SLOVENSKI STANDARD
SIST EN 13507:2010

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Nadomešča:
SIST EN 13507:2002

Vroče brizganje - Predobdelava površin kovinskih delov in komponent za vroče brizganje

Thermal spraying - Pre-treatment of surfaces of metallic parts and components for thermal spraying

Thermisches Spritzen - Vorbehandlung von Oberflächen metallischer Werkstücke und Bauteile für das thermische Spritzen

Projection thermique - Traitement préalable de surface de pièces et composants métalliques pour projection thermique

Ta slovenski standard je istoveten z: **EN 13507:2010**

ICS:

25.220.10	Priprava površine	Surface preparation
25.220.20	Površinska obdelava	Surface treatment

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EUROPEAN STANDARD

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Supersedes EN 13507:2001

English Version

Thermal spraying - Pre-treatment of surfaces of metallic parts and components for thermal spraying

Projection thermique - Traitement préalable de surface de pièces et composants métalliques pour projection thermiques

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This European Standard was approved by CEN on 9 January 2010.

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Contents

Page

Foreword

This document (EN 13507:2010) has been prepared by Technical Committee CEN/TC 240 “Thermal spraying and thermally sprayed coatings”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2010, and conflicting national standards shall be withdrawn at the latest by August 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13507:2001.

This standard differs from EN 13507:2001 as follows:

a) normative references have been reviewed;

b) Clause 3 (Principles) has been modified;

c) in Clause 4 (Methods of surface preparation), paragraphs regarding "Degreasing" and "Cleanliness" have been reviewed and shortened;

d) 4.2.3.3 (Copper refinery slag and coal furnace slag), 4.2.3.4 (Quartz sand) and 4.4 (Roughening by electric spark) have been deleted;

e) in 4.2.5 (Examination of grit blasted surfaces) reference to EN ISO 8503-2 and EN ISO 8503-4 have been added. New number of this subclause is 4.3.5;

f) 4.7 has been reviewed under the aspects of precautions for health, safety and environmental protection.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the processing of surface preparation for thermal spraying. Important principles indicated in this European Standard should be taken into consideration when surfaces of metallic parts are to be prepared for thermal spraying. This European Standard applies for production of new parts as well as for the repair of worn parts.

This European Standard does not apply for thermal spraying in the case of protection against atmospheric corrosion by coatings of zinc and/or aluminium and their alloys, for which EN ISO 2063 applies.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN ISO 8501-1, *Preparation of steel substrates before application of paints and related products — Visual assessment of surface cleanliness — Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings (ISO 8501-1:2007)*

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

EN ISO 11124-2, *Preparation of steel substrates before application of paints and related products — Specifications for metallic blast-cleaning abrasives — Part 2: Chilled-iron grit (ISO 11124-2:1993)*

EN ISO 11126-1, *Preparation of steel substrates before application of paints and related products — Specifications for non-metallic blast-cleaning abrasives — Part 1: General introduction and classification (ISO 11126-1:1993, including Technical Corrigenda 1:1997 and 2:1997)*

3 Principles

The surface preparation of a work piece has a substantial effect on the quality of the sprayed coating especially with regard to its adhesion to the substrate.

To achieve a sufficient adhesive strength the metallic surface shall be processed until a technically clean interface is generated.

The surface to be prepared shall be accessible for grit blasting. EN 15520 gives information regarding suitable component design.

Welding splashes and residues of welding slag shall be removed, and weld seams and brazed or soldered joints shall be prepared with particular accuracy. Oxides, oil, grease and other contamination shall be removed.

The roughness of the surface shall enable a good interlocking of the sprayed coating to the substrate. Grit blasting is a suitable method for obtaining appropriate roughened metallic surfaces, thereby also enlarging the effective area.

The surface to be sprayed shall be kept dry during the preparation and spraying process. For outdoor spraying this requirement shall be met by taking suitable precautions. The prepared surface shall be coated subsequently after carrying out the grit blasting without any undue loss of time[1)].

4 Methods of surface preparation

4.1 General

Depending upon the function of the sprayed coating and the initial condition of the surface, different preparation procedures are used. In any case scale, rust, dust and other contaminants shall be removed by mechanical cleaning.

4.2 Degreasing

Oil and grease contaminants shall be removed thoroughly prior to processing the surface. In particular attention shall be given to bores, slots and channels. Design of components shall be such that fluids can drain out.

Degreasing can be done by heating, dipping and spraying processes with or without additional mechanical support by ultrasonic cleaning, brushing or steam jet blower. Aqueous wash solutions or organic solvents are suitable. For the application of wash solutions a mild alkaline cleaner with a high content of surfactants may be preferred. Whenever possible cleaner free of phosphate should be used. The application of chlorinated or fluorinated hydrocarbons should be avoided due to their detrimental effect on health and the environment. Subsequent rinsing and drying is necessary.

For health, safety and environment aspects see 4.7.

4.3 Grit blasting

4.3.1 Cleanliness

For thermal spraying the surface shall be sufficiently cleaned and roughened by applying a suitable grit. The grit blasting process shall be continued until the area to be coated shows a metallic surface with a uniform structure according to EN ISO 8501-1 Sa 3.

Unwanted loss of material, which can occur by excessive blasting, shall be considered.

Generally, the preparation grade Sa 3 is necessary but often not sufficient for the purpose. If necessary, the required condition of cleanliness and roughness shall be agreed between the contracting parties.

The preparation by grit blasting will vary depending on the type and size of the abrasive, blasting parameters, e.g. blasting time, distance, angle, particle velocity and machine type. Furthermore, the wear rate of the abrasives substantially effects the properties of a grit blasted surface. Therefore, the operating parameters for grit blasting shall be adequate to meet the required roughness criteria and, if necessary, have to be optimised by grit blasting of test pieces of similar material.

For health, safety and environment aspects see 4.7.

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1) Time permissible for a break depends upon material to be coated and the influences exerted on the prepared surface, e.g. dust, vapour and moisture (temperature below dew point, rain, etc.).

4.3.2 Roughness

Since roughness is not the only requirement of the surface preparation for thermal spraying, details of the roughness (peak-to-valley height) have been disregarded as well as their control. Specific roughness patterns shall be agreed and these will serve as reference for the profile required. In EN ISO 8503-1 to EN ISO 8503-4, specifications and definitions for ISO surface profile comparators for the assessment of abrasive blasted, cleaned surfaces and methods for the manufacturing of test pieces are outlined. When assessing the roughness, care shall be taken to avoid contamination of the prepared surface.

Adequate precautions shall be taken to ensure removal of oil and moisture from the air supply as these contaminants have a harmful effect on the quality of the surface preparation and thus on the bond strength of the sprayed coating.

EN ISO 12944-4 gives information regarding suitable grit blasting equipment.

4.3.3 Abrasives

4.3.3.1 General

The blasting medium can be selected according to the standards of EN ISO 11126-3, EN ISO 11126-4, EN ISO 11126-7 and EN ISO 11124-2. It shall be clean and dry. Circulating blasting media shall not have been used before for other purposes where impurities may have been introduced, e.g. during grit blasting of plastics, removal of coatings, blasting of oily or contaminated surfaces. Only sharp edged blasting media will generate a suitable roughness, therefore, visual checking of the grit's particle size and shape is recommended. Fine dust and rounded particles shall be removed.

4.3.3.2 Fused alumina and silicon carbide

Fused alumina (EN ISO 11126-7) and silicon carbide exert an intense effect due to their high hardness and sharp edges and are suited therefore for blasting of very hard surfaces. Due to the limited lifetime of alumina and silicon carbide (SiC) grit the degree of deterioration shall be assessed by regular inspection.

Particular care shall be taken when blasting with SiC. Optimising the blasting parameter (e.g. pressure, angle, grit size, distance) is necessary to minimise the number of particles that are embedded.

4.3.3.3 Chilled iron grit

Chilled iron grit has proved to be well suited for the preparation of surfaces for thermal spraying. The particle shape shall retain a sharp cutting edge according to EN ISO 11124-2. It is distinguished by its long edge life. However, when blasting non-ferrous substrate metals or stainless steel there is an enhanced corrosion probability.

4.3.3.4 Particle size range

The mean particle size of the abrasive shall be adapted to the respective application (see also EN ISO 12944-4). The appropriate particle size range shall be selected according to the standards EN ISO 11126-1 and EN ISO 11124-1.

4.3.4 Post cleaning after grit blasting

A thorough cleaning of the blasted surface by removing grit residues and dust is of great importance for the bond strength of the coating. The best way to remove impurities is by vacuum cleaning or blasting with dry and oil-free compressed air. For particular applications further means may be necessary to remove the grit residues.

4.3.5 Examination of grit blasted surfaces

Cleanliness and roughness of the surface achieved by grit blasting can be confirmed using reference standards. Such reference standards and their use are described in EN ISO 8503-2 and EN ISO 8503-4. Further extensive requirements (refer to 4.3.1, 4.3.2 and 4.3.4) shall be agreed between the contracting parties.

4.4 Threading/grooving

Threading or grooving, followed by grit blasting may be used where appropriate. In particular if parts are to be coated internally (bushing) against abrasive wear or if thick repair coatings (> 0,8 mm) are required. The thread serves to reduce the effect of shrinkage forces. The grooving should have a rounded profile. Threading shall be done without any liquid cooling or lubrication agents. The depth of the groove shall be adjusted in relation to the final coating thickness.

4.5 Cleaning by reversed transferred arc

In vacuum plasma spraying oxide layers are removed from the substrate by using a reversed transferred electric arc (negative polarity at the work piece). At the same time the part can be preheated without formation of new oxides due to the vacuum condition.

4.6 Bond coatings

Adhesion of sprayed coatings to the substrate can be increased or even made possible by spraying a bond coat with, for instance, certain aluminium containing materials, nickel base materials, molybdenum, or other metals.

4.7 Precautions for health, safety and environmental protection

Equipment, materials and abrasives used for surface preparation can be hazardous if used carelessly. Protection of health, safety and the environment according to the national regulations shall be respected.

5 Preheating

Preheating of a work piece can be advisable for various reasons:

— Prevention of moisture due to condensation.

Condensation of atmospheric moisture is reliably avoided by a work piece temperature of more than 50 °C. Usually, when applying powder flame spraying a preheating temperature of 70 °C to 80 °C is recommended to avoid condensation of unwanted by-products of combustion.

— Reduction of tensile stress and the danger of crack formation in the coating due to shrinkage.

The substrate may be preheated to the temperature which would be reached during spraying even without preheating. The optimum temperature depends upon numerous parameters. For internal coatings in bores and tubes preheating may be necessary to avoid coating separation.

— In some individual cases preheating of the work piece can increase the adhesive strength of the sprayed coating.

In any case, when pre-heating, oxidation or other contamination of the substrate surface shall be avoided.

Depending on the base material and size of the work piece the preheating may be carried out before or after grit blasting.