SLOVENSKI STANDARD
SIST EN ISO 14918:1999

01-oktober-1999

Vroče brizganje – Ugotavljanje primernosti opreme (ISO 14918:1998)

Thermal spraying - Approval testing of thermal sprayers (ISO 14918:1998)

Thermisches Spritzen - Prüfung von thermischen Spritzen (ISO 14918:1998)

Projection thermique - Qualification des agents en projection thermique (ISO 14918:1998)

Ta slovenski standard je istoveten z: **EN ISO 14918:1998**

ICS:

25.220.20 Površinska obdelava Surface treatment

SIST EN ISO 14918:1999 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 14918

October 1998

ICS 25.220.20

Descriptors: thermal spraying, qualification, personnel, generalities, certification, verification, tests, acceptability, designation

English version

Thermal spraying - Approval testing of thermal sprayers (ISO 14918:1998)

Projection thermique - Qualification des agents en projection thermique (ISO 14918:1998)

Thermisches Spritzen - Prüfung von thermischen Spritzern (ISO 14918:1998)

This European Standard was approved by CEN on 2 August 1998.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Contents

Foreword

The text of EN ISO 14918:1998 has been prepared by Technical Committee CEN/TC 240 "Thermal spraying and thermally sprayed coatings", the secretariat of which is held by DIN, in collaboration with Technical Committee ISO/TC 107 "Metallic and other inorganic coatings".

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 April 1999, and conflicting national standards shall be withdrawn at the latest by April 1999.

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This standard covers the principles of the approval testing of sprayer performance for thermal spraying.

The quality of work involved in thermal spraying depends on the skill and job knowledge of the thermal sprayer.

The ability of the thermal sprayer to follow verbal and written instructions and testing of his skill are therefore important factors in ensuring the quality of the thermally sprayed product.

This standard is intended to provide the basis for the mutual recognition by examining bodies for approval relating to thermal sprayer's competence in the various fields of application. Tests shall be carried out in accordance with this standard unless more severe tests are specified by the relevant application standards when these shall be applied.

The thermal sprayer's skill and job knowledge continue to be approved only if the thermal sprayer is working with reasonable continuity on thermal spraying work within the extent of approval.

All new approvals are to be in accordance with this standard from the date of this issue.

1 Scope

This standard gives procedural instructions for approval testing of thermal sprayers. It defines essential requirements, ranges of approval, test conditions, acceptance requirements and certification for approval testing of thermal spray performance.

During the approval test the thermal sprayer shall be required to show adequate practical experience and job knowledge of thermal spraying processes, materials and safety requirements for which he is to be approved; information on these aspects is given in Annex A.

This standard shall be used when the thermal sprayer's approval is required by the standard, the purchaser, by inspection authorities or by other organisations.

The thermal spraying processes referred to in this standard include those spraying processes which are designated as manual or mechanized.

Due to the variety and specialisation of automatic systems for thermal spraying where the thermal sprayer has no direct influence on the spraying process, this standard is not applicable in those circumstances.

The certificate of approval testing is issued under the sole responsibility of the examiner or test body.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 582
Testing of thermally sprayed coatings – Determination of adhesive tensile strength

EN 657
Thermal spraying – Terminology, classification

EN 1274
Powders for thermal spraying – Composition – Technical supply conditions

EN 1395
Acceptance inspection of thermal spraying equipment

EN 22063
Metallic and other inorganic coatings – Thermal spraying – Zinc, aluminium and their alloys

ISO 6507-1
Metallic materials – Hardness test – Vickers test – Part 1: HV 5 to HV 100

ISO 6508
Metallic materials – Hardness tests – Rockwell test (scales A – B – C – D – E – F – G – H – K)

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

3 Definitions

For the purpose of this standard the definitions in EN 657 and the following apply.

3.1 thermal sprayer: a person who performs thermal spraying with a manual or mechanized system.

3.1.1 manual thermal spraying: where the spraying gun or torch is manipulated by hand.

3.1.2 mechanized thermal spraying: where some aspects of the process are mechanized, with the gun/torch not manipulated by hand.

3.1.3 automatic thermal spraying: all operations typical of the spraying process are fully mechanized including all handling, e.g. workpiece loading and unloading, and are integrated in a programmed system.

The terms of manual, mechanized and automatic thermal spraying are summarized in table 1.

Table 1: Terms of thermal spraying

term	gun movement	workpiece movement	workpiece loading/ unloading
manual	manual	manual/mechanized	manual/mechanized
mechanized	mechanized	mechanized	manual
automatic	mechanized	mechanized	mechanized

3.2 examiner or examining body: a person or organisation who verifies compliance with the application standard.

3.3 specific acceptance criteria: a document providing in detail the criteria by which a thermal sprayer can be tested to be approved for a particular spraying technique or application area.

3.4 test piece: in the sense of this standard, the thermal spray workpiece used for the approval test.

3.5 test specimen: in the sense of this standard, a portion cut from the test piece in order to perform a specified analytical test.

3.6 test: in the sense of this standard, a series of operations which will include the making of a thermally sprayed test piece and subsequent non-destructive and/or destructive testing and reporting of results.

4 Essential requirements for approval testing

4.1 General

The criteria specified in this clause shall be examined in order to identify the ability of the thermal sprayer in these areas.

The thermal sprayer's approval test shall be carried out on test pieces and is independent of the type of construction.

For all thermal spraying processes and operations there exists basic job knowledge and specific knowledge related to the process, on which the thermal sprayer shall be tested, see Annex A.

4.2 Equipment operation

The thermal sprayer shall be tested to determine his knowledge of the equipment. Further details see A.4.3.

4.3 Masking procedure

The thermal sprayer shall be tested to determine his knowledge of proper masking procedures for both surface preparation and spraying.

4.4 Surface preparation

The thermal sprayer shall approve the surface of the thermal spray test piece which are used for qualification. He should also maintain a properly prepared surface during the qualification testing.

4.5 Environmental conditions

The thermal sprayer shall approve the environmental conditions such as temperature, humidity, dew point, as being suitable for spraying the test pieces.

4.6 Application equipment

Test results, gained from test pieces sprayed with actual production equipment, or equipment similar to it in the view of the certifying examining body and representative of said equipment's quality, shall be utilised for thermal sprayer qualification.

5 Range of approval

5.1 General

Thermal sprayers shall be qualified for thermal spraying to a specific coating process and method of application. The qualification shall only be valid for that specific coating process and method of application. The thermal spraying processes and methods of application covered by this standard are identified in 5.2.

5.2 Thermal spraying processes

5.2.1 Grouping of thermal spraying processes

This standard covers the following thermal spraying processes according to EN 657:

- flame spraying;
- arc spraying;
- plasma spraying;
- high velocity flame spraying;
- powder spraying;
- wire spraying /rods/cords.

5.2.2 Application method

- manual
- mechanized

5.2.3 Materials

The materials given in Annex B are the specific materials to be used in the approval test. The following materials are given only for information to show which material is appropriate for each process.

Appropriate materials for various processes:

Flame spraying: powder, wire or rods: / Arc spraying:

- Metals and alloys (for engineering purposes)
- Zinc and aluminium and their alloys (for corrosion protection)

Flame spraying: powder, wire or rods:

- Self-fluxing alloys

Plasma spraying

- Metals and alloys
- Ceramics
- Metal based carbides/carbides

High velocity flame spraying:

– Metals and alloys
– Metal based carbides

5.3. Qualification scope

The requirements for initial thermal sprayer qualification will be different for each of the classifications in 5.2 above. Qualification in one category (process and application method) would not imply any ability or experience in practising the specific thermal spraying technique in any other category.

The thermal sprayer qualification level shall be indicated by the thermal spray process, followed by the application method e.g. manual operation of plasma arc equipment would be written as "Plasma: Manual". Also information on the type of material (5.2.3) sprayed for qualification shall be available upon request by those invoking this standard.

5.4 Supervision

The thermal spraying and testing of the test pieces shall be witnessed by the certifying body .

5.5 Shapes and dimensions of test pieces

Shapes and dimensions of test pieces and test specimens are as detailed in the specific acceptance criteria for each thermal spraying process (see Annex B).

5.6 Test methods

These shall be as detailed in the specific acceptance criteria. When test specimens are metallographically examined, then they should be compared to test pieces which are known to be satisfactory, which have been mounted and polished in the same way, and at the same time, to avoid preparation discrepancies.

5.7 Acceptance requirements for test pieces

Acceptance requirements for test pieces are as detailed in the specific acceptance criteria. Test pieces shall be evaluated according to the acceptance requirements specified for each spray process and material type in the specific acceptance criteria.

5.8. Spray materials for tests

For each of the equipment categories listed in 5.2.1 there is a variety of consumable types as detailed in 5.2.3. The thermal sprayer can elect to be tested in any one of these categories but the specific material to be used within that category is fixed in the specific acceptance criteria.

For example a plasma thermal sprayer may choose to be tested spraying ceramics. In this category the specific acceptance criteria specifies aluminium oxide/titanium oxide 87/13 (Spray powder EN 1274 – 12.3 – 45/22 – blended) – as the actual material to be used.

6 Examination and testing

The thermal sprayer shall be tested in two ways. Firstly he shall complete a job knowledge test to determine his knowledge of the process, and secondly he shall undergo a practical test to demonstrate his skill in the appropriate area.

6.1 Job knowledge test

The thermal sprayer shall satisfactorily complete a test covering the appropriate coating process, application method and material. The written test should be prepared by the certifying body. For particular aspects to be tested, see Annex A.

6.2 Practical test

The thermal sprayer shall be tested to determine whether he has the practical skills necessary for the thermal spraying procedure, as detailed in the specific acceptance criteria (according to Annex A and Annex B)

7 Re-tests

7.1 General

In the event of the thermal sprayer's failure to meet the requirements of this standard, a re-test may be scheduled at the discretion of the examiner in accordance with the acceptance criteria, but not without additional training and not normally within three months of the last test.

7.2 Additional tests

If during spraying the thermal sprayer can show that there is some extraneous fault preventing spraying a good test piece, a new attempt may be made when the fault has been corrected.

8 Period of validity

8.1 Initial approval

The validity of the thermal sprayer's approval begins from the date when all the required tests are satisfactorily completed. This date may be different to the date of issue marked on the certificate.

A thermal sprayer's approval shall remain valid for a period of three years providing that the relevant certificate is signed at six month intervals by the employer/co-ordinator and that all the following conditions are fulfilled:

8.2 Prolongation

8.2.1 Period

A thermal sprayer shall require requalification every three years.

8.2.2 Thermal sprayer and production spraying

The thermal sprayer must carry out production spraying without lapses of 6 months or more.

8.2.3 Interruption periods in thermal spray works

A thermal sprayer who has not carried out production spraying for a period of six months shall follow the initial thermal sprayer qualification procedure to regain a qualified status.

8.3 Requirements

After the normal expiry of the certificate, the requalification requirement shall be satisfied by thermal spraying of acceptable test specimens. No job knowledge test should be required, providing said results have been obtained within a six months period of the requested re qualification.

8.4 Scheduling

It should be the responsibility of the thermal sprayer and the employer to ensure that requalification takes place as scheduled.

8.5 Thermal sprayers with an expired or cancelled qualification status

Thermal sprayers with an expired or cancelled qualification shall not be permitted to perform thermal spray operations on parts covered by this standard.

9 Certification

9.1 Final approval

Final approval should depend upon the thermal sprayer's ability to satisfactorily demonstrate his proficiency in operating the equipment and spraying the coating test pieces.

9.2 Records

Records of qualification and test results should be maintained by the certifying agent for a period of ten years.

10 Designation

The thermal sprayer approval test shall be designated by the following informations:

- Number of this standard
- Thermal spray process
- Application method

Thermal sprayer approval test EN ISO 14918 Flame spraying – manual