °C)					300 max.		
Acid neutralization			6.30	—	—	—	No rust, rough surface, dirt, and discolouring.		
Corrosiveness on copper plate (at 100 °C for 3 h)			6.12	2 max.			—		
Film remov- ability	After humidity cabinet test		6.23.3 b)	Film is removed.					
Rust pre- ventive perform- ance	Humidity cabinet test		6.34	Grade A (240 h)	Grade A (192 h)		Grade A (480 h)		
	Neutral salt spray test		6.35	Grade A (48 h)	—	—	—		
	Immersion in salt solution test		6.38	—	—	—	Grade A (20 h)		

Table 10 Quality and performance of volatile rust preventive oil

Item		Testing method	NP-20-1	NP-20-2
Flash point °C		6.5	115 min.	120 min.
Pour point °C		6.6	-25.0 max.	-12.5 max.
Kinematic viscosity mm ² /s	100 °C	6.7	—	8.50 to 12.98
	40 °C		10 min.	95 to 125
Amount of volatile matter %		6.25	15 max.	5 max.
Viscosity variation %		6.9	-5 to 20	
Precipitation number		6.10	0.05 max.	
Solubility in hydrocarbon		6.11	No transition and separation of phase.	
Acid neutralization		6.30	No rust, rough surface, dirt, and discolouring.	
Water displacement		6.29	No rust, rough surface, dirt, and discolouring.	
Corrosiveness	Variation of mass mg/cm ²	6.28	Steel ± 0.1 Copper ± 1.0 Aluminium ± 0.1	
Rust preventive performance	Humidity cabinet test	6.34	Grade A (200 h)	
	Vapour inhibatability test	6.39	No rust.	
	Vapour inhibatability test after exposure	6.40	No rust.	
	Vapour inhibatability test after heating	6.41	No rust.	

6 Testing method

6.1 General items The figures shall be rounded off in accordance with **JIS Z 8401**.

6.2 Sampling method The sampling method shall be in accordance with **JIS K 2251**.

6.3 Common items to test piece

6.3.1 Test piece The test piece used in **6.19** to **6.23**, **6.29** to **6.38** and the reference test method in Annex shall be as follows (see figure 1).

a) **Material** SPCC-SB as specified in **JIS G 3141**

b) **Dimensions**

- 1) **Test piece A** 1.0 mm to 2.0 mm (thickness) × 60 mm (longitudinal) × 80 mm (transverse)
- 2) **Test piece B** 1.0 mm to 2.0 mm (thickness) × 80 mm (longitudinal) × 60 mm (transverse)

- c) **Hanging holes** Two holes of 3 mm in diameter shall be made so as to enable hanging.

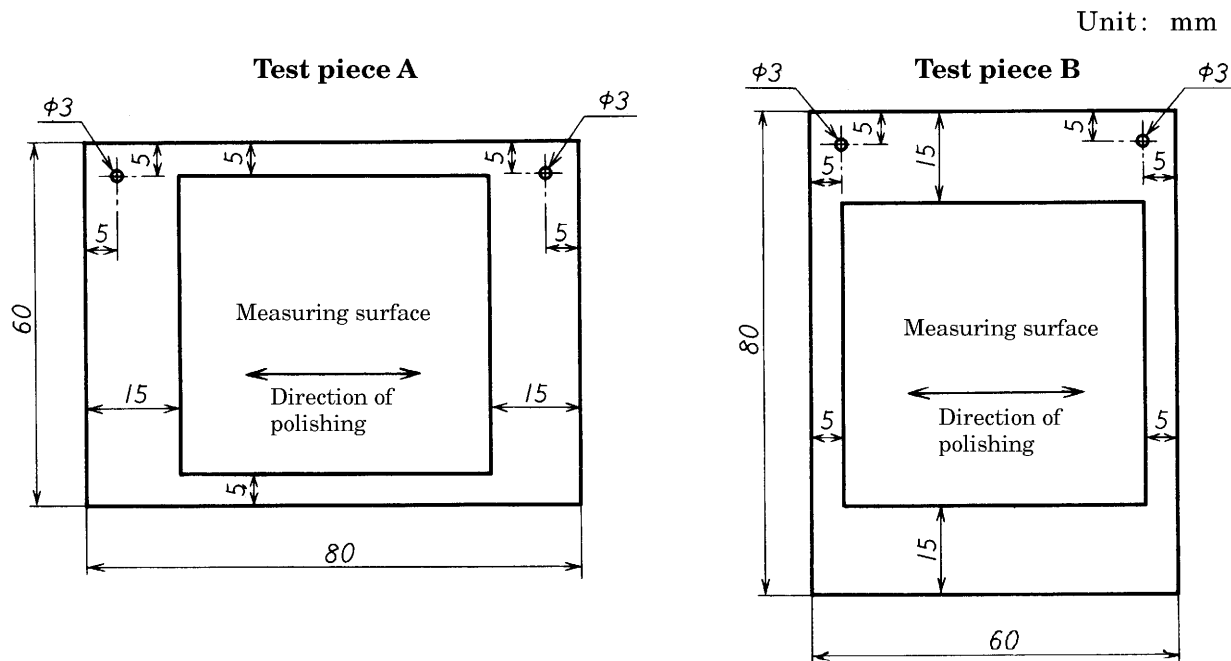


Figure 1 Test piece

6.3.2 Preparation of test piece The preparation of test piece shall be as follows.

a) **Solvent and material**

- 1) **Solvent** No. 3 (volatile soybean oil) or No. 4 (mineral spirit) as specified in **JIS K 2201**
- 2) **Methanol** As specified in **JIS K 8891**
- 3) **Abrasive** A,P240 as specified in **JIS R 6251** or **JIS R 6252**
- 4) **Drying container** Sealable container containing desiccant as specified in **JIS Z 0701**

- b) **Handling of test piece** The test piece shall be handled by using a clean pair of tweezers or gloves so as not to leave fingerprints or other stains on the test piece.

c) **Procedure for preparation**

- 1) **Preliminary cleaning** Wash off the rust-proof oil, dirt or dust adhered to the test piece while slightly rubbing the test piece with clean gauze in the solvent, and dry the test piece by warm air, etc.
- 2) **Preliminary polishing**
 - 2.1) Polish each surface of the test piece in the longitudinal direction with abrasives.
 - 2.2) Polish in the longitudinal direction for test piece A and in the transverse direction for test piece B.

- 2.3) Simultaneously polish the edges and hanging holes.
- 2.4) Wipe the polishing powder with clean gauze, and immerse the test piece in the solvent.
- 3) **Finish polishing**
 - 3.1) Take out the test piece from the solvent, and after drying by warm air, etc., immediately repeat the operation of **2.1)** by using a new polishing material to provide a new polished surface.
 - 3.2) Wipe the polishing powder with clean gauze, and immerse the test piece in the solvent.
- 4) **Finish cleaning**
 - 4.1) Take out the test piece from the solvent, wipe the stains on the surface with clean gauze wetted by the solvent until no stains are left on the gauze, and immerse the test piece in the new solvent.
 - 4.2) Take out the test piece from the solvent, and after drying by warm air, etc., immediately immerse the test piece in the methanol of $35\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ which is separately prepared for 1 min or longer, and then, dry it by warm air, etc.
- 5) **Preservation method** In the case where the test piece is not immediately subjected to be tested, preserve it in a drying container. However, the test piece that has been stored for not less than 24 h shall be prepared again.

6.3.3 Preparation of coated test piece The preparation of the coated test piece shall be as follows.

a) **Material and implement**

- 1) **Test piece** As specified in **6.3.1** and prepared according to **6.3.2**
- 2) **Sample container** A beaker of 500 ml
- 3) **Suspender** Wire of about 1 mm in diameter as specified in **JIS G 4308** or **JIS H 4554**, the shape as shown in figure 2, and the overall length of 90 mm to 100 mm.
- 4) **Suspender base** Capable of hanging the test piece upright

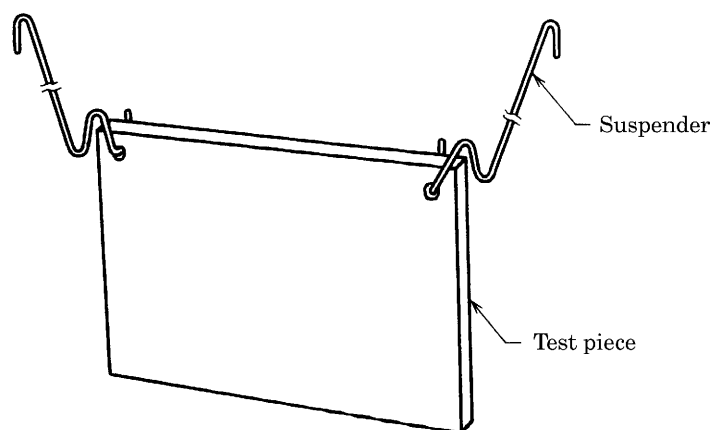


Figure 2 Suspender

b) **Procedure for preparation**

- 1) **Coating method** Take 500 ml of the sample in a sample container, stir it enough, remove the bubbles gathered on the surface, and make the temperature of the sample $23\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$. In the case of petrolatum-type rust preventing oil, the coating temperature is different depending on the sample, therefore change the temperature of the sample beforehand to measure the thickness of film, obtain the temperature at which the thickness of film can be adjusted to $38\text{ }\mu\text{m} \pm 5\text{ }\mu\text{m}$ and heat to melt it.

Next, immerse vertically the test piece prepared according to **6.3.2** in the sample by using a suspender for 1 min and draw it up at the rate of 100 mm per minute.

- 2) **Drying method** Suspend vertically a coated test piece with making its upper edge or lower edge horizontal by using a suspender on a suspender base, and dry naturally it at the clean place where no direct rays of the sun and less ventilation at 70 % or less in relative humidity and $23\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ in temperature for 24 h.

6.4 Measuring method of rust gathering

6.4.1 Measuring surface The measuring surface of rust gathering shall be 50 mm × 50 mm of central part of a test piece (see figure 1).

6.4.2 Measuring plate The measuring plate shall be as follows.

- a) **Material** Colourless transparent plate
- b) **Dimension** Flat plate of 60 mm × 80 mm
- c) **Checkers** On the measuring surface of a measuring plate, score 100 checkers, each of which is a square 5 mm on a side, with scoring line of about 0.5 mm in width

6.4.3 Counting method of rust gathering Lay a measuring plate on a test piece, and count the number of checkers on which one or more rust gatherings are observed with naked eyes.

NOTE : When the rust gathered on score line or their crossing point is protruding into an adjacent checker, the checker into which rust is protruding shall be counted to be rusted. When there is no protruding of rust from line or crossing point, if adjacent checker has no gathering of rust, one checker out of the adjacent checkers is recognized to get rust gathering.

6.4.4 Expression of rust gathering The degree of rust gathering shall be expressed as in table 11.