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Thermal spraying — Thermally sprayed coatings — Symbolic representation on drawings

*Projection thermique — Revêtements appliqués par projection
thermique — Représentation symbolique sur les dessins*

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 12671:2012), which has been technically revised. The main changes compared with the previous edition are as follows:

- the designation examples and figures have been updated in accordance with the latest thermal spray terminology and material standards (see ISO 14917, ISO 14919 and ISO 14232-1).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Thermal spraying — Thermally sprayed coatings — Symbolic representation on drawings

1 Scope

This document specifies how the symbolic representation of thermally sprayed coatings is indicated on drawings.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 General

Coatings may be indicated with the general recommendations for technical drawings. To apply this symbolic representation will make sense in cases where the thermally sprayed coating is very thin and/or can be built up by several dissimilar coatings one upon another.

The symbolic representation shall clearly give all the necessary indications regarding the specific coating to be obtained without over-burdening the drawing with notes or showing an additional view or detail enlargement.

This symbolic representation includes an elementary symbol and one or more supplementary symbols and further complementary indications.

If a large number of instructions for producing the coating have to be mentioned, it is recommended to indicate the specific instructions on the drawing or to define them in a separate parts' list, if applicable (see [Figures 6](#) and [7](#)).

5 Symbols

The elementary symbol shall indicate that this process deals with thermal spraying.

The following information shall be given by supplementary symbols:

- type of coating (bond or top coat);
- the spraying process and subsequent treatments.

The following requirements may be defined by further additional instructions:

- the coating thickness needed or the final coating thickness machined;
- the spray material to be used;

- the surface condition;
- post-treatments of coating;
- a technical specification that defines the requirements necessary to complete the coating.

6 Position of the symbols on drawings

The complete symbol shall contain:

- the designation of the coating (outside the outline of the component);
- an arrow line;
- a reference line (continuous line) with the elementary symbol above it;
- instructions concerning the mode of coating, spraying process, coating thickness, spray material, surface condition and post-treatments, if applicable.

The arrow line and reference line form the complete reference mark. A tail (see [Figure 2](#)) can be added at the end of the reference line, to make a separate representation of bond and top coat possible.

The reference line shall preferably be drawn parallel to the bottom edge of the drawing. Or, if this is impossible, perpendicular to it.

The symbol for the thermally sprayed coating shall be indicated above the reference line (see [Figure 1](#)).



Key

- 1 designation of the coating (outside the outline of component)
- 2 arrow line
- 3 reference line
- TS thermally sprayed coating (elementary symbol)

Figure 1 — Mode of representation and elementary symbol

7 Designation of a thermally sprayed coating

Usually a designation consists of the following symbols and additional indications:

**reference to this document - elementary symbol - supplementary symbol -
symbol for process - spray material - coating thickness - post-treatment**

Spray material is designated in ISO 14232-1:2017 for powder materials and ISO 14919:2015 for wires. If no date is added to the designation, the latest edition of these standards shall be used. The following abbreviations or designations define the type of coating and specific procedures for post-treatments:

- BC bond coat
- TC top coat
- as as sprayed

| | |
|-----|--|
| f | fused |
| sm | finished |
| s | sealed |
| m/c | machined (roughness tolerances on drawing, see Clause 10) |
| X | free choice of spraying process |

NOTE The designations and abbreviations for thermal spraying are given in ISO 14917.

Example of designation 1:

ISO 12671 - TS - TC - APS - ISO 14232-1:2017 - Al₂O₃-TiO₂ 60/40 - 250 - as

or

ISO 12671 - TS - TC - X - ISO 14232-1:2017 - Al₂O₃-TiO₂ 60/40 - 250 ± 50 - as

where

| | |
|------------------|--|
| TS | is the elementary symbol: thermally sprayed coating; |
| TC | is the supplementary symbol: top coat; |
| APS | is the symbol for the spraying process: atmospheric plasma spraying; |
| ISO 14232-1:2017 | is the spray material: powder in accordance with ISO 14232-1:2017, Al ₂ O ₃ -TiO ₂ Al ₂ O ₃ -TiO ₂ 60/40 (aluminium oxide/titanium oxide content 60 % by mass/40 % by mass); |
| 250 ± 50 | is the coating thickness: 250 µm (as sprayed according to the following indication "as"); |
| as | the surface remains in the as sprayed condition, no post-treatment is indicated; |
| X | is the free choice of spraying process. |

Example of designation 2:

TS - TC - PFS - ISO 14232-1:2017 - NiCrBSi 83 10 - 350 - f+m/c

or

TS - TC - X - ISO 14232-1:2017 - NiCrBSi 83 10 - 350 - f+m/c

where

| | |
|------------------|---|
| TS | is the elementary symbol: thermally sprayed coating; |
| TC | is the supplementary symbol: top coat; |
| PFS | is the symbol for the spraying process: powder flame spraying; |
| ISO 14232-1:2017 | is the spray material: powder in accordance with ISO 14232-1:2017, NiCrBSi 83 10; |

| | |
|-------|---|
| 350 | is the coating thickness: 350 μm (after machining according to the following indications “- f+m/c”); |
| f+m/c | is fused and machined; |
| X | is the free choice of spraying process. |

8 Instructions when using a separate parts' list

This clause applies when a component is represented by one or more drawings and a separate parts' list. In such a case, the coating will be indicated on the drawing only by a position number (see [Figure 6](#)). Any instructions regarding the coating, such as the spraying process, coating thickness and its acceptable thickness deviation (especially if coatings consist of a bond and top coat), spray material, surface condition and post-treatments shall be defined in the parts' list or by indicating a specific technical instruction (see [Figure 6](#)).

9 Instructions when the use of the spray process is protected by a patent

If a coating process shall be applied but the use is protected by a patent (spraying procedure, spray material, process parameter, etc.), the trade name of this coating process may be indicated analogous to “Coating per special specification” (see [Figure 7](#)) as a supplementary symbol in the symbolic representation, or it may be defined via a position number in the pertinent parts' list (see [Figure 6](#)).

10 Representation and dimensioning

The area of a component to be coated shall be indicated by a broad dashed-dot-line outside the outline of the component on the drawing. Where necessary, the size and position of the range of coating shall be defined by means of dimensions and tolerances on the drawing.

Areas that are allowed to be coated (e.g. outside the coating range) shall be indicated by a broad dashed line outside the component's outline.

Areas that are not accepted to be coated shall not be indicated (see [Clause 11](#)).

The dimension that locates the coating in relation to the front face of the work piece shall appear on the drawing only.

The dimensions of length and/or width shall appear on the drawing only.

Whenever a post-treatment is applied, the indication of the roughness tolerances shall be mentioned corresponding to the pertinent standard on the drawing close to the dimension.

Instructions regarding coating thickness or thickness of the bond and top coat are to be indicated together with further instructions in the symbolic representation or in the parts' list. The coating thickness shall apply for the indicated condition (e.g. as = as sprayed, f = fused, m/c = machined, or in combination: f+m/c = fused and machined).

If no further instructions about acceptable deviations of coating thickness are mentioned, the general tolerances shall apply.

11 Supplementary instructions

Supplementary instructions may be necessary to define further particular characteristics by indicating them either in the symbolic representation or in a separate parts' list.

Instructions containing specific instructions for the execution of the preparation or spray procedure or thermal treatment or special sealing are preferably indicated behind the elementary symbol for the

