1. Abstract

Calculation overview

SKF Explorer

	Designation	Bearing rating life		Grease	Static safety factor	Frictional moment	Power loss
		Basic	SKF life	Relubrication interval		Total	
		L_{10h} (h)	L_{10mh} (h)	t_f (h)	S_0	M (Nmm)	P_{loss} (W)
Left	6205	> 2x10^5	> 2x10^5	10900	> 20	1.11	0.17
Right	6205	> 2x10^5	> 2x10^5	10900	> 20	5.71	0.87

Left bearing

Consideration

All calculated values are best estimates resulting from the input data and assumptions, and well-recognized data sources, and well-established calculation methods.
SKF follows standards and methods suggested by Greenhouse Gas Protocol for CO_2 estimates.
For details about data, methods, and assumptions used, follow the link below.
If you intend to use these values for decision making, contact SKF for more details and correct interpretation of calculation results.
The values calculated by SKF Product select should not be compared with values obtained from other tools or sources, unless you are confident about the data sources, methods and assumptions used. More info

Consideration

Low viscosity ratio k, reduced asperity contact. It is recommended to select a higher viscosity lubricant or improve cooling. It is not appropriate to look at basic rating life only. Instead use SKF rating life method. Recommended to use anti-wear (AW) or extreme pressure (EP) additives to reduce wear More info

Consideration

For rating life results above 100000 hours, other failure modes than those included in the current rating life models will dominate and limit the life of the bearing.

Right bearing

Consideration

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2. Input

2.1. Bearing data

	Designation	Bearing type	Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Clearance class
						Dynamic	Static		Reference	Limiting	
			d (mm)	D (mm)	B (mm)	C (kN)	C_0 (kN)	P_u (kN)	n_{ref} (r/min)	n_{lim} (r/min)	
Left	6205	Deep groove ball bearing	25.0	52.0	15.0	14.8	7.8	0.335	28000.0	18000.0	Normal
Right	6205	Deep groove ball bearing	25.0	52.0	15.0	14.8	7.8	0.335	28000.0	18000.0	Normal

2.2. Loads & Speed

Locating	1
Bearing distance	60.5 *mm*
Shaft orientation	Vertical
Rotating ring	Inner ring rotation

	Load	Coordinate system	Coordinates			Forces			Speed	Case weight
			x|r (mm)	y|θ (mm|deg)	z (mm)	Fx|Fr (kN)	Fy|Fθ (kN)	Fz (kN)	*(r/min)*	
LC1	F1	Cartesian	0.0	0.0	180.0	0.01	0.01	0.03	1450.0	1

2.3. Temperature

	Left		Right	
Load cases	**Inner ring** (°C)	**Outer ring** (°C)	**Inner ring** (°C)	**Outer ring** (°C)
LC1	70	70	70	70

Maximum temperature is used for calculating the actual viscosity, kappa, a_{SKF} and SKF rating life.

Mean temperature is used for calculating bearing friction and power loss.

2.4. Lubrication

	Designation	Lubricant Type	Lubricant method	Effective EP additives	Viscosity @40° C (mm^2/s)	Viscosity @100 °C (mm^2/s)	Contamination Method	Contamination Cleanliness / Factor
Left	6205	Grease	Viscosity at 40°C and 100°C	False	36.0	6.6	Detailed guidelines	High cleanliness
Right	6205	Grease	Viscosity at 40°C and 100°C	False	36.0	6.6	Detailed guidelines	High cleanliness

2.5. CO_2 emissions settings

	Designation	Input energy mix manually	Geographical location	Period of interest [Years]	Time operational [%]
Left	6205	False	European Union	1	100
Right	6205	False	European Union	1	100

2.6. Fits and tolerances

	Designation	Requirements Guidance	Tolerance Class Housing	Tolerance Class Shaft	Calculated interference	Include Smoothing
Left	6205	False	J6	js5	True	True
Right	6205	False	H6	j5	True	True

3. Results

3.1. Loads & static safety

		Load ratio	Static safety factor	Equivalent dynamic load	Equivalent static load
	Designation	C/P	S_0	P (kN)	P_0 (kN)
Left	6205	> 100	> 20	0.03	0.0279
Right	6205	> 100	> 20	0.09	0.0421

3.2. Bearing minimum load

		Reaction forces		Minimum load	
	Designation	Radial	Axial		Requirements
		F_r (kN)	F_a (kN)	F_{rm} (kN)	met?
Left	6205	0.0279	0	0.0275	yes
Right	6205	0.0421	-0.03	0.0275	yes

3.3. Adjusted reference speed

		Adjusted reference speed	Adjustment factors	
	Designation		For bearing load P	For oil viscosity
		n_{ar} (r/min)	f_p	f_v
Left	6205	43500	1.0	1.56
Right	6205	43500	1.0	1.56

3.4. Lubrication conditions

		Operating viscosity			Viscosity ratio
	Designation	Actual	Rated	Rated @ 40 °C	
		ν (mm^2/s)	ν_1 (mm^2/s)	ν_{ref} (mm^2/s)	κ
Left	6205	13.3	15.8	50.1	0.84
Right	6205	13.3	15.8	50.1	0.84

3.5. Grease life and relubrication interval

	Designation	Relubrication interval	Grease quantity	Speed factor
			Side	Speed x mean diameter
		t_f (h)	G_p (g)	nd_m (mm/min)
Left	6205	10900	4	56600
Right	6205	10900	4	56600

3.6. Bearing rating life

	Designation	Bearing rating life		SKF life modification factor	Contamination factor
		Basic	SKF		
		L_{10h} (h)	L_{10mh} (h)	a_{skf}	η_c
Left	6205	> 2x10^5	> 2x10^5	50.0	0.46
Right	6205	> 2x10^5	> 2x10^5	50.0	0.46

Left bearing

Consideration

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Consideration

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Right bearing

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Consideration

For rating life results above 100000 hours, other failure modes than those included in the current rating life models will dominate and limit the life of the bearing.

3.7. Bearing friction & power loss

	Designation	Frictional moment		Friction sources				Power loss
		Total	At start 20-30°C and zero speed	Rolling	Sliding	Seals	Drag loss	
		M (Nmm)	M_{start} (Nmm)	M_{rr} (Nmm)	M_{sl} (Nmm)	M_{seal} (Nmm)	M_{drag} (Nmm)	*P_{loss} (W)*
Left	6205	1.11	0.04	1.09	0.02	0	0	0.17
Right	6205	5.71	1.13	5.14	0.57	0	0	0.87

3.8. Bearing frequencies

	Designation	Rotational frequencies				Frequency of over-rolling		
		Inner ring	Outer ring	Rolling element set & cage	Rolling element about its axis	Point on inner ring	Point on outer ring	Rolling element
		f_i(Hz)	f_e(Hz)	f_c(Hz)	f_r(Hz)	*f_{ip} (Hz)*	f_{ep}(Hz)	f_{rp}(Hz)
Left	6205	24.167	0.0	9.626	56.97	130.862	86.638	113.941
Right	6205	24.167	0.0	9.626	56.97	130.862	86.638	113.941

3.9. Estimation of CO_2 emissions over period of interest

	Designation	CO_2 emissions caused by bearing production	CO_2 emissions during bearing operation - over period of interest			Resources consumed during bearing operation - over period of interest	
			Frictional power loss	Grease consumption	Sum of CO_2 during operation	Energy	Grease
		kg of CO_2	kg of CO_2	kg of CO_2	kg of CO_2	kWh	kg
Left	6205	*0.5 (Learn more)	0.7	0.0	0.7	1.48	< 0.01
Right	6205	*0.5 (Learn more)	3.5	0.0	3.5	7.6	< 0.01

* Value is not designation specific, but based on bearing mass

Left bearing

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Right bearing

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3.10. Fits and tolerances

3.10.1. Tolerances

		Shaft outer diameter		Bearing bore		Bearing outer diameter		Housing bore		Smoothing	
	Designation	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Shaft and bearing bore	Bearing outer ring and housing
		(µm)	(µm)	(µm)	(µm)	(µm)	(µm)	(µm)	(µm)	(µm)	(µm)
Left	6205	-4	4	-10	0	-13	0	-6	13	4	12
Right	6205	-4	5	-10	0	-13	0	0	19	4	12

Consideration

For the tolerances calculation, the normal tolerance for the bearing bore and outer diameter is used.

3.10.2. Fits, Probable Interference (+) / Clearance (-)

		Shaft			Housing		
	Designation	Probable minimum	Middle	Probable maximum	Probable minimum	Middle	Probable maximum
		(µm)	(µm)	(µm)	(µm)	(µm)	(µm)
Left	6205	-6	1	8	-34	-22	-10
Right	6205	-5	2	8	-40	-28	-16