INTERNATIONAL STANDARD

ISO 29262

First edition
2011-03-01

Production equipment for microsystems — Interface between end effector and handling system

Équipement de production pour systèmes microtechniques — Interface entre outil et dispositif de manipulation

Reference number
ISO 29262:2011(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword iv

Introduction v

1 Scope 1

2 Normative references 1

3 Terms and definitions 2

4 General 3

5 Interface definitions 4
5.1 Coordinate system 4
5.2 Layer 1 — Mechanical interface 4
5.3 Layer 2 — Service interface 8
5.4 Layer 3 — Bus interface part 11
5.5 Tolerances 14
5.6 Load-bearing capacities 14
5.7 Designation 15

Annex A (normative) **Tests procedure for fixation interface, p_R** 16

Bibliography 17

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 29262 was prepared by Technical Committee ISO/TC 39, *Machine tools*.

Introduction

This International Standard specifies requirements for an interface between end effector and handling systems, or between functional modules in production equipment for microsystems. In production equipment for precision and microsystem technology, it is necessary for tools and end effectors to be replaced frequently because of small production runs. Interfaces for macroscopic handling systems, standardized according to ISO 9409-1 or ISO 9409-2 for instance, cannot be considered because of the small dimensions of the parts processed and, thus they are unsuitable for use as interface for end effectors and tools in micro and precision mechanics. This International Standard defines, in addition to the mechanical interface, the position and specification of the feedthroughs for fluidic and electrical coupling elements. An extra feature of this International Standard that differs from other standards in use is a central opening to permit the observation of the production or assembly process.

Production equipment for microsystems — Interface between end effector and handling system

1 Scope

This International Standard specifies provisions for the interface between end effector and handling systems in production equipment for microsystems. It specifies principal deviations, tolerances and designations for manually and automatically changeable end effectors. The aim is to specify the end effector interface in three levels with an increasing degree of specification.

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 286-1, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 1: Basis of tolerances, deviations and fits*

ISO 286-2, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 2: Tables of standard tolerance classes and limit deviations for holes and shafts*

ISO 1101, *Geometrical Product Specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

ISO 3650, *Geometrical Product Specifications (GPS) — Length standards — Gauge blocks*

ISO 8734:1997, *Parallel pins, of hardened steel and martensitic stainless steel (Dowel pins)*

ISO 9409-1, *Manipulating industrial robots — Mechanical interfaces — Part 1: Plates*

ISO 9409-2, *Manipulating industrial robots — Mechanical interfaces — Part 2: Shafts*

ISO 9787, *Manipulating industrial robots — Coordinate systems and motion nomenclatures*

ISO 18265, *Metallic materials — Conversion of hardness values*

ISO/IEC 11801:2002, *Information technology — Generic cabling for customer premises*

ISO/IEC 24702, *Information technology — Generic cabling — Industrial premises*

ISO/IEC 24740, *Information technology — Responsive Link (RL)*

IEC 61131-2, *Programmable controllers — Part 2: Equipment requirements and tests*

IEC 61158 (all parts), *Industrial communication networks — Fieldbus specifications*

IEC 61784 (all parts), *Industrial communication networks — Profiles*

IEC 62026-2, *Low-voltage switchgear and controlgear — Controller-device interfaces (CDIs) — Part 2: Actuator sensor interface (AS-i)*

EN 50295, *Low-voltage switchgear and controlgear — Controller and device interface systems — Actuator Sensor interface (AS-i)*

ANSI/TIA/EIA-568-B.2-2001, *Commercial Building Telecommunications Cabling Standard — Part 2: Balanced Twisted-Pair Cabling Components*

DIN 2269, *Verification of geometrical parameters — Cylindrical measuring pin*[1)]

DIN 32564-1, *Production equipment for micro-systems — Terms and definitions — Part 1: General terms of micro-system technology*[1)]

IEEE 802.3, *IEEE Standard for Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements — Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications*

IEEE 1394, *IEEE Standard for a High Performance Serial Bus*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in DIN 32564-1 and the following apply.

NOTE As DIN 32564-1 is available in German only, it is intended to include the necessary definitions in a future edition.

3.1
end effector interface
interface between end effector and handling system

NOTE This consists of a head plate and an adaptor plate.

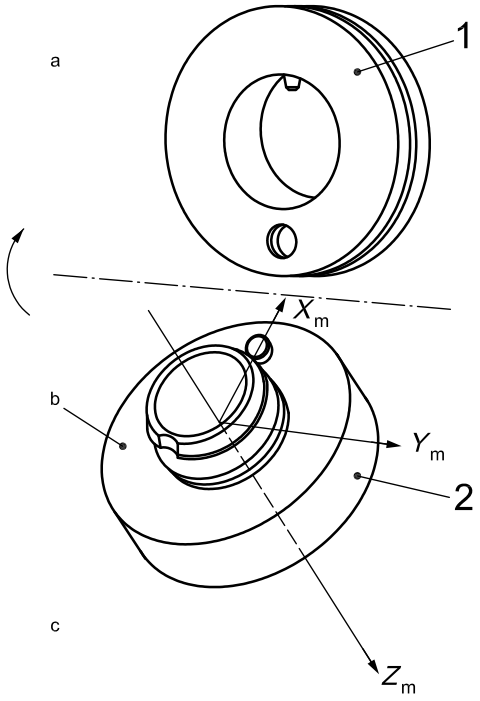
3.2
adaptor plate
part on the end effector side of an end effector interface

See Figure 1.

3.3
head plate
part on the handling system side of an end effector interface

See Figure 1.

1) Available in German only.



Key

1 head plate
2 adaptor plate
a Handling system side.
b Reference plane.
c End effector side.

Figure 1 — Terms relating to the end effector interface

4 General

An end effector interface consists of a handling system side part (head plate) and an end effector side part (adaptor plate). Within the framework of this International Standard, both the adaptor plate and the head plate of the interface are described. The method of locking (manual or automatic) is left to the discretion of the user. The interface specification is subdivided into the following three successive layers with increasing degrees of specification.

a) Layer 1 specifies the mechanical interface part. This includes the position, size and shape of the openings of the adaptor and head plate for the fixation of the end effector.

b) Layer 2 specifies the service interface part. This includes an additional standard configuration of the feedthroughs with electrical and fluidic coupling elements.

c) Layer 3 specifies the bus interface part. This includes the technical specification of the coupling elements (voltage, pressure, etc.) and an additional technical specification (electrical port assignments) for the use of industrial fieldbus interfaces.

The definition of the interface includes five sizes. The nominal size is the outer diameter of the interface in millimetres.

Dimensions in millimetres

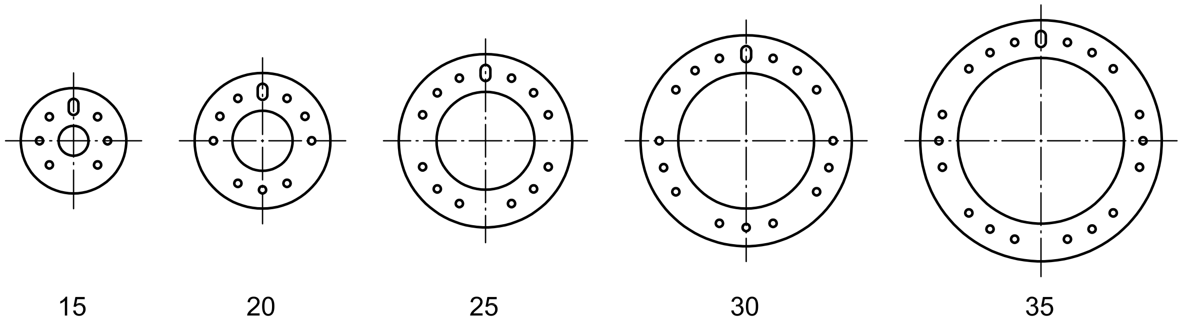


Figure 2 — Nominal sizes 15 mm **to** 35 mm

5 Interface definitions

5.1 Coordinate system

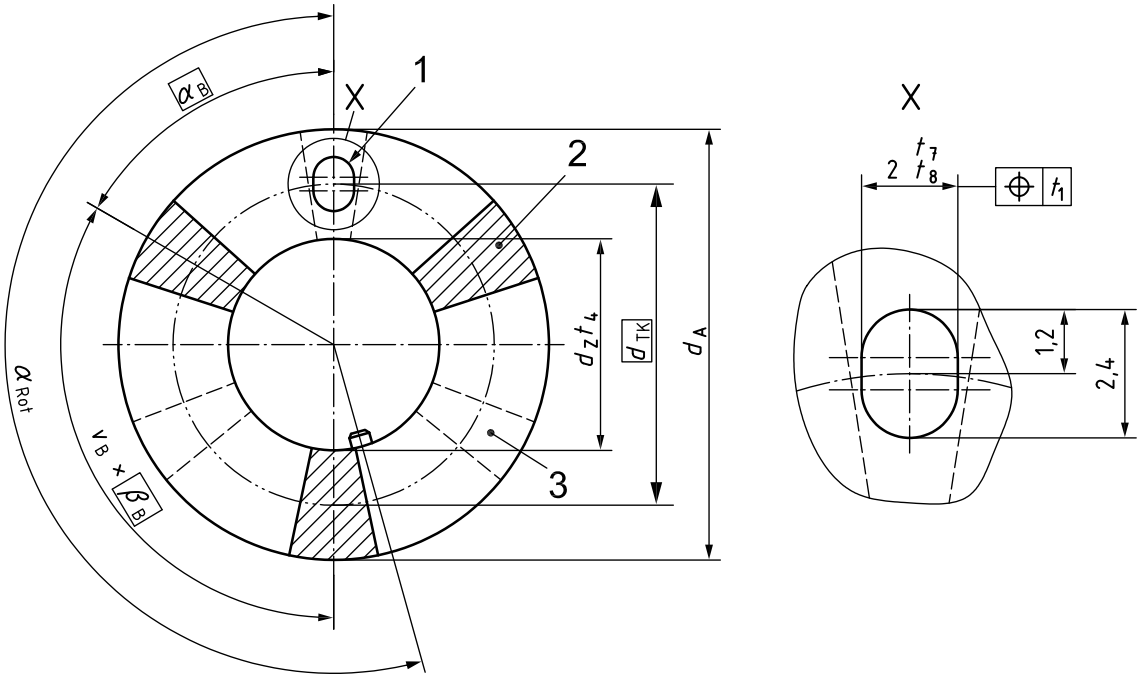
The description is based on the coordinate system in accordance with ISO 9787, as shown in Figure 1. The point of origin of the coordinate system of the mechanical interface is the intersection of the centre-line of the adaptor plate with the reference plane A. The $+Z_m$-axis points away from the origin towards the end effector. The twist lock (cylinder bolt, see 5.2) is located on the $+X_m$-axis.

5.2 Layer 1 — Mechanical interface

Layer 1 specifies position, size and shape of the openings of the adaptor and head plate for fixation.

Figure 3 shows the arrangement determining the position of the angles for mounting and clamping elements. In the event that adaptor plate and end effector are made in one piece, the mounting elements can be omitted.

Dimensions in millimetres



Key

1 twist lock slot; depth 1,1 mm
2 space for mounting elements
3 space for clamping elements

NOTE This is an example of nominal size 20 (see Tables 1 and 2).

Figure 3 — Head plate — Arrangement determining the position of the angles of the holes for mounting and clamping elements

Table 1 — Dimensions of fixation and angular positions of the holes for mounting elements

Dimensions in millimetres

	Nominal size, $\varnothing d_A$				
	15	**20**	**25**	**30**	**35**
Pitch circle diameter, $\varnothing d_{TK}$	10	15	20	25	30
Maximum diameter of centre hole in adaptor plate, $\varnothing d_M$	$2^{+0,1}_{0}$	$7^{+0,1}_{0}$	$12^{+0,1}_{0}$	$17^{+0,1}_{0}$	$22^{+0,1}_{0}$
Nominal diameter of clearance hole in head plate, $\varnothing d_Z$	5	10	15	20	25
Twist lock, long slot (cylinder pin), α/v	0°/1×				
Mounting elements, $\alpha_B / v_B \times \beta_B$	90°/2 × 180°	60°/3 × 120°	45°/4 × 90°	36°/5 × 72°	30°/6 × 60°
Lock against rotation, α_{Rot}	112,5°	195°	146,25°	117°	97,5°
Roller test dimension (for measurement, see Annex A), p_R	7,67 ± 0,01	12,67 ± 0,01	17,67 ± 0,01	22,67 ± 0,01	27,67 ± 0,01
NOTE 1 For the arrangement determining the position of the angles, see Figure 3.					
NOTE 2 α = starting angle/ v = number of repetitions.					