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**Pneumatic fluid power — Cylinders,  
1 000 kPa (10 bar) series — Mounting  
dimensions of rod-end spherical eyes**

*Transmissions pneumatiques — Vérins, série à 1 000 kPa (10 bar) —  
Dimensions d'interchangeabilité des tenons à rotule d'extrémité de tige*

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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](http://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](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 3, *Cylinders*.

This fourth edition cancels and replaces the third edition (ISO 8139:2009), which has been technically revised.

The changes compared to the previous edition are as follows:

- The normative references have been updated.

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](http://www.iso.org/members.html).

## Introduction

In pneumatic fluid power systems, power is transmitted and controlled through a gas under pressure within a circuit.

One component of such systems is the pneumatic fluid power cylinder. This is a device that converts power into linear mechanical force and motion. It consists of a movable element, i.e. a piston and piston rod, operating within a cylindrical bore.

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# Pneumatic fluid power — Cylinders, 1 000 kPa (10 bar) series — Mounting dimensions of rod-end spherical eyes

## 1 Scope

This document specifies the mounting dimensions required for interchangeability of rod-end spherical eyes of pneumatic cylinders. The rod-end spherical eyes have been designed specifically for use with 1 000 kPa [10 bar<sup>1)</sup>] series cylinders manufactured in accordance with ISO 6432 and ISO 15552, but this does not limit their application.

The spherical bearing end eyes are used on piston rods of pneumatic cylinders for mechanically transmitting the cylinder force under oscillatory rotational and tilting movements. The design of the rod-end spherical eyes is based on the maximum forces resulting from the specified internal diameter of the cylinders and pressure according to ISO 6432, ISO 15552 and ISO 21287.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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*

ISO 6099, *Fluid power systems and components — Cylinders — Identification code for mounting dimensions and mounting types*

## 3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

## 4 Mounting dimensions

The identification code for mounting dimensions and mounting types is in accordance with ISO 6099.

See [Figure 1](#) and [Table 1](#) for mounting dimensions.

1) 1 bar = 100 kPa = 10<sup>5</sup> Pa; 1 Pa = 1 N/m<sup>2</sup>.

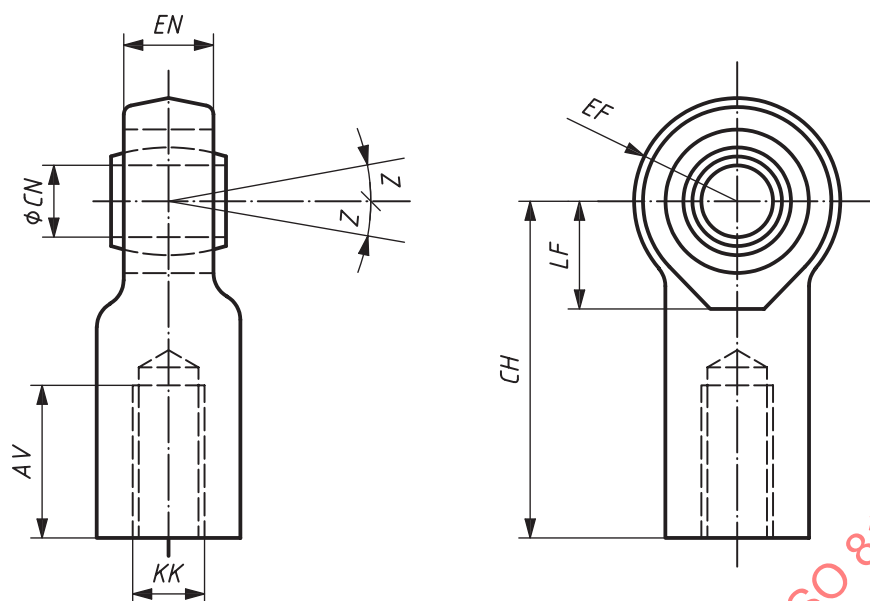


Figure 1 — AP6 — Rod-end spherical eyes

Table 1 — Dimensions of AP6 — Rod-end spherical eyes

Dimensions in millimetres

<i>KK</i>	<i>CN</i>	<i>EN</i>	<i>CH</i>	<i>LF</i>	<i>EF</i>	<i>AV</i>	<b>Tilting angle <i>Z</i> min. degree</b>
	H9	h12		min.	max.	min.	
M4	5	8	27	10	9	10	4
M6	6	9	30	11	10	12	
M8	8	12	36	13	12	16	
M10 × 1,25	10	14	43	15	14	20	
M12 × 1,25	12	16	50	17	16	22	
M16 × 1,5	16	21	64	22	21	28	
M20 × 1,5	20	25	77	26	25	33	
M27 × 2	30	37	110	36	35	51	
M36 × 2	35	43	125	41	40	56	
M42 × 2	40	49	142	46	45	60	
M48 × 2	50	60	160	59	58	65	

## 5 Application instructions

### 5.1 Installation

**5.1.1** Usually a tolerance of m6 (see ISO 286-2) is used for the shaft fitting the spherical plain bearing bore.

However, in exceptional cases (for example cylinder installation difficulties), a tolerance of f7 can be admitted. In this instance, a case-hardened shaft is recommended as movement occurs between the shaft and the bearing bore. Lubrication shall then be effected through the shaft.



**5.1.2** The specified tilting angle of  $\pm 4^\circ$  can still be obtained when the clevis inner faces abut the side faces of the inner ring of the spherical plain bearing.

**5.1.3** The rod-end spherical eyes shall be locked with a locking nut.

## **5.2 Bearing life**

**5.2.1** The life of the spherical plain bearing is influenced by many factors such as specified load, direction of load, angle of oscillation, type of lubricant and frequency of lubrication.

**5.2.2** The spherical plain bearings are designed to give an acceptable bearing life under normal operating conditions.

**5.2.3** When a constant unidirectional load is applied or other unusual operating conditions exist, consultation with the supplier is recommended.

## **5.3 Lubrication**

**5.3.1** Sufficient lubrication shall be provided for the satisfactory performance of the rod-end spherical eyes.

**5.3.2** The method and frequency of such lubrication depend on the particular operating conditions.

## **6 Example of ordering designation**

A rod-end spherical eye with a bore of  $CN = 20$  mm and steel-on-steel surface shall be designated as follows:

**AP6** ISO 8139:—, 20

## **7 Identification statement (reference to this document)**

It is strongly recommended to manufacturers who have chosen to conform to this document that the following statement be used in test reports, catalogues and sales literature:

*“Pneumatic cylinder rod-end spherical eye mounting dimensions in accordance with ISO 8139:—, Pneumatic fluid power — Cylinders, 1 000 kPa (10 bar) series — Mounting dimensions of rod-end spherical eyes.”*