INTERNATIONAL STANDARD

ISO 12168-2

First edition
2001-12-15

Plain bearings — Hydrostatic plain journal bearings without drainage grooves under steady-state conditions —

Part 2: **Characteristic values for the calculation of oil-lubricated plain journal bearings without drainage grooves**

Paliers lisses — Paliers lisses radiaux hydrostatiques sans rainure d'écoulement fonctionnant en régime stationnaire —

Partie 2: Caractéristiques du calcul pour la lubrification des paliers lisses radiaux sans rainure d'écoulement

Reference number
ISO 12168-2:2001(E)

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this part of ISO 12168 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 12168-2 was prepared by Technical Committee ISO/TC 123, *Plain bearings*, Subcommittee SC 4, *Methods of calculation of plain bearings*.

ISO 12168 consists of the following parts, under the general title *Plain bearings — Hydrostatic plain journal bearings without drainage grooves under steady-state conditions*:

— *Part 1: Calculation of oil-lubricated plain journal bearings without drainage grooves*

— *Part 2: Characteristic values for the calculation of oil-lubricated plain journal bearings without drainage grooves*

Plain bearings — Hydrostatic plain journal bearings without drainage grooves under steady-state conditions —

Part 2:
Characteristic values for the calculation of oil-lubricated plain journal bearings without drainage grooves

1 Scope

This part of ISO 12168 lists, in graphic form, characteristic values used in the calculation of oil-lubricated plain bearings without drainage grooves.

2 Normative reference

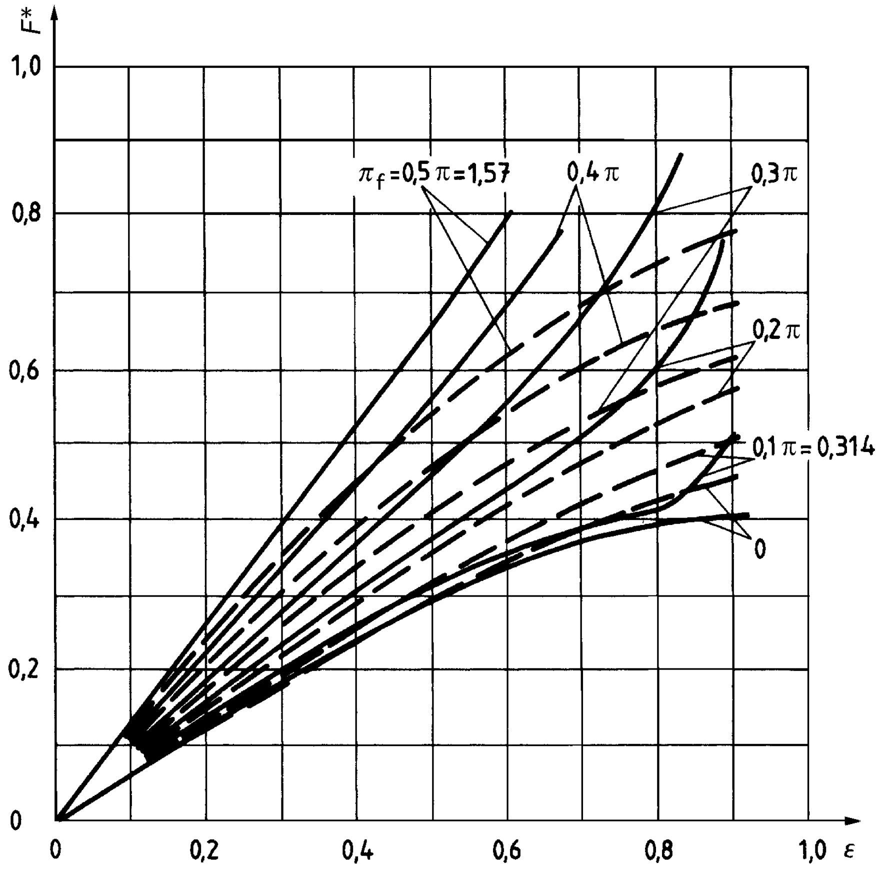
The following normative document contains provisions which, through reference in this text, constitute provisions of this part of ISO 12168. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 12168 are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 12168-1, *Plain bearings — Hydrostatic plain journal bearings without drainage grooves under steady-state conditions — Part 1: Calculation of oil-lubricated plain journal bearings without drainage grooves*

3 Characteristic values

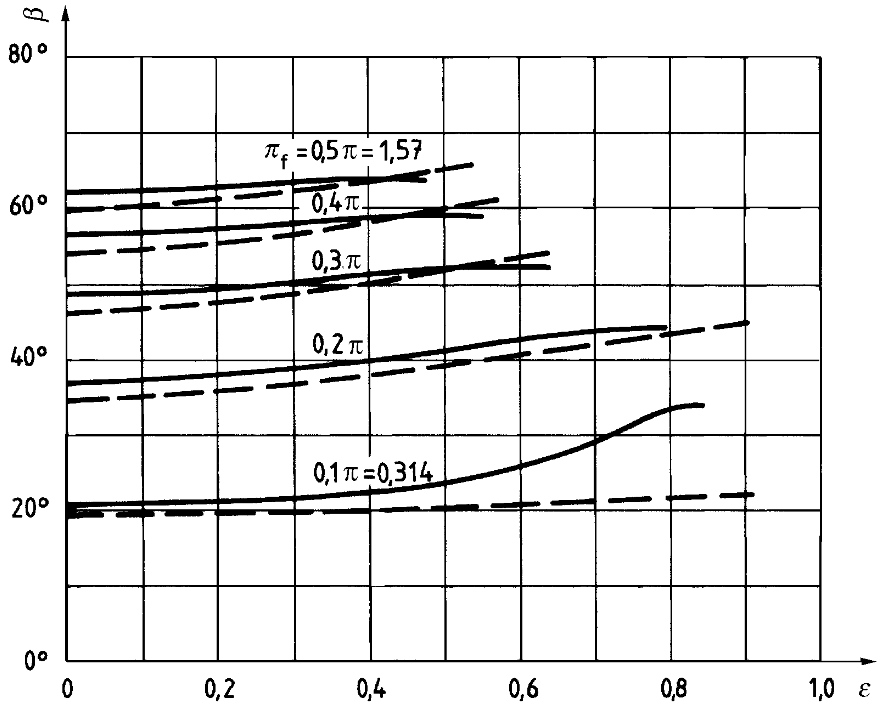
See Figures 1 to 19 and Table 1.

The characteristic values given in this part of ISO 12168 are necessary for the calculation of oil-lubricated hydrostatic plain journal bearings in accordance with ISO 12168-1. They are based on the premises and boundary conditions specified therein. The values required for the calculation can be determined from the diagrams. Explanations concerning the symbols and calculation examples are included in ISO 12168-1. When designing a plain bearing the characteristic values listed in Table 1 can be used for optimized bearings.



------- approximate solution; ——— more precise solution

Figure 1 — Characteristic values of load-carrying capacity F^* as a function of the relative eccentricity ε for different relative frictional pressures π_f and four recesses, B/D = 1; l_{ax}/B = 0,16; l_c/B = 0,26; ξ = 1; α = 0 [1]



------- approximate solution; ——— more precise solution

Figure 2 — Attitude angle β as a function of the relative eccentricity ε for different relative frictional pressures π_f and four recesses, l_{ax}/B = 0,16; l_c/B = 0,26; B/D = 1; ξ = 1; α = 0 [1]

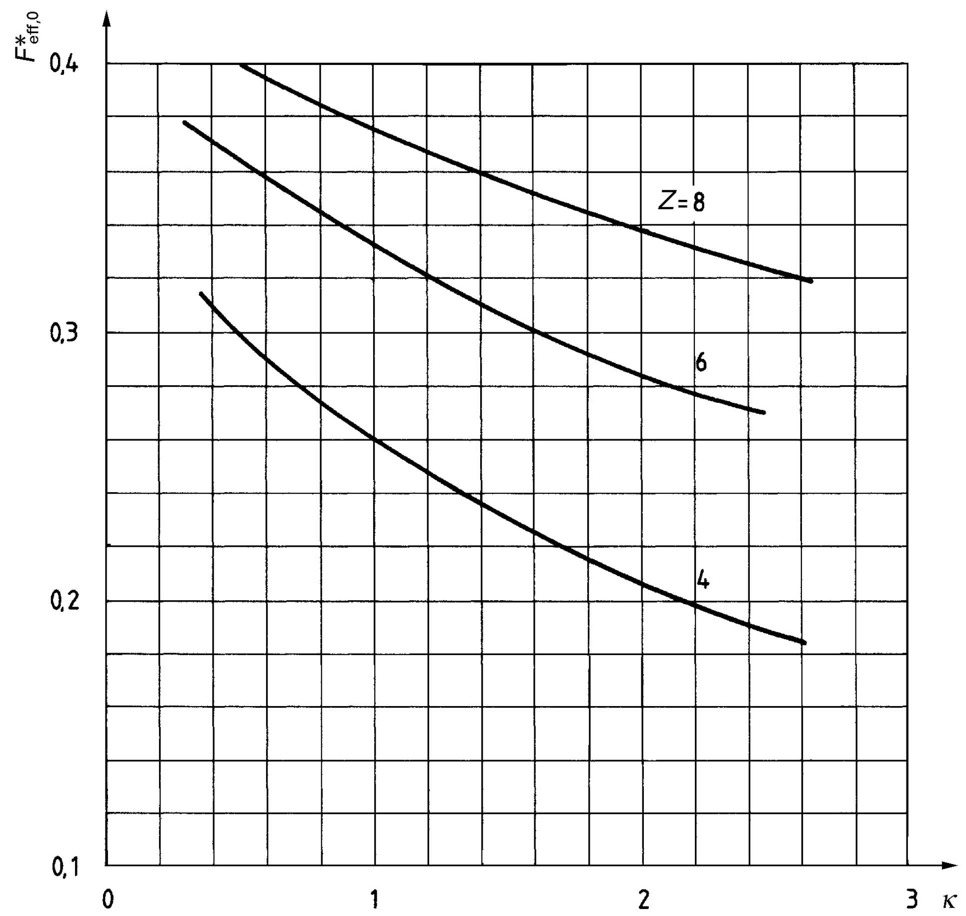


Figure 3 — Characteristic values of load-carrying capacity $F^*_{eff,0}$ for a relative eccentricity ε = 0,4 as a function of the resistance ratio κ and for different numbers of recesses Z, α = 0; ω = 0; ξ = 1

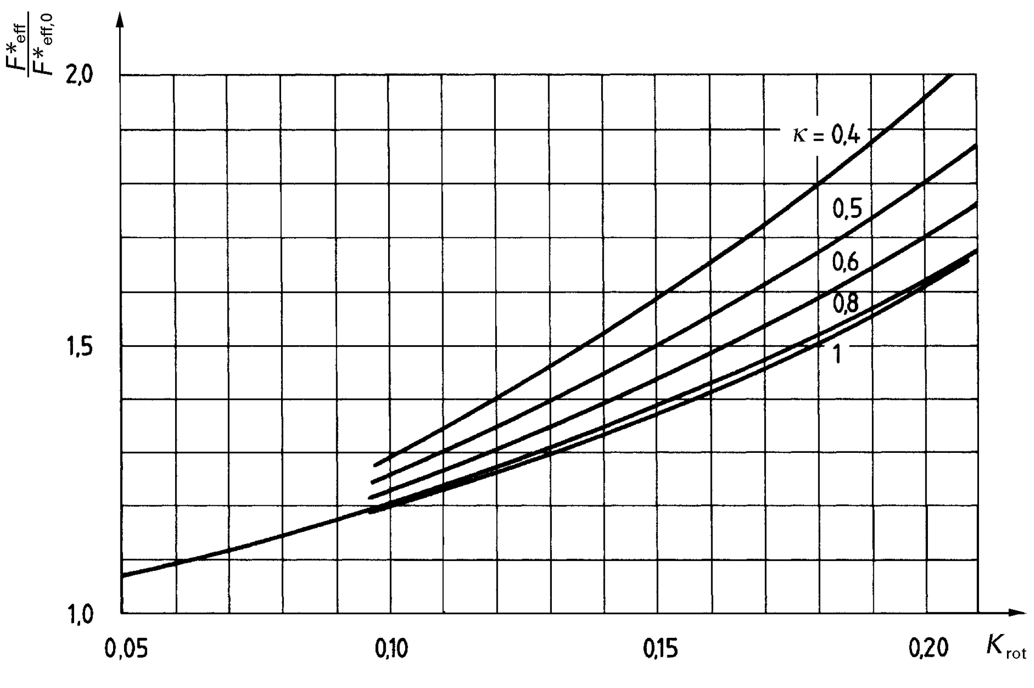


Figure 4 — Ratio of the characteristic values of load-carrying capacity $F^*_{eff}/F^*_{eff,0}$ as a function of the speed dependent parameter K_{rot} for different resistance ratios κ and four recesses, ε = 0,4; α = 0; ξ = 1

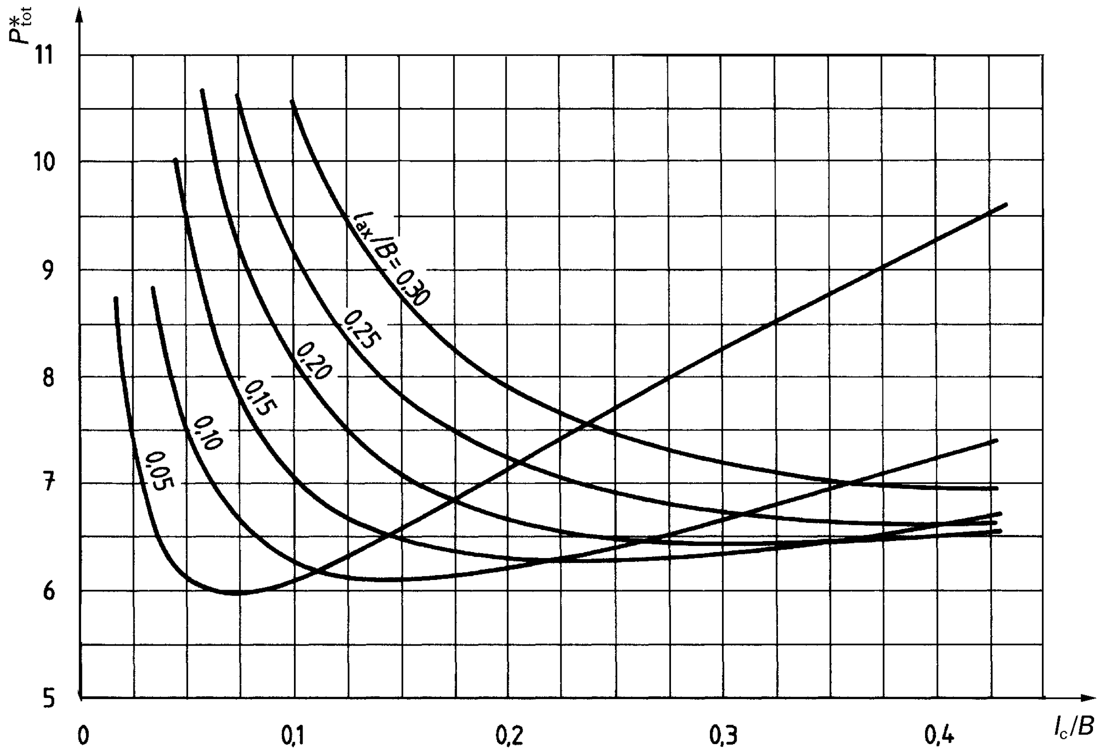


Figure 5 — Characteristic values of total power P^*_{tot} as a function of the relative land widths l_{ax}/B and l_c/B, B/D = 1; ε = 0,4; Z = 4; ξ = 1; P^* = 2; α = 0; h_p = 40 × C_R, without friction in the recesses

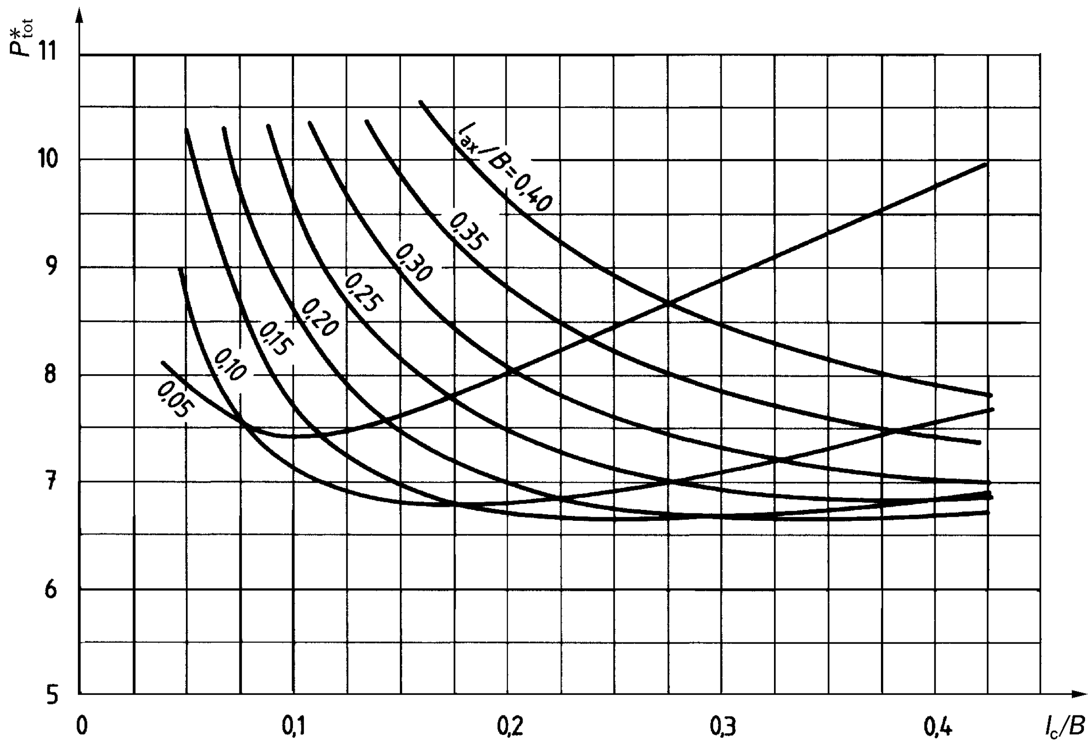


Figure 6 — Characteristic values of total power P^*_{tot} as a function of the relative land widths l_{ax}/B and l_c/B, B/D = 1; ε = 0,4; Z = 4; ξ = 1; P^* = 2; α = 0; h_p = 40 × C_R, with friction in the recesses

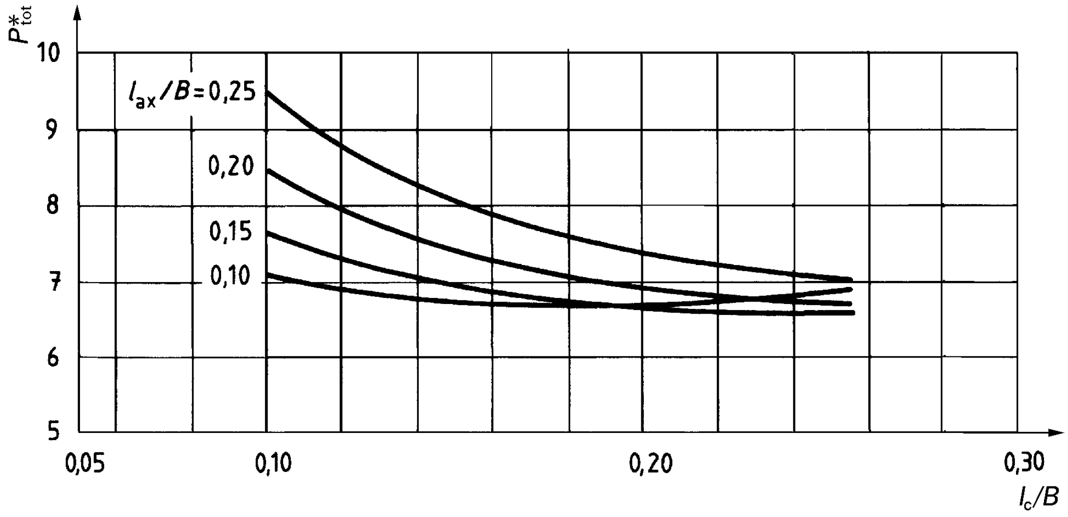


Figure 7 — Characteristic values of total power P^*_{tot} as a function of the relative land widths l_{ax}/B and l_c/B, ε = 0,4; B/D = 1; P^* = 2; Z = 4; ξ = 1; h_p = 40 × C_R, with friction in the recesses

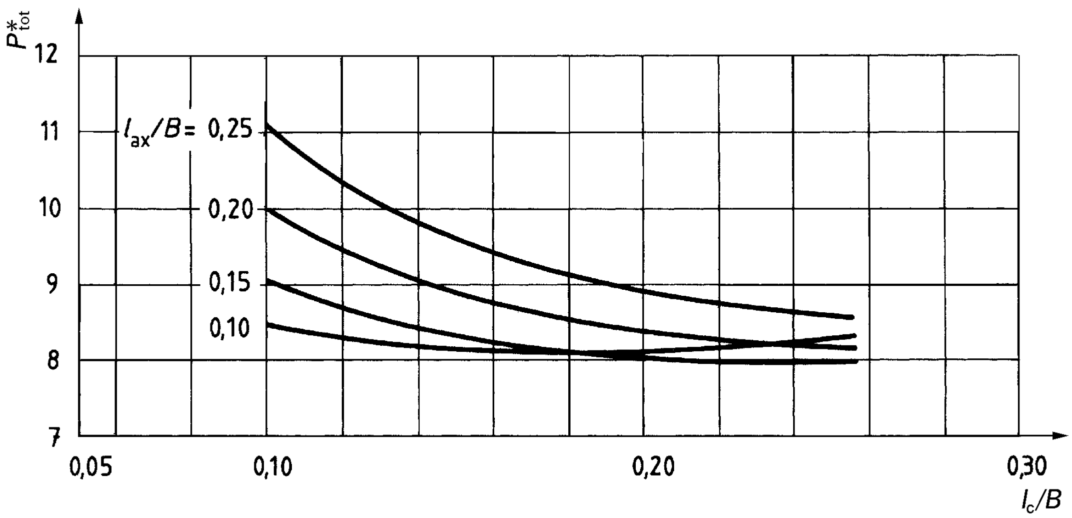


Figure 8 — Characteristic values of total power P^*_{tot} as a function of the relative land widths l_{ax}/B and l_c/B, ε = 0,4; B/D = 0,8; P^* = 2; Z = 4; ξ = 1; h_p = 40 × C_R, with friction in the recesses

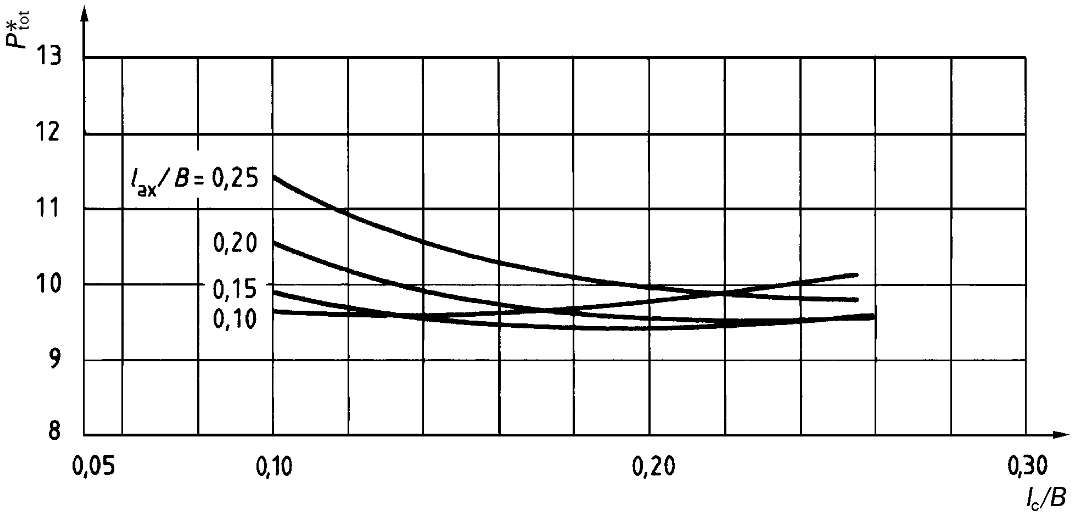


Figure 9 — Characteristic values of total power P^*_{tot} as a function of the relative land widths l_{ax}/B and l_c/B, ε = 0,4; B/D = 0,6; P^* = 2; Z = 6; ξ = 1; h_p = 40 × C_R, with friction in the recesses

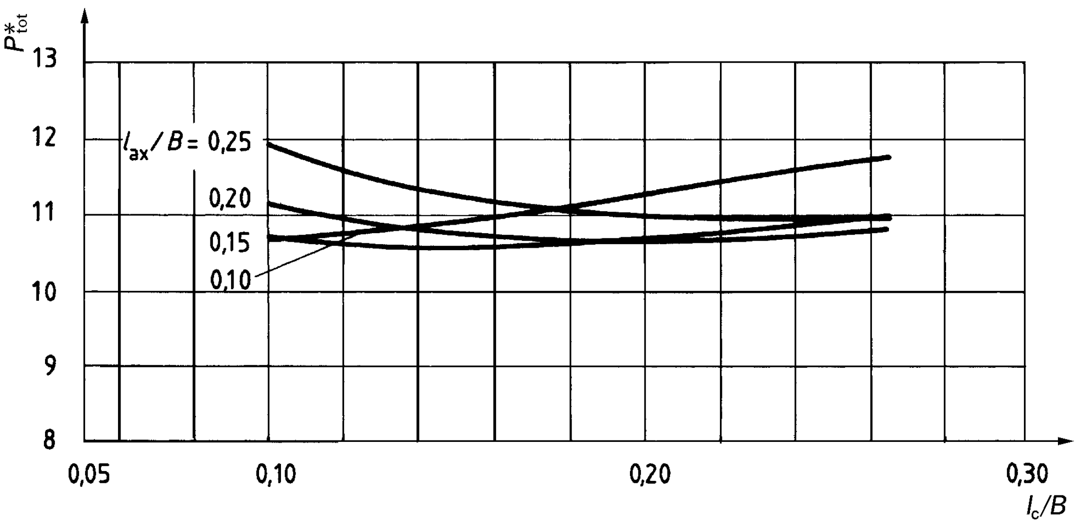


Figure 10 — Characteristic values of total power P^*_{tot} as a function of the relative land widths l_{ax}/B and l_c/B, ε = 0,4; B/D = 0,5; P^* = 2; Z = 8; ξ = 1; h_p = 40 × C_R, with friction in the recesses

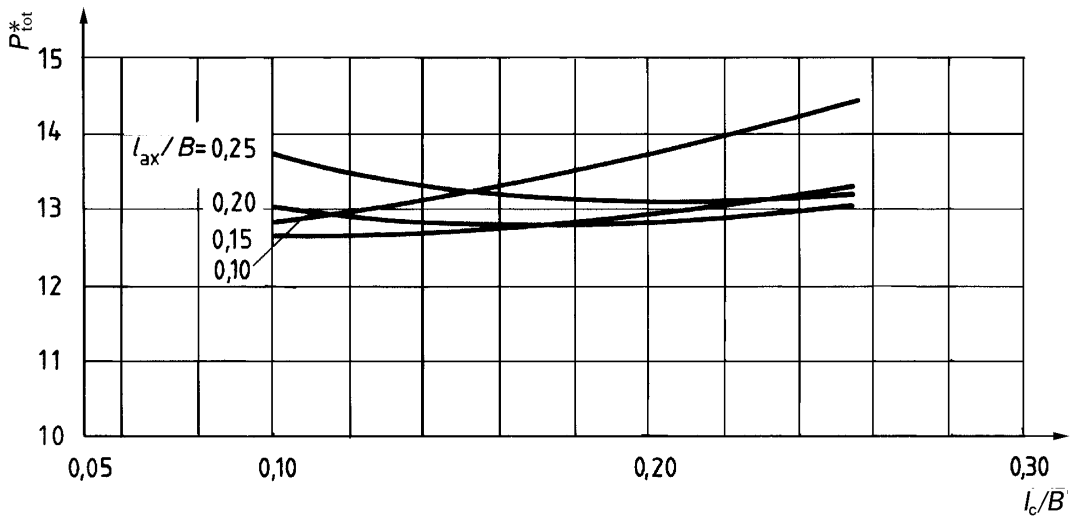


Figure 11 — Characteristic values of total power P^*_{tot} as a function of the relative land widths l_{ax}/B and l_c/B, ε = 0,4; B/D = 0,4; P^* = 2; Z = 10; ξ = 1; $h_p = 40 \times C_R$, with friction in the recesses

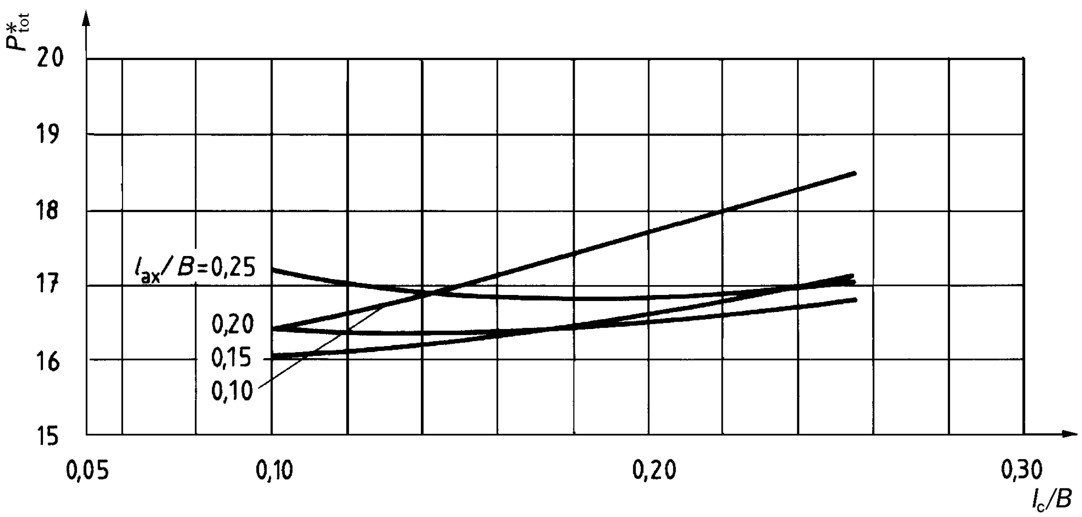


Figure 12 — Characteristic values of total power P^*_{tot} as a function of the relative land widths l_{ax}/B and l_c/B, ε = 0,4; B/D = 0,3; P^* = 2; Z = 12; ξ = 1; $h_p = 40 \times C_R$, with friction in the recesses

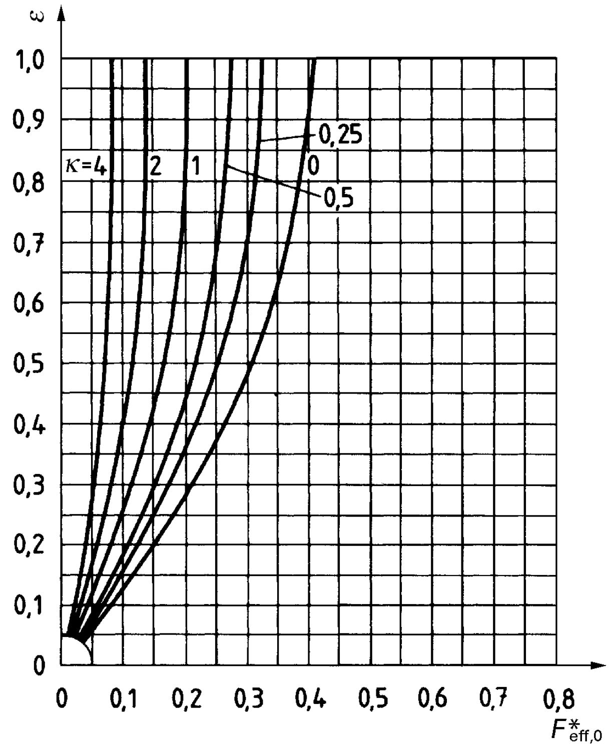


Figure 13 — Relative eccentricities ε as a function of the characteristic values of load-carrying capacity $F^*_{\mathrm{eff},0}$ for different resistance ratios κ and three recesses; load directed to centre of the land [2]

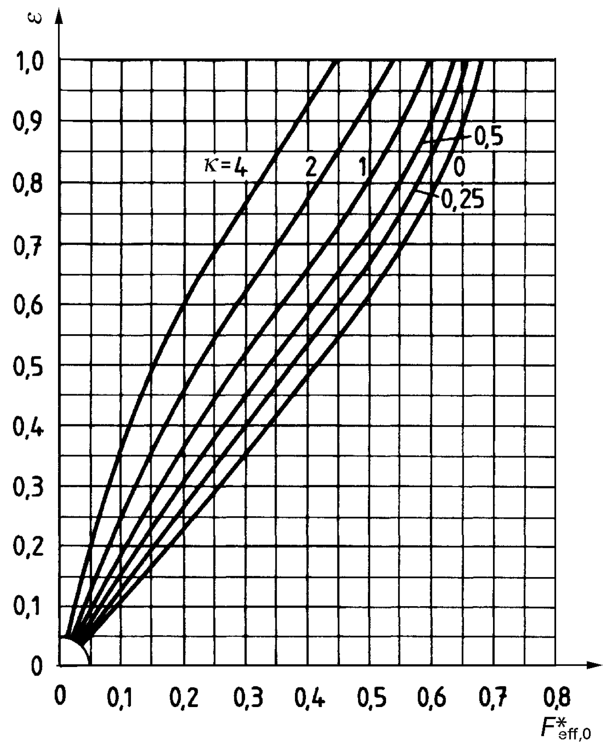


Figure 14 — Relative eccentricities ε as a function of the characteristic values of load-carrying capacity $F^*_{\mathrm{eff},0}$ for different resistance ratios κ and three recesses; load directed to centre of the recess [2]

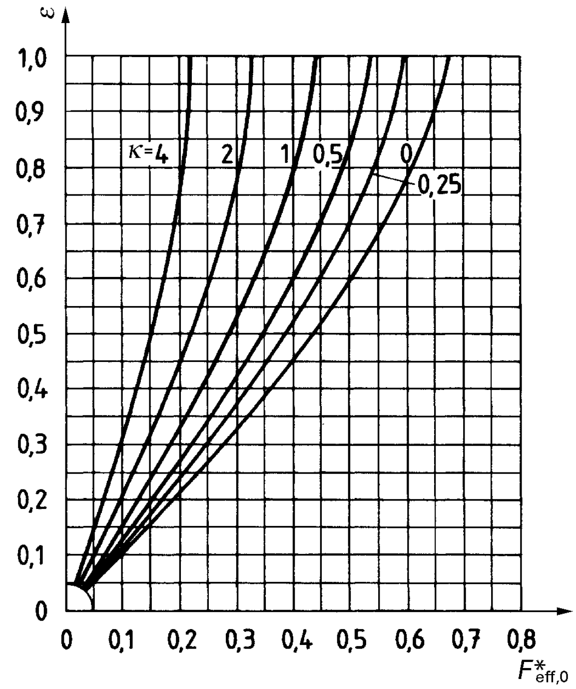


Figure 15 — Relative eccentricities ε as a function of the characteristic values of load-carrying capacity $F^*_{\mathrm{eff},0}$ for different resistance ratios κ and four recesses; load directed to centre of the land [2]

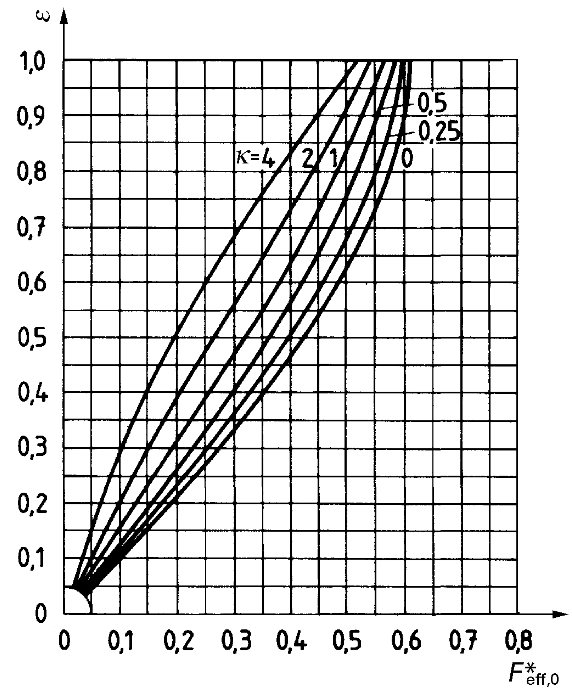


Figure 16 — Relative eccentricities ε as a function of the characteristic values of load-carrying capacity $F^*_{\mathrm{eff},0}$ for different resistance ratios κ and four recesses; load directed to centre of the recess [2]

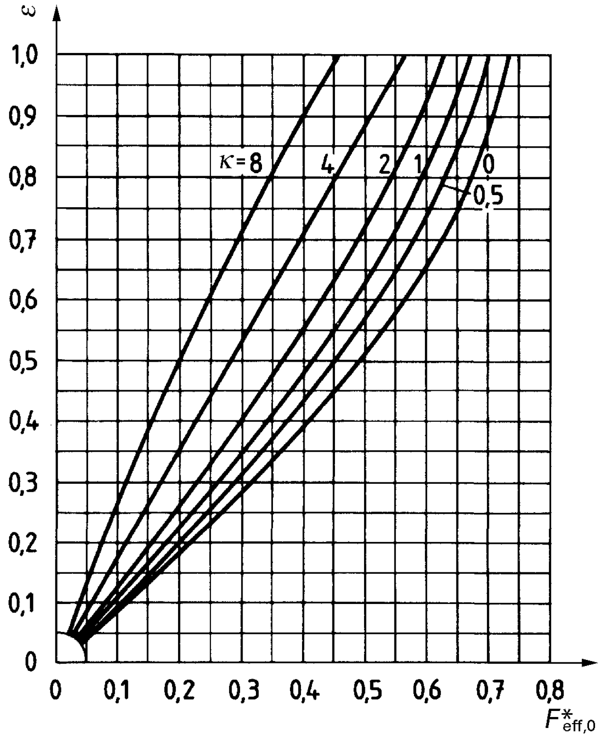


Figure 17 — Relative eccentricities ε as a function of the characteristic values of load-carrying capacity $F^*_{eff,0}$ for different resistance ratios κ and six recesses; load directed to centre of the land [2]

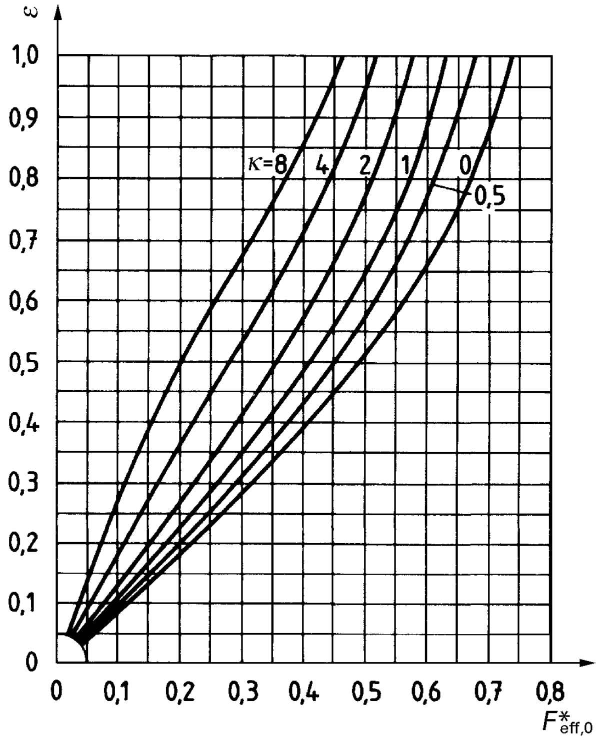


Figure 18 — Relative eccentricities ε as a function of the characteristic values of load-carrying capacity $F^*_{eff,0}$ for different resistance ratios κ and six recesses; load directed to centre of the recess [2]

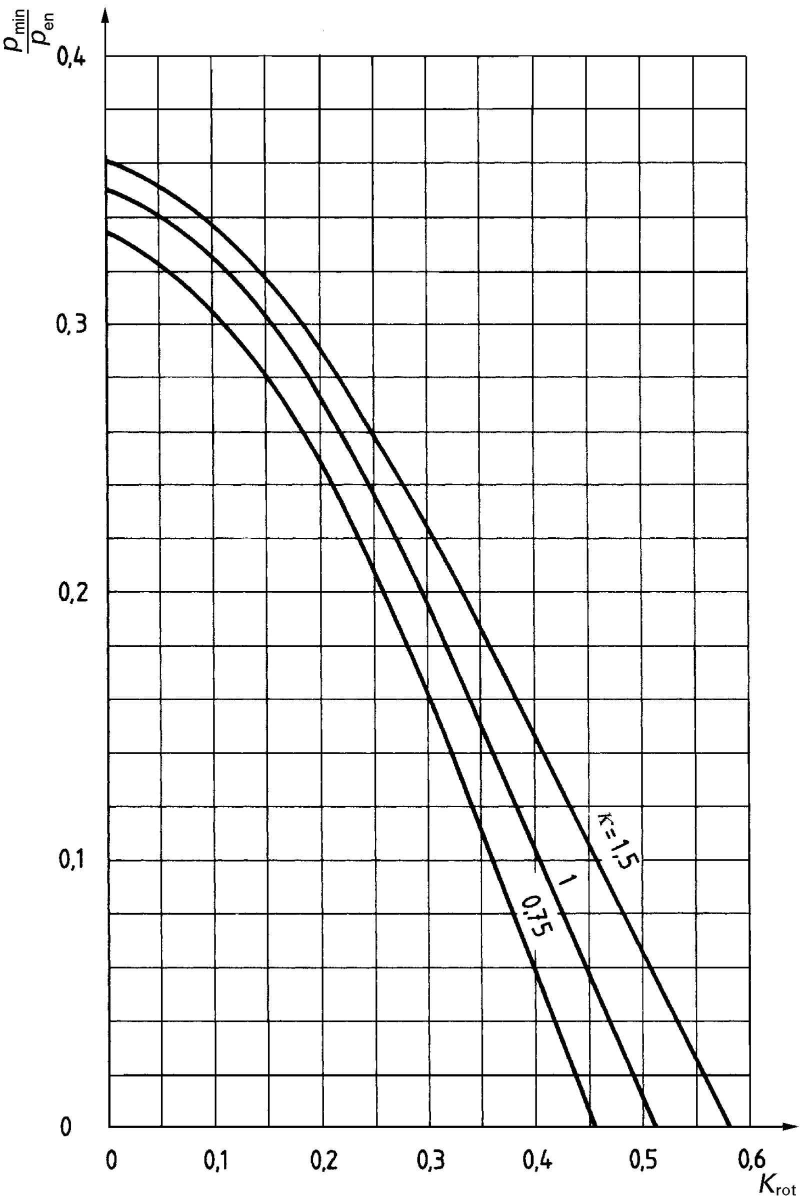


Figure 19 — Minimum relative recess pressures p_{min}/p_{en} as a function of the speed dependent parameter K_{rot} for different resistance ratios κ, ε = 0,4; Z = 4; ξ = 1

Table 1 — Characteristic values for optimized bearings, ε = 0,4; h_p = 40 × C_R; α = 0; P^* = 2; l_{ax}/B = 0,15

Z	B/D	l_c/B	κ	$\beta°$	F^*	F_0^*	π_f	P_f^*	Q^*	P_{tot}^*
4	1	0,25	0,649 4	36,8	0,296 5	0,241 0	0,670 3	1,942	1,745	6,586
4	0,8	0,2	0,519 5	31,5	0,295 4	0,253 5	0,871 8	1,803	2,193	7,982
6	0,6	0,15	0,584 4	23,4	0,333 0	0,305 0	1,128	1,872	2,860	9,513
8	0,5	0,05	1,623	21,8	0,320 9	0,297 9	1,502	1,526	3,443	10,71
10	0,4	0,04	1,623	17,8	0,339 0	0,322 7	1,867	1,526	4,259	12,61
12	0,3	0,03	1,461	13,8	0,350 9	0,340 9	2,503	1,498	5,633	16,03

Bibliography

[1] VERMEULEN, M., *De invloed van de tweedimensionale stroming op het statisch gedrag van het hydrostatisch radial Lager*, Dissertation Rijksuniversiteit, Gent, 1979

[2] OPITZ, H., *Untersuchung der Steifigkeit von Lagern für Hauptspindeln von Werkzeugmaschinen. (A study on the stiffness behaviour of bearings for work spindles of machine tools)*, Westdeutscher Verlag, Cologne and Opladen, 1967

ICS 21.100.10

Price based on 13 pages