INTERNATIONAL STANDARD

ISO 11124-3

Second edition
2018-09

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

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

Partie 3: Grenaille ronde et angulaire en acier coulé à haut carbone

Reference number
ISO 11124-3:2018(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document 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.*

This second edition cancels and replaces the first edition (ISO 11124-3:1993), which has been technically revised.

The main changes compared to the previous edition are as follows:

— Clause 7, Tables 1, 2, 3 and Annex A have been technically revised.

A list of all parts in the ISO 11124 series can be found on the ISO website.

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

WARNING — Equipment, materials and abrasives used for surface preparation can be hazardous. It is important to ensure that adequate instructions are given and that all required precautions are exercised.

1 Scope

This document specifies requirements for 14 grades of high-carbon cast-steel shot and 11 grades of high-carbon cast-steel grit, as supplied for blast-cleaning processes. Values are specified for hardness, density, defect/structural requirements and chemical composition.

The requirements specified in this document 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.

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

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

NOTE 2 Although this document 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.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 439, *Steel and iron — Determination of total silicon content — Gravimetric method*

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

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

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

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

ISO 11125-1, *Preparation of steel substrates before application of paints and related products — Test methods for metallic blast-cleaning abrasives — Part 1: Sampling*

ISO 11125-2, *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, *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, *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, *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, *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, *Preparation of steel substrates before application of paints and related products — Test methods for metallic blast-cleaning abrasives — Part 7: Determination of moisture*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
high-carbon cast-steel shot
metallic blast-cleaning abrasive produced by a casting process in which molten high-carbon steel is formed into *shot* (3.3) by means of an atomization process

3.2
high-carbon cast-steel grit
metallic blast-cleaning abrasive obtained by crushing various *high-carbon cast-steel shot* (3.1) sizes into sharp-edged angular particles

3.3
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

3.4
grit
particles that are predominantly angular, that have fractured faces and sharp edges and that are less than half round in shape

3.5
defect
fault or weakness in an abrasive which, if present at or above a given level, can be detrimental to the performance characteristics of the abrasive

Note 1 to entry: See Table 3.

3.5.1
void
smooth-surfaced internal cavity considered undesirable when greater than 10 % of the cross-sectional area of a particle

3.5.2
shrinkage defect
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

3.5.3
crack
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

3.6
foreign matter
material or particles mixed with the abrasive which are not attached to the abrasive particles and which are nonmagnetic

4 Designation of abrasives

High-carbon cast-steel shot and grit shall be identified by "Abrasive ISO 11124" and the abbreviation "M/HCS" indicating metallic, high-carbon cast-steel abrasive. The symbol "S" or "G" shall follow to indicate the required particle shape of the shot or grit as purchased. The designation shall be completed by a 3-digit number denoting the grade, or nominal particle size, required. If alternative hardnesses of abrasive are available, the particular Vickers hardness (HV) range required shall be specified (see Example 2).

EXAMPLE 1

Abrasive ISO 11124 M/HCS/S140

denotes an abrasive of the metallic, high-carbon cast-steel type, conforming to the requirements of this document, of particle shape shot and grade 140 (i.e. nominal particle size 1,40 mm).

EXAMPLE 2

Abrasive ISO 11124 M/HCS/G140/570-710HV

denotes an abrasive of the metallic, high-carbon cast-steel type, conforming to the requirements of this document, of particle shape grit and grade 140 (i.e. nominal particle size 1,40 mm), and with a hardness range of 570 HV to 710 HV.

This full product designation shall be quoted on all orders.

NOTE 1 Grade requirements and codes are specified in Tables 1 and 2. The grade code is based on a 3-digit number indicating the nominal size of the particle size range, for each grade, expressed in millimetres × 100.

NOTE 2 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 high-carbon cast-steel shot and grit abrasives

The requirements for high-carbon cast-steel shot and grit abrasives shall be as specified in Table 3.

7 Package identification and lot traceability

All supplies shall be clearly marked and identified using the designation system specified in Clause 4. The unit of sale, i.e. commercial packaging unit, shall be clearly labelled with the full product coding, including hardness range, if applicable.

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

Inclusion of additional marking to allow product traceability to a particular production period or lot is 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 3.

Cast-steel shot and grit abrasives shall be supplied and used in a dry condition.

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

Code	Sieve mesh aperture mm																	
	4,75	4	3,35	2,8	2,36	2	1,7	1,4	1,18	1	0,85	0,71	0,60	0,50	0,425	0,355	0,300	0,180	0,125
S280	0	<30		>90	>97														
S236		0	<30		>90	>97													
S200			0	<30		>90	>97												
S170				0	<30		>90	>97											
S140					0	<30		>90	>97										
S118						0	<30		>90	>97									
S100							0	<30		>90	>97								
S085								0	<30		>90	>97							
S071									0	<30		>90	>97						
S060										0	<30		>90	>97					
S050											0	<30		>90	>97				
S035												0	<30			>90	>97		
S030													0	<30			>90	>97	
S018														0	<30			>90	>97

Table 2 — Screening specifications by grade — High-carbon cast-steel grit — Cumulative % retained

Code	Sieve mesh aperture mm																
	2,8	2,36	2	1,7	1,4	1,18	1.00	0,85	0,71	0,60	0,50	0,425	0,355	0,300	0,180	0,125	0,075
G170	0	<30		>85	>95												
G140		0	<30		>85	>95											
G118			0	< 30		>85	>95										
G100				0	<30		>85	>95									
G071					0	<30			>85	>95							

Table 2 *(continued)*

Code	Sieve mesh aperture mm																
	2,8	2,36	2	1,7	1,4	1,18	1.00	0,85	0,71	0,60	0,50	0,425	0,355	0,300	0,180	0,125	0,075
G060						0	<30			>85	>95						
G050							0	<30			>85	>95					
G035								0	< 30				>85	>95			
G030									0	<30				>85	>95		
G012											0	<30				>85	>95
G007													0	<30			>85

Table 3 — Requirements for high-carbon cast-steel shot and grit abrasives

Property	Requirement		Test method
Grade size	See Tables 1 and 2.		ISO 11125-2
Hardness	90 % of the particles tested shall have a hardness value within one of the ranges of *Standard hardnesses* specified below:		ISO 11125-3
		Hardness	
	Shot	390 HV to 530 HV	
	Grit	390 HV to 530 HV	
		470 HV to 610 HV	
		570 HV to 710 HV	
		700 HV minimum	
	Special hardnesses (shot and grit):		
	Other hardness ranges can be specified by the purchaser, with a minimum of 90 % of the particles having a minimum range of approximately 140 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.		
Apparent density	min. 7,0 × 10^3 kg/m^3 (7,0 kg/dm^3)		ISO 11125-4
Defects (see 3.5)	Defects present in the particles examined shall not exceed the following levels:		ISO 11125-5
Particle shape			
a) Shot	max. 5 % non-round		
b) Grit	max. 10 % shot or greater than half-round for grit up to 700 HV, max. 5 % for grit above 700 HV		
Voids			
a) Shot	max. 10 %		
Shrinkage defect			
a) Shot	max. 10 %		
Cracks			
a) Shot	max. 15 %		
b) Grit	max. 40 %		
Total defects			

Table 3 *(continued)*

Property	Requirement		Test method
a) Shot	max. 20 %		
b) Grit	max. 40 %		
Particles with more than one of the above defects shall be counted only once in this total. Voids and shrinkages analyses should be restricted to shots, as there are non-relevant for grits.			
Foreign matter (including slag)	max 0,5 % mass fraction		ISO 11125-6
Structure	Cast-steel shot and grit abrasives shall have a uniform martensite and/or bainite microstructure, tempered to a degree consistent with the hardness range, with fine, well-distributed carbides, if any. Partial decarburization, carbide networks and interdendritic grain boundary segregation with high-temperature transformation products such as pearlite are undesirable.		ISO 11125-5
	No more than 15 % of the particles tested shall have undesirable microstructure.		
Chemical composition	Carbon	0,80 % mass fraction to 1,2 % mass fraction	ISO 9556
	Manganese	0,35 % mass fraction to 1,2 % mass fraction	ISO 629
	Silicon	min. 0,4 %mass fraction	ISO 439
	Sulfur	max. 0,05 % mass fraction	ISO 4935
	Phosphorus	max. 0,05 % mass fraction	ISO 10714
	The manganese content shall be sufficiently high to achieve the required hardness throughout the section of all particles.		
Moisture	max. 0,2 % mass fraction		ISO 11125-7
NOTE The cast steel and grit abrasives can be stored indoors in dry surroundings to prevent condensation, rusting and deterioration of the abrasive, rendering it unsuitable for use.			

Annex A
(informative)

Approximately equivalent codings for high carbon cast-steel 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 informative and should not be taken as indicating that grades are equal. It covers the full range of ISO 11124 codings.

Table A.1 — Approximately equivalent codings

	SAE J444:2017	ISO coding
Shot	S1320	
	S1110	S280
	S930	S236
	S780	S200
	S660	S170
	S550	S140
	S460	S118
	S390	S100
	S330	S085
	S280	S071
	S230	S060
	S170	S050
	S110	S035
		S030
	S70	S018
Grit	—	
	G10	
	G12	G170
	G14	G140
	G16	G118
	G18	G100
	G25	G071
	G40	G060
		G050
	G50	G035
		G030
	G80	G012