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(JAPA/JSA)

**Anodizing of aluminium and its
alloys—Rating system for the
evaluation of pitting corrosion—
Part 1: Rating number method**

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In the event of any doubts arising as to the contents,
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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 Aluminium Products Association (JAPA)/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 H 8679-1**:1999 is replaced with this Standard.

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Attention is drawn to the possibility that some parts of this Standard may conflict with patent rights, applications for a patent after opening to the public or utility model rights. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying any of such patent rights, applications for a patent after opening to the public or utility model rights.

JIS H 8679 consists of the following 2 parts under the general title “*Anodizing of aluminium and its alloys—Rating system for the evaluation of pitting corrosion*”:

Part 1: Rating number method

Part 2: Grid method

Anodizing of aluminium and its alloys— Rating system for the evaluation of pitting corrosion—Part 1: Rating number method

Introduction

This Japanese Industrial Standard has been prepared based on the second edition of **ISO 8993** published in 2010 with some modifications of the technical contents.

The portions with continuous sidelines or dotted underlines are the matters in which the contents of the corresponding International Standard have been modified. A list of modifications with explanations is given in Annex JA.

1 Scope

This Standard specifies the rating number method for evaluation of pitting corrosion of anodic oxide coatings (hereafter referred to as “coatings”) on the products of aluminium or aluminium alloy (hereafter referred to as “products”).

The rating number method evaluates the degree of pitting corrosion on the test pieces subjected to corrosion tests and outdoor exposure tests, and on products subjected to practical service tests, based on the rating number standard charts, and/or percentage area of corrosion pits (%).

This Standard takes into account only pitting corrosion resulting from penetration of the coating.

NOTE : The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 8993:2010 *Anodizing aluminium and its alloys—Rating system for the evaluation of pitting corrosion—Chart method* (MOD)

The symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

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 H 0201 *Glossary of terms used in the surface treatment of aluminium*

JIS H 8688 *Anodizing of aluminium and its alloys—Determination of mass per unit area (surface density) of anodic oxidation coatings*

JIS K 8180 *Hydrochloric acid (Reagent)*

JIS K 8541 *Nitric acid (Reagent)*

JIS Z 8401 *Guide to the rounding of numbers*

JIS Z 8720 *Standard illuminants and sources for colorimetry*

JIS Z 9112 *Classification of fluorescent lamps and light emitting diodes by chromaticity and colour rendering property*

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in the following and in **JIS H 0201** apply.

3.1 significant surface

part of the article covered or to be covered by the coating, for which the coating is essential for satisfying the quality required for the intended use

The significant surface does not include edges of a test piece.

3.2 corrosion pit

surface corrosion in which the local perforated corrosion progresses inside the metal

4 Procedure for rating

4.1 Preparation of test piece

The significant surface of the test piece should be at least 5 000 mm². Use one of the following methods **a)** to **d)** to remove corrosion products or deposits such as water stains on the surface so that corrosion pits may be clearly discerned.

The method in **d)** is applicable to evaluation of corrosion pits which have penetrated through the coating to reach the aluminium basis metal.

- a) Wipe the test piece with the soft cloth or the like immersed in liquid containing suitable abrasives to remove the corrosion products on the surface, then rinse in clean water and air dry.
- b) Remove the corrosion products on the test piece using a nylon brush or the like which has been dipped in the solution prepared by diluting 1 volume of hydrochloric acid [approximately 35 % (mass fraction)] specified in **JIS K 8180** with 10 volume of water in a laboratory maintained at 5 °C to 35 °C, and then rinse in clean water and air dry.
- c) In a laboratory maintained at 5 °C to 35 °C, dip the test piece for 5 min to 10 min in the solution prepared by diluting 1 volume of nitric acid [approximately 60 % (mass fraction)] specified in **JIS K 8541** with 1 volume of water, and then remove the corrosion products on the test piece using a nylon brush or the like, rinse in clean water and air dry.
- d) Dip the test piece in a test solution [phosphoric acid-chromium (VI) oxide] specified in **JIS H 8688** heated to 95 °C to 100 °C for about 10 min to dissolve the corrosion products on the test piece and the coating, rinse in clean water and air dry.

NOTE : This method is particularly useful for dark-coloured coatings.

WARNING: Chromium (VI) is toxic and shall be handled properly. Chromium (VI) solutions are hazardous to the environment and severely hazardous to waters.

4.2 Observation environment

The evaluation of the rating number shall be performed under diffused daylight¹⁾ or artificial light source. The brightness of the observation site shall be 600 Lx or more in illuminance, and in the case of artificial light source, D65 of the daylight simulator specified in 5.3 of **JIS Z 8720** or high colour rendering type fluorescent lamp (colour rendering AAA) specified in **JIS Z 9112** shall be used.

Note ¹⁾ The diffused daylight is non-direct sunlight obtained through a window facing the north, during the period from 3 h after sunrise to 3 h before sunset.

4.3 Determination of rating number

Discolouration or other surface defects which do not penetrate the anodic coating do not count as corrosion pits.

The rating numbers are allocated to each of the eight ranges given in table 1 of percentage area of the significant surface covered by corrosion pits (hereafter referred to as “percentage area of corrosion pits”), and standard charts for respective rating numbers are shown in figures A.1 to A.8.

Corrosion pits shall be evaluated by any of the methods described in the following a) to c).

- a) Compare the size and frequency of corrosion pits on the cleaned significant surface with the rating number standard charts shown in figures A.1 to A.8 and determine the rating number (RN).

The rating number standard charts in figures A.2 to A.7 show the maximum of the percentage area of corrosion pits permissible for the rating. Therefore, if the area of corrosion pits is judged to be slightly larger than the area on the chart, the rating number (RN) shall be lowered by one rank.

NOTE : A mask with an opening of 50 mm × 100 mm can be placed on the evaluated surface to define the area to be evaluated, for comparison of the corrosion pits on significant surface with the rating number standard charts.

- b) Using a scaled magnifying glass of 10 times or more magnifications, measure all the areas of corrosion pits not less than 0.1 mm in short diameter found on the significant surface and obtain the total area thereof. Calculate the ratio of this total area to the total area of significant surface and determine the percentage area of corrosion pits (%).

The percentage area of corrosion pits shall be calculated by $\pi/4 \times d_1$ (long diameter of corrosion pit) $\times d_2$ (short diameter of corrosion pit), and the results shall be rounded to two decimal places according to Rule A of **JIS Z 8401**.

- c) Determine the rating number (RN), by referring to table 1, which corresponds to the percentage area of corrosion pits (%) obtained in b).