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

GB/T 1972-2005

**Disc springs - Part 1: Calculation
(English Translation)**

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Table of Contents

Preface
Introduction
1 Scope
2 Normative references
3 Terms and Definitions
4 Symbols, parameter names and units
5 Structural type, grouping and dimension series
5.1 Structure type
5.2 Disc spring grouping
5.3 Dimension series
6 Single Disc Spring Calculation
6.1 Overview
6.2 Detection load
6.3 Coefficients in calculations
6.4 Calculation of Disc Spring Load, Calculation Stress, Disc Spring Stiffness and Disc Spring Deformation Energy
7 Spring characteristics
7.1 Spring characteristics of a single disc spring
7.2 Spring characteristics of combined disc springs
8 Load classification, allowable stress
8.1 Load classification
8.2 Allowable stress under static load
8.3 Range of allowable stress under dynamic load
Appendix A (Informative) Calculation Example
Appendix B (Informative) Other Combined Disc Springs
Appendix C (informative) The influence of friction force on spring characteristics
Appendix D (informative) Common materials for disc springs
Reference

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;

--- Changed the value of h_0/t of the single disc spring (see 7.2:1) to avoid ambiguity when selecting the C series disc spring ($h_0/t \sim 1:30$);

--- Changed the allowable stress requirements for static loads, and added a reference to the normative reference file GB/T 1222 (see 8.2):

The following editorial changes have been made to this document:

--- Modified the title of Figure 1 (see 5.1);

--- Put the normative reference document GB/T 1972.2-2023 "Disc Spring Part 2: Technical Conditions" into the reference;

---In 8:3:2, three examples about the key positions of disc spring fatigue damage have been added;

--- Increased Appendix A (informative) calculation examples;

--- Added Appendix B (informative) other combined disc springs;

--- Increased the influence of appendix C (informative) friction on spring characteristics;

--- Added Appendix D (informative) commonly used materials for disc springs:

Please note that some contents of this document may refer to patents: The issuing agency of this document assumes no responsibility for identifying patents:

Introduction

Disc spring is a kind of universal elastic element, which is widely used in machinery, chemical industry, aviation, construction and other industries:

GB/T 1972 "Disc Springs" is divided into two parts:

--- Part 1: Calculation: The purpose is to provide a set of standard disc spring structure type, grouping and size series based on the calculation method of the disc spring in the scope of application provides a theoretical basis for the verification and design of the disc spring:

--- Part 2: Technical conditions: The purpose is to standardize the technical conditions, test methods and acceptance rules of disc springs:

Disc Springs Part 1: Calculations

1 Scope

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 1 Symbols, parameter names and units

Symbolic parameter name	unit	C1,C2,C3,C4,k1,k2	Coefficients-D	Outer diameter	mm	D0	neutral diameter	mm	d	Inner diameter	mm	E	Elastic modulus of material	MPa	F	Single disc spring load	N	Fc	is the calculated load N of the single disc spring at the flattened position	FG	combined disc spring (hereinafter referred to as "combined disc spring") load	N	Ft	Detection load (load at Ht position)	N	F1, F2, F3,	corresponding to the load N of disc spring	height H1, H2, H3	Ht	The height corresponding to the detection load ($H_t=H_0-0.75h_0$)	mm
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