INTERNATIONAL STANDARD

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Second edition
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Pneumatic fluid power — Standard reference atmosphere

Transmissions pneumatiques — Atmosphère normalisée de référence

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Contents

Page

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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.

ISO 8778 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 5, *Control products and components*.

This second edition cancels and replaces the first edition (ISO 8778:1990), which has been technically revised.

Introduction

In pneumatic fluid power systems, power is transmitted and controlled through a gas, most commonly compressed air, under pressure within a circuit. When presenting characteristics of pneumatic components, equipment or systems that use compressed air, it is necessary to have a standard reference atmosphere to permit comparison of data obtained under various pressure conditions.

Pneumatic fluid power — Standard reference atmosphere

1 Scope

This International Standard specifies a standard atmospheric reference value to be used in pneumatic fluid power technology for stating the performance data of components and systems.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5598, *Fluid power systems and components — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5598 and the following apply.

3.1
atmosphere
ambient conditions defined by one or more of the following parameters: temperature, relative humidity, pressure

3.2
reference atmosphere
agreed atmosphere to which conditions determined in other atmospheres may be related by using suitable conversion factors

NOTE 1 The term “other atmospheres” can mean pressurized or vacuum conditions.

NOTE 2 See Annex A for a discussion of alternative reference atmospheres.

3.3
standard reference atmosphere
atmosphere whose pressure has been approximated to be nearly that at sea level, whose temperature is typically considered to be room temperature and whose relative humidity is arbitrarily established

4 Standard reference atmosphere

4.1 The standard reference atmosphere shall be as defined in Table 1.

Table 1 — Definition of standard reference atmosphere

Pressure	Temperature	Relative humidity
100 kPa (1 bar)	20 °C	65 %
NOTE This is the same reference atmosphere as that given in ISO 8778:1990.		

4.2 For gases, when the quantity is expressed as free gas, the abbreviation ANR (standard reference atmosphere), in parentheses, shall follow the unit, not the value, for example:

$q_V = x$ m^3/s (ANR)

5 Identification statement (Reference to this International Standard)

Manufacturers are strongly recommended to use the following statement in their catalogues, test reports and sales literature when electing to comply with this International Standard:

"Standard reference atmosphere conforms to ISO 8778:2003, *Pneumatic fluid power — Standard reference atmosphere*."

Annex A
(informative)

Alternative reference atmospheres and determination of humidity and density

A.1 Introduction

This annex provides two additional categories of reference atmospheres for informative purposes only. In addition, equations for calculating humidity and density are also included.

A.2 Description and application of alternative reference atmospheres

A.2.1 Conversion reference atmosphere

The conversion reference atmosphere is a reference atmosphere whose pressure is considered to be atmospheric pressure at sea level, whose temperature is typically considered to be room temperature and whose relative humidity is calculated to be equivalent to that existing at the conditions at which the conversion originates (see Table A.1). The conversion reference atmosphere is considered to be the most accurate for pressure conversions and density calculations.

A.2.2 Engineering reference atmosphere

The engineering reference atmosphere is a reference atmosphere whose pressure is rounded off to a number that provides for very convenient calculations, whose temperature is typically considered to be room temperature and whose relative humidity is assumed to be 0 %. The engineering reference atmosphere is typically used in cases where the effect of relative humidity is ignored.

A.3 Specification of alternative reference atmospheres

The conversion reference atmosphere and engineering reference atmosphere are as defined in Table A.1.

Table A.1 – Definitions of conversion reference atmosphere and engineering reference atmosphere

Type of alternative reference atmosphere	Pressure	Temperature	Relative humidity
Conversion reference atmosphere (ACR – RH %)	760 mm Hg absolute 100,96 kPa[a] (1,009 6 bar)	20 °C	Equivalent to that existing at the conditions at which the conversion originates
Engineering reference atmosphere (AER)	100 kPa (1 bar)	20 °C	0 %

[a] The value of 100,96 kPa is a conversion from 760 mm Hg, using the density of Hg at 20 °C.