SLOVENSKI STANDARD
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Drsni leģaji - Oznaļ be - 2. del: Naļ in uporabe

Plain bearings -- Symbols -- Part 2: Applications

Paliers lisses -- Symboles -- Partie 2: Applications

Ta slovenski standard je istoveten z: **ISO 7904-2:1995**

ICS:

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INTERNATIONAL STANDARD

ISO 7904-2

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Plain bearings — Symbols —

Part 2: Applications

Paliers lisses — Symboles —

Partie 2: Applications

Reference number
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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 7904-2 was prepared by Technical Committee ISO/TC 123, *Plain bearings*.

ISO 7904 consists of the following parts, under the general title *Plain bearings — Symbols*:

— *Part 1: Basic symbols*

— *Part 2: Applications*

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Plain bearings — Symbols —

Part 2:
Applications

1 Scope

This part of ISO 7904 specifies practical applications of the general symbols laid down in ISO 7904-1 with regard to the calculations, design and testing of plain bearings.

ISO 7904-1 distinguishes between basic characters and additional signs. Additional signs are subscripts and superscripts. The symbols necessary for plain bearing calculations, design, manufacture and testing are combinations of the above-mentioned signs.

The symbols which have been found necessary for the calculations, design and testing of plain bearings are given in 3.1 and 3.2. They have been combined according to the recommendations given in ISO 7904-1. The list may be enlarged, if necessary.

Angles and directions of rotation are defined positively as rotating left-hand (counter-clockwise); the same applies to rotational frequencies, peripheral and angular velocities.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 7904. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 7904 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7904-1:1994, *Plain bearings — Symbols — Part 1: Basic symbols.*

3 Symbols and terms

3.1 Symbols (Roman alphabet)

A	heat-emitting surface (bearing housing); elongation at fracture
A_{lan}	land area
A_{lan}^*	relative land area
A_{P}	oil pocket area
A_{S}	area of cross-section
a	distance; acceleration; thermal diffusivity
a_F	distance between entrance of the gap and the location of the pivot point
a_F^*	relative distance between entrance of the gap and the location of the pivot point
a_M	off-set of bearing support
B	(breadth); nominal bearing width; effective bearing width at right angles to the direction of motion; diameter of a circular tilting pad
B^*	relative width; width ratio

B_H	external width of bearing housing in axial direction
B_{tot}	total bearing width at right angles to the direction of motion
b_{ax}	width of axial outlet
b_c	width of circumferential outlet
b_G	width of oil groove; width of bleed groove
b_P	width of oil pocket
C	nominal clearance; concentration; chamfer
C^*	relative bearing clearance (also ψ)
C_B	difference between lobe or pad bore radius and shaft radius of a multi-lobed and tilting pad journal bearing
C_D	bearing clearance; bearing diametral clearance (difference between journal bearing bore and shaft diameter)
$\overline{C}_D$	mean value of C_D
$C_{D,eff}$	effective bearing diametral clearance
$C_{D,max}$	maximum value of C_D
$C_{D,min}$	minimum value of C_D
C_{man}	clearance range due to machining tolerances of a multi-lobed journal bearing
C_{max}	maximum clearance of multi-lobed bearing
C_{min}	minimum clearance of multi-lobed bearing
C_R	bearing radial clearance (difference between journal bearing radius and shaft radius)
$\overline{C}_R$	mean value of C_R
$C_{R,eff}$	effective bearing radial clearance
$C_{R,max}$	maximum value of C_R
$C_{R,min}$	minimum value of C_R
C_{wed}	wedge depth of a multi-taper land bearing ("thrust bearing clearance")
c	specific heat capacity; stiffness coefficient
c_J	flexural stiffness of shaft
c_p	specific heat capacity (with p constant)
D	nominal bearing diameter (inside diameter of journal bearing; mean diameter of thrust-bearing carrier ring)
D_B	twice the radius of lobe or pad in a multi-lobed and tilting pad journal bearing
$D_{B,max}$	maximum value of D_B
$D_{B,min}$	minimum value of D_B
D_H	diameter of bearing housing
D_i	inside diameter of thrust-bearing carrier ring
D_J	shaft diameter
$D_{J,max}$	maximum value of D_J
$D_{J,min}$	minimum value of D_J
D_o	outside diameter of thrust-bearing carrier ring
d	diameter; damping coefficient
d_{cp}	diameter of capillaries
d_L	oil hole diameter
E	modulus of elasticity
E^*	parameter of elasticity
E_B	modulus of elasticity of bearing material
E_J	modulus of elasticity of rotor material (sliding surface)
E_{rsl}	resultant modulus of elasticity
e	eccentricity (eccentricity between the axis of the shaft and the bearing axis)
e^*	relative eccentricity (also ε)
e_B	eccentricity of sliding surfaces (segments) of a multi-lobed and tilting pad journal bearing
e_F	eccentricity of shaft in direction of load of a multi-lobed journal bearing
F	bearing force (nominal load)
F^*	bearing force parameter
F_E	bearing force (with EHD influence)
F_E^*	bearing force parameter (with EHD influence)
$F_{E,tr}$	bearing force (with EHD influence) at the limit of boundary lubrication

$F_{E,tr}^*$ bearing force parameter (with EHD influence) at the limit of boundary lubrication

F_{eff}^* effective bearing force parameter

F_f friction force

F_f^* friction force parameter

F_n normal force; normal to sliding surface

F_{rot} proportion of bearing force absorbed by the rotation of the rotor (wedge action)

F_{sc} static load

F_{sq} proportion of bearing force absorbed by displacement due to squeezing (squeeze action)

F_{st} bearing force at start ($N \approx 0$)

F_{stp} bearing force at stop ($N \approx 0$)

F_{tr} bearing force (without EHD influence) at the limit of boundary lubrication

F_{tr}^* bearing force parameter (without EHD influence) at the limit of boundary lubrication

f coefficient of friction; function

f^* friction parameter

f_h fluid friction coefficient (in the area of boundary lubrication)

f_{min} coefficient of friction on minimum of Stribeck curve

f_s coefficient of friction of a solid

f_{tr} coefficient of friction at transition to boundary lubrication

G shear modulus

g acceleration due to gravity

H nominal height

H_H height of bearing housing

HB Brinell hardness

HRB Rockwell hardness (ball)

HRC Rockwell hardness (cone)

HV Vickers hardness

h local lubricant film thickness (film thickness)

h^* relative local lubricant film thickness (relative film thickness)

h_{en} lubricant film thickness at entrance

h_{ex} lubricant film thickness at exit

h_G depth of oil groove

h_{lim} minimum permissible lubricant film thickness during operation

h_{lim}^* minimum permissible relative lubricant film thickness during operation

$h_{lim,tr}$ minimum permissible lubricant film thickness at transition to boundary lubrication

$h_{lim,tr}^*$ minimum permissible relative lubrication film thickness at transition to boundary lubrication

h_{min} minimum lubricant film thickness (minimum film thickness)

h_{min}^* relative minimum lubricant film thickness (relative minimum film thickness)

$h_{min,tr}$ minimum lubricant film thickness at transition to boundary lubrication

$h_{min,tr}^*$ relative minimum lubricant film thickness at transition to boundary lubrication

h_P depth of oil pocket

h_{wav} waviness of sliding surface

$h_{wav,eff}$ effective waviness of sliding surface

$h_{wav,eff,lim}$ maximum permissible effective waviness of sliding surface

h_0 local lubricant film thickness with $\varepsilon = 0$

h_0^* relative local lubricant film thickness with $\varepsilon = 0$

$h_{0,max}$ maximum lubricant film thickness with $\varepsilon = 0$

$h_{0,max}^*$ lubricant film thickness ratio (relative maximum lubricant film thickness with $\varepsilon = 0$)

K_w coefficient of wear

k heat transmission coefficient

k^* heat transmission parameter

k_A outer heat transmission coefficient (reference area A)

k_i	inner heat transmission coefficient (oil film)
L	nominal length; length of sliding surface in direction of motion; length of pad in circumferential direction
L_H	length of bearing housing at right angles to the axis
l_{ax}	axial land length
l_c	circumferential land length
l_{cp}	length of capillaries
l_G	length of oil groove
l_P	length of oil pocket
l_{wed}	length of wedge
M	moment; mixing factor
M_F	loading moment
M_f	friction moment
m	mass
N	rotational frequency (revolutions per time unit)
N^*	rotational frequency parameter
N_B	rotational frequency of the bearing
N_{cr}	critical rotational frequency of the rigidly supported shaft
N_F	rotational frequency of the bearing force
N_J	rotational frequency of the shaft
$N_{lim,tr}$	maximum permissible transition rotational frequency
N_{min}	rotational frequency at minimum of friction of Stribeck curve
N_{rsn}	resonance rotational frequency of the shaft assembled in a plain bearing
N_{tr}	transition rotational frequency
P_{cl}	cooling capacity; additional cooling
P_f	frictional power
P_p	pumping power
P_{th}	heat flow rate
$P_{th,amb}$	heat flow rate to the ambient
$P_{th,f}$	heat flow rate based on frictional power
$P_{th,L}$	heat flow rate in the lubricant
P_{tot}	total power ($P_p + P_f$)
P^*_{tot}	total power parameter
p	local lubricant film pressure, e.g. specific load
$\bar{p}$	specific load, e.g. load per unit of projected area
$\bar{p}_{dyn}$	dynamic specific load
p_{en}	lubricant feed pressure
p^*_{en}	lubricant feed pressure parameter
p_{lim}	maximum permissible lubricant film pressure
$\bar{p}_{lim}$	maximum permissible specific bearing load
p_{max}	maximum lubricant film pressure
p^*_{max}	maximum lubricant film pressure parameter
p_P	lubricant pressure in pockets
$\bar{p}_{sc}$	static specific load
$\bar{p}_{st}$	specific load at start ($N \approx 0$)
$\bar{p}_{stp}$	specific load at stop ($N \approx 0$)
Q	lubricant flow rate; volume flow rate
Q^*	lubricant flow rate parameter
Q_{cl}	cooling oil flow rate
Q_p	lubricant flow rate based on feed pressure
Q^*_p	lubricant flow rate parameter based on feed pressure
Q_0	reference lubricant flow rate
Q_1	lubricant flow rate at the inlet to lubrication clearance gap (circumferential direction)
Q^*_1	lubricant flow rate parameter at the inlet to lubrication clearance gap (circumferential direction)
Q_2	lubricant flow rate at the outlet of lubrication clearance gap (circumferential direction)
Q^*_2	lubricant flow rate parameter at the outlet of lubrication clearance gap (circumferential direction)

Q_3	lubricant flow rate due to hydrodynamic pressure development
Q_3^*	lubricant flow rate parameter due to hydrodynamic pressure development
R	bearing inside radius of journal bearing
R_a	mean value of surface finish C.L.A.
$R_{a,B}$	mean value of surface finish C.L.A. of bearing sliding surface
$R_{a,J}$	mean value of surface finish C.L.A. of shaft mating surface
R_B	lobe or pad radius of a multi-lobed journal bearing and tilting pad journal bearing
R_{cp}	flow resistance of capillaries (hydrostatic bearing)
R_J	shaft radius
$R_{lan,ax}$	flow resistance of one land in axial direction (hydrostatic bearing)
$R_{lan,c}$	flow resistance of one land in circumferential direction (hydrostatic bearing)
R_P	flow resistance of one pocket (hydrostatic bearing)
R_z	average peak-to-valley height
$R_{z,B}$	average peak-to-valley height of bearing sliding surface
$R_{z,J}$	average peak-to-valley height of shaft mating surface
Re	Reynolds number
Re_{cr}	critical Reynolds number
r	repeatability
S_F	security against boundary lubrication due to excessive loading
S_N	security against boundary lubrication due to lower frequency of rotation
So	Sommerfeld number
So_{rot}	Sommerfeld number (rotation)
So_{sq}	Sommerfeld number (displacement due to squeezing)
So_{tr}	Sommerfeld number at transition to boundary lubrication
s	wall thickness
$s_{A,rsn}$	displacement amplitude of rotor vibration at resonance
T	temperature
T_{amb}	ambient temperature
T_B	bearing temperature
T_{eff}	effective temperature of the lubricant
T_{en}	lubricant temperature at bearing entrance
T_{ex}	lubricant temperature at bearing exit
T_g	glass temperature (plastic testing)
T_J	shaft temperature
T_L	lubricant temperature
T_{lim}	maximum permissible bearing temperature
T_1	lubricant temperature in pockets
T_2	lubricant temperature at the exit of the bearing clearance gap
t	time
U	peripheral speed; sliding velocity (related to the journal bearing shaft diameter or the mean thrust bearing carrier ring)
U_B	peripheral speed of bearing
U_J	peripheral speed of shaft
$U_{lim,tr}$	maximum permissible transition peripheral speed
$\overline{U}_R$	average velocity of flow at pre-restrictor of hydrostatic bearing
U_{tr}	transition peripheral speed
u	velocity component in x-direction; deformation in x-direction; uncertainty of measurement
V	volume; surface velocity in y-direction; displacement velocity
VG	viscosity grade
VI	viscosity index
v	velocity component in y-direction; deformation in y-direction
W	surface velocity in z-direction; work (energy)