



# SLOVENSKI STANDARD

## SIST HD 427 S1:2000

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### Specific safety rules for the installation of equipment for electric arc welding and allied processes

Specific safety rules for the installation of equipment for electric arc welding and allied processes

Besondere Sicherheitsbestimmungen für die Errichtung von Einrichtungen zum Lichtbogenschweißen und für verwandte Verfahren

Règles particulières de sécurité concernant l'installation des équipements pour soudage électrique à l'arc et techniques connexes

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Ta slovenski standard je istoveten z: **HD 427 S1:1981**

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#### **ICS:**

25.160.30      Varilna oprema      Welding equipment

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installation of welding equipments**SPECIFIC SAFETY RULES FOR THE INSTALLATION OF EQUIPMENT  
FOR ELECTRIC ARC WELDING AND ALLIED PROCESSES**Règles particulières de sécurité  
concernant l'installation des  
équipements pour soudage électrique  
à l'arc et techniques connexesBesondere Sicherheitsbestimmungen  
für die Errichtung von Einrichtungen  
zum Lichtbogenschweißen und für  
verwandte Verfahren**iTeh STANDARD PREVIEW  
(standards.iteh.ai)**The Harmonization Document consists of the text prepared by  
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All texts prepared by CENELEC exist in three official versions (English,  
French and German).According to the CENELEC Internal Regulations the CENELEC member National  
Committees are bound to announce the existence of this Harmonization Document  
at national level

by or before: 1st January 1982

and to withdraw all conflicting national standards

by or before: 1st October 1982

and to bring any new national standards into line with this HD.

Harmonized national standards are listed on the HD information sheet,  
which is available from the CENELEC National Committees or from the  
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P R E F A C E

In order to achieve the highest possible degree of safety and the most satisfactory operation of electrical equipment and installations, different harmonization documents regulating design, construction and installation have been already drawn up. In general, the rules contained in those documents apply to equipment for electric arc welding. However, due to the special nature of electric arc welding deviations from the rules are sometimes necessary. The purpose of this document is to specify these deviations and the corresponding compensatory measures to be applied.

The present document is of a general nature. It forms one of a proposed group of harmonization documents which also includes the following :

- a) HD 24 : No-load voltage of arc welding equipment.
- b) HD 362 : Safety rules for the construction of equipment for electric arc welding and allied processes.
- c) HD 407 : Safety rules for the use of equipment for electric arc welding and allied processes.

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1. SCOPE

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This harmonization document complements the rules of document HD 384.4.41. "Electrical installation of buildings. 4th part. Protection for safety. Chapter 41 : Protection against electric shock". It specifies the safety rules specific to the installation of equipment for electric arc welding and allied processes. It applies to equipment for industrial and professional use.

Special rules, which are in the course of preparation, will apply to the installation of electric arc welding equipment carried out in environments with increased risk of electric shock, to equipment for use by layman, to special electric arc welding processes (e.g. plasma) and to underwater welding.

2. DEFINITIONS

2.1. Welding circuit

All electrically conductive material, including the arc, through which the welding current is intended to flow.

Note : In certain processes, the welding arc may be established between two electrodes. In such a case the work pieces are not necessarily a part of the welding circuit.

2.2. Exposed conductive part (quoted from CENELEC HD 384.4.41.)

A conductive part which can be touched easily and which is not live normally but may become live under fault conditions.

2.3. Extraneous conductive parts (quoted from CENELEC HD 384.4.41:)

A conductive part not forming part of electrical installation.

Note : Electrical installation includes the welding circuit.

2.4. Work piece

Metal piece or pieces on which welding or allied processes are being performed.

2.5. Equipotential bonding (quoted from CENELEC HD 384.4.41.)

Special electrical connections intended to keep exposed conductive parts or extraneous conductive parts at the same or approximately the same potential.

2.6. Mobile (or moveable) welding equipments

Equipments (e.g. power sources, wire feed units, torches, etc.) which are not connected to the electrical supply by fixed wiring and which can easily be moved without using separate lifting means.

2.7. Fixed welding equipments

Equipment which are connected to the electrical supply by fixed wiring and which cannot easily be moved from one place to another.

3. GENERAL RULES

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Equipment used in electric arc welding installation shall be intended for the purpose and be built according to the relevant construction standards. In particular they shall conform to the harmonization document HD 362 : "Safety rules for the construction of equipment for electric arc welding and allied processes"

The installation shall be executed in such a way as to minimize the electric shock risk that may be due to voltages higher than the permissible no-load voltage which necessarily occurs at the welding electrodes and care shall be taken to minimize the risks due to the no-load voltage. (See item 4.4.6 and note item 4.4.7.).

4. ELECTRIC CIRCUITS4.1. Welding circuit

The electrical connection between the welding equipment and the work piece shall be made as direct as possible by means of an insulated welding return conductor having an adequate current carrying capacity (according item 4.4.1.) and without using extraneous conductive parts such as rails, pipes, frames, etc. as part of the welding return circuit, unless they constitute the work piece itself.

The return conductor clamp shall be as near as possible to the welding point.

The welding circuit shall not be intentionally in direct or indirect contact with the earth lead at any points other than the work piece itself. Precautions shall be taken to minimize the risk of unintentional contact with the earth lead.

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#### 4.2. Earthing of the work piece

If the work piece is intentionally earthed the connection shall be as direct as possible by means of a conductor which has a current carrying capacity not less than that of the welding return conductor and is connected at the work piece to the same point as the return conductor using the return conductor clamp or a second clamp in its immediate vicinity.

Precautions shall be taken to avoid stray welding currents. See 4.4.2., 4.4.3. and 4.4.4.

#### 4.3. Protection measures with respect to extraneous conductive parts in the welding area

Precautions (protection by insulated screens, distance, etc.) shall be taken to avoid electrical contacts of the welding circuit with extraneous conductive part in the welding area where an electrode holder or torch may be placed, or an attempt made to strike an arc.

Where these precautions are impracticable, equipotential bonding shall be made by means of insulated conductors, having adequate cross section, between the work piece and the extraneous conductive parts.

Necessary precautions shall be taken to prevent gas cylinders in the vicinity of the work piece making contact with the welding circuit.

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#### 4.4. Requirements for welding circuits

4.4.1. The conductors of welding cables, return cables and equipotential bonding (if any) shall have cross sectional areas suitable for the welding current. These conductors may be :

- a) extra flexible and insulated conductors which shall comply with the requirements of CENELEC Harmonization Document HD... (under study) ;
- b) flexible and insulated conductors which shall comply with the requirements of CENELEC Harmonization Document HD... (under study) ;
- c) bare conductors which shall be permanently supported by insulators and protected against accidental contact either by location or by means of suitable guards.

4.4.2. Connection of welding return cable and equipotential bonding (if any) to the work piece shall be ensured by the use of devices having suitable means for cable connection, a fastening system not liable to come loose accidentally, and good electrical contact. When using magnetic devices, care shall be taken to ensure that the contact surfaces of work piece and device are clean.

4.4.3. Connectors and terminals shall be so designed and connected that they cannot be unintentionally disconnected or work loose.

Connection devices for non-stationary flexible welding and return cables shall :

- a) have an adequate covering of insulating material to prevent inadvertent contact with live parts, when connected (with the exception of the return current clamp at the work piece itself).;
- b) be suitable for the sizes of cable used and the welding current ;
- c) be effectively connected to the cables and in good electrical contact with the

- 4.4.4. If the workpieces are on a welding bench, return cable and equipotential bonding may be connected to the bench.
- 4.4.5. All the connections in the welding circuit shall be made before the power source is switched on. The power source shall be switched off before any modification of the welding circuit, except in the case of changing electrodes and in circumstances where connection or disconnection of the welding circuit (or circuits) of multi-operator equipment is carried out. In this case, appropriate safety precautions shall be taken to minimize risk to personnel and equipment.
- 4.4.6. When installing three phase a.c. multi-operator power source equipment, the installer shall, as far as possible separate the operators supplied from one transformer output line from the operators supplied from the other two output lines in order to minimize the electric shock risk at output line to line voltage.
- 4.4.7. When installing a.c. single phase power sources, in order to balance the total line current, it is normal to connect them to different pairs of lines of the three phase supply. In order to minimize the electric shock risk at a voltage up to twice the normal no-load voltage, the operators using a.c. power sources connected to different supply lines shall work as far apart as possible, preferably out of normal reach of each other.

- 4.4.8. In the following cases:

- equipment with external auxiliaries having electrical connections to the welding circuit, such as control and regulating devices, arc initiation devices,

- installation consisting of interconnected equipments,

the installation shall be arranged in such a way that under all normal circumstances the safety rules shall be observed, especially when connecting and disconnecting the equipment. If the safety rules cannot be observed the circuit concerned shall be completely switched off before connecting or disconnecting the equipment.

The resulting voltage of the power source with auxiliary equipment shall not exceed the permissible no-load voltage. This restriction does not prevent the use of safe arc ignition device.

Note for 4.4.7. - 4.4.8

When several operators are welding on the same work piece, using several power sources, the resulting voltage between two electrode holders or torches may be twice the value of the no-load voltage of one power source. The operators shall be informed about the danger.

When using alternating current, the danger can usually be avoided by using a suitable connection. See annex.

- 4.4.9. When the supply voltage is greater than 1000 V, only fixed power source shall be installed.



Annexe / Annex / Anhang

Tension entre porte-électrodes ou torches pour différents raccordement de transformateurs monophasés pour souder sur une même pièce ou de pièces interconnectées.

Voltage between electrode holders or torches for several cases of installation of single phase transformers for welding on the same workpiece or interconnected workpieces.

Spannung zwischen Stabelektrodenhaltern oder Schweißbrennern bei verschiedenen Fällen des Anschlusses von einphasigen Transformatoren zum Lichtbogenschweißen an einem Werkstück oder an miteinander verbundenen Werkstücken.

Ces quelques exemples ont pour but de montrer l'influence du couplage de transformateurs sur la tension à vide entre deux porte-électrodes ou torches.

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The aim of these examples is to show the influence of the connection of transformers on the no-load voltage between two electrode holders or torches.

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Diese Beispiele zeigen den Einfluß des Anschlusses von Transformatoren auf die Leerlaufspannung zwischen zwei Stabelektrodenhaltern oder Schweißbrennern.



Schéma Diagram Schaltbild	Diagramme des tensions Voltage diagram Spannungsdiagramm	Tension entre porte-électrode ou torches Voltage between electrode holders or torches Spannung zwischen Stabelektroden-Haltern oder Schweißbrennern		
		1 - 2	2 - 3	1 - 3

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$b_1 b_2 = 0$

$a_1 b_2 = 2u_0$

$a_1 b_2 = 2u_0$

$b_1 b_2 = 2u_0$

$a_1 b_2 = 0$