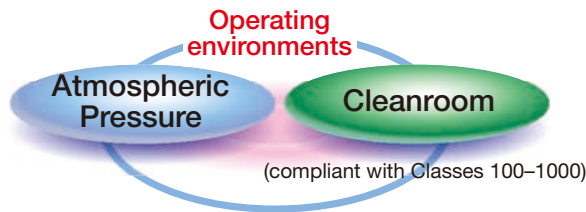



**10. LG2/LGU Grease-Packed Bearings** Pages A21–A22 Dimensions, accuracy and availability of bearings.

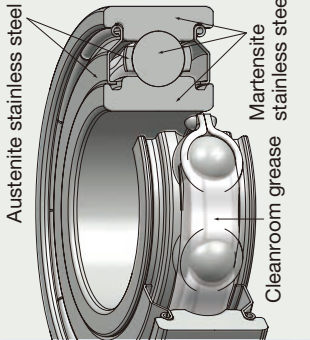
LG2/LGU clean grease-packed stainless steel bearings are suitable for cleanroom environments at atmospheric pressure.



**Product Specifications**



**Representative Structure**

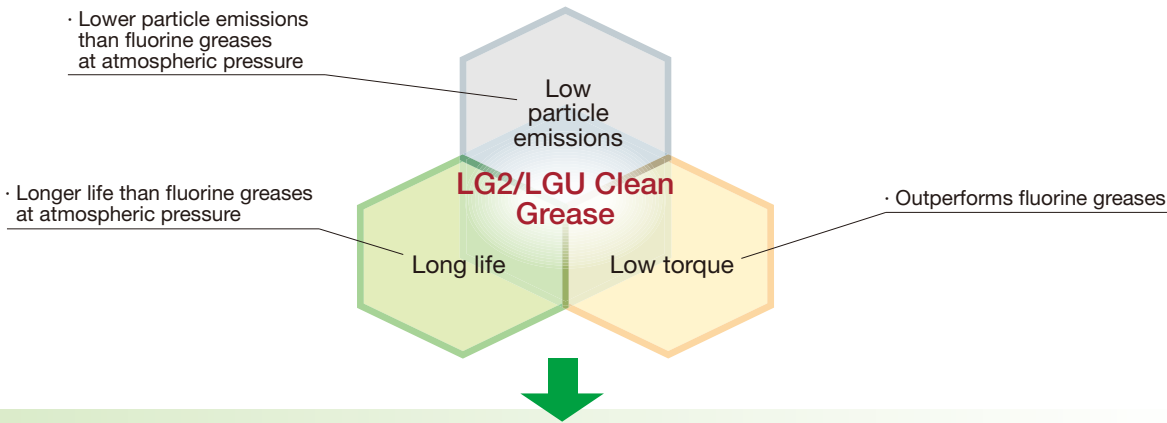


Structure		Shielded Type
Specifications	Outer/Inner rings	Martensite stainless steel
	Balls	Martensite stainless steel
	Cage	Stainless steel or resin
	Lubricant	NSK LG2/LGU grease
	Shields	Austenite stainless steel

Applications: Equipment in cleanrooms

- Operating Instructions and Notes**
- LG2/LGU grease products are for use in normal atmospheric conditions only.
  - Keep bearings packed until immediately before mounting.
  - See the tables on Pages A21 and A22 for limiting loads and limiting rotational speeds.
  - Cleanliness may vary depending on operating conditions, surrounding components, and other factors.
  - All comments referencing certain values or performance in this catalog are for reference only. NSK provides this guide “as is” without express or implied warranties of any kind.

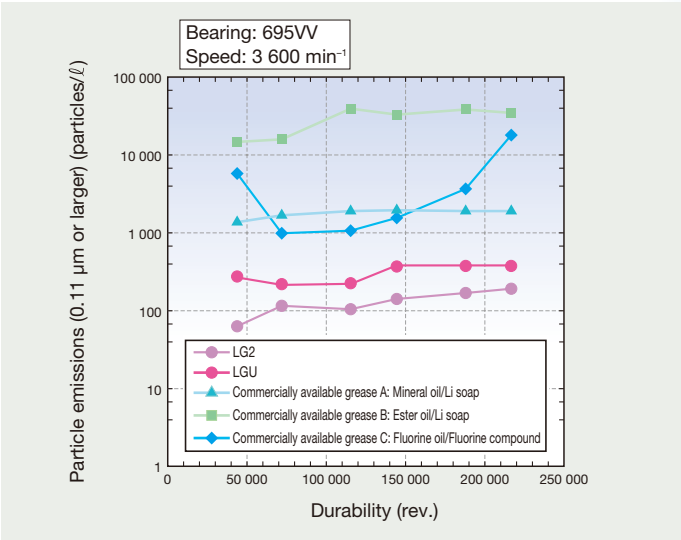
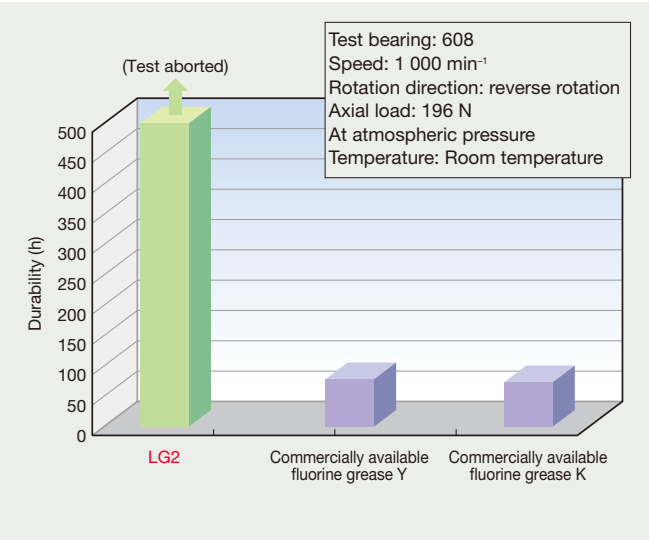
- Features**
- Clean grease lubrication for use at atmospheric pressure only
  - Lower particle emissions, lower torque, longer operating life, and higher corrosion resistance than commercially available fluorine greases
  - LGU grease is free of metallic elements



Performance		
● Properties of grease		
Operating environment	For use at atmospheric pressure only	
Product	LG2	LGU
Base oil	Mineral oil and synthetic hydrocarbon oil	Synthetic hydrocarbon oil
Thickener	Lithium soap	Diurea
Kinematic viscosity (mm²/s, 40 °C)	32	96
Consistency	199	201
Maximum operating temperature (°C)	up to 70	up to 120

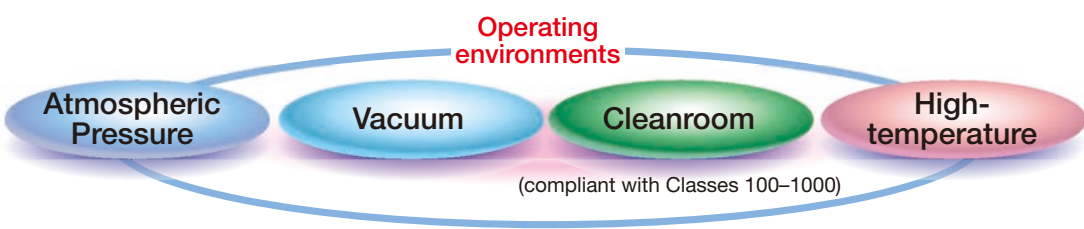
LGU grease is free of metallic elements

- Results of durability tests in normal atmosphere  
LG2/LGU grease feature longer life than other grease at atmospheric pressure.
- Results of particle emission tests in normal atmosphere  
LG2/LGU grease limit particle emissions at atmospheric pressure.




**11. DL2 Grease-Packed Bearings** Pages A21–A22 Dimensions, accuracy and availability of bearings.

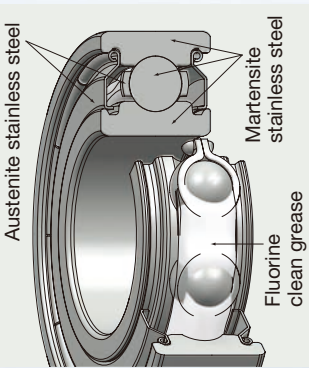
DL2 grease-packed stainless steel bearings are suitable for cleanroom environments at atmospheric pressure up to vacuum.



**Product Specifications**



**Representative Structure**

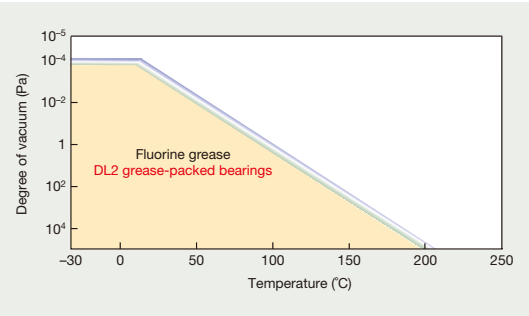


Structure		Shielded
Specifications	Outer/Inner rings	Martensite stainless steel
	Balls	Martensite stainless steel
	Cage	Stainless steel
	Lubricant	DL2 grease
	Shields	Austenite stainless steel

**Applications:** FPD and semiconductor manufacturing equipment, hard disk manufacturing equipment

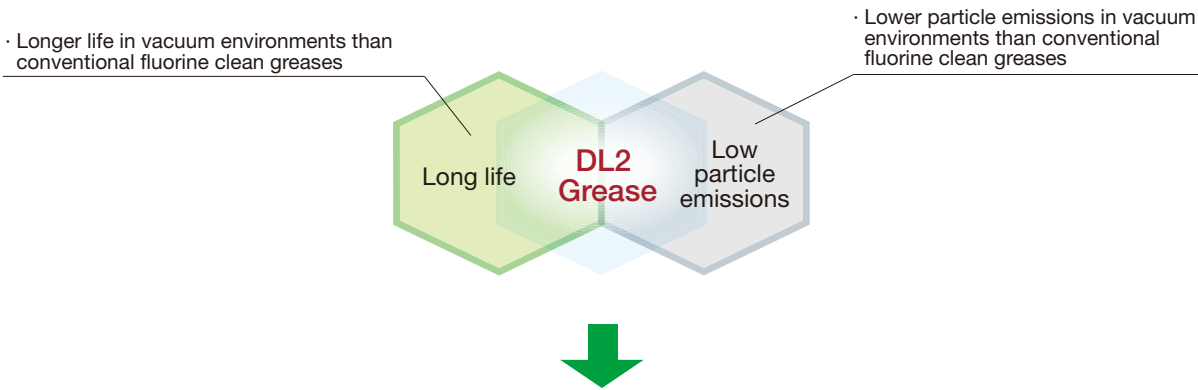
**Operating Instructions and Notes**

- Keep bearings packed until immediately before mounting.
- The scope of application (degree of vacuum, temperature) is listed in the table to the right.
- See the tables on Pages A21 and A22 for limiting loads and limiting rotational speeds.
- Ensure an optimum radial internal clearance for maximum rotational performance by applying a fit that considers bearing load, operating temperatures, materials of the shaft and/or housing (due to coefficient of linear expansion), etc.
- Cleanliness may vary depending on operating conditions, surrounding components, and other factors.
- All comments referencing certain values or performance in this catalog are for reference only. NSK provides this guide “as is” without express or implied warranties of any kind.



**Features**

- Fluorine clean grease lubrication
- More suitable for vacuums and at higher temperatures than LG2/LGU greases
- Lower particle emissions and longer life than conventional fluorine clean greases



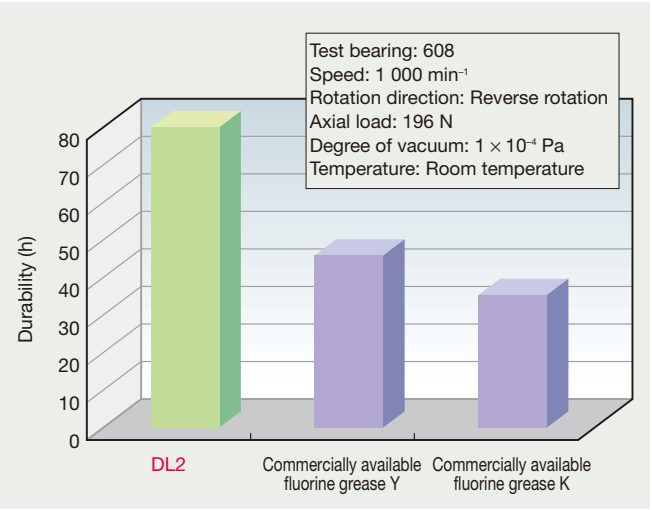
**Performance**

● **Properties of grease**

Operating environments	From atmospheric pressure to vacuum
Name	DL2
Base oil	Fluorine oil
Thickener	PTFE
Kinematic viscosity (mm²/s, 40 °C)	200
Consistency	280
Maximum operating temperature (°C)	up to 200

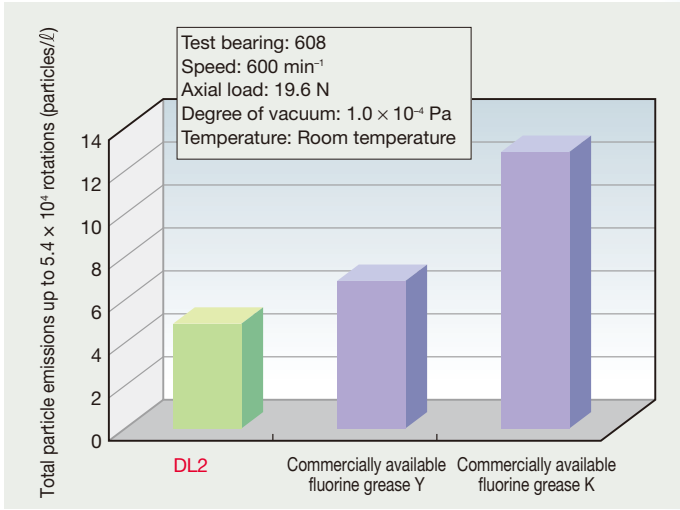
● **Results of durability tests in vacuum**

DL2 grease has a longer operating life than other grease in vacuum environments.



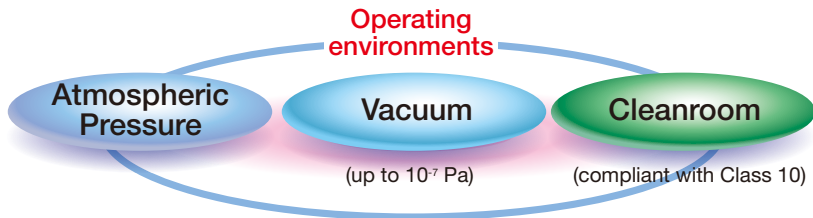
● **Results of particle emission tests in vacuum**

DL2 grease limits particle emissions in vacuum environments.



**12. E-DFO Bearings, V-DFO Bearings** Page A23 Dimensions, accuracy and availability of bearings.

New concept V-DFO and E-DFO bearings have special lubrication coatings applied to the rings, balls, and cage that deliver superior cleanliness and long life. The V-DFO specification uses low-vapor-pressure fluorinated lubricant while the E-DFO specification uses low-vapor-pressure hydrocarbon lubricant. These bearings are suitable for cleanroom environments ranging from atmospheric pressure to vacuum conditions.



**Product Specifications**

**Representative Structure**

Structure		E-DFO	V-DFO
		Shielded	Shielded
Specifications	Outer/Inner rings	Martensite stainless steel and E-DFO	Martensite stainless steel and V-DFO
	Balls	Martensite stainless steel and E-DFO	Martensite stainless steel and V-DFO
	Cage	Stainless steel and E-DFO	Stainless steel and V-DFO
	Lubricant	NSK lubricant E-DFO	NSK lubricant V-DFO
	Shields	Austenite stainless steel	Austenite stainless steel

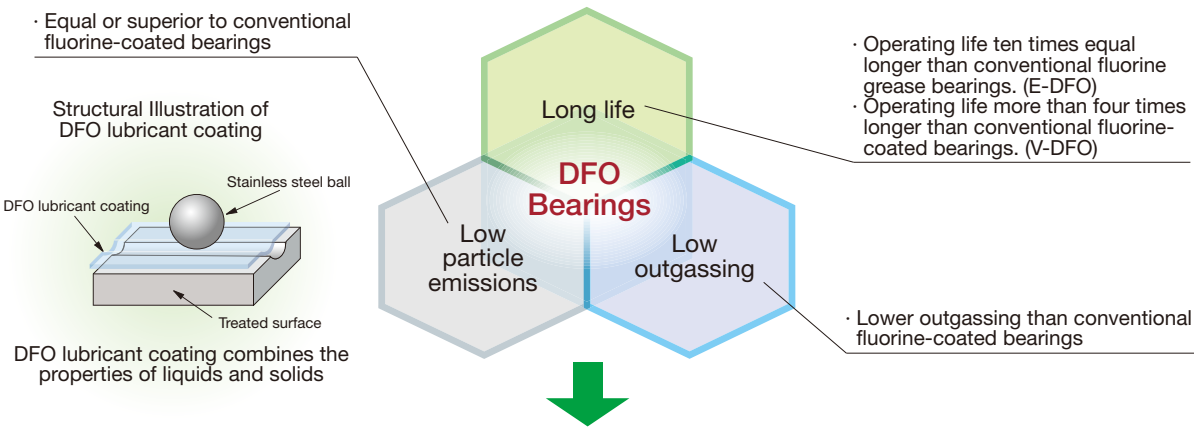
**Applications:** FPD and semiconductor manufacturing equipment, hard disk manufacturing equipment, solar cell manufacturing equipment, robots for vacuum environments

**Operating Instructions and Notes**

- Keep bearings packed until immediately before mounting.
- Avoid storing the bearing for a long amount of time.
- Wear clean gloves when handling.
- Mount the bearing without washing.
- Avoid exposure to any oil or moisture.
- See the tables on Page A23 for limiting loads and limiting rotational speeds.
- Cleanliness may vary depending on operating conditions, surrounding components, and other factors.
- All comments referencing certain values or performance in this catalog are for reference only. NSK provides this guide “as is” without express or implied warranties of any kind.

**Features**

- Operating life more than four times longer than conventional fluorine-coated bearings
- Lower particle emissions and outgassing than MoS<sub>2</sub> solid lubricated bearings
- Usable in environments where lubricants containing metallic elements such as MoS<sub>2</sub> are not suitable
- Usable from atmospheric pressure to vacuums at 10<sup>-7</sup> Pa (room temperature), although the degree of vacuum in which the bearings can be used varies according to operating temperature



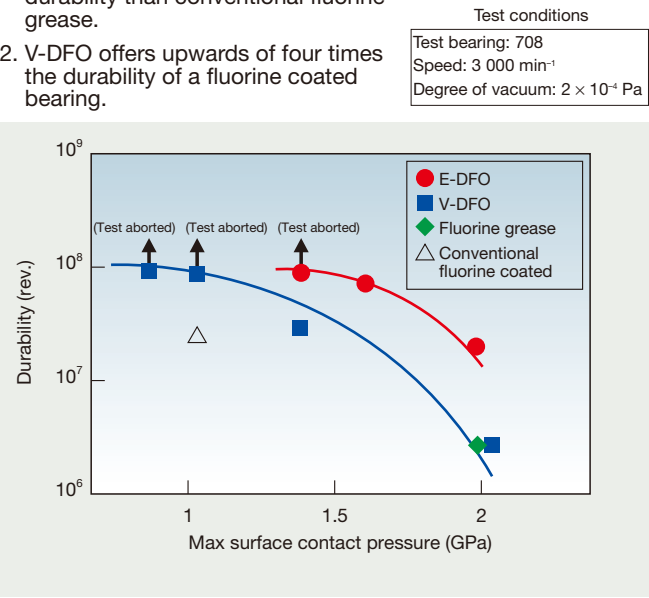
**Performance**

● **Comparison of operating environments for NSK lubricant E-DFO and V-DFO:**

Conditions	E-DFO	V-DFO
Corrosive gas	×	○
Vacuum	◎ (up to 150°C)	○ (up to 150°C)
Atmospheric pressure	◎ (up to 50°C)	◎ (up to 200°C)
Limiting load	◎ (up to 5%)	○ (up to 2%)

● **Durability under vacuum conditions**

1. E-DFO offers nearly ten times more durability than conventional fluorine grease.
2. V-DFO offers upwards of four times the durability of a fluorine coated bearing.



● **Outgassing under high-temperature conditions**  
Low outgassing characteristics

