INTERNATIONAL STANDARD

ISO 11124-4

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Preparation of steel substrates before application of paints and related products — Specifications for metallic blast-cleaning abrasives —

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Part 4:

Low-carbon cast-steel shot

ISO 11124-4:1993
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Préparation des subjectiles d'acier avant application de peintures et de produits assimilés — Spécifications pour abrasifs métalliques destinés à la préparation par projection —

Partie 4: Grenaille ronde en acier moulé à bas carbone

Reference number
ISO 11124-4:1993(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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International Standard ISO 11124-4 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 12, *Preparation of steel substrates before application of paints and related products*.

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ISO 11124 consists of the following parts, under the general title *Preparation of steel substrates before application of paints and related products — Specifications for metallic blast-cleaning abrasives*:

— *Part 1: General introduction and classification*

— *Part 2: Chilled-iron grit*

— *Part 3: High-carbon cast-steel shot and grit*

— *Part 4: Low-carbon cast-steel shot*

— *Part 5: Cut steel wire*

At the time of publication of this part of ISO 11124, part 5 was in course of preparation.

Annexes A and B of this part of ISO 11124 are for information only.

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Preparation of steel substrates before application of paints and related products — Specifications for metallic blast-cleaning abrasives —

Part 4:
Low-carbon cast-steel shot

WARNING — Equipment, materials and abrasives used for surface preparation can be hazardous if used carelessly. Many national regulations exist for those materials and abrasives that are considered to be hazardous during or after use (waste management), such as free silica or carcinogenic or toxic substances. These regulations are therefore to be observed. It is important to ensure that adequate instructions are given and that all required precautions are exercised.

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1 Scope

This part of ISO 11124 specifies requirements for 12 grades of low-carbon cast-steel shot abrasive, as supplied for blast-cleaning processes. Values are specified for hardness, density, defect/structural requirements and chemical composition.

The requirements specified in this part of ISO 11124 apply to abrasives supplied in the "new" condition only. They do not apply to abrasives either during or after use.

Test methods for metallic blast-cleaning abrasives are given in the various parts of ISO 11125.

Low-carbon cast-steel shot abrasives are used in both static and site blasting equipment. They are most often selected where a facility exists for recovery and re-use of the abrasive.

NOTES

1 Information on commonly referenced national standards for metallic abrasives and their approximate relationship with ISO 11124 is given in annexes A and B.

2 Although this part of ISO 11124 has been developed specifically to meet requirements for preparation of steelwork, the properties specified will generally be appropriate for use when preparing other material surfaces, or components, using blast-cleaning techniques. These techniques are described in ISO 8504-2:1992, *Preparation of steel substrates before application of paints and related products — Surface preparation methods — Part 2: Abrasive blast-cleaning.*

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 11124. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 11124 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 439:1982, *Steel and cast iron — Determination of total silicon — Gravimetric method.*

ISO 629:1982, *Steel and cast iron — Determination of manganese content — Spectrophotometric method.*

ISO 4935:1989, *Steel and iron — Determination of sulfur content — Infrared absorption method after combustion in an induction furnace.*

ISO 9556:1989, *Steel and iron — Determination of total carbon content — Infrared absorption method after combustion in an induction furnace.*

ISO 10714:1992, *Steel and iron — Determination of phosphorus content — Phosphovanadomolybdate spectrophotometric method.*

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.*

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.*

3 Definitions

For the purposes of this part of ISO 11124, the following definitions apply.

3.1 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 (see also 3.2) by means of an atomization process.

3.2 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.

3.3 defect: A fault or weakness in an abrasive which, if present at or above a given level, may be detrimental to the performance of the abrasive (see table 2).

3.3.1 void: A smooth-surfaced internal cavity considered undesirable when greater than 10 % of the cross-sectional area of a particle.

3.3.2 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.

3.3.3 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.

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3.4 foreign matter: Any material or particles mixed with the abrasive which are not attached to the abrasive particles and which are nonmagnetic.

ISO 11124-4:1993
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4 Designation of abrasives

Low-carbon cast-steel shot abrasives shall be identified by "Abrasive ISO 11124" and the abbreviation "M/LCS" indicating metallic, low-carbon cast-steel abrasive. The symbol "S" shall follow to indicate the required particle shape of the shot as purchased. The designation shall be completed by a 3-digit number denoting the grade, or nominal particle size, required.

EXAMPLE 1

Abrasive ISO 11124 M/LCS/S100

denotes an abrasive of the metallic, low-carbon cast-steel type, complying with the requirements of this part of ISO 11124, of particle shape shot and grade 100 (i.e. nominal particle size 1,00 mm).

It is essential that this full product designation is quoted on all orders.

NOTES

3 Grade requirements and codes are specified in table 1. The grade code is based on a number indicating the approximate middle of the particle size range, or nominal diameter, for each grade, expressed in millimetres × 100.

4 Annex A provides guidance on approximately equivalent grades and codings in other commonly referenced national standards for cast metal abrasives.

5 Sampling

Sampling procedures shall be as specified in ISO 11125-1.

6 Requirements for low-carbon cast-steel shot abrasives

The requirements for low-carbon cast-steel shot abrasives shall be as specified in table 2.

7 Package identification and lot traceability

All supplies shall be clearly marked and identified using the designation specified in clause 4. The unit of sale, i.e. pallet, drum, box, etc., shall be clearly labelled with the full product coding.

Sub-units, i.e. bags, shall be marked with the particle shape and grade codes.

NOTE 5 Inclusion of additional marking to allow product traceability to a particular production period or lot is strongly recommended. Traceability references should be included at least at the pallet, drum or box level of package marking.

8 Information to be provided by the manufacturer or supplier

The manufacturer or supplier shall provide, if requested, a test report detailing results for any relevant property as determined by the appropriate method specified in table 2.

Table 1 — Screening specifications by grade — Low-carbon cast-steel shot — Cumulative % retained

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ISO 11124-4:1993
https://standards.iteh.ai/catalog/standards/sist/f7fdde1d-2fe5-452a-b581-0af429b53956/iso-11124-4-1993

Grade code	Sieve mesh aperture, mm																	
	3,35	2,80	2,36	2,00	1,70	1,40	1,18	1,00	0,85	0,71	0,60	0,50	0,425	0,355	0,300	0,250	0,180	0,125
S280	0		> 90	> 97														
S240		0		> 85	> 97													
S200			0		> 85	> 97												
S170				0		> 85	> 97											
S140				0	< 5		> 85	> 96										
S120					0	< 5		> 85	> 96									
S100						0	< 5		> 85	> 96								
S080							0	< 5		> 85	> 96							
S070								0	< 10		> 85	> 97						
S060									0	< 10			> 85	> 97				
S040											0	< 10			> 80		> 90	
S030													0	< 10			> 80	> 90

NOTE — For convenience, a similar table is used in most parts of ISO 11124. Not all sieve mesh apertures are relevant in each case.

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Table 2

Property	Requirement	Test method
Grade	See table 1.	ISO 11125-2
Hardness	90 % of the particles tested shall have a hardness range of 390 HV to 520 HV Metallic abrasives sometimes contain internal shrinkage defects or voids which remain undetected beneath the surface in a mounted and polished sample. These hidden cavities cause a non-uniform hardness indentation and give an erroneous hardness reading. These indentations shall be ignored.	ISO 11125-3
Apparent density	min. $7{,}0 \times 10^3$ kg/m^3 (7,0 kg/dm^3)	ISO 11125-4
Defects (see 3.3) Particle shape Voids Shrinkage defect Cracks Total defects Particles with more than one of the above defects shall be counted only once in this total.	Defects present in the particles examined shall not exceed the following levels: max. 15 % non-round max. 15 % max. 5 % None max. 20 %	ISO 11125-5
Foreign matter (including slag)	max. 1 % (*m/m*)	ISO 11125-6
Structure	Low-carbon cast-steel shot abrasives shall have a bainitic or martensitic structure. Grain boundary ferrite and pearlite phases shall be less than 5 % in any single particle. NOTE — This type of structure is essential to produce the combination of high hardness, long life and durability typical of this particular abrasive type. The specific method of manufacture is at the discretion of the producer. No more than 15 % of the particles tested shall have undesirable microstructure.	ISO 11125-5
Chemical composition	Carbon 0,08 % (*m/m*) to 0,20 % (*m/m*) Manganese 0,35 % (*m/m*) to 1,50 % (*m/m*) Silicon 0,10 % (*m/m*) to 2,00 % (*m/m*) Sulfur max. 0,05 % (*m/m*) Phosphorus max. 0,05 % (*m/m*)	ISO 9556 ISO 629 ISO 439 ISO 4935 ISO 10714
Moisture	max. 0,2 % (*m/m*) NOTE — It is essential that low-carbon cast-steel abrasives are supplied and used in a dry condition. They should be stored indoors in dry surroundings to prevent condensation, rusting and deterioration of the abrasive, rendering it unsuitable for use.	ISO 11125-7

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Annex A
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Approximately equivalent codings for shot and grit abrasives

Commonly referenced national standards for metallic abrasives are based on different coding systems for particle size range or grade.

Approximately equivalent codings in some of these national standards are shown in table A.1 and the nearest equivalent codings in ISO 11124 are shown alongside.

This list is purely informative and should not be taken as indicating that grades are equal. It covers the full range of ISO 11124 codings. This part of ISO 11124 may not contain all the codings listed.

ISO 11124 size limits are identical with those specified in SAE J444:1984.

Table A.1

	SAE J444: 1984	BS 2451: 1963	DIN 8201 Teil 2: 1985	ISO Coding
Shot	S1320	S1320	—	S400
	S1110	S1110	—	S300
	S930	S950	—	S280
	S780	S800	2,0 to 2,8	S240
	S660	S660	1,6 to 2,24	S200
	S550	S550	1,25 to 2,0	S170
	S460	S470	—	S140
	S390	S390	1,0 to 1,6	S120
	S330	S340	0,8 to 1,25	S100
	S280	—	0,6 to 1,0	S080
	S230	S240	0,4 to 0,8	S070
	S170	S170	0,3 to 0,6	S060
	S110	S120	0,2 to 0,4	S040
	S70	S070		S030
			DIN 8201 Teil 3: 1985	
Grit	—	G95	—	—
	G10	G80	2,0 to 2,8	G240
	G12	G66	1,6 to 2,24	G200
	G14	G55	1,25 to 2,0	G170
	G16	G47	1,0 to 1,6	G140
	G18	G39	1,0 to 1,6	G120
	G25	G34	0,8 to 1,25	G100
	G40	G24/G17	0,6 to 1,0/0,4 to 0,8	G070
	G50	G12	0,3 to 0,6	G050
	G80	G07	0,2 to 0,4	G030
	G120	G05	0,16 to 0,3	G020
	G200	G02	0,1 to 0,2	G010
	G325	G02	—	G005

NOTE — "S" signifies shot, i.e. round particle form.
"G" signifies grit, i.e. angular particle form.

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Annex B
(informative)

Bibliography

Commonly referenced national standards for metallic abrasives are as follows:

[1] BS 2451:1963, *Specification for chilled-iron shot and grit.*

[2] DIN 8201 Teil 1:1985, *Feste Strahlmittel; Einteilung, Bezeichnung.*

[3] DIN 8201 Teil 2:1985, *Feste Strahlmittel; metallisch, gegossen, Kornform kugelig.*

[4] DIN 8201 Teil 3:1985, *Feste Strahlmittel; metallisch, gegossen, Kornform kantig.*

[5] DIN 8201 Teil 4:1985, *Feste Strahlmittel; Stahldrahtkorn.*

[6] JIS G5903:1975, *Cast shot and grit.*

[7] SAE J444:1984, *Cast-shot and grit size specification for peening and cleaning.*

[8] SAE J827:1990, *Cast steel shot.*

[9] SAE J441:1987, *Cut wire shot.*

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