
**Vročje brizganje - Vročje brizgane prevleke - Simbolično prikazovanje na risbah
(ISO/DIS 12671:2019)**

Thermal spraying - Thermally sprayed coatings - Symbolic representation on drawings
(ISO/DIS 12671:2019)

Thermisches Spritzen - Thermisch gespritzte Schichten - Symbolische Darstellung in
Zeichnungen (ISO/DIS 12671:2019)

Projection thermique - Revêtements appliqués par projection thermique - Représentation
symbolique sur les dessins (ISO/DIS 12671:2019)

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ICS:

| | | |
|-----------|--|--|
| 01.080.30 | Grafični simboli za uporabo v risbah, diagramih, načrtih, zemljevidih v strojništvu in gradbeništvu ter v ustrezni tehnični proizvodni dokumentaciji | Graphical symbols for use on mechanical engineering and construction drawings, diagrams, plans, maps and in relevant technical product documentation |
| 25.220.20 | Površinska obdelava | Surface treatment |

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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

ICS: 01.080.30; 25.220.20

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ISO/DIS 12671:2019(E)**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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 12671 was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*.

This second edition cancels and replaces the first edition (ISO 12671:2012), which has been technically revised.

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Thermal spraying - Thermally sprayed coatings - Symbolic representation on drawings

1 Scope

This International Standard specifies how the symbolic representation of thermally sprayed coatings has to be indicated on drawings.

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 14232-1:2017, *Thermal spraying — Powders — Part 1: Characterization and technical supply conditions*

ISO 14919:2015, *Thermal spraying — Wires, rods and cords for flame and arc spraying — Classification — Technical supply conditions*

3 General

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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 may be built up by several dissimilar coatings one upon another.

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The symbolic representation shall give clearly all 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](#)).

4 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, respectively;
- the spray material to be used;
- surface condition;
- post-treatments of coating;

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- a technical specification, which defines requirements necessary to complete the coating.

5 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, 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

6 Designation of a thermally sprayed coating

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

elementary symbol – supplementary symbol – symbol for process – spray material – coating thickness – post-treatment

The following abbreviations or designations, respectively, define the type of coating and specific procedures for post-treatments:

| | |
|-----|---|
| BC | Bond coat |
| TC | Top coat |
| as | As sprayed |
| f | Fused |
| sm | Linished |
| s | Sealed |
| m/c | Machined (roughness tolerances on drawing, see Clause 9) |
| X | Free choice of spraying process |

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

Example of designation 1:

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

or

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 spraying process: atmospheric plasma spraying; |
| ISO 14232-1:2017 Al ₂ O ₃ -TiO ₂ 60/40 | is the spray material: powder according to ISO 14232-1:2017, Al ₂ O ₃ -TiO ₂ , aluminium oxide/titanium oxide content 60%/40 %); |
| 250 ± 50 | is the coating thickness: 250 µm; |
| As | as sprayed according to the following indication “– as”; surface remains in the as sprayed condition, no post-treatment indicated; |
| X | 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 spraying process: powder flame spraying; |
| ISO 14232-1:2017 83 10 | is the spray material: powder according to ISO 14232-1:2017, NiCrBSi 83 10; |
| 350 | is the coating thickness: 350 µm (after machining according to following indications “– f+m/c”); |
| f+m/c | fused and machined; |
| X | free choice of spraying process. |

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7 Instruction when using a separate parts list

This instruction 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 spraying process, coating thickness and its acceptable thickness deviation (especially if coatings consist of bond and top coat), spray material, surface condition, and post-treatments are to be defined in the parts list or by indicating a specific technical instruction (see [Figure 6](#)).

8 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](#)).

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

Areas, which are not accepted to be coated, are not indicated (see [Clause 10](#)).

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 bond and top coat, respectively, 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.

10 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 execution of the preparation or spray procedure or thermal treatment or special sealing are preferably indicated behind the elementary symbol for the thermally sprayed coating with the pertinent specification number, or they will be indicated by their position number in the parts list (see [Figure 7](#) and [Table 1](#)).

For workshop drawings only, a remark for applying masking may be given by a specific sign on areas which are not allowed to be coated (see [Figure 5](#)).

A remark, restricting the acceptable deviations from the nominal thickness, shall be added to the coating thickness, either on the drawing or in the parts list or an individual specification.