

# Low Temperature Bearing



# LUOYANG MONTON BEARING SCIENCE & TECHNOLOGY CO., LTD.



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MONTON has designed a new bearing, LNG Pump Bearings, to cope with these demanding performance requirements.

# LNG Pump Bearings

LNG (Liquefied Natural Gas) pumps are used for receiving and discharging LNG to road tankers and storage tanks. In this application the bearing operating conditions are very tough, as the temperature can reach -162°C, and the bearing has to run without external lubrication.

## **Condition Description**

- 💥 Arduous Environments
- ※ Corrosive Environment
- ⅔ High Speed
- ℜ High Temperature
- ✗ Lubrication

### **Product Features**

- ※ Inner & Outer ring made of Stainless steel
- ※ Rolling elements made of stainless steel
- 2 pieces riveted Fluororesin cage

#### Industries

- ※ Chemical and Pharmaceutical
- ※ Medical and Health Care
- ※ Petrochemical
- ※ Industrial Pumps and Compressors

#### **Benefits**

- % Corrosion resistant
- ※ No need for lubrication (self-lubricating cage)

Code

- % High speed (up to 3600 rpm)
- ※ Long life

		L	
	•		Fluororesin cage
6			f caraial
			rivets
		$\times$	
			Stainless
I Stainless steel inner a	nd		steel balls

Bearing structure

Our does not only pay careful attention to all bearing materials, but also adapts the inner and outer bearing geometry to the cryogenic environment. Our bearing engineers consider the different thermal properties of all materials, including shaft and housing, during the design phase, so that our bearings provide an optimized radial play or contact angle as well as perfect fits to the mating parts at operating temperature. This leads to maximized load capacity and superior bearing life. We offers customized bearing dimensions and tolerances on request, even in small quantities.

MONTON has a long tradition in supplying hybrid ceramic bearings to the cryogenic industry, for Liquefied Gas Pumps (LNG, LN2, LO2, LH2, LHe2) but also Turbo Expanders, Liquid Turbines and Chillers.

MONTON bearings for cryogenic applications are designed to fulfil the requests of improving productivity and cutting maintenance costs. Skilled MONTON bearing engineers are happy to consult customers to lift their cryogenic rotating equipment to the next performance level.

In Liquefied Gas Pumps (LNG, LN2, LO2, LH2, LHe2) rolling bearings are designed directly into the flow path of the process media. The advantage of this design principle is, that the construction becomes less complex. Rotary seals, which separate and protect the bearings from the process media, and which are typical wear parts, are no longer necessary. The trade-off is, that the bearings must be capable to cope with the various liquefied gases, which act as their only lubrication. Special advanced bearing materials are required to enable bearings for media lubrication by cryogenic liquids and MONTON's long time proven bearing specification for cryogenic temperature perfectly reflects these requirements.

MONTON LNG pump bearings are available not only as deep groove ball bearings but also as angular contact ball bearings and Four-Point contact (QJ) bearings. This leads to increased load capacity, particularly in thrust direction and hence superior bearing life.

steel balls								Speed
	Description	Dimension				Loading (KN)		(r/min)
	Bearing	d	D	В	r <sub>smin</sub>	C <sub>r</sub>	C <sub>or</sub>	
	6206-H-T35D	30	62	16	1	19.3	11.2	14000
	6207-H-T35D	35	72	17	1.1	25.5	15.3	12000
	6208-H-T35D	40	80	18	1.1	29	18	11000
	6209-H-T35D	45	85	19	1.1	31	20.4	10000
	6210-H-T35D	50	90	20	1.1	36.5	24	9500
	6211-H-T35D	55	100	21	1.5	43	29	8500
	6213-H-T35D	65	120	23	1.5	58	41.5	7000
	6215-H-T35D	75	130	25	1.5	64	48	6800
C3	6217-H-T35D	85	150	28	2	82.5	62	6500
	6305-H-T35D	25	62	17	1.1	22	11	22000
	6308-H-T35D	40	90	23	1.5	42.5	25	11000
	6311-H-T35D	55	120	29	2	76	47.5	10000
	6314-H-T35D	70	150	25	2.1	102	66	9000
	6318-H-T35D	90	190	43	3	132	100	6000
	6320-H-T35D	100	215	47	3	160	130	5700
	6322-H-T35D	110	240	50	3	190	165	5400
e	6328-H-T35D	140	300	62	4	255	250	4000
	7205	25	52	15	1	15	9	26000
	7206	30	62	16	1	22	14	22000
anment characterized by temperature for	7207	35	72	17	1.1	29	19	19000
nes a challenge at temperatures close to	7208	40	80	18	1.1	30.5	21.6	17000
ort service life and are the main root cause	7209	45	85	19	1.1	39	27.5	15000
nd unplanned machinery shutdowns.	7210	50	90	20	1.1	40.5	30.5	14000
High-Nitrogen-Steel . High-Nitrogen-Steel	7305	25	62	17	1.1	18.3	10.6	18000
ombination with silicon nitride ceramic (Si3N4)	7306	30	72	19	1.1	24.8	15.4	15000
alified for media lubrication operation.	7307	35	80	21	1.5.	30.6	19.6	14000
, LNG pump bearings feature retainers made	7308	40	90	23	1.5	37	24.4	12600
rication and hence operates perfectly	7309	45	100	25	1.5	47.6	31.8	12000
	7310	50	110	27	2	54.6	39.2	10000

6315	Basic Bearing Number
Н	Stainless Steel
T35D	Fluororesin Cage
С3	Radial Internal Clearance

Description

In cryogenic applications rolling bearings very often operate in the harshest environment, characterized by temperature far below 0°C and poor lubrication, because the lubrication with oil and grease becomes a challenge at temperatures close to absolute zero (0 K). Small wonder then that conventional steel bearings provide short service life and are the main root cause not only for planned maintenance cycles but also premature equipment failures and unplanned machinery shutdowns.

Our cryogenic bearing specification features races either made from AISI 440C or High-Nitrogen-Steel . High-Nitrogen-Steel provides excellent resistance against corrosion, wear and fatigue, particularly in combination with silicon nitride ceramic (Si3N4) rolling elements. Si3N4 rolling bodies, balls or rollers are available, prevent adhesive wear by their inert behavior and significantly reduce abrasive wear and bearing friction. Thus hybrid bearings are especially qualified for media lubrication operation. While polyamide (PA)- and PEEK-cages tend to get brittle at ultra low temperature, LNG pump bearings feature retainers made from fluoropolymer compound material, which remains ductile, provides self-lubrication and hence operates perfectly at temperatures down to -269°C.