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Technical code for the safety of stationary gas engines

固定式燃气发动机安全技术规范

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1 Scope

China's national technical code for the safety of stationary gas engines. It specifies the terms and definitions, a list of hazards and the safety requirements and measures, beginning with the starting and shutdown systems. A stationary gas engine drives a generator or a compressor on natural gas, biogas or coal mine gas, and it presents a

hazard that a diesel does not: its fuel is a gas that mixes with air on its own. A diesel engine's fuel needs to be injected and atomised before it will burn, so a leak makes a mess; a gas engine's fuel forms an explosive mixture with the air in the room the moment it escapes. That is why the code begins where it does. The starting sequence must purge the engine and its exhaust before ignition, because unburnt gas accumulated from a failed start will detonate in the exhaust when the next attempt succeeds. And the shutdown system must close the gas supply positively and independently of whatever caused the shutdown.

This Standard specifies the safety requirements and protective measures for stationary gas engines and their auxiliary equipment. This Standard applies to stationary gas engines with power greater than or equal to 500 kW (hereinafter referred to as "the engine").

2 Normative references

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

GB/T 1883.1 Reciprocating internal combustion engines - Vocabulary - Part 1. Terms for engine design and operation

GB/T 1883.2 Reciprocating internal combustion engines - Vocabulary - Part 2. Terms for engine maintenance

GB 3836.1-2010 Explosive atmospheres - Part 1. Equipment - General requirements

GB/T 4025 Basic and safety principles for man-machine interface, marking and identification - Coding principles for indicators and actuators

GB/T 4365 Electrotechnical terminology - Electromagnetic compatibility

GB/T 4556 Reciprocating internal combustion engines - Fire protection

GB/T 9239.1 Mechanical vibration - Balance quality requirements for rotors in a constant (rigid) state - Part 1. Specification and verification of balance tolerances

GB/T 10715 Belt drives - V-ribbed belts, joined V-belts and V-belts including wide section belts and hexagonal belts - Electrical conductivity of antistatic belts. Characteristics and methods of test

GB/T 15706 Safety of machinery - General principles for design - Risk assessment and risk reduction

GB/T 16754 Safety of machinery - Emergency stop - Principles for design

GB/T 17300 Earth-moving machinery - Access systems

GB/T 17804 Reciprocating internal combustion engines - Graphical symbols

GB/T 18209.1 Electrical safety of machinery - Indication, marking and actuation - Part 1.
Requirements for visual, acoustic and tactile signals

3 Terms and definitions

For the purpose of this document, the terms and definitions defined in GB/T 1883.1, GB/T 1883.2 and GB/T 4365 and the following apply.

5.4 Monitoring instrument

5.4.1 The monitoring instrument shall be marked by a symbol or by text in accordance with the provisions of GB/T 17804.

5.4.2 The monitoring instrument shall be easily visible to the operator. Lighting equipment shall be provided when it requires to work at night or indoors.

5.4.3 The monitoring instrument shall indicate with colors in accordance with the provisions of GB/T 4025. It is recommended to indicate the failure or dangerous state in red and the normal working condition in green.

5.5 Alarm device

5.5.1 The alarm device, signal, sign and color shall comply with the provisions of GB/T 18209.1. If there is an emergency alarm system, a red alarm light and/or audible alarm device capable of displaying its operation shall be provided.

5.5.2 The alarm device shall be provided with an inspection position to indicate whether its function is normal, and it shall be capable of being inspected when the engine is running or stopped.

5.6 Protective design

5.6.1 The moving parts of the engine shall have good balance performance. The unevenness of the crankshaft and flywheel components shall be in accordance with the provisions of technical documentation or GB/T 9239.1.

5.6.2 There shall be sufficient space between the guard and the protected part to avoid friction.

5.6.3 The installation of the guard shall be firm and reliable, and shall be strong enough for guards that may be subjected to trampling or falling.

5.6.4 The guards used to contain the projectile parts shall be capable of preventing the passage of the corresponding size of the flying block.

5.7.1 Mechanical hazard protection

5.7.1.1 The operator shall be protected within the safety distance specified in GB/T 23821. The size of the safety distance depends on the installation of the engine.

5.7.1.2 When the engine is running, the exposed rotating parts and the transmission mechanism that may cause danger to the operator shall be square meter of floor space or ventilates at least 6 times within 1 h, it is considered to be a good ventilation place. This ventilation rate can be achieved by natural or mechanical ventilation.

5.9.2 The engine exhaust pipe shall be fitted with a spark arrester or other device with the function of a spark arrester. The corrosion resistance and wear resistance of the structural materials of the spark arrester shall be equivalent to or better than that of the 07Cr19Ni11Ti stainless steel.

5.10 Explosion proof

5.10.1 For engines where gaseous fuel enters the cylinder through the intake manifold, an explosion-proof safety valve or other explosion-proof measures shall be installed on the intake manifold unless there is evidence that the system is strong enough to withstand the worst-case explosion.

5.10.2 When the engine is used in a potentially explosive atmosphere, it shall comply with the provisions of GB 20800.1-2006, GB 20800.2 and GB 20800.3.

5.10.3 Safety valves shall be installed on the crankcase. The number and installation position shall comply with the relevant regulations.

5.10.4 If the crankshaft ventilation duct is connected to a hazardous area or has special requirements, its ventilation ducts shall have a fire-proof effect or be fitted with a flame arrester.

5.10.5 Explosion-proof lighting shall be used for crankcases with internal lighting and it shall not be routed within the crankcase.

5.11 Static proof

5.11.1 Plastic materials To prevent electrostatic discharge ignition of plastic materials, it shall be carried out in accordance with the requirements of

4.13.1 of GB 20800.1-2006.

5.11.2 Potential balance All externally accessible components shall be connected to the engine cylinder block by conductors to achieve potential balance. If these components are securely attached and in contact with the cylinder block or metal, a separate conductor connection is not required.

5.11.3 Flange electrostatic jumper The gas pipeline of the engine and its accessories shall be electrostatically grounded. For gas pipelines with a nominal diameter greater than or