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**Safety code for painting - Technical requirements of safety
for working in confined spaces**

涂装作业安全规程 有限空间作业安全技术要求

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Safety code for painting - Technical requirements of safety for working in confined spaces

1 Scope

This standard specifies the general safety technical requirements for painting and hot work in confined spaces.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For the dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard; however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB 2893 Safety color (GB 2893-2001, neq ISO 3864:1984)

GB 2894 Safety signs (GB 2894-1996, neq ISO 3864:1984)

GB/T 3805 Extra-low voltage (ELV) - Limit values (GB/T 3805-1993, eqv IEC 1201)

GB 3836.2 Electrical apparatus for explosive gas atmospheres - Part 2: Flameproof enclosure d (GB 3836.2-2000, eqv IEC 60079-1:1990)

GB 6514-1995 Safety code for painting - Safety, ventilation and air clean-up for painting process

GB 7691-2003 Safety code for painting - Safety management general rule

GB 7692 Safety code for painting - Safety, ventilation and air clean-up for pretreatment process of painting

GB 8958 Safety regulation for working under hazardous condition of the oxygen deficiency

GB/T 11651 Code of practice for selection of personal protective equipments

GB/T 14441-1993 Safety code for painting - Terminology

GB 14444 Safety code for painting - Safety rules for spraying booth

11651.

4.1.3 Disconnect the process pipelines leading into the confined space; it is strictly prohibited to block the valves leading to the atmosphere outside the confined space.

4.1.4 The confined space must be secure to prevent rollover, rolling, falling. When the container is manufactured and must be rotated due to confined space due to process requirements, the maximum rotation speed shall be limited.

4.1.5 Liquids and solid sediments in the confined space must be removed in a timely manner, OR other appropriate media must be used for cleaning and replacement; sufficient ventilation must be maintained to discharge dangerous and harmful gases out of the confined space and cool down at the same time, until safe work environments are achieved.

4.1.6 There shall be passages that are convenient for taking first aid measures and fire escapes around the exposed surface of the confined space. Confined spaces with deeper passages must have effective communication methods.

4.1.7 When working at high altitudes in a confined space, scaffolding must be set up and firmly fixed; workers must wear safety harness and safety helmets.

4.2 Occupational safety and hygiene

4.2.1 The oxygen content in the air must be monitored on-site. Under normal pressure conditions, the oxygen content in the air in a confined space shall be 19% ~ 23%. If the oxygen content in the air is lower than 19%, there shall be an alarm signal.

4.2.2 The concentration of flammable gases on site must be monitored. The concentration of flammable gases in the air in a confined space shall be less than 10% of the flammable limit or the lower explosive limit. For the inspection and repair of cargo oil tanks, fuel oil tanks, lubricating oil tanks of ships, as well as the inspection and repair of oil tanks, the concentration of flammable gases in the air in a confined space shall be less than 1% of the lower limit of flammable limit or lower limit of explosion limit.

4.2.3 When it is necessary to enter a confined space lacking oxygen for work, the regulations of GB 8958 shall be complied with. Mechanical ventilation must be used when working to avoid acute poisoning.

4.2.4 According to the working environment and hazardous substances, effective protective equipment for the head, eyes, skin, respiratory system shall be used in accordance with GB/T 11651. If conditions permit, personal respiratory systems that have been widely used abroad can be used or remote-controlled robots can be used.

4.2.5 Personnel who enter a confined space to engage in painting works must dress in strict accordance with the requirements of GB/T 11651. The personal protective

equipment issued shall comply with the requirements of GB/T 11651. The personal protective equipment shall be kept centrally by the organization and inspected regularly, to ensure that its performance is effective.

4.2.6 When performing painting works in a confined space, mutual friction, impact, peeling between objects shall be avoided. It is not allowed to take off clothes, hats, gloves, shoes, etc. in the spray painting area.

4.3 Electrical equipment and lighting safety

4.3.1 It is strictly prohibited to use open flame lighting in confined spaces.

4.3.2 All electrical equipment and lighting facilities in the work area shall comply with the requirements of GB 3836.2, to achieve overall electrical explosion-proof.

4.3.3 Explosion-proof lighting fixtures shall be used; the voltage shall comply with the requirements of GB 3805; the illumination shall comply with the requirements of GB 50034.

4.3.4 Lighting lines introduced into a confined space must be suspended and fixed to avoid working spaces; lighting fixtures are not allowed to be suspended by wires; lighting lines shall have no connectors.

4.3.5 For temporary lighting fixtures or portable lighting fixtures, in addition to complying with the provisions of 4.3.3, the connection between the lighting fixtures and the wires shall be safe and reliable insulated heavy-duty mobile universal rubber-sheathed cables; the exposed metal parts must be well connected to the ground wire.

4.3.6 For wet storage tanks, storage tanks partially filled with liquid and the water side of the boiler, it must use batteries, extra-low voltage (12 V) or lighting systems with grounding fuses.

4.4 Safety of machinery and equipment

4.4.1 When working in a confined space, the power supply of machinery and equipment or rotating devices with rotating parts in the confined space must be cut off; warning signs must be installed.

4.4.2 If the power source of the equipment cannot be controlled, the rotating part shall be disconnected from other machine linkage equipment.

4.4.3 The high-pressure hoses for spray painting must be undamaged; all hoses must not be kinked. It is not allowed to drag or pull equipment with hoses. The metal joints of hoses must be properly wrapped with insulating tape, to avoid spark from friction with steel plates when the hoses are dragged.

4.4.4 The connector wire of the high-voltage paint spraying machine must be well

around their waists, so that external supervisors can pull him out of the confined space when necessary.

5.1.6 After the painting work is completed, the remaining paint, solvents, etc. must be cleared out of the confined space and stored in a designated safe place.

5.1.7 When carrying out painting works in a confined space, regardless of whether flammable gases or dusts are present, it is strictly prohibited to bring appliances or fires that can produce smoke, open flames, or sparks into the confined space.

5.2 Hot work safety

5.2.1 Workers must hold both a confined space work permit and a hot work permit before entering a confined space to perform hot work; work rotation and supervision measures shall be adopted.

5.2.2 When hot work is carried out in a confined space, it must arrange supervisory personnel outside the site. In case of emergency, a call for help shall be sent immediately.

5.2.3 Personnel performing hot work in a confined space with only top access must, in addition to wearing personal protective equipment, also wear a lifeline around their waists, so that external supervisory personnel can pull them out of the confined space when necessary.

5.2.4 No combustible substances are allowed to remain inside all pipelines and containers; the combustible gas concentration in the confined space must comply with the provisions of 4.2.2 before work can be performed.

5.2.5 When painting and hot work are required in a confined space or near a confined space, the hot work is generally performed first and then the painting. It is strictly prohibited to perform both works at the same time.

5.2.6 Oxygen pipes, acetylene pipes, cutting torches (cutting knives), welding guns, etc. brought into a confined space for gas cutting and welding works must be taken out of the confined space, when the workers leave, which are not allowed to remain in the confined space.

5.2.7 When performing hot work on a working surface that has been coated with primer (including workshop primer), sufficient ventilation must be maintained and harmful substances must be eliminated at any time.

5.2.8 When performing welding hot work in a confined space, the air flow and ventilation volume must be reasonably organized; effective dust collection devices must be selected, to reduce the concentration of asphyxiating gases and eliminate smoke and dust.

5.2.9 In wet conditions, welding workers are not allowed to touch the conductors of the

secondary circuit; good insulators shall be laid on the ground near the working point.

5.2.10 Welding workers shall dress in accordance with GB/T 11651 and must maintain good insulation from the parts to be welded.

6 Safety management

When working in a confined space, in addition to complying with the provisions of this standard, it shall also comply with the provisions of GB 7691.

6.1 Work safety

6.1.1 The relevant departments of the organization are responsible for work safety management. Personnel engaged in confined space works shall be issued a work permit. A confined space work permit must be issued by the person in charge of production safety.

6.1.2 To issue an work permit, the following conditions shall be met:

- a) Have trained and qualified work personnel, monitoring personnel, testing personnel, certified work personnel;
- b) Have testing instruments that have passed the inspection;
- c) Have special protective equipment and electrical lighting equipment that meet national standards and have passed inspections.

6.1.3 Personnel entering a confined space and their belongings shall be counted one by one; the time shall be recorded. After the work is completed and it is confirmed that there are no remains and no fire, it can be evacuated and close the confined space.

6.1.4 Establish a work record system for each shift and keep files.

6.2 Work approval

6.2.1 When applying for a confined space work permit, the following contents shall be reviewed:

- a) Operation procedures, work locations, work content, work methods, work personnel, work persons in charge, work guardians, work safety countermeasures for confined spaces (including possible escape routes in confined spaces and corresponding measures taken);
- b) Delimitation of warning areas and setting of warning signs in confined space places;
- c) Schematic diagram of the internal structure of a confined space (including the

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