INTERNATIONAL STANDARD

ISO 14922-1

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Thermal spraying — Quality requirements of thermally sprayed structures —

Part 1: Guidance for selection and use

Projection thermique — Exigences qualité des constructions obtenues par projection thermique —

Partie 1: Lignes directrices pour leur sélection et utilisation

Reference number
ISO 14922-1:1999(E)

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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

Attention is drawn to the possibility that some of the elements of this part of ISO 14922 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 14922-1 was prepared by the European Committee for Standardization (CEN) in collaboration with ISO Technical Committee TC 107, *Metallic and other inorganic coatings*, Subcommittee SC 5, *Thermal spraying*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this standard, read "...this European Standard..." to mean "...this International Standard...".

ISO 14922 consists of the following parts, under the general title *Thermal spraying — Quality requirements of thermally sprayed structures*:

— *Part 1: Guidance for selection and use*

— *Part 2: Comprehensive quality requirements*

— *Part 3: Standard quality requirements*

— *Part 4: Elementary quality requirements*

Annexes A and B of this part of ISO 14922 are for information only.

Contents

Foreword

The text of EN ISO 14922-1:1999 has been prepared by Technical Committee CEN/TC 240 "Thermal spraying and thermally sprayed coatings", the secretariat of which is held by DIN**,** in collaboration with Technical Committee ISO/TC 107 "Metallic and other inorganic coatings".

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of an identical text or by endorsement, at the latest by December 1999, and conflicting national standards shall be withdrawn at the latest by December 1999**.**

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

Introduction

Thermal spraying processes are widely applied for producing industrial products. Thermal spraying has become increasingly important in parts of industrial application, manufacturing, maintenance and repair. It is applied on constructions in automotive industry, aerospace gasturbines, machinery construction, printing industry, chemical industry for anticorrosive purposes, antiwear, high temperature protection and against chemical attack, to mention some of the applications.

Consequently the thermal spraying process has a great influence on the production costs and completion of the product. Therefore it is important to apply the thermal spraying process in an effective way and to carry out quality management and assurance on any point of the production.

In the standard EN ISO 9000 and series for quality management systems for instance, the processes for protecting surfaces are pointed out as special processes, because most of the processes for surface protection cannot be NDT-controlled during the production in that way to garanty that the required standard of quality has been fulfilled.

Quality cannot be put into a product by testing afterwards, but it has to be created in it by quality assurance during its manufacturing. Even the most developed and complete nondestructive testing procedures do not improve the quality of a thermal sprayed coating afterwards, they only give records upon its quality.

To use the thermal sprayed coating adequatedly and to avoid severe problems during the production and during operational time, controlling and supervising are necessary including the phases of construction, the choise of material, the production and the succeeding testing procedures.

To assure perfect thermal spraying manufacturing and to recognize sources of possible problems, the manufacturer's management has to introduce an adequate quality management.

1 Scope

This standard specifies guidelines to describe thermal spraying quality requirements suitable for application by the manufacturers using the thermal spraying process for coating new parts, for repair and maintenance. They are structured in the way that they can be used for any type of construction to be sprayed. These guidelines relate only to those aspects of the quality of the final construction to be sprayed which may be influenced by thermal spraying and allied processes (pre- and posttreatment, etc.).

The guidelines define various approaches to quality requirements for thermal spray works, both in workshops and on sites and to provide guidance for describing the capability of a manufacturer on producing thermally sprayed structures of the specified quality. They also can be used by any interested party as a basis for assessing a manufacturer's thermal spraying quality arrangements.

The guidelines are intended as a guide for the preparation of regulatory or contractual requirements and for a manufacturer's management to define the thermal spraying requirements for quality system related to the type of thermally sprayed construction. The guidelines are not structured to be used in isolation as a part of any regulatory contractual or managerial requirement.

These guidelines are intended to be used for the following purposes:

a) providing interpretation of the requirements in the EN ISO 9000 series of standards, as a guideline for specification and establishment of the part of the quality system related to control of thermal spraying as a "Special Process";

b) providing guidelines to establish specifications and thermal spraying quality requirements, where a quality system according to EN ISO 9001 and EN ISO 9002 is not involved;

c) assessment of the thermal spraying quality requirements mentioned in a) and b) above.

The application of this standard would typically occur in the following circumstances:

– in contractual situation: specification of thermal spraying requirements for quality systems;

– by manufacturers: establishment and maintenance of thermal spraying quality requirements;

– by committees preparing structural codes or other application standards: specification of thermal spraying requirements;

– by interested parties, e.g. third parties, customers or manufacturers management: assessment of thermal spraying requirements.

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 ISO 9000-1
Quality management and quality assurance standards – Part 1: Guidelines for selection and use (ISO 9000-1 : 1994)

EN ISO 9001
Quality systems – Model for quality assurance in design/development, production, installation and servicing (ISO 9001 : 1994)

EN ISO 9002
Quality systems – Model for quality assurance in production, installation and servicing (ISO 9002 : 1994)

EN ISO 14922-2
Thermal spraying – Quality requirements of thermally sprayed structures – Part 2: Comprehensive quality requirements

EN ISO 14922-3
Thermal spraying – Quality requirements of thermally sprayed structures – Part 3: Standard quality requirements

EN ISO 14922-4
Thermal spraying – Quality requirements of thermally sprayed structures – Part 4: Elementary quality requirements

ISO 8402 : 1994
Quality management and quality assurance – Vocabularity

3 Definitions

For the purpose of this standard the following definitions shall apply:

3.1 contract (for thermal spraying): Agreed requirements for constructions to be sprayed or for the coating ordered by the customer, or manufacturer's basic specification for constructions manufactured in series for several customers, unknown to the manufacturer at the time of design and production.

The contract is, in both cases, assumed to include reference to all relevant regulatory requirements.

NOTE: The role of an independent body is considered to be a matter which is determined by the contracting parties and/or the application standard.

3.2 special process: Processes the results of which cannot be fully verified by subsequent inspection and testing of the product and where, for example, processing deficiencies may become apparent only after the product is in use. Accordingly, continuous monitoring and/or compliance with documented procedures is required to ensure that the specified requirements are met (see 4.9 of EN ISO 9001: 1994).

3.3 manufacturing organisation: Organization of which the thermal spraying workshops and/or sites are under the same technical and quality management.

3.4 qualified person (for thermal spraying): A person whose competence and knowledge has been obtained by education, by training and/or relevant practical experience.

3.5 construction (for thermal spraying): Synonym for product, structure or any other thermally sprayed system.

3.6 quality management system:

According to ISO 8402.

4 Selection of quality requirements for thermal spraying

By using this standard it is possible to select the thermal spraying quality requirements, to suit the type of thermally sprayed constructions concerned, in accordance with the following parts as appropriate:

– Quality requirements of thermally sprayed structures – Part 2: Comprehensive quality requirements (EN ISO 14922-2);

– Quality requirements of thermally sprayed structures – Part 3: Standard quality requirements (EN ISO 14922-3);

– Quality requirements of thermally sprayed structures – Part 4: Elementary quality requirements (EN ISO 14922-4).

Guidance in the selection is shown in table 1. Annex A and Annex B also give further information on the selection and content of Part 2, 3 and 4.

5 Requirements for quality assurance systems

Control and testing are means to avoid the on site application of constructions of insufficient quality. The establishment of a quality assurance system is one precondition to have a productive manufacturing, assure the right in time completion of components or constructions without unforseen time delays, repairs or other additional measures.

The installation of an effective quality assurance system is initially expensive, but in the future it garantees high quality to a reasonable cost. Generally, a manufacturer installs one quality system and chooses contracts and constructions, that corrospond to his quality assurance system.

Suitable standards are listed in clause 4 that are the basis for the installation and defintion of a quality assurance system for thermal spraying.

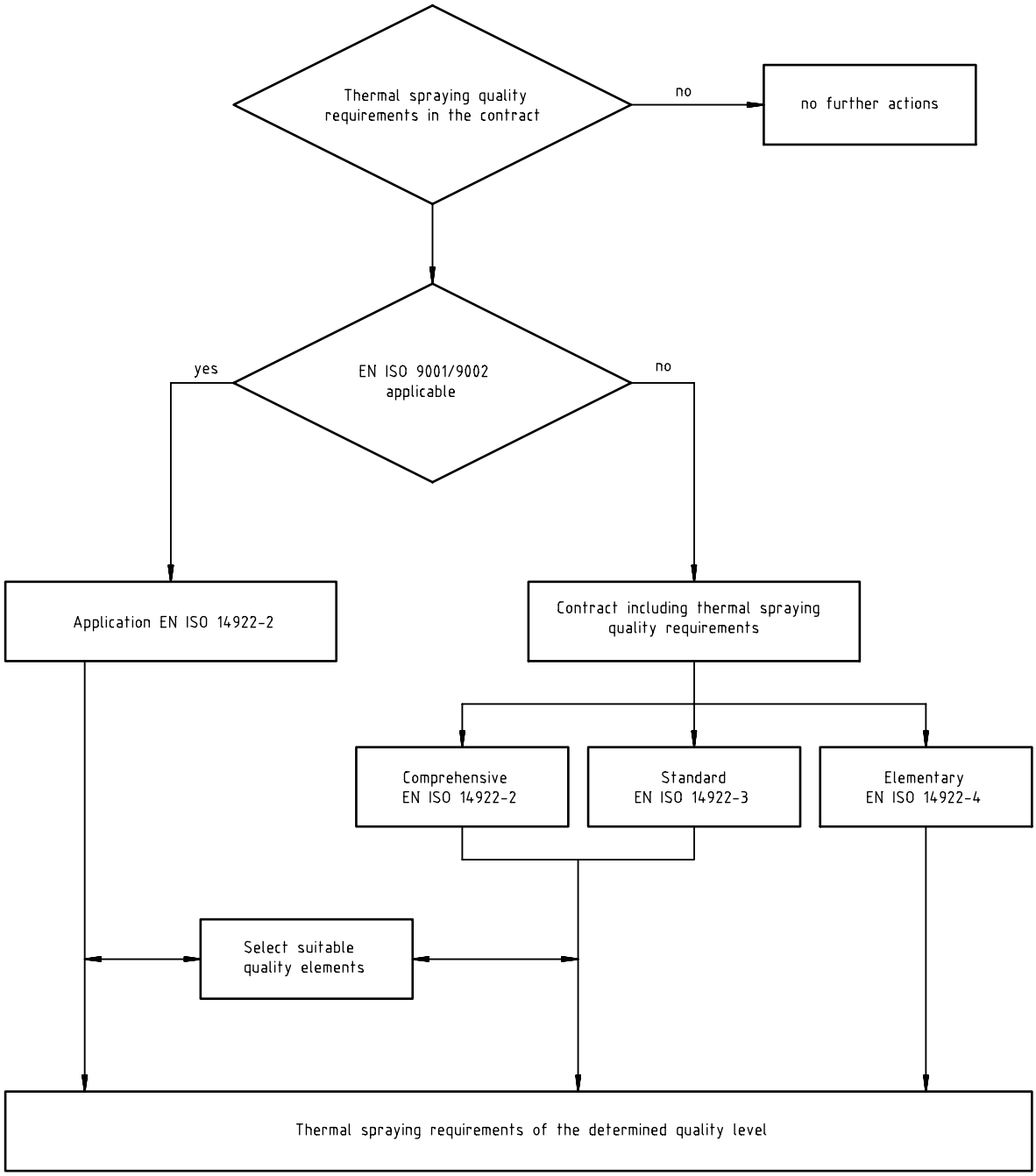
These standards can be helping means to facilitate the technological development.

Table 1: Selection of thermal spraying quality requirement

Contract thermal spraying requirements	Quality requirements	
	If a quality system[1]) according to EN ISO 9001 or EN ISO 9002 is required, use	If a quality system according to EN ISO 9001 or EN ISO 9002 is not required, use
comprehensive quality requirements	EN ISO 14922-2[1])	EN ISO 14922-2
standard quality requirements	EN ISO 14922-2[1])	EN ISO 14922-3
elementary quality requirements	EN ISO 14922-2[1])	EN ISO 14922-4
[1]) Within the scope of EN ISO 9001 and 9002, the requirements of EN ISO 14922-2 may be minimized to an appropriate level to suit the type of sprayed construction.		

Annex A (informative)

Flow diagram for selection of thermal spraying quality requirements



Annex B (informative)

Summary comparison of thermal spraying quality requirements

with regard to EN ISO 14922-2, -3 and -4

Quality requirements	Part 2	Part 3	Part 4
Contract review	●	φ	O
Design review	●	φ	O
Sub-contractor	●	φ	O
Thermal sprayer	●	●	O
Thermal spraying coordination	●	●	O
Inspection personnel	●	●	O
Production equipment	●	●	O
Description of the equipment	●	●	–
Suitability of the equipment	●	●	–
New equipment	●	–	–
Maintenance of the equipment	●	φ	–
Health and environmental aspects	●	●	●
Production plan	●	O	–
Thermal spraying procedure specification	●	φ	O
Work instruction	●	O	–
Pre- and post-treatment	●	●	–
Documentation	●	O	–
Batch testing of consumables	●	–	–
Storage and handling of thermal spraying consumables	●	●	●
Storage and handling of substrate materials	●	●	O
Inspection and testing before thermal spraying	●	●	O
Inspection and testing during thermal spraying	●	●	–
Inspection and testing after thermal spraying	●	●	O
Inspection and test status	●	●	–
Non-conformance and corrective activities	●	●	O
Calibration	●	●	O
Identification and traceability	●	●	O
Quality records	●	●	O

●	full requirements
φ	less requirements than in Part 2
O	minimum requirements
–	not specified

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