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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

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UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 31657-2

Plain bearings — Hydrodynamic plain journal bearings under steady-state conditions —

Part 2: Functions for calculation of multi- lobed journal bearings

ICS: 21.100.10

ISO/TC 123/SC 8

Secretariat: JISC

Voting begins on:
2024-11-26

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This document is circulated as received from the committee secretariat.

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 123, *Plain bearings*, Subcommittee SC 8, *Calculation methods for plain bearings and their applications*.

A list of all parts in the ISO 31657 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Plain bearings — Hydrodynamic plain journal bearings under steady-state conditions —

Part 2: Functions for calculation of multi-lobed journal bearings

1 Scope

This document specifies the characteristic values for selected two-, three- and four-lobe bearings.

The functions plotted and listed in table form below are required for the operationally safe design of hydrodynamic multi-lobed journal bearings according to ISO 31657-1. They are based on the presumptions and boundary conditions indicated there and only apply to stationary operating states. The symbols used are explained in ISO 31657-1; calculation examples are also included there.

NOTE Equivalent calculation procedures exist that enable operating conditions to be estimated and checked against acceptable conditions. The use of them is equally admissible.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Functions for calculation of multi-lobed journal bearings

4.1 General

The characteristic values for two-, three- and four-lobe bearings with relative lubrication pocket widths of $b_p^* = 0,8$ are shown in table form below. The characteristic values were calculated for the geometrical parameters summarised in [Figure 1](#) (angular spans of segment sliding surface, Ω , angular coordinates of lubricant pocket centrelines, $\varphi_{p,1}$, gap ratios, $h_{0,max}^*$, bearing width ratios B^*) in the operating range $0,02 \leq h_{min}^* \leq 1$. The profile factors, K_p , associated with the indicated gap ratios, $h_{0,max}^*$, can be calculated for these bearing types as follows:

$$K_P = h_{0,\max}^* \quad \text{for } Z = 2$$

$$K_P = 2 \cdot h_{0,\max}^* \quad \text{for } Z = 3$$

$$K_P = \frac{h_{0,\max}^* - \frac{1}{\sqrt{2}}}{1 - \frac{1}{\sqrt{2}}} \quad \text{for } Z = 4$$

The following (dimensionless) characteristic values are indicated in [Tables 1](#) to [43](#):

a) Static characteristic values

Sommerfeld number:

$$So = \frac{F \cdot \psi_{\text{eff}}^2}{B \cdot D \cdot \eta_{\text{eff}} \cdot \omega}$$

Relative eccentricity:

$$\varepsilon = \frac{e}{C_{R,\text{eff}}}$$

Attitude angle, β , in °.

Product of maximum lubricant film pressure parameter and Sommerfeld number:

$$p_{\max}^* \cdot So = \frac{p_{\max} \cdot \psi_{\text{eff}}^2}{\eta_{\text{eff}} \cdot \omega}$$

Minimum relative lubricant film thickness:

$$h_{\min}^* = \frac{h_{\min}}{C_{R,\text{eff}}}$$

Friction force parameter:

$$F_f^* = \frac{f}{\psi_{\text{eff}}} \cdot So$$

Lubricant flow rate parameter due to hydrodynamic pressure build-up:

$$Q_3^* = \frac{Q_3}{Q_0}$$

Lubricant flow rate parameter due to supply pressure:

$$Q_p^* = \frac{Q_p}{P_{\text{en}}^* \cdot Q_0}$$

Lubricant flow rate parameter at the exit of the lubrication gap:

$$Q_2^* = \frac{Q_2}{Q_0}$$

Non-dimensional difference between maximum lubricant temperature and lubricant temperature in the lubricant pockets:

$$\Delta T_{\max}^* = \frac{\rho \cdot c_p \cdot \psi_{\text{eff}}}{\bar{p} \cdot f} \cdot \Delta T_{\max}$$

b) Dynamic characteristic values

Non-dimensional lubricant film stiffness coefficients:

$$c_{i,k}^* = \frac{\psi_{\text{eff}}^3}{2 \cdot B \cdot \eta_{\text{eff}} \cdot \omega} \cdot c_{i,k} \quad (i, k = 1, 2)$$

Non-dimensional lubricant film damping coefficients:

$$d_{i,k}^* = \frac{\psi_{\text{eff}}^3}{2 \cdot B \cdot \eta_{\text{eff}} \cdot \omega} \cdot \omega \cdot d_{i,k} \quad (i, k = 1, 2)$$

For some selected four-lobe bearings ($\Omega = 70^\circ$, $\varphi_{P,1} = 315^\circ$), these characteristic values are shown graphically as a function of the Sommerfeld number So , the gap ratio $h_{0,\max}^*$ and the bearing width ratio B^* in [Annex A](#), [Figures A.1](#) to [A.16](#).

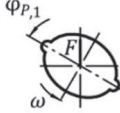
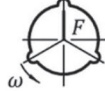
Z	$\Omega[^\circ]$	$\varphi_{P,1}[^\circ]$	$h_{0,max}^*$	B^*	Load case
2	150	180	3, 5	0,75	
		240	3, 5	0,75	
		270	1, 3, 5	0,5, 0,75, 1	
		300	3, 5	0,75	
3	100	240	3, 5	0,75	
		300	1, 3, 5	0,5, 0,75, 1	
4	70	270	3, 5	0,75	
		315	1, 2, 3, 4, 5	0,5, 0,75, 1	

Figure 1 — Geometrical parameters of selected multi-lobed journal bearings

4.2 Two-lobe bearings

Characteristic values for two-lobe bearings are listed in [Tables 1](#) to [15](#).

Table 1 — Characteristic values of a two-lobe bearing with $\Omega = 150^\circ$, $\varphi_{P,1} = 180^\circ$, $h_{0,\max}^* = 3$, $B^* = 0,75$

So	ε	$\beta [^\circ]$	$p_{\max}^* \cdot So$	$h_{\min}^*$	F_f^*	Q_3^*	Q_P^*	Q_2^*	$\Delta T_{\max}^*$	c_{11}^*	c_{12}^*	c_{21}^*	c_{22}^*	d_{11}^*	d_{12}^*	d_{21}^*	d_{22}^*
0,000	0,000	90,00	0,327	1,000	1,780	0,959	36,868	1,619	1,25	0,364	-0,107	0,174	0,019	0,541	0,168	0,168	0,093
0,014	0,203	15,82	0,364	0,935	1,790	0,971	37,474	1,604	1,35	0,373	-0,106	0,181	0,023	0,548	0,171	0,171	0,099
0,029	0,406	15,38	0,422	0,856	1,822	1,007	39,301	1,560	1,50	0,401	-0,105	0,201	0,035	0,576	0,182	0,182	0,116
0,048	0,607	14,65	0,510	0,768	1,878	1,065	42,339	1,488	1,71	0,455	-0,100	0,241	0,058	0,623	0,202	0,202	0,150
0,073	0,805	13,63	0,639	0,675	1,962	1,145	46,566	1,388	1,99	0,542	-0,089	0,306	0,099	0,699	0,235	0,235	0,206
0,108	1,001	12,36	0,834	0,579	2,083	1,243	52,000	1,265	2,35	0,684	-0,067	0,415	0,174	0,815	0,289	0,289	0,297
0,159	1,195	10,84	1,139	0,485	2,255	1,357	58,643	1,118	2,88	0,916	-0,020	0,599	0,314	0,994	0,376	0,377	0,450
0,241	1,387	9,11	1,645	0,392	2,504	1,482	66,479	0,953	3,64	1,323	0,084	0,932	0,597	1,285	0,525	0,525	0,721
0,384	1,577	7,17	2,569	0,303	2,884	1,616	75,476	0,769	4,80	2,120	0,326	1,599	1,240	1,810	0,801	0,801	1,249
0,677	1,768	5,05	4,546	0,217	3,522	1,755	85,736	0,567	6,73	4,010	1,012	3,194	3,029	2,907	1,371	1,371	2,459
1,478	1,959	2,79	10,341	0,133	4,839	1,898	97,153	0,350	10,97	10,662	3,665	8,585	10,316	6,159	2,978	2,978	6,332
3,840	2,100	1,14	29,250	0,071	7,487	2,003	106,265	0,177	20,77	40,455	15,265	29,531	46,571	17,323	7,373	7,374	20,278
18,558	2,200	0,18	183,912	0,022	16,491	2,079	113,058	0,049	65,04	514,115	142,002	242,523	642,042	124,068	32,520	32,518	154,507
45,130	2,220	0,06	569,417	0,010	26,225	2,095	114,450	0,023	142,08	2 504,109	425,818	779,476	3 114,672	443,694	115,503	115,503	554,368

Table 2 — Characteristic values of a two-lobe bearing with $\Omega = 150^\circ$, $\varphi_{p,1} = 180^\circ$, $h_{0,\max}^* = 5$, $B^* = 0,75$

So	ε	$\beta [^\circ]$	$p_{\max}^* \cdot So$	$h_{\min}^*$	F_f^*	Q_3^*	Q_p^*	Q_2^*	$\Delta T_{\max}^*$	c_{11}^*	c_{12}^*	c_{21}^*	c_{22}^*	d_{11}^*	d_{12}^*	d_{21}^*	d_{22}^*
0,000	0,000	90,00	0,342	1,000	1,507	1,787	152,625	1,670	1,25	0,284	-0,038	0,110	0,022	0,315	0,081	0,081	0,039
0,011	0,301	7,29	0,370	0,951	1,518	1,801	154,870	1,650	1,33	0,292	-0,038	0,114	0,024	0,321	0,083	0,083	0,041
0,023	0,602	7,02	0,418	0,883	1,551	1,841	161,614	1,598	1,46	0,315	-0,036	0,125	0,031	0,339	0,089	0,089	0,048
0,038	0,902	6,57	0,493	0,800	1,610	1,905	172,838	1,510	1,64	0,359	-0,033	0,147	0,044	0,373	0,099	0,099	0,062
0,058	1,202	5,93	0,609	0,706	1,703	1,994	188,597	1,388	1,88	0,434	-0,026	0,185	0,069	0,427	0,116	0,116	0,085
0,088	1,500	5,14	0,793	0,604	1,841	2,104	208,778	1,235	2,25	0,564	-0,012	0,252	0,116	0,519	0,145	0,145	0,125
0,134	1,798	4,21	1,106	0,496	2,051	2,234	233,495	1,050	2,78	0,805	0,021	0,373	0,212	0,674	0,194	0,194	0,199
0,218	2,095	3,15	1,701	0,384	2,386	2,380	262,650	0,836	3,69	1,311	0,097	0,623	0,435	0,977	0,287	0,287	0,350
0,321	2,293	2,40	2,463	0,307	2,742	2,486	284,578	0,676	4,64	2,042	0,218	0,968	0,784	1,367	0,401	0,402	0,554
0,517	2,491	1,62	3,996	0,228	3,319	2,597	308,482	0,504	6,29	3,737	0,505	1,725	1,650	2,183	0,611	0,611	0,992
1,004	2,690	0,86	8,151	0,146	4,446	2,713	334,471	0,319	9,97	9,508	1,410	3,958	4,721	4,513	1,177	1,177	2,276
3,915	2,900	0,18	40,203	0,052	8,632	2,842	364,011	0,109	28,23	85,684	10,417	24,374	47,054	24,886	4,356	4,355	13,687
8,457	2,950	0,07	107,659	0,027	12,809	2,873	371,364	0,056	54,49	334,928	30,443	71,696	186,580	74,182	9,627	9,627	41,342
14,689	2,970	0,03	224,879	0,017	17,027	2,886	374,341	0,035	89,35	926,933	61,807	152,876	517,668	164,982	19,973	19,972	92,317

Table 3 — Characteristic values of a two-lobe bearing with $\Omega = 150^\circ$, $\varphi_{P,1} = 240^\circ$, $h_{0,\max}^* = 3$, $B^* = 0,75$

So	ε	$\beta [^\circ]$	$p_{\max}^* \cdot So$	$h_{\min}^*$	F_f^*	Q_3^*	Q_P^*	Q_2^*	$\Delta T_{\max}^*$	c_{11}^*	c_{12}^*	c_{21}^*	c_{22}^*	d_{11}^*	d_{12}^*	d_{21}^*	d_{22}^*
0,000	0,000	90,00	0,327	1,000	1,780	0,959	36,868	1,619	1,25	0,135	-0,307	-0,025	0,249	0,351	-0,278	-0,278	0,283
0,024	0,300	65,76	0,343	0,948	1,800	0,986	38,272	1,585	1,30	0,144	-0,316	-0,024	0,259	0,360	-0,279	-0,279	0,296
0,053	0,600	64,93	0,388	0,863	1,862	1,065	42,498	1,483	1,39	0,176	-0,345	-0,021	0,296	0,394	-0,286	-0,285	0,339
0,096	0,900	63,58	0,501	0,756	1,983	1,191	49,575	1,320	1,55	0,239	-0,401	-0,010	0,380	0,458	-0,297	-0,297	0,435
0,195	1,255	61,44	0,833	0,612	2,255	1,387	61,648	1,055	2,00	0,395	-0,528	0,031	0,646	0,603	-0,316	-0,316	0,697
0,337	1,488	59,74	1,406	0,502	2,590	1,535	71,722	0,844	2,77	0,602	-0,683	0,128	1,168	0,780	-0,327	-0,326	1,148
0,647	1,698	58,00	2,889	0,331	3,159	1,675	82,206	0,632	4,44	0,968	-0,912	0,463	2,796	1,054	-0,296	-0,296	2,322
1,449	1,860	56,29	7,683	0,182	4,165	1,784	91,126	0,455	9,19	1,578	-1,003	1,986	9,830	1,400	0,010	0,010	6,279
4,655	1,931	53,56	34,941	0,068	6,408	1,816	94,911	0,372	29,85	3,188	2,998	14,895	75,236	1,592	2,566	2,567	30,672
11,520	1,879	50,12	119,413	0,030	9,298	1,747	90,997	0,431	76,95	7,878	21,587	63,226	403,924	1,955	9,260	9,259	113,638
26,368	1,811	46,94	379,970	0,014	13,580	1,670	86,161	0,509	179,60	19,622	83,789	224,646	1 939,293	3,095	25,234	25,233	393,073

Table 4 — Characteristic values of a two-lobe bearing with $\Omega = 150^\circ$, $\varphi_{P1} = 240^\circ$, $h_{0,\max}^* = 5$, $B^* = 0,75$

So	ε	$\beta [^\circ]$	$p_{\max}^* \cdot So$	$h_{\min}^*$	F_f^*	Q_3^*	Q_P^*	Q_2^*	$\Delta T_{\max}^*$	c_{11}^*	c_{12}^*	c_{21}^*	c_{22}^*	d_{11}^*	d_{12}^*	d_{21}^*	d_{22}^*
0,000	0,000	90,00	0,342	1,000	1,507	1,787	152,625	1,669	1,25	0,119	-0,206	-0,057	0,188	0,178	-0,160	-0,160	0,175
0,013	0,300	59,79	0,356	0,988	1,517	1,801	154,887	1,650	1,27	0,121	-0,209	-0,058	0,193	0,181	-0,162	-0,162	0,180
0,028	0,600	59,61	0,387	0,951	1,548	1,839	161,674	1,597	1,34	0,130	-0,220	-0,060	0,209	0,189	-0,167	-0,167	0,193
0,046	0,900	59,33	0,442	0,890	1,604	1,902	172,982	1,508	1,44	0,148	-0,240	-0,065	0,240	0,203	-0,176	-0,176	0,218
0,074	1,231	58,89	0,549	0,792	1,703	1,998	190,702	1,371	1,64	0,179	-0,279	-0,073	0,305	0,230	-0,194	-0,194	0,269
0,111	1,518	58,43	0,717	0,683	1,837	2,102	210,507	1,220	1,95	0,225	-0,335	-0,083	0,413	0,268	-0,218	-0,218	0,350
0,171	1,797	57,95	1,021	0,556	2,037	2,219	233,701	1,046	2,47	0,300	-0,428	-0,097	0,630	0,324	-0,255	-0,255	0,499
0,281	2,070	57,47	1,659	0,416	2,354	2,348	260,142	0,851	3,45	0,433	-0,601	-0,115	1,150	0,415	-0,318	-0,318	0,815
0,546	2,341	57,09	3,440	0,264	2,940	2,489	290,060	0,633	5,87	0,710	-1,003	-0,110	2,946	0,588	-0,441	-0,441	1,731
1,816	2,625	56,97	15,037	0,101	4,646	2,652	325,394	0,380	17,84	1,631	-2,658	0,683	21,407	1,044	-0,742	-0,742	8,014
3,419	2,702	57,02	34,428	0,058	6,004	2,699	335,693	0,306	34,13	2,381	-4,050	3,505	65,596	1,325	-0,735	-0,735	19,502
13,503	2,757	56,80	224,496	0,017	10,618	2,731	343,151	0,252	136,17	5,394	6,815	53,808	863,057	1,707	2,358	2,358	132,080

Table 5 — Characteristic values of a two-lobe bearing with $\Omega = 150^\circ$, $\varphi_{p,1} = 270^\circ$, $h_{0,\max}^* = 1$, $B^* = 0,5$

So	ε	$\beta [^\circ]$	$p_{\max}^* \cdot So$	$h_{\min}^*$	F_f^*	Q_3^*	Q_p^*	Q_2^*	$\Delta T_{\max}^*$	c_{11}^*	c_{12}^*	c_{21}^*	c_{22}^*	d_{11}^*	d_{12}^*	d_{21}^*	d_{22}^*
0,000	0,000	90,00	0,000	1,000	2,614	0,000	3,008	1,000	2,00	0,000	-0,262	0,671	0,000	0,523	0,000	0,000	1,342
0,090	0,236	64,91	0,192	0,764	2,430	0,175	3,394	0,796	2,71	0,160	-0,171	0,469	0,163	0,372	0,174	0,174	0,923
0,163	0,361	56,42	0,373	0,639	2,471	0,245	3,784	0,706	3,34	0,292	-0,210	0,674	0,345	0,510	0,339	0,338	1,309
0,260	0,467	50,13	0,643	0,533	2,607	0,291	4,131	0,639	3,93	0,438	-0,204	0,976	0,690	0,599	0,501	0,501	1,868
0,401	0,562	44,64	1,081	0,438	2,833	0,323	4,403	0,588	4,66	0,650	-0,180	1,473	1,332	0,730	0,740	0,740	2,783
0,626	0,649	39,58	1,849	0,351	3,168	0,342	4,584	0,548	5,68	0,983	-0,107	2,338	2,622	0,926	1,120	1,120	4,383
1,011	0,729	34,71	3,317	0,271	3,649	0,351	4,663	0,520	7,20	1,570	0,093	4,007	5,477	1,241	1,791	1,793	7,460
1,783	0,805	29,68	6,656	0,195	4,392	0,350	4,633	0,502	9,89	2,748	0,706	7,804	13,213	1,799	3,154	3,155	14,473
3,709	0,877	24,15	16,512	0,123	5,714	0,335	4,477	0,497	15,89	5,805	3,052	19,273	41,921	3,039	6,768	6,767	35,742
11,175	0,943	17,40	66,166	0,057	8,914	0,303	4,174	0,511	36,26	18,352	19,280	80,457	252,403	6,810	21,690	21,697	148,293
30,369	0,974	12,58	238,937	0,026	13,981	0,273	3,946	0,534	85,56	53,612	93,221	315,937	1 384,251	14,455	64,581	64,585	574,742
59,033	0,985	9,96	568,507	0,015	19,196	0,255	3,837	0,550	155,16	109,469	267,165	805,560	4 501,754	23,051	130,675	130,663	1 433,334

Table 6 — Characteristic values of a two-lobe bearing with $\Omega = 150^\circ$, $\varphi_{p,1} = 270^\circ$, $h_{0,\max}^* = 3$, $B^* = 0,5$

So	ε	$\beta [^\circ]$	$p_{\max}^* \cdot So$	$h_{\min}^*$	F_f^*	Q_3^*	Q_p^*	Q_2^*	$\Delta T_{\max}^*$	c_{11}^*	c_{12}^*	c_{21}^*	c_{22}^*	d_{11}^*	d_{12}^*	d_{21}^*	d_{22}^*
0,000	0,000	90,00	0,219	1,000	1,737	0,864	50,725	1,052	1,16	0,017	-0,121	0,059	0,244	0,062	-0,107	-0,107	0,330
0,029	0,300	81,39	0,264	0,934	1,758	0,884	52,595	1,030	1,30	0,020	-0,121	0,067	0,259	0,066	-0,102	-0,102	0,346
0,065	0,574	79,98	0,352	0,825	1,819	0,935	57,521	0,972	1,54	0,031	-0,121	0,093	0,310	0,075	-0,088	-0,087	0,394
0,138	0,861	76,57	0,600	0,646	1,967	1,014	65,671	0,879	2,09	0,059	-0,105	0,182	0,481	0,095	-0,040	-0,040	0,549
0,228	1,001	72,54	0,976	0,510	2,132	1,054	70,214	0,825	2,83	0,101	-0,068	0,328	0,784	0,113	0,030	0,030	0,797
0,343	1,066	67,95	1,538	0,404	2,320	1,064	71,688	0,804	3,75	0,160	-0,010	0,551	1,309	0,133	0,121	0,121	1,184
0,505	1,092	62,75	2,424	0,318	2,554	1,052	71,111	0,804	5,03	0,246	0,084	0,904	2,271	0,159	0,240	0,241	1,814
0,756	1,097	56,85	3,974	0,243	2,874	1,026	69,181	0,819	6,99	0,385	0,250	1,532	4,237	0,198	0,418	0,418	2,959
1,208	1,090	50,03	7,147	0,174	3,365	0,989	66,289	0,845	10,42	0,642	0,617	2,852	9,028	0,266	0,735	0,736	5,382
2,202	1,074	41,86	15,349	0,110	4,232	0,940	62,611	0,882	17,84	1,239	1,686	6,465	24,638	0,409	1,478	1,479	12,023
5,666	1,047	30,73	52,233	0,051	6,345	0,876	58,047	0,935	42,44	3,428	7,798	24,121	128,756	0,772	4,047	4,046	43,158
13,560	1,028	22,43	166,704	0,024	9,519	0,837	55,380	0,971	98,25	8,914	30,395	85,418	623,960	1,465	10,802	10,799	150,032
24,443	1,019	17,86	371,567	0,014	12,657	0,819	54,246	0,987	175,92	17,061	74,399	204,567	1 848,538	2,327	21,727	21,726	361,019

Table 7 — Characteristic values of a two-lobe bearing with $\Omega = 150^\circ$, $\varphi_{p,1} = 270^\circ$, $h_{0,\max}^* = 5$, $B^* = 0,5$

So	ε	$\beta [^\circ]$	$p_{\max}^* \cdot So$	$h_{\min}^*$	F_f^*	Q_3^*	Q_p^*	Q_2^*	$\Delta T_{\max}^*$	c_{11}^*	c_{12}^*	c_{21}^*	c_{22}^*	d_{11}^*	d_{12}^*	d_{21}^*	d_{22}^*
0,000	0,000	90,00	0,247	1,000	1,450	1,650	213,796	1,082	1,13	0,017	-0,082	0,023	0,209	0,027	-0,055	-0,055	0,212
0,016	0,250	77,97	0,282	0,941	1,459	1,658	215,843	1,072	1,25	0,018	-0,082	0,025	0,215	0,027	-0,055	-0,055	0,217
0,033	0,470	77,67	0,329	0,874	1,481	1,675	221,018	1,052	1,39	0,019	-0,082	0,031	0,233	0,028	-0,053	-0,053	0,230
0,075	0,854	76,43	0,487	0,718	1,569	1,726	237,424	0,990	1,79	0,026	-0,081	0,057	0,315	0,032	-0,044	-0,044	0,289
0,133	1,118	74,44	0,768	0,567	1,701	1,775	253,621	0,928	2,43	0,039	-0,071	0,115	0,489	0,037	-0,024	-0,024	0,405
0,217	1,270	71,65	1,238	0,438	1,871	1,803	263,800	0,887	3,41	0,060	-0,047	0,222	0,826	0,045	0,011	0,011	0,609
0,338	1,335	68,02	2,019	0,333	2,085	1,806	266,737	0,873	4,79	0,096	0,005	0,409	1,485	0,054	0,063	0,064	0,953
0,524	1,341	63,43	3,385	0,246	2,370	1,790	263,798	0,879	7,04	0,157	0,102	0,755	2,844	0,069	0,147	0,148	1,591
0,846	1,306	57,59	6,119	0,172	2,790	1,758	256,513	0,901	10,80	0,270	0,320	1,476	6,156	0,094	0,293	0,293	2,916
1,534	1,240	49,80	13,089	0,107	3,517	1,714	246,007	0,936	18,85	0,524	0,962	3,420	17,016	0,139	0,603	0,603	6,416
3,824	1,144	38,09	43,390	0,049	5,237	1,659	232,808	0,981	46,29	1,454	4,265	12,856	86,361	0,272	1,777	1,777	23,268
8,906	1,081	28,45	136,265	0,023	7,783	1,627	225,087	1,009	105,72	3,721	15,807	45,042	407,129	0,523	4,864	4,863	81,056
16,009	1,051	22,64	305,473	0,014	10,294	1,613	221,714	1,022	184,85	6,936	40,897	106,192	1 241,172	0,729	8,678	8,678	184,187

Table 8 — Characteristic values of a two-lobe bearing with $\Omega = 150^\circ$, $\varphi_{P1} = 270^\circ$, $h_{0,\max}^* = 1$, $B^* = 0,75$

So	ε	$\beta [^\circ]$	$p_{\max}^* \cdot So$	$h_{\min}^*$	F_f^*	Q_3^*	Q_P^*	Q_2^*	$\Delta T_{\max}^*$	c_{11}^*	c_{12}^*	c_{21}^*	c_{22}^*	d_{11}^*	d_{12}^*	d_{21}^*	d_{22}^*
0,000	0,000	90,00	0,000	1,000	2,614	0,000	2,419	1,500	2,00	0,000	-0,397	1,303	0,000	0,793	0,000	0,000	2,604
0,067	0,100	76,62	0,136	0,900	2,503	0,106	2,480	1,370	2,20	0,100	-0,209	0,696	0,112	0,427	0,101	0,101	1,392
0,162	0,225	63,62	0,343	0,775	2,442	0,217	2,685	1,219	2,70	0,252	-0,253	0,871	0,293	0,551	0,273	0,273	1,744
0,290	0,348	54,89	0,648	0,652	2,488	0,299	2,963	1,088	3,38	0,472	-0,332	1,207	0,579	0,794	0,558	0,557	2,425
0,457	0,457	48,98	1,091	0,543	2,635	0,355	3,240	0,985	4,09	0,721	-0,361	1,696	1,103	0,999	0,870	0,871	3,406
0,692	0,555	43,88	1,780	0,445	2,882	0,390	3,475	0,903	4,90	1,042	-0,331	2,442	2,074	1,199	1,247	1,248	4,895
1,051	0,645	39,18	2,936	0,355	3,251	0,410	3,655	0,838	6,02	1,540	-0,234	3,707	3,955	1,496	1,835	1,835	7,407
1,653	0,729	34,54	5,096	0,271	3,797	0,415	3,765	0,788	7,80	2,399	0,043	6,097	8,041	1,966	2,855	2,854	12,140
2,787	0,807	29,76	9,707	0,193	4,637	0,406	3,793	0,755	10,96	4,080	0,888	11,320	18,552	2,781	4,861	4,862	22,404
5,384	0,879	24,49	22,147	0,121	6,098	0,382	3,723	0,742	18,01	8,162	4,039	26,083	54,894	4,462	9,790	9,792	51,020
14,772	0,945	17,77	80,430	0,055	9,630	0,335	3,530	0,761	42,36	24,424	25,423	102,609	311,066	9,486	29,552	29,548	194,465
37,137	0,975	12,88	268,936	0,025	15,046	0,295	3,368	0,797	98,40	67,256	120,183	382,518	1 634,706	18,574	81,019	81,010	695,146
70,430	0,986	10,12	636,223	0,014	20,696	0,272	3,286	0,823	176,24	135,182	347,197	971,881	5 376,094	28,396	158,436	158,420	1 696,999

Table 9 — Characteristic values of a two-lobe bearing with $\Omega = 150^\circ$, $\varphi_{P,1} = 270^\circ$, $h_{0,\max}^* = 3$, $B^* = 0,75$

So	ε	$\beta [^\circ]$	$p_{\max}^* \cdot So$	$h_{\min}^*$	F_f^*	Q_3^*	Q_P^*	Q_2^*	$\Delta T_{\max}^*$	c_{11}^*	c_{12}^*	c_{21}^*	c_{22}^*	d_{11}^*	d_{12}^*	d_{21}^*	d_{22}^*
0,000	0,000	90,00	0,327	1,000	1,780	0,959	36,868	1,619	1,25	0,019	-0,174	0,107	0,364	0,093	-0,168	-0,168	0,541
0,045	0,300	83,10	0,392	0,942	1,802	0,984	38,266	1,584	1,40	0,025	-0,175	0,117	0,382	0,099	-0,161	-0,160	0,560
0,117	0,638	80,98	0,557	0,808	1,892	1,067	43,136	1,466	1,73	0,046	-0,171	0,165	0,470	0,118	-0,127	-0,126	0,650
0,227	0,900	77,18	0,909	0,632	2,059	1,158	49,062	1,323	2,37	0,091	-0,143	0,291	0,703	0,146	-0,047	-0,046	0,872
0,353	1,026	73,00	1,404	0,499	2,241	1,197	52,183	1,245	3,20	0,148	-0,089	0,483	1,096	0,170	0,055	0,055	1,206
0,510	1,086	68,38	2,114	0,396	2,450	1,198	53,198	1,212	4,30	0,228	-0,007	0,769	1,762	0,195	0,181	0,181	1,718
0,721	1,110	63,23	3,198	0,311	2,709	1,176	52,773	1,210	5,78	0,341	0,119	1,214	2,965	0,228	0,338	0,338	2,533
1,042	1,114	57,40	5,043	0,236	3,065	1,137	51,373	1,230	8,14	0,522	0,341	2,001	5,377	0,280	0,576	0,576	4,004
1,594	1,105	50,69	8,665	0,168	3,600	1,084	49,245	1,268	12,06	0,845	0,828	3,608	11,141	0,363	0,969	0,968	6,955
2,789	1,085	42,46	17,882	0,106	4,546	1,018	46,449	1,326	20,82	1,590	2,224	8,015	29,830	0,542	1,900	1,900	15,036
6,710	1,053	31,31	57,534	0,049	6,779	0,936	43,014	1,409	48,78	4,258	9,513	28,983	147,989	1,032	5,266	5,266	52,508
15,486	1,030	22,73	180,447	0,023	10,111	0,887	40,957	1,467	108,79	10,525	37,762	98,999	719,051	1,718	12,433	12,433	169,558
27,571	1,020	18,00	406,280	0,013	13,447	0,867	40,095	1,493	194,71	20,214	89,574	239,540	2 124,936	2,831	26,132	26,132	419,399

Table 10 — Characteristic values of a two-lobe bearing with $\Omega = 150^\circ$, $\varphi_{p,1} = 270^\circ$, $h_{0,\max}^* = 5$, $B^* = 0,75$

So	ε	$\beta [^\circ]$	$p_{\max}^* \cdot So$	$h_{\min}^*$	F_f^*	Q_3^*	Q_p^*	Q_2^*	$\Delta T_{\max}^*$	c_{11}^*	c_{12}^*	c_{21}^*	c_{22}^*	d_{11}^*	d_{12}^*	d_{21}^*	d_{22}^*
0,000	0,000	90,00	0,342	1,000	1,507	1,787	152,625	1,669	1,25	0,022	-0,110	0,038	0,284	0,039	-0,081	-0,081	0,315
0,029	0,300	78,47	0,399	0,929	1,520	1,799	154,807	1,651	1,40	0,023	-0,110	0,043	0,295	0,039	-0,080	-0,080	0,325
0,049	0,488	78,16	0,453	0,872	1,543	1,817	158,387	1,622	1,54	0,025	-0,110	0,049	0,315	0,041	-0,077	-0,077	0,341
0,108	0,877	76,80	0,656	0,714	1,642	1,879	171,063	1,520	2,02	0,035	-0,107	0,084	0,419	0,046	-0,063	-0,063	0,419
0,187	1,139	74,73	0,998	0,562	1,788	1,934	183,227	1,421	2,79	0,052	-0,094	0,157	0,629	0,054	-0,035	-0,035	0,569
0,294	1,289	71,93	1,548	0,433	1,974	1,962	190,823	1,356	3,86	0,079	-0,061	0,286	1,033	0,063	0,009	0,009	0,815
0,444	1,355	68,35	2,439	0,327	2,209	1,961	193,200	1,330	5,54	0,124	0,003	0,513	1,803	0,076	0,079	0,079	1,245
0,667	1,361	63,83	3,967	0,241	2,519	1,935	191,147	1,338	8,08	0,198	0,129	0,922	3,404	0,093	0,182	0,181	2,001
1,044	1,324	58,10	6,949	0,168	2,971	1,891	185,766	1,371	12,44	0,335	0,400	1,772	7,225	0,123	0,361	0,361	3,568
1,825	1,254	50,39	14,389	0,104	3,743	1,834	177,889	1,425	21,58	0,641	1,169	4,049	19,502	0,180	0,749	0,749	7,686
4,371	1,151	38,56	46,618	0,047	5,555	1,766	167,848	1,499	51,14	1,733	5,058	14,976	97,311	0,343	2,180	2,180	27,196
9,686	1,085	28,94	141,384	0,023	8,110	1,730	162,095	1,544	112,02	4,175	18,270	49,367	439,551	0,591	5,339	5,339	86,992
17,351	1,053	22,89	321,176	0,013	10,739	1,715	159,494	1,565	196,95	7,771	47,131	117,285	1 358,273	0,819	9,579	9,579	199,359

Table 11 — Characteristic values of a two-lobe bearing with $\Omega = 150^\circ$, $\varphi_{P,1} = 270^\circ$, $h_{0,\max}^* = 1$, $B^* = 1$

So	ε	$\beta [^\circ]$	$p_{\max}^* \cdot So$	$h_{\min}^*$	F_f^*	Q_3^*	Q_P^*	Q_2^*	$\Delta T_{\max}^*$	c_{11}^*	c_{12}^*	c_{21}^*	c_{22}^*	d_{11}^*	d_{12}^*	d_{21}^*	d_{22}^*
0,000	0,000	90,00	0,000	1,000	2,614	0,000	2,108	2,000	2,00	0,000	-0,489	1,949	0,000	0,978	0,000	0,000	3,900
0,099	0,100	75,43	0,202	0,900	2,504	0,122	2,158	1,834	2,21	0,135	-0,259	1,039	0,163	0,528	0,138	0,138	2,084
0,229	0,217	62,56	0,479	0,783	2,451	0,237	2,311	1,651	2,70	0,323	-0,309	1,262	0,399	0,671	0,349	0,348	2,558
0,402	0,338	53,64	0,882	0,662	2,502	0,324	2,531	1,483	3,38	0,597	-0,405	1,685	0,766	0,957	0,704	0,704	3,465
0,624	0,448	47,91	1,451	0,552	2,656	0,382	2,764	1,344	4,23	0,941	-0,501	2,314	1,367	1,318	1,190	1,191	4,826
0,933	0,549	43,19	2,317	0,451	2,919	0,419	2,983	1,228	5,11	1,335	-0,472	3,215	2,548	1,563	1,664	1,665	6,733
1,391	0,642	38,78	3,732	0,358	3,315	0,438	3,166	1,134	6,40	1,936	-0,360	4,718	4,788	1,913	2,386	2,385	9,890
2,118	0,727	34,46	6,227	0,273	3,890	0,440	3,295	1,061	8,35	2,935	-0,048	7,439	9,440	2,463	3,590	3,592	15,533
3,466	0,807	29,85	11,452	0,193	4,788	0,427	3,361	1,010	11,89	4,896	0,934	13,394	21,341	3,419	5,955	5,959	27,630
6,450	0,880	24,68	25,040	0,120	6,339	0,397	3,345	0,988	19,73	9,558	4,626	29,934	61,882	5,316	11,559	11,552	60,213
16,854	0,946	17,96	86,518	0,054	10,043	0,343	3,220	1,011	46,31	27,847	29,359	114,765	343,527	10,933	33,673	33,682	219,295
40,350	0,975	13,08	277,380	0,025	15,534	0,300	3,102	1,058	104,69	74,270	131,880	413,357	1 726,357	21,118	90,642	90,640	754,679

Table 12 — Characteristic values of a two-lobe bearing with $\Omega = 150^\circ$, $\varphi_{P,1} = 270^\circ$, $h_{0,\max}^* = 3$, $B^* = 1$

So	ε	$\beta [^\circ]$	$p_{\max}^* \cdot So$	$h_{\min}^*$	F_f^*	Q_3^*	Q_P^*	Q_2^*	$\Delta T_{\max}^*$	c_{11}^*	c_{12}^*	c_{21}^*	c_{22}^*	d_{11}^*	d_{12}^*	d_{21}^*	d_{22}^*
0,000	0,000	90,00	0,393	1,000	1,808	0,986	29,398	2,196	1,31	0,019	-0,207	0,147	0,440	0,114	-0,211	-0,211	0,698
0,079	0,400	83,67	0,512	0,918	1,850	1,035	31,411	2,112	1,55	0,031	-0,207	0,166	0,476	0,126	-0,193	-0,193	0,735
0,159	0,675	81,48	0,697	0,796	1,942	1,118	35,083	1,961	1,90	0,057	-0,201	0,221	0,572	0,149	-0,148	-0,148	0,839
0,292	0,921	77,45	1,104	0,623	2,120	1,209	39,751	1,771	2,63	0,112	-0,165	0,367	0,837	0,181	-0,048	-0,048	1,097
0,439	1,039	73,23	1,651	0,494	2,311	1,243	42,157	1,667	3,55	0,180	-0,101	0,584	1,272	0,208	0,075	0,075	1,483
0,618	1,096	68,61	2,420	0,392	2,531	1,240	42,954	1,621	4,75	0,270	-0,006	0,900	2,010	0,235	0,220	0,220	2,057
0,857	1,120	63,47	3,584	0,307	2,806	1,212	42,658	1,617	6,43	0,399	0,140	1,399	3,339	0,273	0,404	0,404	2,985
1,214	1,123	57,68	5,540	0,232	3,179	1,166	41,559	1,642	9,06	0,602	0,398	2,268	6,003	0,329	0,667	0,667	4,610
1,821	1,112	51,00	9,343	0,165	3,739	1,108	39,856	1,692	13,43	0,970	0,942	4,065	12,275	0,430	1,134	1,135	7,956
3,101	1,090	42,82	18,828	0,104	4,711	1,035	37,631	1,770	22,61	1,784	2,518	8,837	32,377	0,619	2,137	2,137	16,629
7,286	1,056	31,54	59,890	0,048	7,014	0,947	34,862	1,885	52,36	4,684	10,704	31,510	159,850	1,140	5,743	5,743	56,670
16,347	1,032	22,96	184,394	0,023	10,374	0,896	33,221	1,965	114,02	11,300	41,323	105,004	757,441	1,843	13,157	13,156	177,370
29,280	1,020	18,04	424,328	0,013	13,865	0,875	32,501	2,003	206,19	21,870	98,747	258,299	2 287,242	3,066	28,191	28,188	448,341

Table 13 — Characteristic values of a two-lobe bearing with $\Omega = 150^\circ$, $\varphi_{P,1} = 270^\circ$, $h_{0,\max}^* = 5$, $B^* = 1$

So	ε	$\beta [^\circ]$	$p_{\max}^* \cdot So$	$h_{\min}^*$	F_f^*	Q_3^*	Q_p^*	Q_2^*	$\Delta T_{\max}^*$	c_{11}^*	c_{12}^*	c_{21}^*	c_{22}^*	d_{11}^*	d_{12}^*	d_{21}^*	d_{22}^*
0,000	0,000	90,00	0,393	1,000	1,542	1,820	119,959	2,263	1,32	0,024	-0,126	0,050	0,327	0,046	-0,098	-0,098	0,383
0,028	0,250	78,87	0,443	0,944	1,551	1,826	121,181	2,248	1,47	0,025	-0,126	0,053	0,335	0,047	-0,097	-0,097	0,390
0,060	0,500	78,46	0,519	0,871	1,581	1,851	124,833	2,198	1,67	0,028	-0,126	0,063	0,362	0,049	-0,093	-0,093	0,413
0,130	0,891	77,02	0,744	0,711	1,687	1,917	135,296	2,053	2,22	0,040	-0,122	0,102	0,476	0,055	-0,075	-0,075	0,503
0,220	1,151	74,89	1,110	0,559	1,841	1,972	145,155	1,916	3,06	0,059	-0,106	0,182	0,705	0,064	-0,042	-0,042	0,668
0,339	1,300	72,08	1,689	0,430	2,036	1,999	151,327	1,826	4,26	0,090	-0,069	0,323	1,142	0,074	0,009	0,009	0,942
0,504	1,365	68,51	2,615	0,324	2,280	1,995	153,279	1,790	6,05	0,139	0,004	0,569	1,976	0,088	0,085	0,085	1,403
0,746	1,370	64,05	4,187	0,238	2,602	1,965	151,680	1,800	8,79	0,220	0,142	1,012	3,680	0,108	0,200	0,200	2,229
1,153	1,333	58,31	7,273	0,165	3,072	1,917	147,414	1,845	13,48	0,371	0,444	1,939	7,793	0,141	0,400	0,400	3,935
1,985	1,261	50,62	14,933	0,102	3,867	1,856	141,074	1,920	23,18	0,704	1,291	4,395	20,907	0,203	0,826	0,826	8,372
4,632	1,155	38,81	47,788	0,047	5,703	1,785	132,986	2,023	53,77	1,855	5,535	15,862	102,663	0,368	2,295	2,295	28,511
10,243	1,086	29,00	146,773	0,022	8,344	1,748	128,281	2,086	118,11	4,483	19,982	52,802	469,566	0,635	5,700	5,699	92,269
18,128	1,054	22,97	331,415	0,013	11,001	1,735	126,220	2,115	205,49	8,279	50,526	124,315	1 429,759	0,882	10,240	10,240	210,308