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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB 16541-2010

**Shaft cage hoisting signal system - safety technical
requirements**

竖井罐笼提升信号系统 安全技术要求

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Foreword

Chapter 3 of this standard are recommended, the rest are mandatory. This standard replaces GB 16541-1996 "shaft cage hoisting signal system security technical requirements." This standard compared with GB 16541-1996, the main changes are as follows:

- Clear standards for metal and nonmetal mines, coal mines and coal mine shaft cage hoisting signal system;
- Complements the potentially explosive premises, equipment and devices signaling system shall comply with the relevant requirements of explosion. The standard proposed by China Machinery Industry Federation. This standard by the National Mining Machinery Standardization Technical Committee (SAC/TC88) centralized. This standard was drafted. Steel Group, Wuhan Research Institute of safety and environmental protection. The main drafters of this standard. Li Xiaofei, Zhang opened Valley Qinghong, Wanghong Han, Cen Yuan Gang, Li Yang now. This standard replaces the standards previously issued as follows:
 - GB 16541-1996. Shaft cage hoisting signal system security technical requirements

1 Scope

China's mandatory safety technical requirements for shaft cage hoisting signal systems. A mine hoist raises and lowers people in a cage on a rope down a shaft that may be a kilometre deep, and the operator at the winder cannot see the cage or the people at any landing. The signal system is the only link between them, and every serious hoisting accident begins with a signal that was ambiguous, misheard or sent by the wrong person. So the requirements are about certainty rather than convenience: the signal codes and their unambiguous meaning, the requirement that a signal be acknowledged before the hoist

moves, the lockout that prevents a second landing signalling while another is in control, the separate emergency stop available from every landing and from the cage, and the reliability and independence of the circuits, which must fail to a state that stops the hoist rather than one that moves it.

This standard specifies the shaft cage hoisting signal system of terms and definitions, technical requirements and safety requirements. This standard applies to shaft cage hoisting signal system design, installation, use and maintenance. The system is mainly used for metal and nonmetal mines Hill, coal mines and coal mine shaft cage hoisting.

2 Normative references

The following documents contain provisions which, through reference in this standard and become the standard terms. For dated references, subsequent Amendments (not including errata content) or revisions do not apply to this standard, however, encourage the parties to the agreement are based on research Whether the latest versions of these documents. For undated reference documents, the latest versions apply to this standard.

GB/T 1251.1 Ergonomics public places and work areas - Auditory danger signal danger signal (GB/T 1251.1- 2008, ISO 7731.2003, IDT)

GB 3836.4 explosive gas environment with electrical equipment - Part 4. Intrinsic safety "i" (GB 3836.4-2000, eqv IEC 60079-11.1999)

GB/T 7679.3 Mining machinery terminology - Part 3. Lifting Equipment

GB/T 12173 Mine general electrical equipment

GB/T 14778 Security Shade general rules

GB 16423 metal and nonmetal mine safety rules Coal Mine Safety Regulations (National Coal Mine Safety Supervision Bureau released 2006)

3 Terms and Definitions

GB/T 7679.3 and established the following terms and definitions apply to this standard.

3.1 Signal signal Lifting systems, electrical equipment by appointment information with sound, light, text, digital display mode transmission.

3.2 Middle (horizontal) indication signal leveldirectionssignal When the second run to the middle of the cage (horizontal) signal.

3.3 Enhance Category Signal hoistingclassificationssignal Refers explicitly mentioned or extract other different types of signals.

3.4 Maintenance signal examiningandrepairingsignal Wellbore, signal the lifting equipment or devices used for maintenance.

3.5 Working perform signal operatingsignal Requirements hoist drivers with driving, parking and signals cans and other operations.

3.6 Accident signal faultsignal When lifting system failure or an accident occurs during the operation, requiring the driver to stop the elevator or take other security measures signal.

3.7 Standby signal sparesignal For special circumstances (such as a signaling system for various reasons can not work when the normal procedure) signals used.

4.1 Signal requirements

4.1.1 bottom cage hoisting system, underground each middle (horizontal), wellheads and hoist room, etc., between them should be audible or digital signal phase China Unicom, and the installation of direct telephone or mouthpiece.

4.1.2 The signaling system should be provided with work performing signal, the middle (horizontal) indication signal to enhance the signal category, maintenance and accident signal signal. Work was performing signal should sound and light signals or signal number, accident signal should sound and light signals, general indication signal may be light or signal Digital signal.

4.1.3 using sound to enhance the difference signal category, should meet the following requirements.

- With a clear audibility, distinguish for clarity and meaning.
- Sound level, frequency, instantaneous sound level distribution, frequency distribution, and listen to the instantaneous inspection should be consistent with GB/T 1251.1 relevant Provisions.
- Parking. loudly.
- Uplink. When people mention, the second tone; when extract, the sound of a long, one short blast.
- Line. When people mention, two short blasts, one prolonged blast; when extract, two prolonged blasts and one short blast.
- Sound duration is determined by the instantaneous sound level diagram shown in Table 1.
- Not a "three-pulse" signal.
- Maintenance, incident handling and custom backup signal by the mining enterprises, and approval by the competent mine.
- Same wellbore when there are two lifting means, each acoustic signal should have significantly different characteristics.

Note. The "three-pulse" signal is a staff emergency evacuation signal, the signal can not be used for general contact.

4.1.4 Each downhole middle (horizontal) drive signal, shall be forwarded to the wellhead total signal station hoist driver. Drive signal lights should be retained or Digital reserved. Mention people, extract and repair lights retention signal or digital signal retention should be set.

4.2 Interlock Requirements

4.2.1 The use of two or more layers cage hoisting personnel and personnel in and out of the layers simultaneously, each layer should be in the tank to stop access point or internet have imposed Signaling system effective contact wellhead total signal station and shall be closed, only the signal at the wellhead workers confirm the cage all the layers of personnel access has been completed Only issue driving signal.

4.2.2 hoist signal devices and control loops should be closed, only the total signal at the wellhead station issued after driving signal hoist to start.

4.2.3 should lock between each middle (horizontal) signal, the same time allowing only one in the middle (horizontal) to issue a signal to the wellhead total station signal. Only when the middle (horizontal) drive cage where the signal emitted, the total signal wellhead station in order to issue driving signal to the driver hoist.

4.2.4 mention, should the latch between the extract and repair the three signals.

4.2.5 Under the following conditions each downhole middle (horizontal) can send a signal directly to hoist the driver, but it should convert the signal to a signal station at the wellhead total After lifting room, hoist the driver to listen to a middle (horizontal) signal workers command.

--- Enhance the ore or waste rock;

--- Single cage hoisting;

--- Surface and underground interlock signal automated lift system.

4.2.6 wellhead and downhole each middle (horizontal) safety door and shake Taiwan and upgrading signal should be blocked. Only the safety door is closed, after the lift cradle, Before issuing driving signal.

4.2.7 cage hoisting seat or with a cage brake tank, the tank should be set up base or cage brake signal lights, and should set the locking device. Only in the tank After the seat or supporting cage gate open, in order to issue driving signal.

4.3 Signaling equipment and cabling requirements

4.3.1 The signaling system used materials and equipment shall comply with the relevant