



**SLOVENSKI STANDARD**  
**SIST EN 1395:1999**

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Thermal spraying - Acceptance inspection of thermal spraying equipment

Thermisches Spritzen - Abnahmeprüfungen für Anlagen zum thermischen Spritzen

Projection thermique - Contrôle d'acceptation du matériel de projection thermique

**Ta slovenski standard je istoveten z: EN 1395:1996**

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English version

## Thermal spraying - Acceptance inspection of thermal spraying equipment

Projection thermique - Contrôle d'acceptation  
du matériel de projection thermique

Thermisches Spritzen - Abnahmeprüfungen für  
Anlagen zum thermischen Spritzen

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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.

The European Standards exist 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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

# CEN

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

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

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**Foreword**

This European Standard 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publication of an identical text or by endorsement, at the latest by September 1996, and conflicting standards shall be withdrawn at the latest by September 1996.

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

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## 1 Scope

This European standard specifies requirements for the acceptance inspection of thermal spraying equipment including plasma, arc and flame spraying plants used to produce high-quality sprayed coatings.

## 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 1274 Thermal spraying – Powders – Composition – Technical supply conditions

## 3 Purpose of acceptance inspection

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

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

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 Annex A, B, C and D. The spraying equipment may be considered adequately designed if all the requirements specified in clause 6 are satisfied in the tests described in clause 7.

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## 4 Conditions for acceptance inspection

Spraying equipment shall comply with the relevant safety specifications. They 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 electrical values. Every equipment shall be supplied with an operating and maintenance instruction manual.

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

## 5 Designation

Acceptance inspection of thermal spraying equipment shall be designated for example:

Acceptance inspection according to EN 1395.

## 6 Principles of acceptance inspection

### 6.1 Plasma spraying equipment

#### 6.1.1 Electrical power

The maximum power level for continuous operation of the plasma spraying system shall be maintained during continuous duty, a precondition for this being that the spraying gun is designed for such performance.

### 6.1.2 High-voltage ignition device

Other components and functions of the spraying equipment shall not be affected by operation of the high-voltage ignition device.

### 6.1.3 Cooling water circuit

The cooling water circuit shall be adequately sized and should include devices to maintain and control the water quality required as well as devices to measure water temperature and water flow.

### 6.1.4 Gases

A plasma spraying unit shall be designed to permit spraying with the gases or gas mixture specified by the user.

### 6.1.5 Plasma nozzle

Processing of the spraying powder shall be possible without this producing any disturbing deposits on and in the nozzle.

### 6.1.6 Powder feed unit

The following requirements shall be met by the powder feed unit:

- a) The unit shall be a stand alone system, even if it consists of several components, and function irrespective of the setting of the gas volume flow rate or the type of electrical control of the spraying device.
- b) It shall be possible to control the powder feed rate. The set values shall be constant and reproducible. The test shall be carried out using the powder defined by the parties concerned.
- c) The unit shall permit uniform feed of the powder mixtures without demixing whilst processing the powder in accordance with the supplier's specifications.
- d) The feeding of fine grained spraying powders, see EN 1274, shall be possible.

### 6.1.7 Control Unit/Monitoring

It shall be possible to monitor and control, read clearly and correct, by means of instruments, any deviations from the set values of gas pressure, gas volume flow rate, powder feed rate and arc amperage during the spraying process. The arc voltage shall also be indicated. These values shall be recorded during acceptance inspection. The limits of error of the measuring instruments shall not exceed 5 % for all set values and at least has to correspond to class 2,5<sup>1)</sup> for excess pressure measuring equipment resp. to electrical measuring devices (see also 7.1.7).

It shall be ensured that, in the case of lack of water supply or excessive deviations from the selected parameters, the system shuts down automatically.

## 6.2 Arc spraying system

### 6.2.1 Electrical power

The maximum level for continuous operation of an arc spraying system shall be maintained during continuous duty. A precondition for this being that the diameter of the spraying wires is adequate and that the spraying head is designed for such power ratings.

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<sup>1)</sup> Maximum permissible error expressed by percentage of measuring span.

### 6.2.2 Atomizing gas feed

The atomizing gas tube and the control device shall be designed to ensure undisturbed operation.

### 6.2.3 Nozzle system

The nozzle system (contact tubes and air nozzle) shall permit a constant arc to be maintained and provide atomization without causing deposits that might disturb operation.

### 6.2.4 Spraying wire feed system

A continuously controllable, and reproducible feed of the wires shall be provided, a precondition for this being adequate constant air pressure and supply of electrical power.

### 6.2.5 Monitoring

It shall be possible to monitor, read clearly and correct, by means of instruments, any deviations from the set values of atomizing gas pressure, current and voltage during the spraying process. These values shall be recorded during acceptance inspection. The limits of error of the measuring instruments shall not exceed 5 % for all set values and shall correspond at least to class 2,5<sup>1)</sup> in the case of pressure gauges, or in the case of electrical measuring instruments (see also 7.2.4).

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## 6.3 Flame spraying equipment for powder, wire, rod and cord

### 6.3.1 Gases

Flame spraying equipment shall permit spraying with the combustible gases, atomizing gas – if any – and carrier gas – if any – for which it was designed.

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### 6.3.2 Nozzles

Processing of the spraying material shall be possible without any visibly disturbing deposits on the burner nozzle and air nozzle.

### 6.3.3 Spraying material feed unit

The spraying material feed unit shall comply with following conditions:

The unit shall permit uniform processing of the consumables for which it is designed. It shall be possible to adjust the spraying material feed rate. The set values shall be constant and reproducible, a precondition for this being adequate and constant carrier gas pressure or actuating air pressure or supply of electrical power as appropriate.

### 6.3.4 Monitoring

It shall be possible to monitor, read clearly and correct, by means of instruments, any deviations from the set values of gas pressure and gas volume flow rate during the spraying process. These values shall be recorded during acceptance inspection. The limits of error of the measuring instruments shall not exceed 5 % for all set values and shall correspond at least to class 2,5<sup>1)</sup> (see also 7.3.5).

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<sup>1)</sup> Maximum permissible error expressed by percentage of measuring span.



## 7 Procedure of acceptance inspection

Spraying equipment may be deemed to have been adequately designed for all relevant spraying applications and for use with all customary spraying materials required for the spraying process if they comply with the following requirements:

### 7.1 Plasma spraying equipment

#### 7.1.1 Electrical power

Proof of the power rating required shall be given by

- 20 min. of spraying with the parameters recommended for Aluminum-oxyde as supplied by equipment manufacturer.

During the test, the following items will be examined:

- a) Gas Control;
- b) Electrical Control;
- c) Cooling temperature.

Limit deviations: see Annex A; Class A, B, C.

Upon stabilization, the deviation of the voltage (variable parameter) from the set value shall not exceed 3 % (Class A), 6 % (Class B) and 12 % (Class C). The time it takes for the stabilization to be reached shall be recorded.

#### 7.1.2 High-voltage ignition device

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The high-voltage ignition device shall be deemed to meet the requirements given in 6.1.2 if it does not interfere with any appliances and functions of the spraying equipment during the test as specified in 7.1.1.

#### 7.1.3 Cooling water circuit

The cooling water circuit shall be tested by measuring capacity. The minimum volume flow as declared by the manufacturer shall be ensured.

#### 7.1.4 Plasma gases

The system shall be deemed to comply with the requirements specified in 6.1.4. The values of gas pressure and gas volume flow must not deviate by more than  $\pm 1,5$  % (Class A),  $\pm 3$  % (Class B) and  $\pm 5$  % (Class C) from the set values over a 20-minutes period of spraying. If the secondary gas is the variable parameter, the deviations according from the set value shall not exceed 3 % (Class A), 6 % (Class B) and 12 % (Class C) upon stabilization.

#### 7.1.5 Nozzle

The nozzle shall be deemed to comply with the requirements given in 6.1.5 if there are no disturbing deposits of spraying material on or in the nozzle after testing as specified in 7.1.1.

#### 7.1.6 Powder feed unit

Compliance with the requirements specified in 6.1.6 shall be tested as follows:

- a) A change in the primary gas flow indicated at the control panel shall not have any influence on the carrier gas flow.