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# MODULE R

# Safety in resistance welding

Welding protection electrocution



## Welding electrocution

- ▶ §7 (1) Is of electrical conductors are placed on the non-flammable insulating substrate.
- ▶ §7 (2) Replacing the electric wires and welding the terminals other than those specified or approved leads and terminals (e.g. various metal objects, parts, constructions, chains, ropes) is not permitted.
- ▶ §7 (3) The arc welding in a hazardous area with subsequent fire, the electrical power sources are placed outside this environment, unless the manufacturer or importer possible otherwise.
- ▶ § 7 (4) In the arc welding electrode holder with delay in order to prevent accidental arcing and splashing molten metal.

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## Welding electrocution

- §7 (5) Butts electrodes are deposited on a designated safe place (e.g. into a fireproof container with sand).
- §7 (6) The welded item must be provided so that when an electric current passes through the welding other than the designated routes and for other than the designated subjects. These paths and objects should be determined so as to avoid the possibility of fire.
- §7 (7) After the welding the welding device must be disconnected from the power supply.

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## Welding work according to CSN 05 0600 and Decree 87/2000 Coll.

- ▶ Section 5 Welding work
- ▶ Section 5 (1) Welding work intended for welding project documentation is considered stable welding work; others are considered temporary welding work.
- ▶ Section 5 (2) Welding work is secure so as to avoid especially
  - a) Formation fire or explosion followed by fire and fire spread.
  - b) Creation obstacles that impede or prevent the escape of persons.
  - c) Threat lives and health of people the fundamental and specific risks.
- ▶ These requirements also apply to adjacent spaces.

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## Welding work

- ▶ §5 (3) Parts and materials of the welding work are deployed so as to retain the possibility of free passage and confined and avoid collision points. Welding equipment to ensure, so as to prevent movement or the movement of their parts, and the damage that would lead to the emergence or spread of fire or explosion followed by a fire with a possible aggravation of the conditions for the escape of persons.
- ▶ §5 (4) The weld material is deposited on the work so as to prevent movement or moving parts, the system which may cause damage to the welding device, in particular damage to moving parts of the conductors and electrical welding equipment, gas piping, hoses, damage could lead to the emergence or spread of fire or explosion and the subsequent fire.

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## Welding work

- ▶ Section 5 (5) Transitional welding workplaces are equipped with appropriate fire extinguishers and other extinguishing agents under special legislation. Besides these extinguishers are still fitted with at least two portable fire extinguishers with a suitable filling, of which one portable fire extinguisher powder extinguishing agent with a weight of 5 kg. In the case of welding in the flat with respect to the type of welding, unless they are directly threatened by the other areas is minimal equipment one portable fire extinguisher powder extinguishing agents, weighing less than 5 kg.

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## Welding work

- Section 5 (6) Of fixed welding workstations can not save or store flammable and combustible supporting substances unless they are part of the technology. In the event that such matters in the technology necessary to determine the fire safety measures to prevent the possibility of occurrence and spread of fire or explosion followed by fire and ensure the containment and evacuation.
- Section 5 (7) Commands and prohibitions, or other important information on the welding workplace and on devices characterized by safety markings. Warning and table specifying the type and quantity of gas cylinders are placed also at the entrance to the facility where they are placed.

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## Welding work

- ▶ Section 5 (8) When welding in areas from 2 m height over the places to be protected from the effects of these works, in terms of fire protection department provides protection zones. The band lays down the minimum distance from which prior to the commencement of welding remove flammable materials and ensure their safe isolation, or to implement other effective measures, especially against the effects of hot particles. Protective zones in terms of fire protection set individually with regard to the technology used and the welding process so that the center of the protection zone is always the point of welding minimum is determined by a circle with a radius of 10 m in the horizontal plane. When welding at altitudes in excess of 2 m for each additional 1 m in height extending protection zone of at least 0.3 m to 7 m in height; for each additional 1 m in height extending guard band of 0.1 m up to 20 m. These increments are added to the radius. Protective zones for welding performed at heights exceeding 20 m are set individually. When applying the technology using compressed gas (e.g. oxygen cutting) and the interaction of the airflow with the air velocity exceeding 1 m.sec<sup>-1</sup> protection distance extending into the area defined by an ellipse and a distance of 20 m according to an individual assessment of the fire hazard.

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## Welding work

- §5 (9) Fixed welding workplaces with a distinct demarcation method characterized
  - a) Fire safe distance, if the definition provided in the device documentation, or
  - b) Protection band.
- §5 (10) Current leads and gas distribution tube for welding device are passed and stored so as to avoid damage sharp folds, the material, grease, chemicals, the effects of the welding process and the like. In case of danger of mechanical damage, the device protects the hard cover .

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## Welding work

- ▶ § 5 (11) If any part is damaged welding equipment, welding can not start or to continue.
- ▶ §5 (12) For welding with a hydraulic drive device that utilizes flammable working fluids are a possible leakage place combustible media protected housings similarly as in the presence of flammable substances.
- ▶ §5 (13) Welding machines and equipment in the space in which can cause dangerous concentrations can only be made on machines and equipment that can not be removed from the compartment. From space machinery it is necessary to remove the combustible dust, to prevent dust escaping into the space in machinery and equipment, and measure the concentration of explosive dust in the air before the start of welding and during.

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## Welding work

- §5 (14) The welding can be performed only on machines and equipment that are blocked against unwanted actuation.
- §5 (15) The replacement of fresh air supply of oxygen is unacceptable.
- §5 (16) in areas where there may be flammable gases, vapors or dusts are not placed gas cylinder for welding or acetylene, and the current source of electrical energy to the welding work. At each exit of these spaces are removed from spaces burners and gas supply hose for welding.

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## Welding work

- § 5 (17) Containers, pipes and devices, which can not reliably determine whether their contents are not dangerous fire, proceed as if the fire was dangerous.
- §5 (18) There is a risk withdrawal of the welding wire or hoses attach these to the fixed structure or to any other suitable solid device.
- § 5 (19) As subscription welding more persons determined to advance the way of mutual communication.
- § 5 (20) Instructs the welder to turn on the power source or circuit once it is ready to begin work and took up work position.

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## Questions to ponder

1. What a standard applies to occupational safety for resistance welding?
2. What danger arises when resistance welding ferrous metals?
3. When can cause electric shock when the resistance welding?
4. What personal protective equipment welder?



## Recommended literature and information sources

- ▶ AMBROŽ, O. A KOL. *Technologie svařování a zařízení: učební texty pro kurzy svářečských inženýrů a technologů*. Ostrava: ZEROSS, 2001, 395 s. Svařování. ISBN 80-85771-81-0.
- ▶ KUBÍČEK, J. DANĚK, L. KANDUS, B. *Technologie svařování a zařízení. Učební texty pro kurzy svařovacích inženýrů a technologů*. Plzeň: ŠKODA WELDING, s. r. o., 2011, 242 s.
- ▶ ČSN 05 0650. *Zváranie. Bezpečnostné ustanovenia pre odporové zváranie kovov*. Praha: Český normalizační institut, 1993. Třídící znak 050650.
- ▶ *Vyhláška Ministerstva vnitra č. 87/2000 Sb., kterou se stanoví podmínky požární bezpečnosti při svařování a nahřívání živců v tavných nádobách*. Praha: 2000. <http://multimedia.ebozrp.cz/document/get/eb2415fc20fb45e146a55d6c6e7ca9d78bff7448>