

ICS 21.160  
CCS J26



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

**GB/T 1972.1-2023**

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**Disc springs - Part 1: Calculation**

碟形弹簧 第1部分：计算

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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 is Part 1 of GB/T 1972 "Disc Springs": GB/T 1972 has issued the following parts:

--- Part 1: Calculation;

--- Part 2: Technical conditions: This document is modified to adopt ISO 19690-1:2017 "Disc Springs Part 1: Calculation": Compared with ISO 19690-1:2017, this document has made the following structural adjustments:

--- 6:3 and 6:4:1 of this document correspond to 6:3 of ISO 19690-1:2017;

--- 6:4:2 of this document corresponds to 6:4 of ISO 19690-1:2017;

--- 6:4:3 of this document corresponds to 6:5 of ISO 19690-1:2017;

--- 6:4:4 of this document corresponds to 6:6 of ISO 19690-1:2017;

--- 6:4:5 of this document corresponds to 6:7 of ISO 19690-1:2017;

--- 8:1 of this document corresponds to 9:1 and 9:2 of ISO 19690-1:2017;

--- 8:2 and 8:3 of this document correspond to Chapter 8 of ISO 19690-1:2017: The technical differences between this document and ISO 19690-1:2017 and their reasons are as follows:

--- Replaced ISO 26909 (see Chapter 3) with the normatively quoted GB/T 1805 to adapt to the technical conditions of our country;

--- Deleted the reference to ISO 16249 (see Chapter 4);

--- Added the load calculation formula (9) and formula (11) of the disc spring during flattening (see 6:4:2), because the computer-aided calculation method is not used. When calculating, the flattened load will be used;

--- Changed Figure 3 (see 7:1:2), which is more in line with the actual situation in our country;

## 1 Scope

GB/T 1972.1-2023 gives the calculation method for disc springs - the coned washers used where a very large force is needed in very little space, in clutches, bolted joints that must stay tight, valves, and machine tool clamping. Their behaviour is what makes them useful and what makes them difficult: the load-deflection curve is non-linear, and depending on the ratio of the cone height to the material thickness it can rise, flatten out or even fall as the spring is compressed. A designer can exploit that to get almost constant force over a range of travel, or be caught out by a spring that suddenly gives way. Stacking them multiplies the possibilities - in series for more travel, in parallel for more force - and the friction between stacked discs then affects the result. None of this can be estimated by intuition. This part gives the calculation criteria and requirements for single and stacked disc springs of rectangular cross-section, including the definitions of the quantities involved, the load and stress calculations, and the treatment of stacks. Under ICS 21.160 and CCS J26, it is written for spring manufacturers and for the mechanical designers who specify them.

This document gives the calculation criteria and requirements for single-piece disc springs and combined disc springs (hereinafter referred to as "disc springs") with rectangular cross-sections: Including definitions of related concepts, calculation formulas and checking of key positions of fatigue damage: This document applies to single disc springs and combined disc springs: This document does not apply to grooved disc springs, diaphragm disc springs and other structural types of disc springs:

## 2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text: Among them, dated references. For documents, only the version corresponding to the date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to this document: GB/T 1222 Spring steel

GB/T 1805 Spring Terminology ( GB/T 1805-2021, ISO 26909:2009, MOD)

## 3 Terms and Definitions

The terms and definitions defined in GB/T 1805 apply to this document:

4 Symbols, parameter names and units The symbols, parameter names and units used in this document are shown in Table 1: Table

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