
**Metallic and other inorganic coatings —
Thermal spray coordination — Tasks and
responsibilities**

*Revêtements métalliques et autres revêtements inorganiques —
Coordination en projection thermique — Tâches et responsabilités*



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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.

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 12690 was prepared by the European Committee for Standardization (CEN) Technical Committee TC 240, *Thermal spraying and thermally sprayed coatings*, in collaboration with ISO Technical Committee ISO/TC 107, *Metallic and other inorganic coatings* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Introduction

Thermal spraying is a special process which requires qualified personnel for execution of thermal spraying operations on components or parts. This provides confidence in thermal spraying fabrication and allows reliable performance to be achieved in service during operational time. Coordination personnel are able to coordinate all activities related to thermal spraying, and are responsible for planning, executing, supervising and inspecting.

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Metallic and other inorganic coatings — Thermal spray coordination — Tasks and responsibilities

1 Scope

This International Standard specifies the tasks and responsibilities necessary to ensure the quality of a thermal sprayed coating or a coated component, including the coordination of activities related to thermal spraying.

Thermal spraying coordination can be carried out by one or a number of persons within the same company or manufacturing department.

The responsibilities of the spraying coordinator are specified by the manufacturer.

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.

ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method*

ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T)*

ISO 14918, *Thermal spraying — Approval testing of thermal sprayers*

ISO 14922-1, *Thermal spraying — Quality requirements of thermally sprayed structures — Part 1: Guidance for selection and use*

ISO 14922-2, *Thermal spraying — Quality requirements of thermally sprayed structures — Part 2: Comprehensive quality requirements*

ISO 14922-3, *Thermal spraying — Quality requirements of thermally sprayed structures — Part 3: Standard quality requirements*

ISO 14922-4, *Thermal spraying — Quality requirements of thermally sprayed structures — Part 4: Elementary quality requirements*

ISO 14923, *Thermal spraying — Characterization and testing of thermally sprayed coatings*

EN 473, *Non-destructive testing — Qualification and certification of NDT personnel — General principles*

EN 571-1, *Non-destructive testing — Penetrant testing — Part 1: General principles*

EN 582, *Thermal spraying — Determination of tensile adhesive strength*

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

EN 1395-1, *Thermal spraying — Acceptance inspection for thermal spraying equipment — Part 1: General requirements*

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

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

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

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

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

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

EN 15311, *Thermal spraying — Components with thermally sprayed coatings — Technical supply conditions*

EN 15340, *Thermal spraying — Determination of shear load resistance of thermally sprayed coatings*

EN 15648, *Thermal spraying — Component related procedure qualification*

3 Terms and definitions

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

3.1

manufacturing department

thermal spraying workshops or sites under the same technical and quality management

3.2

thermal spraying coordinator

person who has responsibilities in the manufacturing organization for thermal spraying and thermal-spraying-related activities, whose competence and knowledge has been demonstrated by, for example, education, training and/or relevant manufacturing experience

3.3

thermal spraying inspection

inspecting of all activities related to thermal spraying, testing and measuring the thermal sprayed coatings to be manufactured, and thereby influencing components or parts to meet the requirements defined by the contractor's coating specification or by the responsible technical department of the manufacturer

NOTE Thermal spraying inspection is part of spraying coordination.

4 Tasks and responsibilities

4.1 Quality-related activities

Annex B shall be used to allocate quality-related tasks and responsibilities to thermal spraying coordination personnel within the company or manufacturing department practising thermal spraying fabrication. Annex B

may be supplemented for special applications. Not all items will necessarily apply to all manufacturing organizations or quality system or are necessary. Therefore, an application-related selection should be made.

4.2 Definition of tasks and responsibilities

Each single activity in Annex B may be associated with a number of tasks and responsibilities, such as:

- preparation of the spray procedure specification;
- control;
- inspection, checking or witnessing;
- to ensure that international and national laws and regulations concerning protection of the operator's health and the environment are followed, and the safety requirements for thermal spraying equipment according to the EN 15339 series are fulfilled as far as they belong to the duties of the user.

All relevant tasks and responsibilities shall be defined and allocated for all relevant items.

If thermal spraying coordination is carried out by a number of persons, the tasks, responsibilities and activities shall be specified and allocated for each thermal spraying coordinator in the organization.

The manufacturer shall appoint at least one spraying coordinator.

Thermal spraying coordination is the sole responsibility of the manufacturer. The spraying coordination may be subcontracted, however, compliance to this International Standard remains the responsibility of the manufacturer.

5 Job description

5.1 General

If a job description for the thermal spraying coordinator is required by the quality management system of the manufacturer, contract or specified application standard, it shall include the tasks and responsibilities of the coordinator.

5.2 Tasks

For identification of the assigned tasks, see 4.2 and Annex B.

5.3 Responsibility

For identification of the assigned responsibility, consider the following:

- position in the manufacturing department and responsibility;
- the extent of authorization to accept by signing on behalf of the manufacturing department, for example, procedure specifications, supervision reports, etc., as needed in order to fulfil their assigned tasks;
- the extent of authorization to carry out the assigned tasks.

6 Technical knowledge

6.1 General knowledge requirements of all spraying coordination personnel

For all tasks assigned, a thermal spraying coordinator shall be able to demonstrate adequate technical knowledge that enables him to perform such tasks in a satisfactory way.

The following factors should be considered:

- general technical knowledge;
- specialized technical knowledge. This may be attained by a combination of theoretical knowledge, training and/or experience.

The extent of required manufacturing experience, education and technical knowledge shall be described by the manufacturing department and will depend on the assigned tasks and responsibilities.

6.2 Specific knowledge requirements of responsible spraying coordination personnel

6.2.1 General

Responsible thermal spraying coordinators shall be allocated from one of the groups described in 6.2.2 to 6.2.4. This will depend on the nature, complexity of the production and the requirements concerning the component.

6.2.2 Comprehensive technical knowledge

Thermal spraying coordination personnel with the full knowledge of a specialist, also having a basic knowledge of mechanical engineering, of a sufficient level (according to 6.1) for planning, executing, supervising and testing of all tasks and responsibilities in a thermal spraying fabrication.

6.2.3 Specific technical knowledge

Thermal spraying coordination personnel, where the level of technical knowledge of a specialist is sufficient for planning, executing, supervising and testing of all tasks and responsibilities in a thermal spraying fabrication within a selective technical field.

6.2.4 Basic technical knowledge

Thermal spraying coordination personnel with the wider and deeper knowledge of a practitioner similar to that of an experienced thermal sprayer that is sufficient for planning, executing, supervising and testing of all tasks and responsibilities in a thermal spraying fabrication within a limited technical field (see Annex A).

Annex A

(informative)

Recommendations of technical knowledge

The European Federation for Welding, Joining and Cutting (EWF) has, on a voluntary basis, prepared recommendations for minimum requirements for education, examination and certification of thermal spraying coordination personnel.

The recommendations are stated in the following documents:

- European Thermal Spraying Specialist (ETSS), Doc. EWF, pp. 459-01;
- European Thermal Spraying Practitioner (ETSP), Doc. EWF, pp. 592-01.

For evaluation of specific technical knowledge, the contents of the EWF guidelines may be used. Thermal spraying coordinating personnel fulfilling the requirements of these documents, or holding accepted national qualifications, may be considered to satisfy the relevant requirements of 6.2.

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Annex B (normative)

Essential thermal-spraying-related tasks in accordance with ISO 14922 to be considered when appropriate

B.1 Contract and design review

The following elements shall be considered with regard to contract, technical, and design review:

- location of thermal sprayed coatings in relation to the design requirements, as far as they are known;
- accessibility for thermal spraying and testing;
- detailed instructions for thermal spraying, for example, in the coating specification;
- acceptance level for imperfections for the thermal sprayed coating.

B.2 Subcontracting

The following elements shall be considered with regard to subcontracting:

- suitability of subcontractors;
- qualification of subcontractors.

B.3 Thermal spraying personnel

The following elements shall be considered with regard to the spraying personnel:

- availability of qualified personnel;
- thermal sprayer qualified in accordance with ISO 14918 or equivalent qualification agreed by the parties concerned;
- spraying coordinator qualified in accordance with this International Standard or equivalent qualification agreed by the parties concerned.

B.4 Inspecting personnel for quality testing

The following elements shall be considered with regard to the inspection personnel:

- availability of qualified personnel;
- inspectors for non-destructive testing qualified in accordance with EN 473.

B.5 Equipment

The following elements shall be considered with regard to equipment:

- availability of equipment for manufacture;
- description of the equipment;
- suitability of the thermal spraying and associated equipment, for example, according to the EN 15339 series;
- acceptance tests in accordance with the appropriate part of EN 1395;
- preparation, designation and handling of auxiliaries and equipment;
- equipment maintenance and repair;
- suitability of the working conditions and environmental requirements to be considered, for example, according to the EN 15339 series;
- personal protective equipment and other safety equipment, directly associated with the applicable manufacturing process.

B.6 Applying the thermal spraying

The following elements shall be considered with regard to applying a thermal spraying process:

- production plan, for example according to ISO 14921 or ISO 2063, for spraying applications in the field of corrosion protection;
- spray procedure specification, determination, respectively checking, of parameter set;
- confirmation of the parameter by a procedure qualification in accordance with EN 15648, as far as necessary or required in the coating specification;
- work instructions, process instructions;
- sequence of spraying on the component, if several sections are to be coated and assemble the sequences, if applicable;
- thermal spraying jigs and fixtures;
- thermal sprayer's qualification in accordance with ISO 14918, if necessary;
- thermal spraying inspection requirements to be defined, for example, according to EN 15311, if this is not specified in the coating specification;
- pretreatment, for example according to EN 13507, and post-treatment, for example according to ISO 14924 or ISO 14920, if applicable;
- documentation;
- requirements for working safety and protection of the environment.

B.7 Spraying consumables

The following elements shall be considered with regard to consumables:

- conformity with the instructions of the coating specification and suitability, if applicable;
- supply conditions, workshop certificates;
- batch test, if required;
- any supplementary requirements for purchasing consumables (see EN 1274);
- identification, handling and storage of consumables.

B.8 Storage and use of substrate materials

The following elements shall be considered with regard to storage and use of substrate materials:

- identification with regard to supply instructions;
- any supplementary requirements in the material purchasing;
- identification, handling and storage of the substrate materials.

B.9 Inspection and testing with regard to the thermal spraying

B.9.1 Preliminary activities

The following elements shall be considered with regard to preparation:

- surface preparation;
- preparation of work instructions;
- suitability and validity of the thermal sprayer's qualification, if required;
- suitability of the thermal spray procedure specification and qualification in accordance with EN 15648 for the component;
- suitability of the work area, including the environment, especially for spray operations on site, with protection from wind and rain, and a temperature below the dew-point on the component.

B.9.2 Thermal spraying

The following elements shall be considered with regard to applying thermal spraying:

- assignment of thermal sprayers;
- use or function of equipment and accessories;
- thermal spraying consumables and auxiliaries;
- application for thermal spraying process;

- application and method of preheating and post-treatment;
- application and method of cooling, if applicable.

B.9.3 Inspection and testing after thermal spraying

The following elements shall be considered with regard to inspection and testing after thermal spraying:

- dimension of coating or coatings;
- shape, dimensions and tolerances of the component;
- appearance of the thermal sprayed coating, to be judged, for example, according to the elements in ISO 14923;
- destructive and non-destructive testing in accordance with the coating specification or EN 15311;
- application of destructive and non-destructive tests in accordance with EN 582, EN 15340, ISO 14923, EN 571-1, ISO 6507-1, ISO 6508-1, if applicable;
- special tests, for example wear and/or corrosion tests, if required;
- assessment of the sprayed coating in accordance with the coating specification, EN 15311, or ISO 14923, if applicable;
- assessment inspection and examination results;
- when a faulty coating is identified, corrective measures to be induced and the instructions of the contract, agreement with contractor, the coating specification, or EN 15311, are to be considered;
- re-assessment of renewed or repaired spray coatings;
- state when inspecting and testing.

B.10 Insufficient conformity and corrective actions

The following elements shall be considered with regard to insufficient conformity and corrective measures:

- hindrance of further working on faulty coatings;
- rework according to relevant instructions, for example, of the contract or agreement with the contractor, the coating specification, or EN 15311.

B.11 Calibration

The following elements shall be considered with regard to calibration:

- calibration of equipment and flow meter;
- calibration of measuring devices;
- calibration intervals;
- equipment monitoring in accordance with the applicable part of EN 1395.

B.12 Identification and traceability

Traceability concerns employed personnel, substrate materials and spraying consumables, applied spray procedure specification, applied spraying equipment, for example for mechanized spraying, tests, applied repairs, if applicable.

B.13 Quality records

The following elements shall be considered with regard to quality instructions:

- preparation and maintenance of the necessary records;
- drawings, workshop certificates, other certificates, test reports, subcontracting;
- location and period of storage.

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Bibliography

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- [4] ISO 14924, *Thermal spraying — Post-treatment and finishing of thermally sprayed coatings*
- [5] EN 1274, *Thermal spraying — Powders — Composition, technical supply conditions*
- [6] EN 13507, *Thermal spraying — Pre-treatment of surfaces of metallic parts and components for thermal spraying*
- [7] EN 15339 (all parts), *Thermal spraying — Safety requirements for thermal spraying equipment*

