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Fifth edition
2022-03

Hydraulic fluid power — Calibration of automatic particle counters for liquids

Transmissions hydrauliques — Étalonnage des compteurs automatiques de particules en suspension dans les liquides



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 131 *Fluid power systems*, SC 6, *Contamination control*.

This fifth edition cancels and replaces the fourth edition (ISO 11171:2020), which has been technically revised.

The main changes are as follows:

- in term [3.8](#), particle size distribution, Note 1 to entry has been amended;
- in [6.12 c\)](#), 0,72 has been changed to 0,56;
- in [6.12 d\)](#) 1,32 has been changed to 1,56;
- in [B.4](#), 3rd line, “mass concentrate” has been changed to “mass concentration”;
- [B.8](#) has been amended to read: “.....”calculate the theoretical number concentration of particles for each mass concentration, X_t .”;
- in [Table B.1](#), the units for “ X_t (particles/L)” have been corrected to “ X_t (particles/mL)”;
- in [D.3 c\)](#), 0,72 has been changed to 0,56;
- in [D.3 d\)](#), 1,32 has been changed to 1,56;
- in [D.7 a\)](#), 0,72 has been changed to 0,56;
- in [D.7 e\)](#), 1,32 has been changed to 1,56;
- in [G.6](#), the subscript in the denominator of [Formula G.3](#) has been corrected from “ V_0 ” to “ V_S ”;
- in Reference [\[6\]](#) in the Bibliography, the RM 8631 batch identifier has been changed from “a” to “b”;
- in Reference [\[7\]](#) in the Bibliography, the RM 8632 batch identifier has been changed from “b” to “a”.

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Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit. The fluid is both a lubricant and a power-transmitting medium. Reliable system performance requires control of the contaminants in the fluid. Qualitative and quantitative determination of the particulate contaminants in the fluid medium requires precision in obtaining the sample and in determining the contaminant particle size distribution and concentration. Liquid automatic particle counters (APC) are an accepted means of determining the concentration and size distribution of the contaminant particles. Individual APC accuracy is established through calibration.

This document is a standard calibration procedure for APC that are used for determining particle sizes and counts. The primary particle-sizing calibration is conducted using NIST SRM 2806x suspensions with particle size distribution certified by the United States National Institute of Standards and Technology (NIST) for particle sizes 30 $\mu\text{m(c)}$ and smaller, and using polystyrene latex spheres at larger sizes.

A secondary calibration method uses suspensions of NIST RM 8631x, ISO MTD, or other test dust conforming to ISO 12103-1, which are independently analysed using an APC calibrated by the primary method. Minimum performance specifications are established for the APC coefficient of variation (CV) of sample volume, CV of flow rate, resolution and particle counting accuracy. The operating limits of an APC, including its threshold noise level, coincidence error limit and flow rate limits are determined.