
**Cylindrical gears for general and heavy
engineering — Standard basic rack tooth
profile**

*Engrenages cylindriques de mécanique générale et de grosse
mécanique — Tracé de référence*

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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.

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.

International Standard ISO 53 was prepared by Technical Committee ISO/TC 60, *Gears*.

This second edition cancels and replaces the first edition (ISO 53:1974), which has been technically revised.

Annex A of this International Standard is for information only.

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Cylindrical gears for general and heavy engineering — Standard basic rack tooth profile

Scope

This International Standard specifies the characteristics of the standard basic rack tooth profile for cylindrical involute gears (external or internal) for general and heavy engineering.

This International Standard applies to the standardized modules specified in ISO 54.

The defined profile does not take into account the possible cut-off of the height of internal teeth. This height is to be calculated for each case.

The standard basic rack tooth profile defined in this International Standard constitutes a geometrical reference for a system of involute gears in order to fix the sizes of their teeth. It does not constitute a definition of a cutter, but a cutter may be defined from this standard basic rack tooth profile in order to realize a conforming profile.

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2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 54:1996, *Cylindrical gears for general and for heavy engineering — Modules*.

ISO 1122-1:1998, *Vocabulary of gear terms — Part 1: Definitions related to geometry*.

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 1122-1 and the following apply.

3.1

standard basic rack tooth profile

tooth profile normal section through the teeth of a basic rack which corresponds to an external gear with number of teeth $z = \infty$ and diameter $d = \infty$

Figure 1.

NOTE — The tooth of the standard basic rack tooth profile is bounded by the tip line at the top and by the parallel root line at the bottom. The fillet between the straight part of the profile and the root line is a circular arc with a radius equal to ρ_{IP} .

3.2

mating standard rack tooth profile

rack tooth profile symmetrical to the standard basic rack tooth profile about the datum line P-P and displaced by half a pitch relative to it

Figure 1.

4 Symbols and units

See table 1.

Table 1 — Symbols and units

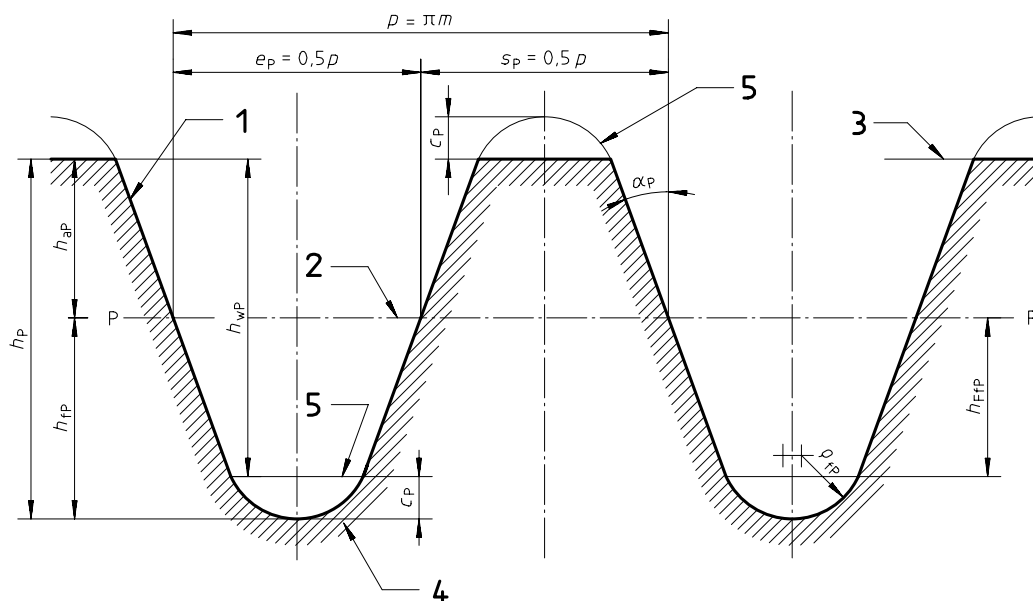
Symbol	Description	Unit
c_p	Bottom clearance between standard basic rack tooth and mating standard basic rack tooth	mm
e_p	Spacewidth of standard basic rack	mm
h_{aP}	Addendum of standard basic rack tooth	mm
h_{iP}	Dedendum of standard basic rack tooth	mm
h_{fIP}	Straight portion of the standard basic rack tooth dedendum	mm
h_p	Tooth depth of standard basic rack	mm
h_{wP}	Common depth of standard basic rack and mating standard basic rack tooth	mm
m	Module	mm
p	Pitch	mm
s_p	Tooth thickness of standard basic rack tooth	mm
U_{fP}	Size of undercut	mm
α_{fP}	Angle of undercut	degrees
α_p	Pressure angle	degrees
ρ_{iP}	Fillet radius of the basic rack	mm

5 Standard basic rack tooth profile

5.1 The characteristics of the standard basic rack tooth profile are given in figure 1 and table 2. Additional basic rack recommendations and applications are given in annex A.

5.2 The standard basic rack tooth profile with module m has a pitch $p = \pi m$.

5.3 The flanks of the standard basic rack tooth profile are straight for the section h_{aP} plus h_{fIP} .

**Key**

- 1 Standard basic rack profile
- 2 Datum line
- 3 Tip line
- 4 Root line
- 5 Mating standard basic rack tooth profile

Figure 1 — Standard basic rack tooth profile and mating standard basic rack tooth profile

Table 2 — Standard basic rack proportions

Item	Standard basic rack value
α_P	20°
h_{aP}	1 <i>m</i>
c_P	0,25 <i>m</i>
h_{fP}	1,25 <i>m</i>
ρ_{fP}	0,38 <i>m</i>

5.4 On the line P-P the tooth thickness is equal to the space-width, i.e. half the pitch.

$$s_P = e_P = \frac{p}{2} = \frac{\pi m}{2} \quad (1)$$

where

- s_P is the tooth thickness of standard basic rack tooth;
- e_P is the spacewidth of standard basic rack;
- p is the pitch;
- m is the module.