

# Ceramic Open Linear Bearings self-lubricating

# -inear Bearings





L1767

# Material

Aluminium with aluminium-oxide ceramic coating (4-7µ). Hardness >80 HRC. PTFE insert.

# Technical Notes

Concentricity is better than 15µ. Available with or without seals, if seals are required, please contact our sales team. Temperature range: -130°C to +200°C.

## Tips

Can be run on hardened or soft steel shafts, tolerance h6, all part no. L1770-L1776.

Self lubricating versions can also be run on ceramic coated aluminium shafts (see part no. L1778).

Inverting (hanging upside down) open style bearing use is not recommended. \* **Bore tolerances where d<sub>1</sub> is:** 12-16: +0,0, -0.04 to -0.07 20-30: +0.0, 0.05 to -0.07 40-60: +0.0, 0.05 to -0.09 80: +0.0, 0.12 to -0.17

Order No.	Туре	d <sub>1</sub> *	d <sub>2</sub> tol. h7	ا tol. h14	l <sub>2</sub>	l <sub>3</sub>	$w_1$	°	Static load C <sub>o</sub> kN max
L1767.012	Self Lub.	12	22	32	20	1.30	7.6	78°	8.2
L1767.016	Self Lub.	16	26	36	22	1.30	10.8	78°	12.0
L1767.020	Self Lub.	20	32	45	28	1.60	10.8	60°	18.0
L1767.025	Self Lub.	25	40	58	40	1.85	13.2	60°	35.0
L1767.030	Self Lub.	30	47	68	48	1.85	14.2	50°	43.0
L1767.040	Self Lub.	40	62	80	58	2.15	18.7	50°	67.0
L1767.050	Self Lub.	50	75	100	72	2.65	23.8	50°	106.0
L1767.060	Self Lub.	60	90	125	95	3.20	29.8	54°	159.0
L1767.080	Self Lub.	80	120	165	125	4.20	38.4	54°	277.0
L1767.012-SA	Self Lub/align	12	22	32	20	1.30	7.6	78°	8.2
L1767.016-SA	Self Lub/align	16	26	36	22	1.30	10.8	78°	12.0
L1767.020-SA	Self Lub/align	20	32	45	28	1.60	10.8	60°	18.0
L1767.025-SA	Self Lub/align	25	40	58	40	1.85	13.2	60°	35.0
L1767.030-SA	Self Lub/align	30	47	68	48	1.85	14.2	50°	43.0
L1767.040-SA	Self Lub/align	40	62	80	58	2.15	18.7	50°	67.0
L1767.050-SA	Self Lub/align	50	75	100	72	2.65	23.8	50°	106.0
L1767.060-SA	Self Lub/align	60	90	125	95	3.20	29.8	54°	159.0
L1767.080-SA	Self Lub/align	80	120	165	125	4.20	38.4	54°	277.0





# Self-lubricating

These ceramic coated linear bearings are lined with a self-lubricating composite which is bonded to the aluminium shell. This composite is a combination of Teflon<sup>®</sup> and non-abrasive, polyamide fillers for both load carrying capability and dynamic coefficient of friction.

As the self-liner is non-abrasive, it runs equally well on either hardened steel or on soft steel or stainless steel shafting (303 or 316).

### **Ceramic coated**

Ceramic coated linear bearings are a one piece construction, employing a file-hard ceramic coating over an aluminium shell. Our ceramic coating is not an anodised or surface coating that can fracture, flake, chip or wash-off in corrosive environments. The ceramic coating is FDA compliant.

These bearings require lubrication (grease or light oil is sufficient - no silicone based lubricants).



- Automated assembly.Packaging machines.
- Food processing equipment.
- Pharmaceutical equipment.
- Medical equipment.
- Wash-down systems.

# Applications









# **Technical Information**

Ceramic linear bearings



# **Ceramic coated bearings**

These are manufactured from a special grade of aluminium, then ceramic coated. Surface hardness is 85HRC, which is why the bearings have extremely long wear life. Their extreme hardness prevents particles from entering into the surface of the shafting, (this is the primary cause of bearing and shaft failure).

The ceramic series must be lubricated with a thin film of oil in order to perform correctly.

- Lasting precision alignment.
- Abrasion resistance. •
- Elimination of noise.
- Interchangeable with ball bushings.
- Minimal lubrication is required.
- Design economies.
- Rotary/linear motion capabilities. .
- Zero shake or play.
- Elimination of galvanic action.

- High operation speeds.
- Excellent electrical insulating abilities.
- Oscillatory motion & rapid directional change.
- Unaffected by salt water or corrosion.
- Cleanliness.
- Vacuum applications.
- No catastrophic failure.
- Low friction.
- Food machinerv (FDA approved materials available).

# Self-lubricating bearings

- Tough
- **Resource free**

- Quiet
- Cost-effective

These are maintenance free bearings, manufactured to the same standards as our ceramic coated series, but the inside diameter is lined with a special blended Teflon-material; eliminating the need for lubrication. It also allows the use of soft shaft materials such as unhardened steel, 300 series stainless steel or aluminium.

# Parallel shafting and edge loading

Sleeve-type linear motion bearings, more so than ball bushings, require parallel shafting to be aligned as closely as possible to avoid edge loading. Edge loading can cause higher than expected friction and subsequent wear.

To combat shaft misalignment, we offer two options:

- Self-aligning bearings: a subtle o/d radius allows the bearing to pivot on the bearing crown 1.
- Bearings can be supplied with self-aligning O-rings to provide for a "full float bearing". Unlike 2. our self-aligning bearings, floating bearings on O-rings result in changes between shaft centreline to housing tolerances due to deflection and possible mechanical sets

Breakaway force re	equirements - static
Self lube PTFE dry	Ceramic coated lubricated
30% of static load	10% of static load

# Example

For a linear slide employing 2 rails and 4 self lubricating PTFE pillow block assemblies and supporting a horizontal, centred load of 250N

Static self-lubricating linear bearings 30% of system load to get the system moving

Dynamic self-lubricating linear bearings (in motion) 10% of system load

 $250N \times 0.1 = 25N$ 

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	Comparison	between	ceramic	coated	and	self-lı	ubricat	ting	beari	ngs
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Linear bearing categories	Self-lubricating bearings	Ceramic coated bearings		
Max PV (continuous) N/mm² x m/s	63,05	84,06		
Max. pressure N/mm <sup>2</sup>	34,47	34,47		
Max. speed (no load) m/s	2	Unlimited		
Shaft hardness (minimum) 25HRB		35HRB		
Coefficient of friction 0,09 - 0,12		0,04 - 0,08		
Temperature range - Typical limits -240°C to +190°C		-125°C to +200°C		

# Pressure velocity (PV) calculations

The load factor PV has a considerable influence on determining the bearing's useful operating life. PV is determined by multiplying the specific bearing load or pressure (P) by the sliding speed (V).

Bearing materials are rated by a PV limit, with the PV limit representing the highest combination of load and speed under which the bearing material will operate. The PV unit of measure is N/mm<sup>2</sup> x m/s.

To determine P in an application: the specific bearing load (P) is found by dividing the bearing load by the pressure supporting area of the bearing. The units for P are  $N/mm^2$ .

The pressure supporting area depends on the the specific geometry of the bearing.

The following are formulae for the most common types of bearing geometry.





# Technical Information



# Open bearing load capacity

Inverting (hanging upside down) open style sleeve bearings is not an optimal design configuration. System load is forced into the bearing slot - the weakest part of the bearing. Depending on the load and possible moments, point loading on the edges of the slot can result in hot spots, liner cold flow and excessive wear. If the bearings are being used in this way the percentage of the load stated in the data table they can take is shown below.

Straight downward	Side	Inverted
compressive	mounted	(upside down)
100%	70%	30%

## **Cantilevered loading**

When you have a cantilevered load **you must observe the 2:1 ratio rule**. Moment loading can result in edge loading of sleeve-type linear bearings, so the correct spacing between bearings on a single shaft (vertical or Z axes) and spacing between shafting on horizontal applications (X,Y axes) must meet the 2:1 ratio rule.

If this rule is not observed the friction will increase, the system will bind and the bearings will ultimately fail.







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