

ICS 23.100.10
CCS J 20



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

GB/T 41980.3-2024

**Hydraulic fluid power - Determination method of pressure
ripple levels generated in systems and components - Part 3:
Hydraulic motors
(English Translation)**

Issued on: September 29, 2024

Implemented on: September 29, 2024

**Issued by: State Administration for Market Regulation, China National
Standardization Administration**

Table of Contents

Preface
Introduction
1 Scope
2 Normative references
3 Terms and Definitions
4 Symbols and subscripts
5 Instruments
6 Installation of hydraulic motor
7 Test conditions
8 Test bench
9 Test Procedure
10 Test Report
11 Marking instructions (refer to this document)
Appendix A (normative) Error of mean value and measurement level
Appendix B (Normative) Data Processing Algorithm
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 3 of GB/T 41980 "Methods for determining pressure fluctuations in hydraulic transmission systems and components".

The following parts have been published.

- Part 1: Hydraulic pumps (precision method);
- Part 2: Hydraulic pumps (simplified method);
- Part 3: Hydraulic motors.

This document is modified from ISO 10767-3:1999 "Determination of pressure fluctuations in hydraulic transmission systems and components - Part 3: Motors method".

This document has the following structural adjustments compared to ISO 10767-3:1999.

--- Chapters 5 to 9 correspond to Chapters 4 to 8 of ISO 10767-3:1999, and the numbers of the subsequent clauses shall be adjusted accordingly.

8.7.1, 8.11.1, 9.3.1 and 9.4.1 correspond to the suspension sections 7.7, 7.11, 8.3 and 8.4 of ISO 10767-3:1999 respectively;

--- Chapter 10 corresponds to Chapter 9 of ISO 10767-3:1999, of which 10.1 corresponds to 9.1 and 9.2 of ISO 10767-3:1999, 10.2 corresponds to 9.3 of ISO 10767-3:1999;

--- Chapter 11 corresponds to Chapter 10 of ISO 10767-3:1999;

--- Tables 2 to 4 correspond to Tables 1 to 3 of ISO 10767-3:1999, with Tables 1 and 5 to 7 added;

--- Merge A.1 and A.2 into segments;

--- B.6.1 corresponds to the suspension section of B.6 in ISO 10767-3:1999, B.6.2 and B.6.3 correspond to B.6.1 and B.6.3 in ISO 10767-3:1999 B.6.2;

--- B.7.1 corresponds to the suspension section of B.7 in ISO 10767-3:1999, B.7.2 and B.7.3 correspond to B.7.1 and B.7.3 in ISO 10767-3:1999 B.7.2.

The technical differences between this document and ISO 10767-3:1999 and their reasons are as follows.

--- ISO 5598:1985 (see Chapter 3) has been replaced by the normative reference GB/T 17446 to adapt to my country's technical conditions.

High operability;

--- Added the content of symbols (see Chapter 4).

The following editorial changes were made to this document.

--- Change the name of the standard to "Methods for determination of pressure fluctuations in hydraulic transmission systems and components Part 3: Hydraulic motors";

--- The informative reference ISO 1219-1:1991 has been deleted from the list of normative references;

--- Figure 1 was redrawn in accordance with the requirements of national standards;

--- Added distribution example of pressure sensor calibration (see Figure 3);

--- Adjust the general information, test information and test results into a table format (see Table 5 to Table 7);

--- Corrected minor editorial changes in formula (B.4), formula (B.38), formula (B.39) and formula (B.42) in ISO 10767-3:1999 mistake;

--- Deleted the informative Appendix C;

---Added references.

Introduction

GB/T 41980 aims to standardize the determination method of pressure fluctuations in hydraulic systems and components and consists of three parts.

--- Part 1: Hydraulic pumps (precision method). The purpose is to determine the test method for measuring the source flow fluctuation and source impedance of a positive displacement hydraulic pump program.

--- Part 2: Hydraulic pumps (simplified method). The purpose is to determine the test procedure for measuring positive displacement hydraulic pumps when the accuracy requirements are not high.

--- Part 3: Hydraulic motors. The purpose is to determine the test procedures for hydraulic motors under steady-state conditions.

This document mathematically processes the pressure fluctuation measurement values to analyze the interaction between the hydraulic motor flow, pressure fluctuation value and the circuit.

The performance of the hydraulic motor is evaluated by assessing the pressure fluctuations and the impact of design changes on the operation of the hydraulic motor.

The impact of the pressure fluctuation value generated helps hydraulic system designers avoid selecting hydraulic motors with high pressure fluctuation values.

This method uses plane wave transmission line theory to analyze the pressure fluctuations in the hydraulic system.

The characteristic impedance of the circuit is evaluated by measuring the pressure fluctuation at the position. In order to fully characterize the impedance of the system, the secondary source method is used to introduce the pressure fluctuation at the position of the reference pipe is far from the pressure fluctuation source at the other end of the motor inlet. Measuring the pressure fluctuation can evaluate the source impedance of the hydraulic motor, so that there is enough information.

The information is used to evaluate the source flow fluctuations and pressure fluctuations of the hydraulic motor.

Pressure fluctuations in hydraulic transmission systems and components Determination methods Part 3: Hydraulic motors

1 Scope

This document establishes the test procedures for source flow fluctuation, source impedance, and pressure fluctuation values for positive displacement hydraulic motors, including bidirectional motors.

Ratings are based on the following parameters.

- a) Source flow fluctuation amplitudes of at least 10 individual motor excitation frequency harmonics (m^3/s);
- b) the source impedance magnitude ($\text{N}\cdot\text{s}/\text{m}^5$) and phase ($^\circ$) of at least 10 individual motor excitation frequency harmonics;
- c) The amplitude of the anechoic pressure fluctuations of at least 10 individual motor excitation frequency harmonics (Pa);
- d) Total root mean square of anechoic pressure fluctuation (Pa);
- e) High impedance pressure fluctuation amplitude of at least 10 harmonics of the motor excitation frequency (Pa);
- f) Total RMS of high impedance pressure fluctuations (Pa).

This document applies to all types and specifications of positive displacement hydraulics with motor excitation frequencies in the range of 50Hz to 400Hz under steady-state conditions.

motor.

2 Normative references

The contents of the following documents constitute 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 17446 Fluid power systems and components vocabulary (GB/T 17446-2024, ISO 5598:2020, MOD)

3 Terms and definitions

The terms and definitions defined in GB/T 17446 and the following apply to this document.

Source flow fluctuation sourceflowripple the variable component of the flow rate produced by a hydraulic motor (regardless of the characteristics of the connected circuit).