



**International
Standard**

ISO 5686-3

**Polygonal turret interface with flat
contact surface —**

**Part 3:
Coupling for driven tool holders
with shanks of type F and A**

Interfaces de tourelle polygonales avec surface de contact plane —

*Partie 3: Accouplement pour porte-outils entraînés avec des
queues de type F et A*

**First edition
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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 document 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).

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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 29, *Small tools*, Subcommittee SC 9, *Tools with defined cutting edges, holding tools, cutting items, adaptive items and interfaces*.

A list of all parts in the ISO 5686 series can be found on the ISO website.

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.

Polygonal turret interface with flat contact surface —

Part 3:

Coupling for driven tool holders with shanks of type F and A

1 Scope

This document specifies the dimensions of couplings for driven tool holders with polygonal taper shanks with flat contact surface (PTI). These shanks are the tool-side part of the interface to the (in cutting process non-rotating) tool carrier of machine tools (e.g. turret lathes, turning centres).

This document specifies a coupling type that applies to two of the three tool-side interface types defined in ISO 5686-1 (F, A). The tool shanks themselves are designed identically for all types.

- Shank type F has two holes for the coolant supply (F = fluid) on the face contact for use in two installation positions (offset by 180°).
- Shank type A has two holes on the face contact for the primary coolant supply and additional two holes for supplying the tool holder (driven tool) with sealing air (A = air). An installation position offset by 180° is possible. A spring-type straight pin belongs to the holder and avoids incorrect insertion.

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 5686-1, *Polygonal turret interface with flat contact surface — Part 1: Shanks of type F, H and A*

ISO 5686-2, *Polygonal turret interface with flat contact surface — Part 2: Receivers of type F, H, A and X for shanks of type F, H and A*

3 Terms and definitions

No terms and definitions are listed in this document.

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

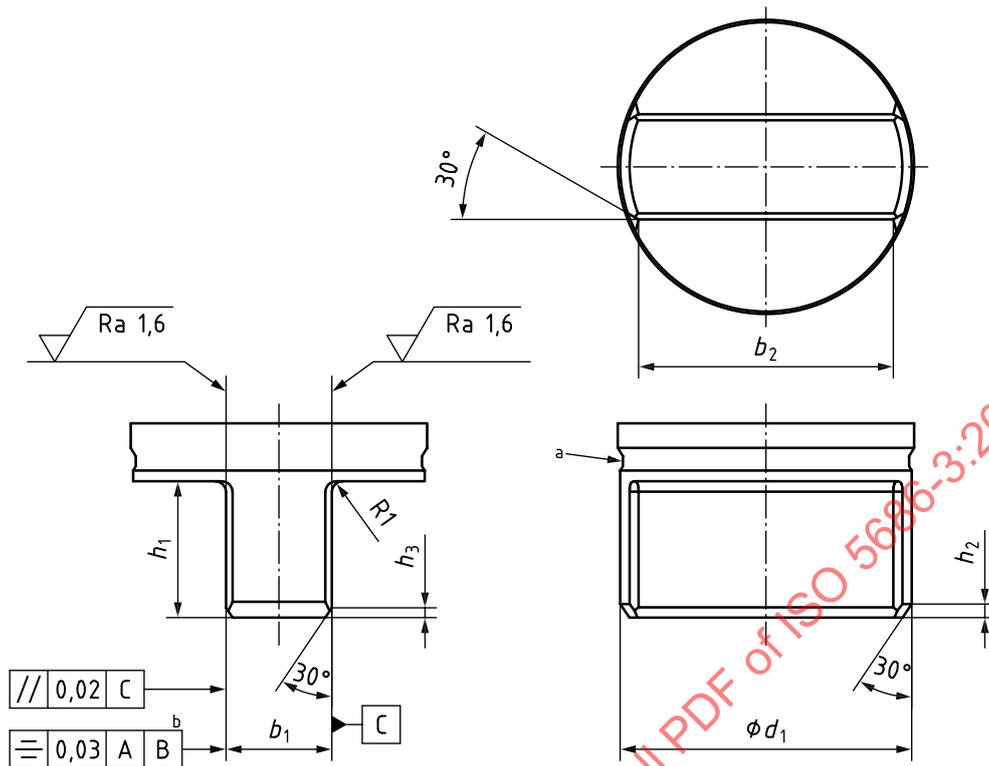
- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Couplings for polygonal taper shanks, dimensions

4.1 General

The dimensions of the coupling type A for driven tool holders with shanks of type F and A are specified in [Figure 1](#). Details, not specified in [Figure 1](#), shall be chosen appropriately.

4.2 Coupling for driven tool holders with polygonal taper shank



a Undercut according to the manufacturer's choice.

b The symmetry tolerance relates to the reference plane A and the reference polygon B from ISO 5686-1 (shanks).

NOTE See [Table 1](#) for all symbols.

Figure 1 — Coupling for driven tool holders with polygonal taper shank

4.3 Dimensions

The dimensions of couplings for driven tool holders with polygonal taper shanks defined in this document shall be in accordance with [Table 1](#).

Table 1 — Coupling for driven tool holders with polygonal taper shank, Type A — Dimensions

Dimensions in millimetres

| Nominal size | 42 | 54 | 65 |
|--------------|--|------|------|
| b_1 | $\begin{matrix} 0 \\ -0,02 \end{matrix}$ | 6 | 8 |
| b_2 | 12,5 | 19,5 | 24 |
| d_1 | g_6 | 15 | 22,5 |
| h_1 | 9 | 11,5 | 13 |
| h_2 | 0,8 | 1,2 | 1,5 |
| h_3 | 0,6 | 0,8 | 1 |

5 Design

5.1 Assignment of PTI-couplings to PTI-shanks

The PTI couplings specified in this document are drive elements for driven tool holders with a polygonal taper shank (PTI). A coupling size is assigned to a specific nominal size of the PTI shank. Dimensional specifications for this assignment can be found in [Annex A](#).

5.2 Low-backlash and backlash-free application

The design of the double flat coupling with the fit size g_6 at diameter d_1 allows the use in turrets with two different drive concepts. If the coupling is only to be swivelled into the operating position, it has a low drive backlash. The drive on the turret side can be provided with a sliding bushing, the inside diameter d_1 of which is given a fitting tolerance H7. This allows the drive to be centred on diameter d_1 for backlash-free operation.

The turret-side drive is not part of the PTI coupling standard. The manufacturer is responsible for the appropriate design of the turret drive.

5.3 Material and heat treatment

Couplings for polygonal taper tool shanks are manufactured from either tempered or case-hardening steel with a core strength of at least 800 N/mm² and a surface hardness of 56+4 HRC.

6 Designation

A coupling for a polygonal taper shank (PTI) in accordance with this document shall be designated by:

- a) coupling for polygonal taper shank,
- b) this document, i.e. ISO 5686-3,
- c) PTI,
- d) nominal PTI size, in millimetre (e.g. 65), corresponding to dimension d_1 of the PTI shank/receiver standards (i.e. ISO 5686-1 and ISO 5686-2),
- e) width of coupling b_1 (e.g. 10 mm), corresponds to dimension b_1 of this document.

EXAMPLE A coupling for polygonal taper shank (PTI), size 65, is designated as follows:

Coupling for polygonal taper shank ISO 5686-3 — PTI-65-10

Annex A
(informative)

Application of PTI types in turret lathes

The various PTI types in ISO 5686-1 are preferably applied for stationary and driven tool holders that are used in lathes. [Table A.1](#) shows the assignment between the type of tool holder and its associated PTI embodiments. The assignments apply to all PTI nominal sizes.

Table A.1 — PTI types for stationary and driven tool holders

| Tool holder version | PTI-type | | |
|---------------------------|----------|-------|-------|
| | PTI-F | PTI-H | PTI-A |
| Static tool holder | x | x | – |
| Driven tool holder | x | – | x |
| x standardized | | | |
| – not defined | | | |

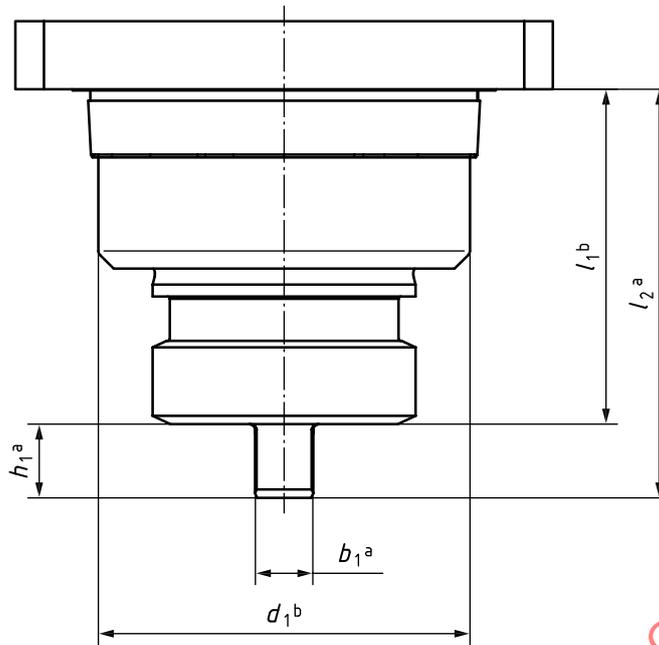
The four holder types (PTI-F stationary, PTI-H stationary, PTI-F driven, PTI-A driven) can be combined with the four PTI receiver types (PTI-F, PTI-H, PTI-A, PTI-X). [Table A.2](#) shows the assignment of the PTI holder to the PTI receiver, including an evaluation of the possible combinations.

In addition to a combination with a complete function (xx) on the tool holder, a possible combination with a restricted function on the tool holder (x) is given. The identifier (o) describes a combination that cannot be implemented.

Table A.2 — Relationship between PTI tool holder types and PTI receiver types

| PTI-receiver type | PTI-tool holder type (stationary) | | PTI-tool holder type (driven) | |
|---|-----------------------------------|-------|-------------------------------|-------|
| | PTI-F | PTI-H | PTI-F | PTI-A |
| PTI-F | xx | x | xx | o |
| PTI-H | xx | xx | xx | o |
| PTI-A | xx | x | xx | xx |
| PTI-X | xx | xx | xx | xx |
| xx main application, complete function usable | | | | |
| x fitting compatibility, function restricted | | | | |
| o not applicable | | | | |

Driven tool holders of types PTI-F and PTI-A are equipped with drive couplings, which are described in this document. There is a defined relationship between the nominal size of the PTI shanks with the nominal diameter d_1 and the coupling dimensions (b_1, h_1), shown in [Figure A.1](#). In addition, the dimension l_2 is described, which identifies the coupling in mounting position on a PTI holder. Driven PTI tool holders are only equipped with PTI couplings. The turret coupling drives themselves are not part of this document.



- a Dimension of the PTI coupling, see [Table 1](#).
- b Dimension of the PTI shank, see ISO 5686-1.

Figure A.1 — PTI coupling for driven tool holders with PTI shank

[Table A.3](#) shows the l_2 dimensions for all three nominal sizes as control dimensions for the coupling mounted in the driven tool holder.

Table A.3 — Dimensions of PTI-coupling in mounting position

| nominal sizePTI-shank (size) | 42 | 54 | 65 |
|---|-----------|----|----|
| PTI-coupling (size)/ coupling dimension b_1 (mm) | 6 | 8 | 10 |
| l_2 (mm) | $\pm 0,2$ | 47 | 60 |