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

GB/T 18153-2024

Replacing GB/T 18153-2000

**Safety of machinery - Safety data for establishing temperature
limit values for touchable hot surfaces**

机械安全 用于确定可接触热表面温度限值的安全数据

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Foreword

This document is in accordance with the provisions of GB/T 1:1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents"

Drafting: This document replaces GB/T 18153-2000 "Ergonomics for determining hot surface temperature limits for mechanical safety - accessible surface temperature"

Compared with GB/T 18153-2000, in addition to structural adjustments and editorial changes, the main technical changes are as follows:

--- Added the term "contactable hot surface" (see 3:1);

--- Change the term "burn threshold" to "scald threshold" (see 3:5, 3:6 of the:2000 edition), and change "burn" to "scald" throughout the text hurt";

---Change the scalding threshold for contact time less than 1s and the scalding threshold for contact time between 1s and 10s to 0:5s~ The burn threshold of 10s contact time has been revised and the requirements have been refined (see 4:2:1, 4:2:1 and 4:2:2 of the:2000 edition);

---Change the scald threshold subdivision from contact time greater than or equal to 1 minute to 10s~1min and contact time not less than 1min Burn threshold (see 4:2:2 and 4:2:3, 4:2:3 of the:2000 edition);

--- Deleted the explanation and conclusion (see Chapter 6 of the:2000 edition);

--- Added the method for determining the surface temperature limit (see Chapter 5): Please note that some of the contents of this document may involve patents: The issuing organization of this document does not assume the responsibility for identifying patents:

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The structure of safety standards in the field of machinery is as follows:

- Category A standards (basic safety standards) give basic concepts, design principles and general characteristics applicable to all machinery;
- Class B standards (general safety standards) involve a safety feature of a machine or a type of safety device with a wide range of use: - Category B1, standards for specific safety features (such as safety distance, surface temperature, noise); - Category B2, safety device (such as two-hand control device, interlock device, pressure-sensitive device, protective device) standards;
- Category C standards (machinery product safety standards) are standards that specify detailed safety requirements for a specific machine or a group of machines: According to

GB/T 15706, this document belongs to Class B1 standard: This document is particularly relevant to the following stakeholders involved in machinery safety:

---Machine manufacturer;

---Health and safety agencies: Other stakeholders affected by the level of machinery safety are:

---Machine users;

1 Scope

China's national source of the burn threshold data used to decide how hot a machine surface may be if a person can touch it. It specifies the scald and burn threshold data and the method for determining surface temperature limits, for use in the safety design of machinery. The question it answers is deceptively simple and cannot be answered with a single number. Whether a hot surface burns depends on three things: the temperature, the contact time, and what the surface is made of. Material matters as much as temperature because what injures skin is heat transferred into it, and that depends on the thermal inertia of the material - the product of conductivity, density and specific heat. Bare metal at 65 degrees Celsius will burn in a second because it delivers heat as fast as the skin can take it; plastic at the same temperature can be held for a minute; wood longer still. A single limit applied to all materials would therefore be either useless or absurdly restrictive. The standard provides the burn threshold curves for metals, coated metals, ceramics, glass, plastics and wood as a function of contact duration, and then a procedure for applying them: identify which surfaces are touchable at all, analyse the task to establish how long contact realistically lasts and whether it is voluntary or accidental, select the appropriate burn threshold for the population and the situation, and derive the temperature limit for that contact time. Informative annexes give the working procedure, guidance on contact times, and the thermal inertia of common materials. It is the data source that product safety standards refer to rather than restate. Issued and in force since 25 April 2024, it replaces GB/T 18153-2000.

This document specifies the burn thresholds for human skin in contact with hot surfaces of machines or workpieces and describes the methods used to prevent skin burns: Method for determining the limit value of hot surface temperature for damage: This document does not specify hot surface temperature limits for specific machines or workpieces, and does not give data to prevent pain: This document applies to contacts where the surface temperature remains essentially constant during contact (see 4:1) and the contact time is not less than 0:5 s: This document is not applicable to situations where large areas of skin, approximately 10% or more of the body, come into contact with hot surfaces: This document also does not apply to contacts exceeding 10% of the head skin, or contacts that result in burns to important parts of the face: NOTE: In some cases, the consequences of contact with hot surfaces may be more serious, for example:

---Burns that cause respiratory obstruction;

---Large burns covering 10% or more of the body's skin may damage the circulatory system due to loss of body fluids;

---Heating of a large proportion of the head or body may cause unacceptable heat stress even in the absence of burns:

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document: For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document:

GB/T 15706-2012 General principles for safety design of machinery - Risk assessment and risk reduction

3 Terms and definitions

The terms and definitions defined in GB/T 15706-2012 and the following apply to this document: 3:1 touchable hot surface The surface of the machine or workpiece whose temperature is not less than 43°C and may be touched by the skin: 3:2 surface temperaturesurface temperature T_s The temperature of the machine or workpiece surface: 3:

3 Contact time contactperiod The duration of skin contact with the surface: 3:

4 Thermal inertia Properties of an object due to its heat transfer characteristics when it is heated or cooled: NOTE: Thermal inertia is usually expressed as the product of the material's density (ρ), thermal conductivity (K) and specific heat capacity (c):