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Hydraulic fluid power — Measurement techniques —

Part 1: General measurement principles

*Transmissions hydrauliques — Techniques de mesure —
Partie 1: Principes généraux de mesure*



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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9110-1 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*.

ISO 9110 consists of the following parts, under the general title *Hydraulic fluid power — Measurement techniques*:

- *Part 1: General measurement principles*
- *Part 2: Measurement of average steady-state pressure in a closed conduit*

Annex A of this part of ISO 9110 is for information only.

Introduction

The various International Standards listed in annex A provide unified testing methods for comparing the performance of different hydraulic fluid power components. Such comparisons may be made against a written specification (as in the case of production components), against a competitive component of equivalent purpose (for example in the selection of components by prospective purchasers) or between two slightly different designs (as in the case of experimental development). In order for such comparisons to be meaningful, the criteria measured must be valid parameters of the performance of the component under test and the method of measurement used must be capable of reliably determining any significant differences between the components being compared.

This part (ISO 9110-1) relates to general principles for the measurement of static or steady-state conditions. ISO 9110-2 deals with the measurement of average steady-state static pressure in a closed conduit.

Further parts will be published as technology develops.

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Hydraulic fluid power — Measurement techniques —

Part 1: General measurement principles

1 Scope

This part of ISO 9110 establishes general principles for the measurement of performance parameters under static or steady-state conditions.

It gives guidance on the sources and magnitudes of errors to be expected in the calibration of and measurements using hydraulic fluid power components. It describes practical requirements for assessing the capability of the measuring system, and hence the level of accuracy of measurement of the system, or for assisting in developing a system which will meet a prescribed level of accuracy.

2 Definitions

For the purposes of this part of ISO 9110, the following definitions apply.

2.1 calibration: A set of operations which establish, under specified conditions, the relationship between values indicated by a measuring instrument or measuring system and the corresponding values indicated by a reference standard.

2.2 measuring instrument: A device intended to make a measurement, alone or in conjunction with other equipment.

2.3 measuring system: A complete set of measuring instruments and other equipment assembled to carry out a specified measurement task.

2.4 measurement: The set of operations for determining the value of a quantity.

2.5 random uncertainty; random error: An error which varies in an unpredictable manner in absolute value and sign when a large number of measure-

ments of the same value of a quantity are made under effectively identical conditions.

2.6 reference standard: An instrument of the highest metrological quality available at a given location which is used to calibrate a working instrument of the same broad type.

2.7 repeatability of measurements: The closeness of agreement between the results of successive measurements of the same quantity carried out by the same method, by the same observer, with the same measuring instruments, in the same laboratory, over quite short intervals of time.

2.8 static conditions: Conditions under which the parameter does not vary with time.

2.9 steady-state conditions: Conditions under which the mean of a variable does not change with time and the variation of an instantaneous value of that variable is cyclic and can be described by a simple mathematical expression.

2.10 systematic uncertainty; systematic error: An error which, in the course of a number of measurements, made under the same conditions, of the same value of a given quantity, either remains constant in absolute value and sign, or varies according to a definite law when the conditions change.

3 Classes of accuracy

3.1 General

3.1.1 The uncertainty of measurement which can be tolerated in a fluid power test depends on the anticipated use of the data obtained. The result of a measurement may be a direct measure of the performance of the component, for example the pressure maintained by a regulating valve. In such a case,