ICS 23.100.10
CCS J 20

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 41980.1-2022

Hydraulic fluid power - Determination method of pressure ripple levels generated in systems and components - Part 1: Hydraulic pumps(precise method)

Issued on: October 12, 2022 **Implemented on: October 12, 2022**

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

Table of Contents

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 of Standardization Documents"

drafted.

This document is the first part of GB/T 41980 "Determination of pressure fluctuations in hydraulic transmission systems and components". GB/T 41980

The following sections have been published.

--- Part 1.Hydraulic pumps (precision method);

--- Part 2.Hydraulic pumps (simplified method).

This document is modified using ISO 10767-1.2015 "Determination of pressure fluctuations in hydraulic transmission systems and components - Part 1.Determination of pumps

Methods of Source Flow Pulsation and Source Impedance.

The technical differences between this document and ISO 10767-1.2015 and their reasons are as follows.

--- Replaced ISO 5598 (see Chapter 3) with the normatively cited GB/T 17446 to adapt to my country's technical conditions and increase the operability

action;

--- Changed "the instrument does not need to respond to steady-state pressure" to "the instrument should not be affected by steady-state pressure" (see 4.2), the expression is more accurate;

--- Change the magnetic gap detector that measures the rotational speed of the drive motor to a sensor (see 6.4, Figure 4) to adapt to the technical conditions of our country;

--- Added "Pipeline should be fixed with pipe clamps" (see 7.6.1) to adapt to the technical

conditions of our country;

--- Change the dynamic pressure measurement requirements to use piezoelectric pressure sensors to dynamic pressure sensors, and change the static pressure measurement requirements to use

Changing from piezoresistive pressure sensor or strain pressure sensor to static pressure sensor does not limit the pressure sensor principle

(see 7.7) to adapt to the technical conditions of our country;

--- Changed the diagram and description of the hydraulic test circuit and measurement system of the dual pressure/dual system method (see Figure 4) to adapt to our country's technology

condition.

The following editorial changes have been made to this document.

--- In order to harmonize with existing standards, the name of the standard is changed to "Determination of Pressure Fluctuations in Hydraulic Transmission Systems and Components Part 1"

Part. Hydraulic Pump (Precision Method)";

--- Redrawing Figure 2 according to GB/T 786.1-2021 (see 7.1);

--- Adjusted the appendix number and order;

--- Change the pressure unit bar in Appendix B to MPa;

--- Change "see Chapter 9" in Table B.1 to "see Chapter 10".

Please note that some content of this document may be patented. The issuing agency of this document assumes no responsibility for identifying patents.

Introduction

GB/T 41980 "Determination of pressure fluctuations in hydraulic transmission systems and components" aims to standardize pressure waves in hydraulic systems and components

The dynamic measurement method consists of three parts.

--- Part 1.Hydraulic pumps (precision method). A test designed to determine source flow pulsation and source impedance for measuring positive displacement hydraulic pumps

program.

--- Part 2.Hydraulic pumps (simplified method). The purpose is to determine the test procedure for measuring the accuracy of a positive displacement hydraulic pump without high requirements.

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

If the source flow pulsation and source impedance of the hydraulic pump are known, the pressure fluctuations generated by the pump in the hydraulic system can be determined by using the system components

The known harmonic propagation characteristics are simulated. This document establishes the measurement process of hydraulic pump source flow pulsation and source characteristic impedance for

The design of low-noise hydraulic systems helps.

Since the source flow pulsation and source impedance of hydraulic pumps are extremely important for the design of low noise pumps and hydraulic systems, ISO 10767-1.1996

The use of the "secondary source method" measurement is proposed in this test procedure, in which a determined secondary pulsation source is used to generate large pulses in the test system.

However, it requires the use of complex test systems and signal processing techniques, which is relatively difficult to implement, and is only adopted by the sponsoring country, the United Kingdom. therefore

ISO 10767-1.2015 adopts the method proposed by Weddfelt and Kojima, only based on the measured pressure fluctuation of the pump under test, simplifying the test system and

Signal processing method, and can achieve higher precision, Appendix A gives the theoretical basis of this method.

in hydraulic transmission systems and components

Determination of pressure fluctuations

Part 1.Hydraulic Pumps (Precision Method)

1 Scope

This document establishes a test procedure for source flow pulsation and source impedance of positive displacement hydraulic pumps.

This document applies to all types and sizes of volumes with pumping frequencies in the range of 50 Hz to 400 Hz under steady state conditions

type pump.

This document uses the calculation of high impedance pressure fluctuations as an example. The methodology and rationale for the test procedure are explained in Appendix A. Measurement

The test procedure is called the dual pressure/dual system method. The ratings are as follows.

a) source flow pulsation (in standard Norton model) amplitude (m3/s) and phase (°) over 10 individual pump frequency harmonics;

b) source flow pulsation (in the corrected model) amplitude (m3/s), phase (°) and time-domain waveforms for more than 10 individual pump frequency harmonics;

c) source impedance magnitude (N s/m5) and phase (°) for more than 10 individual pump frequency harmonics;

d) High impedance pressure fluctuations (MPa) over 10 individual pumping frequency harmonics, rms square of pressure fluctuation harmonics f1~f10

mean.

2 Normative references

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, dated citations

documents, only the version corresponding to that date applies to this document; for undated references, the latest edition (including all amendments) applies to

this document.

GB/T 17446 Vocabulary of Fluid Transmission Systems and Components (GB/T 17446-2012, ISO 5598.2008, IDT)

3 Terms and Definitions

GB/T 17446 as well as the following terms and definitions apply to this document.

3.1

sourceflowripple

The flow pulsation component generated in the pump (independent of the characteristics of the connecting circuit).

Note 1.Since there are two definitions of pump source flow pulsation, they need to be used differently.

--- The source flow pulsation in the standard Norton model, QS is the source flow pulsation assumed to be generated at the pump outlet, as shown in Figure 1a);

--- Correct the source flow pulsation in the model, Q*S is the source flow pulsation assumed to be inside the end of the outlet pipe, as shown in Figure 1b).