



SLOVENSKI STANDARD

SIST EN 1395-1:2007

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Thermal spraying - Acceptance inspection of thermal spraying equipment - Part 1:
General requirements

Thermisches Spritzen - Abnahmeprüfungen für Anlagen zum thermischen Spritzen - Teil
1: Allgemeine Anforderungen

Projection thermique - Contrôle d'acceptation du matériel de projection thermique -
Partie 1: Exigences générales

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ICS:

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English Version

Thermal spraying - Acceptance inspection of thermal spraying equipment - Part 1: General requirements

Projection thermique - Contrôle d'acceptation du matériel
de projection thermique - Partie 1: Exigences générales

Thermisches Spritzen - Abnahmeprüfungen für Anlagen
zum thermischen Spritzen - Teil 1: Allgemeine
Anforderungen

This European Standard was approved by CEN on 23 December 2006.

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 CEN Management Centre 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 CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, 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 United Kingdom.

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

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Foreword

This document (EN 1395-1:2007) 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 July 2007, and conflicting national standards shall be withdrawn at the latest by July 2007.

This document, together with EN 1395-2, 1395-3, 1395-4, 1395-5, 1395-6 and 1395-7 supersedes EN 1395:1996.

EN 1395 consists of the following Parts, under the general title *Thermal spraying — Acceptance inspection of thermal spraying equipment*:

- Part 1: General requirements;
- Part 2: Flame spraying including HVOF;
- Part 3: Arc spraying;
- Part 4: Plasma spraying;
- Part 5: Plasma spraying in chambers;
- Part 6: Manipulator systems;
- Part 7: Powder feed systems.

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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, 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 United Kingdom.

1 Scope

This European Standard specifies requirements for the acceptance inspection of thermal spraying equipment including plasma (atmospheric and with controlled atmosphere in chambers), arc and flame including HVOF (high velocity oxygen-fuel) spray systems, as well as manipulator and powder feed systems used in spray jobs to produce thermally sprayed coatings of reproducible quality.

This European Standard is applied to thermal spray equipment where components are supplied by one manufacturer/supplier. If one or more interdependent components of the thermal spray equipment are not from the same manufacturer/supplier the technical specification will be agreed between the manufacturer/supplier and user/customer.

This European Standard is intended to form the basis of technical delivery conditions.

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 657:2005, *Thermal spraying — Terminology, classification*

EN 1395-2, *Thermal spraying — Acceptance inspection of thermal spraying equipment — Part 2: Flame spraying including HVOF*

EN 1395-3, *Thermal spraying — Acceptance inspection of thermal spraying equipment — Part 3: Arc spraying*

EN 1395-4, *Thermal spraying — Acceptance inspection of thermal spraying equipment — Part 4: Plasma spraying*

EN 1395-5, *Thermal spraying — Acceptance inspection of thermal spraying equipment — Part 5: Plasma spraying in chambers*

EN 1395-6, *Thermal spraying — Acceptance inspection of thermal spraying equipment — Part 6: Manipulator systems*

EN 1395-7, *Thermal spraying — Acceptance inspection of thermal spraying equipment — Part 7: Powder feed systems*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 657:2005 apply.

4 Purpose of acceptance inspection

4.1 General

4.1.1 Class A

A fully computerized thermal spray equipment using gas mass flow controller, PLC and/or PC, monitor and/or a screen for process control shall be considered as an Class-A-System concerning accuracy as well as stability and reproducibility. A Class-A-System represents state of the art technology.

4.1.2 Class B

A more simple system using analogue gauges and/or flow meter for process control shall be considered at the least, as a Class-B-System concerning accuracy as well as stability and reproducibility.

4.2 Health and safety

Acceptance inspection as part of health and safety provisions for thermal spraying equipment serves to provide proof that the equipment is safe according to EC directives. This inspection will also cover the completeness of documentation with regard to CE conformity declaration.

4.3 Functionality

The functionality of the thermal spraying equipment shall be checked according to the:

- 1) purchasing contract between contracting parties or if not mentioned;
- 2) supplier's order confirmation or if not mentioned;
- 3) technical data sheet.

Using a suitable check list is recommended.

4.4 Accuracy

The accuracy of the thermal spraying equipment shall be checked according to the:

- 1) purchasing contract or if not mentioned;
- 2) supplier's manufacturer's order confirmation or if not mentioned;
- 3) technical data sheet.

Using a suitable inspection report is recommended.

4.5 Stability and reproducibility

The acceptance inspection as part of a quality assurance system for spraying equipment serves to provide proof that the equipment is suitable for producing thermally sprayed coatings of uniform quality in particular, to satisfy the requirements of this European Standard.

Proof of the suitability of equipment for thermal spraying is to be provided by the supplier when delivering a spray unit for the first time, but may also be verified by the user as described in Clause 6. The values thereby obtained and any other data of significance in deciding on the suitability of the equipment shall be recorded on report sheets or in an inspection report as shown in the documents listed in Clause 2.

The spraying equipment shall be considered properly supplied if all the requirements specified in the tests and described in the corresponding parts of this European Standard are satisfied.

5 Conditions for acceptance inspection

All equipment shall be supplied with an operating and maintenance instruction manual.

Spraying equipment shall be installed so that the spraying process is not impaired by other production equipment or environmental conditions.

The gas supply provided shall be adequate in volume and purity.

Care shall be taken to ensure that no interference by fluctuations of the main power supply can influence the set points.

The equipment shall be tested with the gun or burner in a fixed position and in a manner agreed between purchaser/supplier and manufacturer.

The user/customer shall ensure a suitable supply of gas, electrical power and water as specified by the manufacturer/supplier.

6 Acceptance test according to technical specification

The following parts of this European Standard reveal the state of the art technology in thermal spraying equipment and the minimum requirements concerning a stable parameter setting and maintenance according to the respective class:

- Part 2: Flame spraying including HVOF;
- Part 3: Arc spraying;
- Part 4: Plasma spraying;
- Part 5: Plasma spraying in chambers;
- Part 6: Manipulator systems;
- Part 7: Powder feed systems.

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7 Acceptance test according to coating specification

7.1 General

Instead of the acceptance test according to the technical specification, an acceptance test according to coating specification can be used. The coating specification shall be clarified before signing the contract and shall be part of the contract.

7.2 Coating properties

All sprayed coating properties shall be specified by relevant or required values and/or a micro cross section, e.g.:

- type of thermal spraying material;
- coating thickness;
- roughness (Ra/Rz);
- bond strength;
- porosity (%);
- interface bonding (%);
- oxides (%);

- non melted particles (%).

Furthermore, the deposition efficiency according to EN ISO 17836 can be specified. The thermal spraying material used for the acceptance tests shall be specified (e.g. according to EN 1274) and agreed.

7.3 Substrate properties

The test piece or component shall be specified and agreed concerning:

- dimensions;
- pieces per time (for mass or series production);
- area to be sprayed;
- substrate material;
- pretreatment.

7.4 Tolerances

All tolerances for specified values shall be agreed among contracting parties.

8 Monitoring

It shall be possible to monitor, clearly read and correct, by means of instruments, any deviations from the set points of the parameters of the spraying process. The error limits of the inspection instruments shall not exceed 5 % for all set points and shall correspond at least to class 2,5 ¹⁾. The reproducibility of the setting shall be verified. All values shall be recorded during acceptance inspection.

9 Inspection report

An example for an inspection report for each type of thermal spraying equipment is given as an annex in each part of EN 1395 according to Clause 6.

10 Validity of inspection report and retest

10.1 Validity of inspection report

The inspection report shall be deemed valid if all requirements of this European Standard have been complied with. It is invalidated by deviations from this European Standard see 10.2.

10.2 Retest

If the values obtained during acceptance inspection of a thermal spraying system are altered by modification or repair work, retesting of the properties affected shall be carried out.

Retesting shall be carried out in the same way as the initial tests are described in this European Standard.

¹⁾ Maximum permissible error expressed by percentage of a measuring span.