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Metallic blast-cleaning abrasives

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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 0311 : 1996 is replaced with this Standard.

This revision has been made based on ISO 11124-1 : 1993 *Preparation of steel substrates before application of paints and related products—Specifications for metallic blast-cleaning abrasives—Part 1 : General introduction and classification*, ISO 11124-2 : 1993 *Preparation of steel substrates before application of paints and related products—Specifications for metallic blast-cleaning abrasives—Part 2 : Chilled-iron grit*, ISO 11124-3 : 1993 *Preparation of steel substrates before application of paints and related products—Specifications for metallic blast-cleaning abrasives—Part 3 : High-carbon cast-steel shot and grit*, ISO 11124-4 : 1993 *Preparation of steel substrates before application of paints and related products—Specifications for metallic blast-cleaning abrasives—Part 4 : Low-carbon cast-steel shot*, ISO 11125-1 : 1993 *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 1 : Sampling*, ISO 11125-2 : 1993 *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 2 : Determination of particle size distribution*, ISO 11125-3 : 1993 *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 3 : Determination of hardness*, ISO 11125-4 : 1993 *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 4 : Determination of apparent density*, ISO 11125-5 : 1993 *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 5 : Determination of percentage defective particles and of microstructure*, ISO 11125-6 : 1993 *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 6 : Determination of foreign matter* and ISO 11125-7 : 1993 *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 7 : Determination of moisture for the purposes of making it easier to compare this Standard with International Standards*; to prepare Japanese Industrial Standard conforming with International Standards; and to propose a draft of an International Standard which is based on Japanese Industrial 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.

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Metallic blast-cleaning abrasives

Introduction This Japanese Industrial Standard has been prepared based on each first edition of **ISO 11124-1 : 1993** *Preparation of steel substrates before application of paints and related products—Specifications for metallic blast-cleaning abrasives—Part 1 : General introduction and classification*, **ISO 11124-2 : 1993** *Preparation of steel substrates before application of paints and related products—Specifications for metallic blast-cleaning abrasives—Part 2 : Chilled-iron grit*, **ISO 11124-3 : 1993** *Preparation of steel substrates before application of paints and related products—Specifications for metallic blast-cleaning abrasives—Part 3 : High-carbon cast-steel shot and grit*, **ISO 11124-4 : 1993** *Preparation of steel substrates before application of paints and related products—Specifications for metallic blast-cleaning abrasives—Part 4 : Low-carbon cast-steel shot*, **ISO 11125-1 : 1993** *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 1 : Sampling*, **ISO 11125-2 : 1993** *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 2 : Determination of particle size distribution*, **ISO 11125-3 : 1993** *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 3 : Determination of hardness*, **ISO 11125-4 : 1993** *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 4 : Determination of apparent density*, **ISO 11125-5 : 1993** *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 5 : Determination of percentage defective particles and of microstructure*, **ISO 11125-6 : 1993** *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 6 : Determination of foreign matter* and **ISO 11125-7 : 1993** *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 7 : Determination of moisture with some modifications of the technical contents*.

Portions given sidelines or dotted underlines are the matters modified from the original International Standards. The list of modifications with their explanations is given in annex 2 (informative).

1 Scope This Standard specifies the metallic abrasives (hereafter referred to as “abrasives”) used for blasting as surface preparation before applying paints and a coat of related products to steel products for the corrosion prevention and rust prevention.

Remarks : The International Standards corresponding to this Standard are as follows.

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

ISO 11124-1 : 1993 *Preparation of steel substrates before application of paints and related products—Specifications for metallic blast-cleaning abrasives—Part 1 : General introduction and classification* (MOD)

- ISO 11124-2 : 1993 *Preparation of steel substrates before application of paints and related products—Specifications for metallic blast-cleaning abrasives—Part 2 : Chilled-iron grit (MOD)*
- ISO 11124-3 : 1993 *Preparation of steel substrates before application of paints and related products—Specifications for metallic blast-cleaning abrasives—Part 3 : High-carbon cast-steel shot and grit (MOD)*
- ISO 11124-4 : 1993 *Preparation of steel substrates before application of paints and related products—Specifications for metallic blast-cleaning abrasives—Part 4 : Low-carbon cast-steel shot (MOD)*
- ISO 11125-1 : 1993 *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 1 : Sampling (MOD)*
- ISO 11125-2 : 1993 *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 2 : Determination of particle size distribution (MOD)*
- ISO 11125-3 : 1993 *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 3 : Determination of hardness (MOD)*
- ISO 11125-4 : 1993 *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 4 : Determination of apparent density (MOD)*
- ISO 11125-5 : 1993 *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 5 : Determination of percentage defective particles and of microstructure (MOD)*
- ISO 11125-6 : 1993 *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 6 : Determination of foreign matter (MOD)*
- ISO 11125-7 : 1993 *Preparation of steel substrates before application of paints and related products—Test methods for metallic blast-cleaning abrasives—Part 7 : Determination of moisture (MOD)*

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. If the indication of the year of publication is given to these referred standards, only the edition of the indicated year constitutes the provision of this Standard but the revision and amendment made thereafter do not apply. The normative references without the indication of the year of coming into effect apply only to the most recent edition (including amendments).

JIS B 7725 *Vickers hardness test—Verification of testing machines*

JIS G 1201 *Iron and steel—General rules for analytical methods*

JIS G 1211 *Iron and steel—Methods for determination of carbon content*

Remarks : **ISO 9556** : 1989 *Steel and iron—Determination of total carbon content—Infrared absorption method after combustion in an induction furnace* is equivalent to the said standard.

JIS G 1212 *Iron and steel—Methods for determination of silicon content*

JIS G 1213 *Iron and steel—Methods for determination of manganese content*

Remarks : **ISO 629** : 1982 *Steel and cast iron—Determination of manganese content—Spectrophotometric method* is equivalent to the said standard.

JIS G 1214 *Iron and steel—Methods for determination of phosphorus content*

Remarks : **ISO 10714** : 1992 *Steel and iron—Determination of phosphorus content—Phosphovanadomolybdate spectrophotometric method* is equivalent to the said standard.

JIS G 1215 *Iron and steel—Methods for determination of sulfur content*

JIS G 1253 *Iron and steel—Method for spark discharge atomic emission spectrometric analysis*

JIS K 0050 *General rules for chemical analysis*

JIS R 3503 *Glass apparatus for chemical analysis*

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

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

JIS Z 2244 *Vickers hardness test—Test method*

JIS Z 8401 *Guide to the rounding of numbers*

JIS Z 8402-1 *Accuracy (trueness and precision) of measurement methods and results—Part 1 : General principles and definitions*

JIS Z 8402-2 *Accuracy (trueness and precision) of measurement methods and results—Part 2 : Basic method for the determination of repeatability and reproducibility of a standard measurement method*

JIS Z 8402-3 *Accuracy (trueness and precision) of measurement methods and results—Part 3 : Intermediate measures of the precision of a standard measurement method*

JIS Z 8402-4 *Accuracy (trueness and precision) of measurement methods and results—Part 4 : Basic methods for the determination of the trueness of a standard measurement method*

JIS Z 8402-5 *Accuracy (trueness and precision) of measurement methods and results—Part 5 : Alternative methods for the determination of the precision of a standard measurement method*

JIS Z 8402-6 *Accuracy (trueness and precision) of measurement methods and results—Part 6 : Use in practice of accuracy values*

JIS Z 8801-1 *Test sieves—Part 1 : Test sieves of metal wire cloth*

JIS Z 8815 *Test sieving—General requirements*

3 Definitions For the purposes of this Standard, the definitions given in **JIS Z 0103**, **JIS Z 0310** and the following definitions shall apply.

- a) **grit** Particles that are predominantly angular, that have fractured faces and sharp edges and that are less than half-round in shape in the state before use.
- b) **shot** Particles that are predominantly round, that have a length of less than twice the maximum particle width and that do not have edges, broken faces or other sharp surface defects in the state before use.
- c) **chilled-iron grit** A metallic blast-cleaning abrasive obtained by crushing various chilled iron-shot sizes into sharp-edged angular particles.
- d) **high-carbon cast-steel grit** A metallic blast-cleaning abrasive obtained by crushing various high-carbon cast-steel shot sizes into sharp-edged angular particles. There are four grades, A, B, C and D, according to hardness.
- e) **high-carbon cast-steel shot** A metallic blast-cleaning abrasive produced by a casting process in which molten high-carbon steel is formed into shot by means of an atomization process.
- f) **low-carbon cast-steel shot** A metallic blast-cleaning abrasive produced by a casting process in which molten low-carbon steel is formed into shot by means of an atomization process.
- g) **apparent density** An average density of the whole particles including the cavity portion as a defect (of which opening is not opened on the surface) which exists in the heterogeneous section and in the inside of abrasive particles.
- h) **void** A smooth-surfaced internal cavity considered undesirable when greater than 10 % of the cross-sectional area of a particle. A kind of defect of abrasives.
- i) **shrinkage defect** An internal cavity with a rough dendritic surface or a zone of microporosity, considered undesirable when greater than 40 % of the cross-sectional area of a particle. A kind of defect of abrasives.
- j) **crack** A linear discontinuity that has a length-to-width ratio of 3 : 1 or greater, that extends over more than 20 % of the diameter or shortest dimension of a particle and that is radial in direction. A kind of defect of abrasive.
- k) **foreign matter** Any material or particles mixed with the abrasive which are not attached to the abrasive particles and which are nonmagnetic. The slag at the time of steel production is included.
- l) **free moisture** A moisture adhered to the surface. Water of crystallization is not included.
- m) **total quantity** The overall quantity of the abrasive to be tested (for example, the quantity of a consignment) for which the sampling procedure is to be considered as representative.
- n) **sample unit** The packaged unit of sale, e.g. bulk sack, drum, from which single samples are taken.
- o) **single sample** A sample obtained from the total quantity by a single sampling operation. This sample is not immediately used for testing.

- p) **mixed sample** A sample obtained by mixing a number of single samples.
- q) **reduced sample** A sample obtained by reduction of a mixed sample.
- r) **test sample** A reduced sample that comprises a mass or volume sufficient for testing, portions of which are immediately used for testing.

4 Classification The classification of abrasives shall be as given table 1.

Table 1 Classification

Classification	Abbreviation of shape	Symbol
Chilled-iron grit	G	M-CI
High-carbon cast-steel grit	G	M-HCS-G
Grade A	G	M-HCS-G-A
Grade B	G	M-HCS-G-B
Grade C	G	M-HCS-G-C
Grade D	G	M-HCS-G-D
High-carbon cast-steel shot	S	M-HCS-S
Low-carbon cast-steel shot	S	M-LCS

Remarks : For the abbreviation of shape, G indicates grit shape and S indicates shot shape.

5 Quality The quality shall be as given in table 2 when testing in accordance with clauses 6 and 7.

Table 2 Quality

Item	Quality			
	Chilled-iron grit	High-carbon cast-steel grit	High-carbon cast-steel shot	Low-carbon cast-steel shot
Particle size distribution	In accordance with particle size distribution in Table 3.	In accordance with particle size distribution in Table 4.	In accordance with particle size distribution in Table 5.	In accordance with particle size distribution in Table 6.
Vickers hardness (HV)	Not less than 90 % of measuring particles shall be in the following range. ⁽¹⁾			
	min. 650	Grade A 390 to 530 Grade B 470 to 610 Grade C 570 to 710 Grade D 710 or over	390 to 530	390 to 520
Apparent density kg/dm ³	min. 7.0			

Table 2 (concluded)

Item		Quality			
		Chilled-iron grit	High-carbon cast-steel grit	High-carbon cast-steel shot	Low-carbon cast-steel shot
Particle shape		Shot or more than half-round		Grit	
		max. 10 %	Grade A, B, C: max. 10 % Grade D: max. 5 %	max. 5 %	max. 15 %
Number of defective particles	Voids	max. 10 %			max. 15 %
	Shrinkage defect	max. 10 %			max. 5 %
	Cracks	max. 40 %		max. 15 %	0
	Sum of single defect or multiple defects	max. 40 %		max. 20 %	max. 20 %
Foreign matter wt%		max. 1			
Structure of metal		It shall have a white iron type microstructure. The area of undesirable structure shall be less than 5 % for every individual particle. Furthermore, the sum of particles with undesirable structure shall be no more than 15 %.	It shall have a uniform tempered martensite and/or bainite microstructure. If there is carbide, the distribution shall be finely uniform. The sum of particles with undesirable structure shall be no more than 15 %.		It shall have a bainite and/or martensite microstructure. The area of undesirable structure shall be less than 5 % for every individual particle. Furthermore, the sum of particles with undesirable structure shall be no more than 5 %.
Chemical composition wt%		Carbon min. 1.7	Carbon	0.80 to 1.2	0.08 to 0.20
			Silicone	min. 0.4	0.10 to 2.0
			Manganese	0.35 to 1.2	0.35 to 1.5
			Phosphorous	max. 0.05	max. 0.05
			Sulfur	max. 0.05	max. 0.05
Free moisture wt %		max. 0.2			

Note (1) If not less than 90 % of measuring particles is within a range of about 140 difference between the lower and the higher Vickers hardness (HV), the hardness other than those described above may be specified according to the agreement between the parties concerned.