

DIN 32711-1

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Together with
DIN 32711-2:2009-03,
supersedes
DIN 32711:1979-03

**Shaft-to-hub connection –
P3G polygon profile –
Part 1: General information and geometry
English translation of DIN 32711-1:2009-03**

Welle-Nabe-Verbindung –
Polygonprofil P3G –
Teil 1: Allgemeines und Geometrie
Englische Übersetzung von DIN 32711-1:2009-03

Liaison arbre moyeu –
Polygon profilé P3G –
Partie 1: Généralités et géométrie
Traduction anglaise de DIN 32711-1:2009-03

Document comprises 10 pages

Translation by DIN-Sprachendienst.

In case of doubt, the German-language original shall be considered authoritative.



A comma is used as the decimal marker.

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Foreword

This standard has been prepared by Working Committee NA 060-34-32 AA of Section *Antriebstechnik* of the *Normenausschuss Maschinenbau* (Mechanical Engineering Standards Committee).

The polygon shaft-hub connections serve to transmit torques between machine components. They are suitable for permanent and/or repeatedly detachable connections, as well as for interference fits.

The original version of this standard, DIN 32711, was published in March 1979. As this was before the rapid spread of NC machining technology, the standard was based on the kinematics of a mechanically-controlled polygon grinding machine made by a German manufacturer. This meant that it was not absolutely necessary to include the equation in the standard. Now that it is possible to produce polygon-profile shafts and hubs on a variety of CNC machine tools, this omission has become apparent and therefore the standard has been revised.

The present standard is a revised version of the 1979 edition of DIN 32711. It takes into account technological progress made since then, particularly developments in the field of NC machining. For this reason, the fundamental mathematical principles of polygon profiles required for writing NC programs have now been added to the standard.

In the process of revising the standard for P3G polygon profiles, it was subdivided into two parts.

Part 1 contains information on the profile geometry, in particular the equations required for NC-supported production processes.

Part 2 contains data which designers require to calculate the dimensions of polygon joints. The classical calculation model described here should be replaced in due course by other formulae corresponding to the respective state of engineering practice.

Great importance has been placed on ensuring the interchangeability of the parts manufactured in accordance with the standard.

This standard comprises the following parts:

- *Part 1: General information and geometry*
- *Part 2: Calculation of mechanical properties and dimensions*

Amendments

This standard differs from DIN 32711:1979-03 as follows:

- a) the mathematical definition of the profile curve has been added;
- b) Figures 3 and 4 have been added;
- c) the standard has been divided into two parts;
- d) nominal sizes have been extended to 180 mm;
- e) editorial revisions have been made.

Previous editions

DIN 32711: 1979-03

1 Scope

This standard specifies the dimensions and geometry definitions of P3G polygon connections.

The scope of this standard extends to industrial products, e.g. those used in general engineering, and in machine tool, motor vehicle and aircraft construction, as well as in the electronics industry.

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 document (including any amendments) applies.

DIN 32711-2, *Shaft-to-hub connection — P3G polygon profile — Part 2: Calculation of mechanical properties and dimensions*

DIN ISO 286-1, *ISO system of limits and fits — Bases of tolerances, deviations and fits*

DIN ISO 286-2, *ISO system of limits and fits — Tables of standard tolerance grades and limit deviations for holes and shafts*

3 Characteristics of P3G polygon connections

The P3G polygon profile is a uniform-thickness profile (G in the designation is the abbreviation for the German word “*Gleich*”, meaning equal or uniform). It represents a special form of the trochoid and has the following characteristic features:

- the P3G polygon profile is a harmonic curve;
- it leads to low notch effects or no notch effect at all;
- higher torques can be transmitted than by other shape-interlocking shaft-hub connections;
- self-centring of hub and shaft when torque is applied;
- cost-effective manufacturing when the polygon profile and sections with circular cross-sections of one and the same part can be machined without having to re-clamp the workpiece;
- no room for tool movement or withdrawal is required, i.e. the polygon profile may follow directly after a shaft collar;
- the P3G profiles are not suitable for connections that need to permit longitudinal movement while transmitting a torque.

4 Geometry definitions

A polygon curve is described by the following equations:

- in parameter form in Cartesian coordinates

$$x(\alpha) = [R_m - e \cdot \cos(3 \cdot \alpha)] \cdot \cos(\alpha) - 3 \cdot e \cdot \sin(3 \cdot \alpha) \cdot \sin(\alpha)$$

$$y(\alpha) = [R_m - e \cdot \cos(3 \cdot \alpha)] \cdot \sin(\alpha) + 3 \cdot e \cdot \sin(3 \cdot \alpha) \cdot \cos(\alpha)$$