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# Basic rack tooth profiles

for involute teeth of cylindrical gears
for general engineering and heavy engineering

DIN 867

Bezugsprofile für Evolventenverzahnungen an Stirnrädern (Zylinderrädern) für den allgemeinen Maschinenbau und den Schwermaschinenbau

Supersedes September 1974 edition.

*In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.*

See Explanatory notes for connection with International Standard ISO 53-1974 published by the International Organization for Standardization (ISO).

## 1 Scope and field of application

This standard lays down rules for the basic rack tooth profile to be preferred for involute teeth of cylindrical gears for general and heavy engineering. It shall be used predominantly for cylindrical gears as specified in DIN 3960 with module $m_n$ from 1 mm to 70 mm.

The basic rack tooth profile as specified in DIN 58 400 shall preferably be used for teeth in precision engineering (0,1 mm to 1 mm module).

## 2 Symbols, quantities, units

Consistent with the provisions of DIN 3960 (June 1984 draft), the following symbols and quantities are used in the present standard.

| Symbol | Quantity | Unit |
|---|---|---|
| $c_P$ | Bottom clearance between basic rack tooth profile and counterpart tooth profile | mm |
| $c_P^*$ | Bottom clearance coefficient | – |
| $e_P$ | Space width of basic rack tooth profile | mm |
| $h_{aP}$ | Addendum of basic rack tooth profile | mm |
| $h_{aP}^*$ | Addendum coefficient | – |
| $h_{fP}$ | Dedendum of basic rack tooth profile | mm |
| $h_{fP}^*$ | Dedendum coefficient | – |
| $h_{wP}$ | Common tooth depth of basic rack and counterpart rack tooth profiles | mm |
| $h_{wP}^*$ | Common tooth depth coefficient | – |
| $h_{FfP}$ | Root form depth of basic rack tooth profile | mm |
| $h_P$ | Tooth depth of basic rack tooth profile | mm |
| $h_P^*$ | Tooth depth coefficient | – |
| $m$ | Module | mm |
| $p$ | Pitch | mm |
| $s_P$ | Tooth thickness of basic rack tooth profile | mm |
| $\alpha_P$ | Pressure angle | ° |
| | Angle given in formulae | rad |
| $\varrho_{aP0}$ | Tip rounding radius of tool basic rack tooth profile | mm |
| $\varrho_{fP}$ | Fillet radius of basic rack tooth profile | mm |
| $\varrho_{fP}^*$ | Fillet radius coefficient | – |

## 3 Basic rack tooth profiles

### 3.1 Basic rack tooth profile of a cylindrical gear

The basic rack tooth profile for the involute teeth of a cylindrical gear has straight flanks, which extend up to the addendum line and down to the fillet radius and tooth root (see figure 1).

### 3.2 Datum line (PP), addendum line, dedendum line

The datum line is that straight line on which the tooth thickness is equal to the space width or half the pitch:

$$s_P = e_P = p/2 \quad (1)$$

The basic rack tooth profile is enclosed by the addendum line which runs parallel with the datum line and the dedendum line which runs parallel with the latter.

The basic rack tooth profiles of the cutting tool have been derived from the basic rack tooth profile of the teeth (see DIN 3972).

### 3.3 Basic rack tooth profile of the mating gear (counterpart rack tooth profile)

The basic rack tooth profile of the mating gear (counterpart rack tooth profile) is equal to the cylindrical gear basic rack tooth profile folded through 180° around the datum line and displaced by half a pitch along this line. The counterpart rack tooth profile shall engage with its teeth in the tooth spaces in the basic rack tooth profile of the cylindrical gear.

The teeth of the gear and mating gear as specified in this standard thus have the same basic rack tooth profile.

## 4 Features of the basic rack tooth profile

The dimensions of the basic rack tooth profile shall be nominal dimensions.

### 4.1 Module, pitch

The module, $m$, is a length which determines the size of the basic rack tooth profile and thus of the associated cylindrical gear teeth.

All linear sizes of the basic rack tooth profile can also be specified as a multiple of the module; the corresponding factors are additionally identified by an asterisk (*).

The basic rack tooth profile of module $m$ has the pitch

$$p = \pi \cdot m. \quad (2)$$

### 4.2 Pressure angle

The pressure angle, $\alpha_P$, is formed by the straight flanks and a line perpendicular to the datum line.

The two flanks of a tooth are symmetrical about the midline of the tooth.

$\alpha_P$ is equal to 20° for a basic rack tooth profile as specified in this standard.

Continued on pages 2 and 3



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