
**Vročje brizganje - Varnostne zahteve za opremo za vroče brizganje - 3. del:
Gorilniki za vroče brizganje, njihove povezave in oskrbovalne enote**

Thermal spraying - Safety requirements for thermal spraying equipment - Part 3: Torches for thermal spraying and their connection and supply units

Thermisches Spritzen - Sicherheitsanforderungen für Einrichtungen für das thermische Spritzen - Teil 3: Brenner und Spritzpistolen und ihre Anschlüsse und Stromquellen

Projection thermique - Exigences de sécurité relatives au matériel de projection thermique - Partie 3 : Chalumeaux de projection thermique et leurs unités de raccordement et d'alimentation

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English Version

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Foreword

This document (CEN/TR 15339-3:2014) has been prepared by Technical Committee CEN/TC 240 "Thermal spraying and thermally sprayed coatings", the secretariat of which is held by DIN.

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CEN/TR 15339, *Thermal spraying - Safety requirements for thermal spraying equipment* is composed of the following parts:

- *Part 1: General requirements*
- *Part 2: Gas control units* (published as a European Standard)
- *Part 3: Torches for thermal spraying and their connection and supply units*
- *Part 4: Gas and liquid fuel supply*
- *Part 5: Powder and wire feed units*
- *Part 6: Spray booth, Handling system, Dust collection, Exhaust system, Filter*

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CEN/TR 15339-3:2014 (E)**1 Scope**

This Technical Report specifies safety requirements of equipment for thermal spraying, in this case of spray torches, gas hoses, hose assemblies and their electrical and water junctions in junction and monitoring boxes and power sources.

Equipment and storage for gas and liquid fuel supply are presented in CEN/TR 15339-4.

This document should be used in conjunction with CEN/TR 15339-1, which deals with general aspects of designing, manufacture, and/or putting into service of machines or equipment and with the responsibility to issue the CE Conformity Declaration.

Spraying equipment for specific thermal spraying processes, induction plasma spraying, water stabilized plasma spraying and plasma spraying in chambers (below or above atmospheric pressure) are not within the scope of this Technical Report.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 657, *Thermal spraying — Terminology, classification*

EN 1256, *Gas welding equipment — Specification for hose assemblies for equipment for welding, cutting and allied processes*

CEN/TR 15339-1, *Thermal spraying — Safety requirements for thermal spraying equipment — Part 1: General requirements*

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CEN/TR 15339-6, *Thermal spraying — Safety requirements for thermal spraying equipment — Part 6: Spray booth, Handling system, Dust collection, Exhaust system, Filter*

EN 60974-1, *Arc welding equipment — Part 1: Welding power sources (IEC 60974-1)*

EN 60974-3, *Arc welding equipment — Part 3: Arc striking and stabilizing devices (IEC 60974-3)*

EN 60974-7, *Arc welding equipment — Part 7: Torches (IEC 60974-7)*

EN 60974-10, *Arc welding equipment — Part 10: Electromagnetic compatibility (EMC) requirements (IEC 60974-10)*

EN ISO 3821, *Gas welding equipment — Rubber hoses for welding, cutting and allied processes (ISO 3821)*

3 Function of thermal spraying equipment**3.1 General**

Thermal spray processes and spray torches are described and schematically represented in EN 657.

Thermal spray processes use flammable gases for flame-, plasma- or HVOF (high velocity oxygen fuel) spraying, which create significant potential hazards. Pure oxygen shall also be considered a dangerous gas, because relatively non-flammable material will burn in the presence of a certain concentration of oxygen.

Electrical devices are common sources for igniting an explosive atmosphere. Only spraying equipment which is suitable for the rated zone shall be operated.

NOTE See Directive 94/9/EC [1].

Operation of thermal spraying equipment in the rated zone 0 shall be avoided in any case.

3.2 Safety related features of the spray torches and their connections

3.2.1 Spray torches for flame and HVOF spraying

The following items shall be considered:

- supply of fuel gas or liquid fuel;
- supply of oxygen and/or air for combustion, acceleration or part cooling;
- combustion of fuel gas or liquid fuel with oxygen or air;
- powder injection or wire supply;
- molten spray particles in the spray jet;
- transport and distribution of cooling media.

3.2.2 Spray torches for cold spraying

The following items shall be considered:

- supply of hot process gas;
- powder injection;
- heating and acceleration of the spray particles in the spray jet.

3.2.3 Spray torches for arc spraying

The following items shall be considered:

- power supply;
- wire supply;
- supply of process gas for acceleration the spray jet.

3.2.4 Spray torches for plasma spraying

The following items shall be considered:

- power supply via water or air cooled cables to the torch;
- supply of plasma gas or other gases;
- igniting the arc and the plasma;
- powder supply and injection;
- spray particles in the spray jet;
- transport and distribution of cooling media.

CEN/TR 15339-3:2014 (E)**3.3 Safety related features of the ignition unit**

The following items shall be considered:

- energy transfer from power source to the torch via a water cooled cable;
- transport and distribution of cooling media to the torch and back to the heat exchanger.

3.4 Safety related features of the power source

The following items shall be considered:

- electrical connection between mains power supply and the power source;
- electrical connection between the power source and the ignition unit or the spray system;
- fusing;
- cooling.

4 Potential hazards**4.1 General**

For a safe operation of the entire spray system, the following hazards shall be considered for normal operation or foreseeable abnormal circumstances.

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4.2 Flame and HVOF spraying

The following items shall be considered:

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- flashback;
- fire risk due to leaks in the torch or the connections;
- explosive gas mixtures in the torch and the environment, if the fuel gas did not ignite;
- escape of gas or liquid under excessive pressure;
- impairment of the environment due to the escape of gases like acetylene, propane, carbon dioxide (CO₂) and/or liquids like cooling media, hot water, liquid fuel;
- increased fire risk due to escape of oxygen;
- back flow of gas into the powder supply hose and the powder feed unit;
- insufficient distance to gas cylinders or bundles;
- electrostatic charging in the powder supply hose;
- excessive torch surface temperature.

4.3 Cold spraying

The following items shall be considered:

- escape of gas under excessive pressure;
- escape of hot process gas under excessive pressure;
- escape of powder under excessive pressure;
- electrical connections and the heating system;
- excessive torch surface temperature;
- impairment of the environment due to escape of gases and/or liquids, e.g. cooling water.

4.4 Arc spraying

The following items shall be considered:

- damages of the insulation on cables;
- electrical connections;
- excessive torch surface temperature.

4.5 Plasma spraying

The following items shall be considered:

- high voltage and/or high frequency during the ignition;
- excessive fluctuations for current and voltage;
- escape of gas or cooling water under excessive pressure;
- damages to the insulation on cables;
- excessive torch surface temperature;
- electrostatic charging in the powder supply hose;
- impairment of the environment due to escape of gases and/or liquids, e.g. cooling water.

5 Safety requirements – Protection measures

5.1 General safety requirements and measures

According to the type of spraying torch and whether it is operated in a manual, mechanised or automatic manner, spraying process specific safety requirements are to be considered and protection measures are to be carried out both for normal circumstances and foreseeable abnormal circumstances.

It shall be possible to start and stop the operation of the spraying process (spray torch and powder feeder) from the control unit for mechanised or automatic processes and at the torch or by a remote control for manual operation. The remote control should contain an emergency stop function.