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Method of macro-streak-flaw test for steel

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Foreword

This Japanese Industrial Standard has been revised by the Minister of Economy, Trade and Industry based on the provision of Article 14, paragraph (1) of the Industrial Standardization Act applied mutatis mutandis pursuant to the provision of Article 16 of the said Act in response to a proposal for revision of Japanese Industrial Standard with a draft being attached, submitted by The Japan Iron and Steel Federation (JISF), an accredited standards development organization. This edition replaces the previous edition (**JIS G 0556** : 2014), which has been technically revised.

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Method of macro-streak-flaw test for steel

Introduction

This Japanese Industrial Standard has been prepared based on **ISO 3763** :1976, Edition 1, with some modifications of the technical contents.

Annex JA and Annex JB are unique to **JIS** and not given in the corresponding International Standard. The vertical lines on both sides and dotted underlines indicate changes from the corresponding International Standard. A list of modifications with the explanations is given in Annex JC.

1 Scope

This Standard specifies a step machined test method, blue fracture test method and magnetic particle inspection method for assessing the content of macro-streak-flaws (pinholes, blowholes, non-metallic inclusions, inclusions of foreign matter, etc.) in rolled or forged steel with the naked eye or under appropriate magnification.

NOTE 1 The corresponding International Standard specifies a magnification of not more than $\times 10$.

NOTE 2 The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 3763 : 1976 *Wrought steels — Macroscopic methods for assessing the content of non-metallic inclusions* (MOD)

In addition, 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

Part or all of the provisions of the following standards, 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 0601 *Geometrical Product Specifications (GPS) — Surface texture : Profile method — Terms, definitions and surface texture parameters*

JIS G 0202 *Glossary of terms used in iron and steel (Testing)*

JIS G 0701 *Symbols of forming ratio for steel forging*

JIS Z 2320-1 *Non-destructive testing — Magnetic particle testing — Part 1 : General principles*

JIS Z 8401 *Rounding of numbers*

3 Terms and definitions

For the purpose of this Standard, the following term and definition, and those given in JIS G 0202 apply.

3.1

macro-streak-flaw

streak flaws formed by pinholes, blowholes, etc., streak flaws formed by non-metallic inclusions, streak flaws formed by inclusions of foreign matter such as sand, or other flaws that can be seen on the finished surface of the steel with the naked eye or under appropriate magnification

Note 1 to entry Any defects clearly recognized as machining flaws or cracks are not included in macro-streak-flaws.

4 Types of test methods

The types of test methods covered by this Standard are given in Table 1. The choice of the test method shall be as specified in the product standard or shall be subject to the agreement between the purchaser and the supplier.

Table 1 Types of test methods

Test methods
Step machined test method
Blue fracture test method
Magnetic particle inspection method

5 Step machined test method

5.1 Principle

The step machined test method consists in determining the total number and the distribution of macro-streak-flaws revealed by machining and visible on the longitudinal surfaces of a cylindrical stepped test piece.

5.2 Test piece

The test piece shall be as follows.

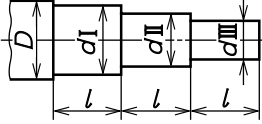
- The test piece shall be generally prepared by machining a rolled or forged steel product having a round section to the step dimensions given in Table 2.

Other dimensions of steps may be used subject to agreement between the purchaser and the supplier.

- The test piece shall be generally machined to a roughness of Ra 3.2 μm to Ra 6.3 μm specified in JIS B 0601. Other appropriate roughness may be applied as required. For samples having other section than round, the surface roughness shall be as agreed between the purchaser and the supplier.

Table 2 Dimensions of steps on test piece

Unit: mm

Nominal diameter D	First step diameter $d \text{ I}$	Second step diameter $d \text{ II}$	Third step diameter $d \text{ III}$	Length of each step l	
20 or over up to and incl. 30	$D - 2$	—	—	63.6	
Over 30 to and excl. 75	$D - 4$	$D \times \frac{2}{3}$	$D \times \frac{1}{2}$	63.6	
75 or over up to and incl. 150	$D - 6$	$D \times \frac{2}{3}$	$D \times \frac{1}{2}$	63.6	

For the steel products whose nominal diameter is under 20 mm or over 150 mm, step dimensions shall be as agreed between the purchaser and the supplier.

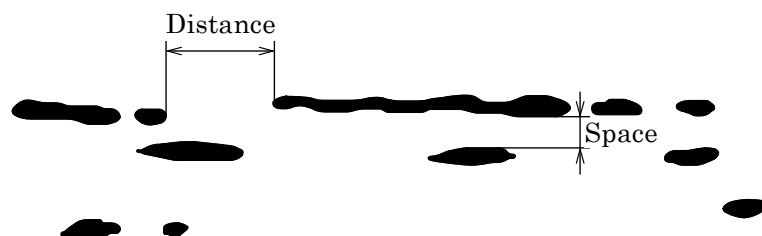
5.3 Test

The test shall be conducted as follows.

- The length and the number of macro-streak-flaws shall be measured on the finished surface of each step of a test piece. Macro-streak-flaws not longer than 0.5 mm shall not be counted.
- The length and the number of all macro-streak-flaws shall be measured with the naked eye or under appropriate magnification. If two macro-streak-flaws exist adjacent to each other, with the distance between them being not more than 0.5 mm or the space between them being not more than 0.2 mm (see Figure 1), regard the two as one flaw and measure their total length.

NOTE The corresponding International Standard specifies a magnification of not more than $\times 10$.

- Alternatively, an automatic image analysis may be utilized for this measurement provided that a prior verification has been made to adequately establish its accuracy and correlation.

**Figure 1 Space and distance between two macro-streak-flaws**

5.4 Determination

The determination shall be as follows.

- Determination of macro-streak-flaws shall be made by the length and the number