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

GB/T 25338.1-2019

Replacing GB/T 25338.1-2010

Switch machines for railways - Part 1: General specification

铁路道岔转辙机 第1部分：通用技术条件

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1 Scope

China's national general specification for railway point machines. It is Part 1 of GB/T 25338 and specifies the general requirements, the test methods and the inspection rules for the machines that move and lock railway switches. A point machine does three things and the third is what matters. It moves the switch rails from one position to the other; it locks them there, so that a train passing over cannot force them; and it detects and reports that the movement completed and the lock is engaged - and the signal protecting the route cannot clear until that detection is proved. A point machine that reports locked when the switch rail is not fully home is the mechanism of a derailment, and the detection is therefore not a monitoring feature but the safety function of the device. Everything else follows from that. The detection must be mechanically driven from the switch rail itself rather than from the drive, because a broken rod would otherwise report the drive's position instead of the rail's; the tolerance is a few millimetres, because an obstruction of that size between the switch rail and the stock rail is enough to derail a wheel; and the machine must trail safely if a vehicle runs through the switch from the wrong direction, which either means it is designed to be forced without damage or the route is protected so that it cannot happen. Around that sit the throwing force and speed, the operation under snow, ice and vibration, the electrical requirements and the compatibility with the interlocking, the enclosure and its sealing in a trackside environment, and the endurance over millions of operations. Issued on 30 August 2019 and in force since 1 March 2020, it replaces GB/T 25338.1-2010.

This Part of GB/T 25338 specifies the terms, classification, technical requirements, inspection rules, marking, packaging, transportation and storage of electric, electro-hydraulic, and electro- pneumatic switch machines for railway turnouts (hereinafter referred to as the "switch machines"). This Part applies to the design, manufacture and inspection of switch machines.

2 Normative References

The following documents are indispensable to the application of this document. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 191 Packaging - Pictorial Marking for Handling of Goods (GB/T 191-2008, ISO 780.1997, MOD)

GB/T 755-2008 Rotating Electrical Machines - Rating and Performance (IEC 60034-1.2004, IDT)

GB/T 2408-2008 Plastics - Determination of Burning Characteristics - Horizontal and Vertical Test (

IEC 60695-11-10.1999, IDT)

GB/T 2423.16-2008 Environmental Testing for Electric and Electronic Products - Part

3 Terms and Definitions

The following terms and definitions are applicable to this document.

3.1 locking A mechanism that locks the switch machine's switching bar or detecting bar in its terminal position.

3.2 external locking equipment A mechanical device that directly locks the switch rail to the stock rail and the point rail to the wing rail via the switch machine.

3.3 detector of trailing movement A bar within the switch machine that can check the status of the turnout. NOTE. during a trailing movement, this bar can disconnect the switch machine's detecting contact point.

3.4 locking bar A bar within the switch machine that can check the turnout's tightness and provides a secondary locking function for the turnout's movable parts.

3.5 locking-and-detecting bar A bar within the switch machine that provides a secondary locking function and can check the turnout's status. NOTE. during a trailing movement, this bar can disconnect the switch machine's detecting contact point.

3.6 throwing movements The number of times that the switch machine switches from one terminal position to another during its stroke.

3.7 rated throwing force The specified output force when the switch machine's switching bar or piston rod stretches out or retracts.

3.8 rated voltage The minimum voltage at the electric motor terminal when the DC switch

machine is switching under the given rated throwing force condition.

3.9 supply voltage The voltage output from the power supply panel to the switch machine.

3.10 switching time The time it takes for the switch machine to switch from one terminal position to another, and the connection of the detecting contact point, starting from the energization of the electric motor (electric, electro-hydraulic) or solenoid directional valve (electro-pneumatic).

4 Classification

4.1 Classification of Switch Machines by Switching Time See Table 1 for the classification of switch machines by switching time.

4.2 Classification of Switch Machines by Rated Throwing Force See Table 2 for the classification of switch machines by rated throwing force.

4.3 Classification of Switch Machines by Power Supply DC switch machines are classified into two types based on rated voltage. DC 160 V and 180 V. AC switch machines have a three-phase

50 Hz power supply of 380 V. The voltage of the electro-pneumatic switch machines with a solenoid directional valve is DC 24 V.

4.4 Classification of Switch Machines by Drive Mode Switching machines can be classified into electric switch machines, electro-hydraulic switch machines, and electro-pneumatic switch machines based on their drive mode.

4.5 Meaning of Switch Machine Models The meaning of switch machine models is as follows: EXAMPLE 1.an electric switch machine with a rated throwing force of

2.5 kN, a switching bar stroke of 220 mm, and a derivative type of A is designated as ZD9-A220/2.5. EXAMPLE 2.an electro-hydraulic switch machine with a rated throwing force of 4 kN, a switching bar stroke of 170 mm, and a derivative type of A is designated as ZY6-A170/4. EXAMPLE 3.an electro-pneumatic switch machine with a rated throwing force of

2.5 kN and a switching bar stroke of 170 mm is designated as ZK4-170/2.5. NOTE. when a power source switches more than two traction points, the switching bar stroke and throwing force at each traction point are connected by a plus sign (200 + 94/1.8k + 4.2k).

5 Technical Requirements

5.1 Operating Environment of Switch Machine The switch machine shall normally operate under the following environmental conditions.

a) Air pressure. not lower than

70.1 kPa (equivalent to an altitude below 3,000 m);

b) Ambient air temperature. 40 C ~ +70 C;

c) Relative humidity. not greater than 90% (at 25 C);

d) No harmful or corrosive gases posing an explosion hazard in the surrounding environment.

5.2 Switching Sequence of Switch Machine After power is connected, the switch machine shall accurately switch in the following sequence.

a) Disconnect the original detecting contact point;

b) Unlock the switch machine;

c) Switch machine switches;

d) Switch machine locks;

e) Connect the new detecting contact point. For high-speed switch machines and switch machines with traction external locking devices, steps

e) are allowed to be simultaneously realized.

5.3 Parts and Components of Switch Machine All parts and components of the switch machine shall be inspected and qualified. Standard parts and purchased parts shall conform to relevant technical standards.

5.4 Appearance

5.4.1 The surfaces of metal parts and electroplated or coated parts shall be smooth, and free of burrs. The plating layer shall be free of spots, protrusions, and unplated areas. Edges and corners shall be free of burn marks. The coating layer shall be uniform in color and free of defects such as wrinkles, flow marks, pinholes, and bubbles, etc.

5.4.2 Plastic parts shall have good gloss and shall be free of defects such as bubbles, cracks, missing materials, swelling, obvious deformation, scratches, and burrs, etc.

5.4.3 Threaded connections and riveted joints shall be free of loosening and automatic detachment.

5.4.4 Welds shall be firm and free of defects such as slag inclusions, bubbles, and cracks, etc.

5.4.5 The surface of castings shall be flat and free of harmful deformation, defects, protrusions, burrs, sand adhesion, and cracks.

5.4.6 Forgings shall be free from defects such as delamination, cracks, and overheating, etc.