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General rule for rust preventive packaging method

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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 Z 0303** : 1985 is replaced with this Standard.

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General rule for rust preventive packaging method

Introduction

This Japanese Industrial Standard was established in 1959 and to this day has gone through three revisions. The last revision was made in 1985 and the revision at this time is to respond to the technical innovation.

The corresponding International Standard has not yet been published at this moment.

1 Scope

This Standard specifies the rust preventive packaging method processed to prevent the generation of rust in transportation or storage of metallic materials and metal products, mainly iron and steel (hereafter referred to as the “metal products”) and the test methods.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. For standards with the year indication, only the editions of the indicated year shall apply but the revisions (including amendments) made thereafter shall not apply. The normative reference without the indication of the year shall apply only to the most recent edition (including amendments).

JIS H 4160 *Aluminium and aluminium alloy foils*

JIS K 2241 :2000 *Cutting Fluid*

JIS K 2246 :2007 *Rust preventive oils*

JIS K 7126-1 *Plastics— Film and sheeting— Determination of gas-transmission rate—Part 1: Differential-pressure method*

JIS K 7126-2 *Plastics— Film and sheeting— Determination of gas-transmission rate—Part 2: Equal-pressure method*

JIS K 7129 *Plastics— Film and sheeting— Determination of water vapour transmission rate— Instrumental method*

JIS P 8133 *Paper, board and pulps— Determination of pH of aqueous extracts*

JIS Z 0103 *Glossary of terms used in rust and corrosion preventive technology*

JIS Z 0108 *Glossary of terms for packaging*

JIS Z 0208: 1976 *Testing methods for determination of the water vapour transmission rate of moisture-proof packaging materials (dish method)*

JIS Z 0305: 1998 *Chemical cleaning of steel products*

JIS Z 0310 *Abrasive blast-cleaning methods for surface preparation*

JIS Z 0701 *Silicagel desiccants for packaging*

JIS Z 1514:1994 *Polyethylene coated paper*

JIS Z 1519:1994 *Volatile corrosion inhibitor*

JIS Z 1520 *Laminated aluminium foils*

JIS Z 1535:1994 *Volatile corrosion inhibitor treated paper*

JIS Z 1702 *Polyethylene films for packaging*

JIS Z 1705 *Corrosion preventive greaseproofed barrier materials*

JIS Z 1708:1976 *Sprayable and strippable protective plastic coatings*

3 Terms and definitions

For the purposes of this Standard, the following terms and definitions apply with given in **JIS Z 0103** and **JIS Z 0108**.

3.1 inserting paper

the paper put between metal products for maintaining the quality of plate type metal products

3.2 cushioning material

the material having cushioning property for protecting the metal products from the generation of flaw due to shock

3.3 anti-tarnish paper

the generic term of paper having the function to protect the metal products from the generation of rust, and having the performance to pass 5.6 of **JIS Z 1535:1994**

3.4 rust preventive film

the plastic film coated or kneaded with corrosion inhibitor for preventing the generation of rust, which is the material to exhibit the effect by acting synergistically with moisture barrier property or corrosive gas barrier property

3.5 underlay material

the material to be used between a metal product and a container so that the metal product is not directly contacted to the bottom of the container when the metal product is placed in the container

3.6 high barrier film

the plastic film of which the oxygen gas permeability is not more than $5 \text{ fmol}/(\text{m}^2 \cdot \text{s} \cdot \text{Pa})$ when measured according to **JIS K 7126-1** or **JIS K 7126-2** and the water vapour permeability (water vapour transmission rate) is not more than $5 \text{ g}/(\text{m}^2 \cdot \text{d})$ when measured under condition 3 of **JIS K 7129** or condition B in 3.3 of **JIS Z 0208 :1976**

3.7 corrosive gas

the gas having the function to accelerate the corrosion of metal, such as NO_x (nitrogen oxide), SO_x (sulfur oxide), hydrogen sulfide, chlorine, formic acid, acetic acid

In the case of non-ferrous metal, the alkaline gas such as ammonia is also included.

3.8 moisture-proof property

the property to indicate the resistance to moisture (water vapour) permeation

It means the case where for the anti-tarnish paper, the water vapour permeability (water vapour transmission rate) is not more than $50 \text{ g}/(\text{m}^2 \cdot \text{d})$ when measured under condition 3 of **JIS K 7129** or under condition B of 3.3 of **JIS Z 0208:1976** and for other packaging materials, the water vapour permeability (water vapour transmission rate) is not more than $15 \text{ g}/(\text{m}^2 \cdot \text{d})$ when measured under condition 3 of **JIS K 7129** or under condition B of 3.3 in **JIS Z 0208:1976**.

3.9 water-proof property

the property being difficult to permeate water

It does not always hold moisture-proof property concurrently.

3.10 water-proof packaging

the packaging to prevent water from permeating inside the packaging

3.11 sealed space treatment

the method to hold metal products in sealed container together with volatile corrosion inhibiting material for preventing the generation of rust and deterioration

3.12 sealed rigid container

the sealable packaging container made of very rigid material such as metal and plastics

3.13 solvent

the liquid capable of dissolving substances, which is composed of single or mixture of paraffin, naphthene series and aromatic hydrocarbon in chemical constitution and, that used especially for cleaning metal products such as synthetic hydrocarbon, alcohols.

4 Classification of packaging method

The rust preventive packaging method shall be divided into RP1 to RP5 (see 5.7) in consideration of the features of contents, degree of surface finish, period of transportation and storage, environment conditions during that period and the degree of handling of packaged freight suffered during transportation and furthermore shall be subdivided as shown in table 1 according to the classification of rust preventive material and the application method thereof. Provided that in the case of double packaging, the packaging method for outer packaging shall not be specified.

Moreover, the old and new comparison table of symbol of rust preventive packaging method is indicated in Annex A and the guide of selection of rust preventive packaging method is indicated in Annex B.

Table 1 Classification of rust preventive packaging method

Classification of packaging method		Rust preventive material	Applying method and packaging of rust preventive material	Symbol ^{b)}
RP1	Moisture-proof packaging	Rust preventive oil	Covered and packaged by a of table 9	RP1-P1
			Immersed in oil in oil resistant rigid container	RP1-P2
		Volatile corrosion inhibitor	Either sealed space treatment or covering treatment is applied and packaging by a of table 9	RP1-V
		Water soluble corrosion inhibitor and volatile water soluble corrosion inhibitor	Covered and packaged by a of table 9	RP1-W
		Anti-tarnish paper (non-moisture proof type)	Any one of wrapping treatment, inserting paper treatment or sealed space treatment is applied and packaged by a of table 9	RP1-K1
		Anti-tarnish paper (moisture-proof type)	Either wrapping treatment or using by making bag-shaped is applied	RP1-K2
		Rust preventive film	Any one of wrapping treatment, using by making bag-shaped or stretching packaging is applied	RP1-F
		Strippable plastics	After directly covered or packaged with aluminium foil, etc., covered	RP1-S
RP2	Water-proof packaging	Rust preventive oil	Covered and packaged by b of table 9	RP2-P
		Volatile corrosion inhibitor	Either sealed space treatment or covering treatment is applied and packaged by b of table 9	RP2-V
		Water soluble corrosion inhibitor and volatile water soluble corrosion inhibitor	Covered and packaged by b of table 9	RP2-W
		Anti-tarnish paper (non-moisture proof type)	Any one of wrapping treatment, inserting paper treatment or sealed space treatment is applied and packaged by b of table 9	RPX-K
RP3	General packaging ^{a)}	Rust preventive oil	Covered and packaged by c of table 9	RP3-P
		Volatile corrosion inhibitor	Either sealed space treatment or covering treatment is applied and packaged by c of table 9	RP3-V
		Water soluble corrosion inhibitor and volatile water soluble corrosion inhibitor	Covered and packaged by c of table 9	RP3-W1
			Immersed in liquid in water resistant rigid container	RP3-W2
		Anti-tarnish paper (non-moisture proof type)	Either wrapping treatment or using by making bag-shaped is applied	RP3-K
RP4	Dehumidifying packaging	Desiccant	Sealed-packaged by moisture barrier	RP4-1
			Sealed in sealed rigid container	RP4-2
			Floating barrier method	RP4-3
RP5	Deoxidization packaging	Free-oxygen absorber	Sealed-packaged by high barrier film, etc.	RP5
Notes ^{a)} General packaging means the packaging method by using packaging materials without water-proof property and moisture-proof property. ^{b)} For the symbols, see 5.7.				

5 Rust preventive packaging method

The rust preventive packaging method shall be applied with cleaning, drying, application of rust preventive material and one of or combination of packaging methods considering features of contents, degree of surface finish, period of transportation and storage, atmospheric conditions during that period and the degree of handling which is received by a packaged freight during transportation.

5.1 General common matters

General common matters shall be as follows:

- a) For the operation of rust preventive packaging, a series of continuous operations should be preferable.
- b) The operation of rust preventive packaging should preferably be carried out under circumstances at as low humidity (the relative humidity 60 % or less is preferable) as possible.
- c) The polishing parts of metal products should preferably not be touched with bare hands. When touched with bare hands, they shall necessarily be removed of finger prints by **5.2 c)**.
- d) The disassembling in the case where the metal products are composed of complicate assemblies shall necessarily, be limited to the minimum required for the purpose of protection of the precise finish surface especially required for corrosion prevention. The components of complicate assemblies shall be cleaned before assembling and shall not be stained after cleaning.
- e) For the metal products, the rust preventive material shall, as a rule, be used. Provided that for the products (metal products including non-ferrous metal parts) with the possibility of generating hindrance on their performances or handling by using the rust preventive material, the preliminary test is previously carried out under the following condition and the metal products shall be used after confirming the presence of its influence.
 - 1) For the rust preventive oil, the presence of influence shall be judged according to clause **5** of **JIS K 2246:2007** after confirming by the method specified in **6.28** of **JIS K 2246:2007**.
 - 2) For the water soluble corrosion inhibitor and volatile water soluble corrosion inhibitor, the presence of influence shall be judged by confirming according to the method specified in **7.9** of **JIS K 2241:2000** by using the aqueous solution diluted to the same concentration with the same diluting water as used for iron and steel.
 - 3) For the volatile corrosion inhibitor, the presence of influence shall be judged by confirming according to the method specified in **5.3** of **JIS Z 1519:1994**.
 - 4) For the anti-tarnish paper and the rust preventive film, the presence of influence shall be judged by confirming according to the method specified in **5.3** of **JIS Z 1535:1994**.
 - 5) For the strippable plastics, the presence of influence shall be judged according to clause **4** of **JIS Z 1708:1976** by confirming according to the method specified in **5.8** of **JIS Z 1708:1976**.

- f) In the case where metal products processed with rust preventive material are under heated state, rust preventive materials are sometimes decomposed by heating. Therefore, in this case, it is preferable that rust preventive materials are used after standing to cool.
- g) The packaging paper material contacted to the metal surface without rust preventive material applied shall be in the range between 6.0 and 8.0 in pH measured according to **JIS P 8133** and shall have no possibility of contact corrosion.
- h) Although the grease-proof barrier materials directly wrapping the metal surface coated with rust preventive materials shall, as a rule, be those specified in Class 1 of **JIS Z 1705**, if required, they may be those specified in **JIS H 4160**, **JIS Z 1520** or **JIS Z 1702**. However, in that case, they shall be attached with no foreign matters and clean.
- i) In the case where the metal products have protrusions and end parts with acute angle and there is a fear of damaging packaging material or container, they shall be covered with damage preventive packaging, or they shall be preliminarily protected with cushioning material.
- j) In the case where the metal product moves or turns over inside the packaging during storage or transportation and there is a fear of damaging it, a cushioning material or a underlay material shall be used or otherwise, locking, supporting, fixing, etc. shall be carried out.
- k) When cushioning material and underlay material are used throughout each method, the cushioning material and underlay material shall not cause contact corrosion and the corrosive gas shall not be generated.
- l) The packaging should preferably have as small mass and volume as possible.

5.2 Cleaning methods

When metal products are attached with foreign matters such as rust, dust, grease, residue, and with fingerprint, sweat, acid, alkali or the like, they become the causes for generating rust during transportation or storage. Therefore, cleaning operation shall be sufficiently carried out.

- a) **Cleaning method with solvent** After carrying out the first cleaning by wholly or partially immersing metal products into solvent and rubbing them using brush or cloth or otherwise, spraying solvent, the cleaning on and after the second one shall be carried out using other clean solvent. In the case where immersing or spraying can not be carried out, they may be cleaned with the brush or cloth containing solvent.
- b) **Vapour degreasing method** Metal products shall be cleaned by exposing them to the vapour of solvents. This method shall apply where stains are substances like oil or grease. However, it is unsuitable for metal products which are fouled by vapour or otherwise, have complicate precise surfaces.
- c) **Method for removing sweat and fingerprint** Sweat and fingerprints shall completely be removed by immersing metal products into fingerprint remover type rust preventive oil, fingerprint remover such as methanol, and sufficiently shaking them.