DIN 8000:2025-02 (E)

Hobs - Design dimensions and deviations of hobs for involute gears

Contents

Page

Foreword ... 5

1 Scope ... 6

2 Normative references ... 6

3 Terms and definitions, symbols and abbreviated terms ... 6
3.1 Terms and definitions ... 6
3.2 Symbols and abbreviations ... 8

4 Explanation of terms ... 13
4.1 Principles ... 13
4.2 Designations of hob parts and elements ... 14
4.2.1 Hob axis ... 14
4.2.2 Basic geometry ... 15
4.2.3 Enveloping helix, number of starts and direction of starts ... 16
4.2.4 Gashes ... 16
4.2.5 Numbering ... 16
4.3 Designation of hob tooth parts ... 18

5 Design dimensions ... 18
5.1 Pitch cylinder ... 18
5.2 Reference cylinder ... 18
5.3 Basic rack tooth profile ... 19
5.4 Base cylinder ... 20
5.5 Enveloping helix ... 21
5.5.1 General ... 21
5.5.2 Lead angle ... 21
5.5.3 Lead height and lead height from cutting edge to cutting edge ... 21
5.5.4 Pitch ... 22
5.5.5 Relieving ... 23
5.6 Gashes ... 23
5.6.1 General ... 23
5.6.2 Gash lead and gash angle ... 23
5.6.3 Gash pitch ... 24
5.6.4 Tip rake angle and rake face offset ... 24
5.6.5 Re-grind angle ... 25
5.7 Form of the hob tooth ... 26
5.7.1 General ... 26
5.7.2 Tooth height ... 26
5.7.3 Tooth thickness and gap width ... 26
5.7.4 Fillet at the tooth tip ... 28
5.7.5 Fillet at the root ... 28
5.7.6 Profile angle and pressure angle ... 28

6 Deviations ... 30
6.1 Deviation, tolerance, variation ... 30
6.2 Measuring axis ... 30
6.3 Test surfaces ... 30
6.3.1 General ... 30
6.3.2 Indicator hub radial run-out deviation ... 30

6.3.3 Axial run-out deviation at the clamping face ... 31
6.4 Enveloping helix ... 31
6.4.1 Deviation of the lead height ... 31
6.4.2 Deviation of the thread pitch ... 32
6.5 Gashes ... 33
6.5.1 Gash lead deviations ... 33
6.5.2 Gash pitch deviations ... 34
6.5.3 Rake face ... 36
6.6 Hob gearing, tooth form ... 37
6.6.1 Radial run-out deviation at tooth tips ... 37
6.6.2 Tooth thickness deviations of a hob tooth ... 37
6.6.3 Transverse pitch deviations ... 38
6.6.4 Axial pitch deviation ... 38
6.6.5 Profile deviation of a cutting edge ... 38
6.6.6 Base pitch deviation ... 42
Bibliography ... 43

Figures

Figure 1 — Basic hob geometry (multi-start, helically grooved) ... 13
Figure 2 — Bore-type hobs ... 14
Figure 3 — Shaft-type hobs ... 14
Figure 4 — Monobloc hob ... 14
Figure 5 — Rake face with carbide insert ... 14
Figure 6 — Indexable inserts ... 14
Figure 7 — Notation of basic hob geometry ... 15
Figure 8 — Notation of basic hob geometry ... 16
Figure 9 — Numbering of tooth segments and teeth on a single-start hob (i gashes) ... 17
Figure 10 — Unwound pitch cylinder envelope surface with numbering on a multi-start hob ... 17
Figure 11 — Designation of hob tooth parts ... 18
Figure 12 — Hobs — Non-modified basic rack tooth profile ... 19
Figure 13 — Hob basic rack tooth profile with protuberance and tip chamfer ... 20
Figure 14 — Design dimensions of the enveloping helix ... 21
Figure 15 — Lead height Δp_{z0} from cutting edge to cutting edge ... 22
Figure 16 — Radial relieving h_r of the tip flanks ... 23
Figure 17 — Gash pitch p_{N0} ... 24
Figure 18 — Tip rake angle γ_{Sa} ... 24
Figure 19 — Rake face offset u = 0 mm ... 25
Figure 20 — Rake face offset u > 0 mm, positive tip rake angle ... 25
Figure 21 — Re-grind angle ε and useful segment length S_A ... 26
Figure 22 — Partially developed pitch cylinder of a hob ... 27
Figure 23 — Axis section through a helical-gashed hob and its enveloping helix ... 30

Figure 24 — Testing the radial run-out at the indicator hubs and the axial run-out at the clamping faces **31**
Figure 25 — Individual and total deviation of the lead height **31**
Figure 26 — Measurement teeth for checking the thread pitch **33**
Figure 27 — Thread pitch deviations (example: 4-start hob) **33**
Figure 28 — Gash lead deviation F_{pzN0} **34**
Figure 29 — Measurement teeth for checking gash pitch (example: 6 gashes and 4-start enveloping helix) **35**
Figure 30 — Test diagrams for gash pitch **35**
Figure 31 — Determining the rake face and evaluation using the test diagram **36**
Figure 32 — Radial run-out deviation at the tooth tip **37**
Figure 33 — Determination of the axial pitch deviation **38**
Figure 34 — Methods of determining a cutting edge **39**
Figure 35 — Profile deviation in the axis section of the enveloping helix **39**
Figure 36 — Evaluation of the profile deviation **39**
Figure 37 — Evaluation of the profile deviation in various profile sections **41**
Figure 38 — Base pitch section **42**
Figure 39 — Engagement test diagram **42**

Tables

Table 1 — Symbols **8**
Table 2 — Indices **12**
Table 3 — Common designations for hob end faces and flank sides **16**
Table 4 — Parameters of the profile section to be evaluated **41**