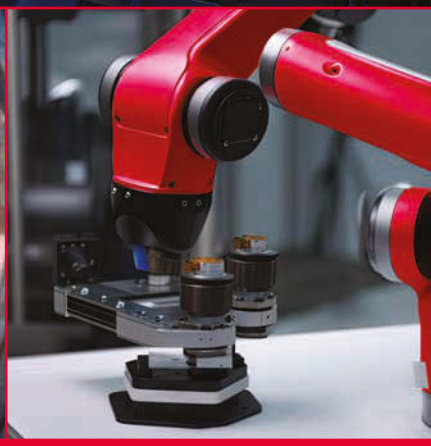
NSK

DEEP GROOVE BALL BEARINGS

FOR PEAK MACHINERY AND EQUIPMENT PERFORMANCE

STAY IN MOTION. STAY IN CONTROL.



SMOOTH. QUIET. EFFICIENT.

SINGLE ROW DEEP GROOVE BALL BEARINGS

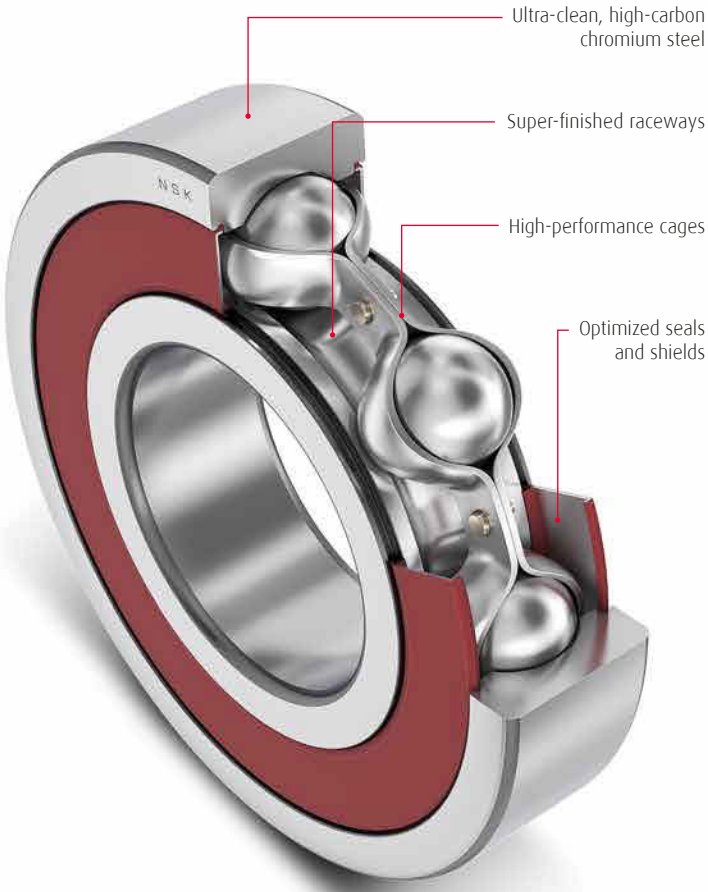
Single row deep groove ball bearings are inarguably the most widely used and versatile bearing type, owing to their simple, low-maintenance design and robust performance. NSK deep groove ball bearings deliver superior total operating and energy efficiency through our core development and manufacturing technologies with:

- Optimized rolling contact for reduced noise, energy use and power loss
- Advanced lubricant technologies and seal designs for durability and reliability
- Special materials, coatings and innovation to contend with extraordinary environments
- An extensive catalog of types and variants for easy adoption

For virtually any rotating machinery and equipment application – in virtually any working environment – NSK deep groove ball bearings quietly deliver exceptional performance and a reliably long service life for lower total cost of operation.

HIGHER SPEEDS. LOWER NOISE. LONGER LIFE.

OPTIMIZED DESIGN, MATERIAL AND MANUFACTURING



With our single row deep groove ball bearings, NSK brings our core technologies to bear to deliver unsurpassed performance and reliability to a near-infinite range of machinery, equipment, applications and operating conditions with:

- **Ultra-clean steel** to promote greater fatigue strength and longer operating life
- **Super-finished raceways** to minimize running noise and improve lubricant distribution
- **High-performance cages** to support smooth and reliable operation at high speeds
- **Optimized seals and shields** to provide problem-free performance in challenging environments
- **Advanced lubrication technology** to ensure durability and reliability

ULTRA-CLEAN STEEL EXTENDS BEARING LIFE

NSK ultra-clean steel is a highly pure, vacuum-degassed high-carbon chromium steel containing a minimum of non-metallic inclusions. In conjunction with appropriate heat treatment, it significantly increases bearing life by providing:

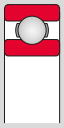
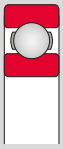
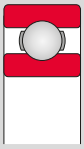
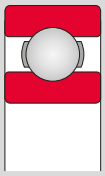
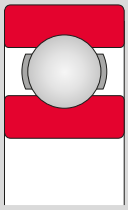
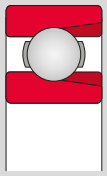
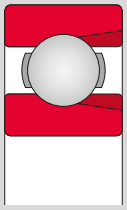
- high rolling contact fatigue strength
- high hardness
- high wear resistance
- high dimensional stability

AN EXTENSIVE RANGE OF TYPES, DESIGN AND CONSTRUCTION

Pictured from left:

- Standard **pressed steel cage** with tightly controlled clearances to deliver reduced friction and even distribution of lubricant
- **Polyamide resin cage** for high-speed applications, with low temperature rise to extend grease life while reducing noise and power loss
- **Machined brass cage** for larger size bearings and for applications with high mechanical stresses

Table 1: Single row deep groove ball bearings series and size range

SINGLE ROW DEEP GROOVE BALL BEARINGS - DIMENSION SERIES (TYPES) AND STANDARD BORE DIAMETER							
							
68	69	160	60	62	63	BL2	BL3
from 10 to 800 mm	from 10 to 800 mm	from 12 to 320 mm	from 10 to 670 mm	from 10 to 360 mm	from 10 to 280 mm	from 25 to 110 mm	from 25 to 95 mm

NSK offers an extensive range of single row deep groove ball bearing dimension series and bore diameters, shown in **Table 1** above.

The basic construction of single row deep groove ball bearings may consist of a number of design / construction variants that include:

- optional seals and shields for protection against the ingress of contaminant
- cages constructed from pressed steel, polyamide resin (for high speeds) or machined brass (for larger sizes or severe mechanical stresses)
- outer ring snap ring grooves, with / without snap rings
- internal clearances ranging from tight to extra-loose
- filling slots to accommodate a larger number of balls (maximum capacity type)
- noise level specifications
- high performance grease options for a wide range of operating conditions

Table 2: Standard cages of deep groove ball bearings

DIMENSION SERIES	PRESSED STEEL	MACHINED BRASS
68	6800 to 6838	6840 to 68/800
69	6900 to 6936	6938 to 69/800
160	16001 to 16026	16028 - 16064
60	6000 to 6040	6044 to 60/670
62	6200 to 6240	6244 to 6272
63	6300 to 6332	6334 to 6356

LONG-LIFE DURABILITY AND RELIABILITY

EFFICIENT SEALING AND LUBRICATION SELECTION

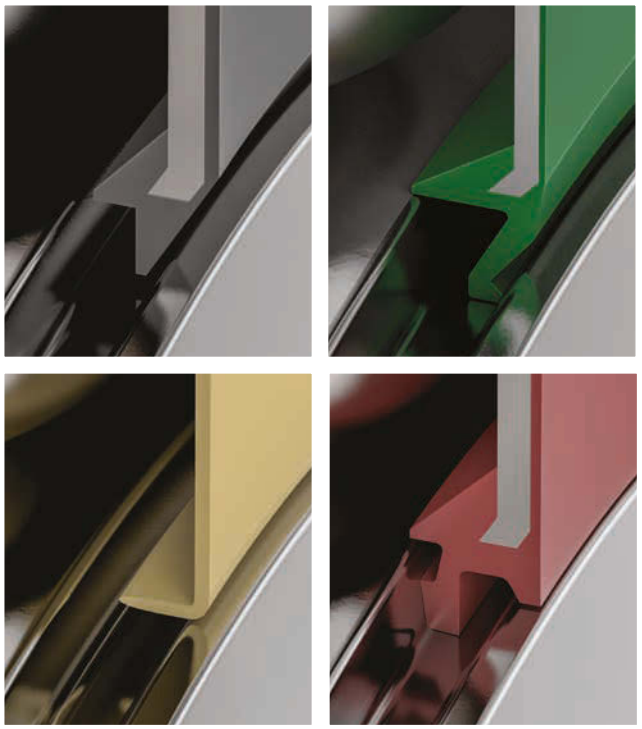
TROUBLE-FREE OPERATION - SEALS, SHIELDS

Deep groove ball bearings equipped with seals or shields can deliver years of trouble-free operation, retaining clean grease free from external contaminants. Selection of appropriate sealing is based not only by the severity of the application environment, but also with consideration of operating speeds, seal torque and temperatures.

NSK offers a variety of standard sealing solutions designed to achieve optimal sealing while mitigating power loss in a wide variety of application conditions:

- **non-contact V seals** for high performance at high speeds, particularly for electric motor applications
- **light-contact DW seals** for high contamination protection with 1/3 lower friction than a full contact seal
- **contact DU seals** for maximum protection against contaminant ingress - small particle, dust and water
- **non-contact Z shields** for moderate protection at high speeds through a wide temperature range

Special seal designs and seal materials for highly corrosive, dust-laden and high temperature environments, as well as for low drag requirements, are also available.



Clockwise from top left: non-contact seal (V), light-contact seal (DW), contact seal (DU), non-contact shield (Z)

Table 3: Comparison of seal / shield performance

OPERATING CHARACTERISTICS	CLOSURE TYPE AND RELATIVE PERFORMANCE			
	VV	DDW	DDU	ZZ
Resistant to dust	good	excellent	excellent	normal
Resistant to water intrusion	not suitable	normal	excellent	not suitable
Effective against grease leakage	good	excellent	excellent	normal
Torque	very low	low	normal	very low
Speed capability	high	good	normal	high

Table 4: High performance greases for deep groove ball bearings

GREASE CODE / BRAND NAME		OPERATING TEMP. °C		KEY FEATURES	TYPICAL APPLICATIONS
		min	max		
AS2	Shell Alvania S2	-10	+110	good general purpose lithium grease with good rust prevention for normal and high loads	general purpose industrial applications
B32	Beacon 325	-50	+100	superior low temperature grease with low viscosity synthetic base oil capable of high speeds	motors in low temperature applications / arctic service
EA6	NSK Grease EA6	-40	+160	synthetic oil base, delivers long life at high temperatures with good wear resistance and rust prevention	induction motors, compressors, ventilators, vacuum cleaners
EA7	NSK Grease EA7	-40	+160	improved fretting resistance in environments with micro-vibrations	servomotors, actuators, oscillatory applications
EA9	NSK Grease EA9	-40	+140	low torque with reduced bearing heat generation at high speeds, low fill with extended grease life	high-efficiency motors, EV motors
EEM	Exxon Mobil Polyrex EM	-5	+140	good rust prevention and low noise performance	general industrial applications and industrial motors
LGU	NSK Grease LGU	-40	+120	significantly reduces particle emissions, preventing encoder contamination and brake slip	servomotors, ball screws, linear guides, clean rooms
NS7	NS Hi-Lube	-40	+130	exceptional low torque and low noise performance particularly at low temperature	motors, ventilators, pumps, compressors

LONG OPERATING LIFE - ADVANCED LUBRICANTS

Lubrication is essential to minimize friction and wear between rolling contact surfaces of bearings. NSK sealed and shielded deep groove ball bearings are factory-filled with water-resistant grease for general industrial machinery, or with special lubricant formulations for operating considerations that include:

› stability in high/low temperature environments
› low torque and heat generation at high speeds
› additive rust prevention
› resistance to micro-vibrations
› reduced particle emissions

Table 4 illustrates a variety of grease types commonly employed by NSK for sealed or shielded single row deep groove ball bearings, each with unique attributes and suitability to meet various operating and environmental conditions.

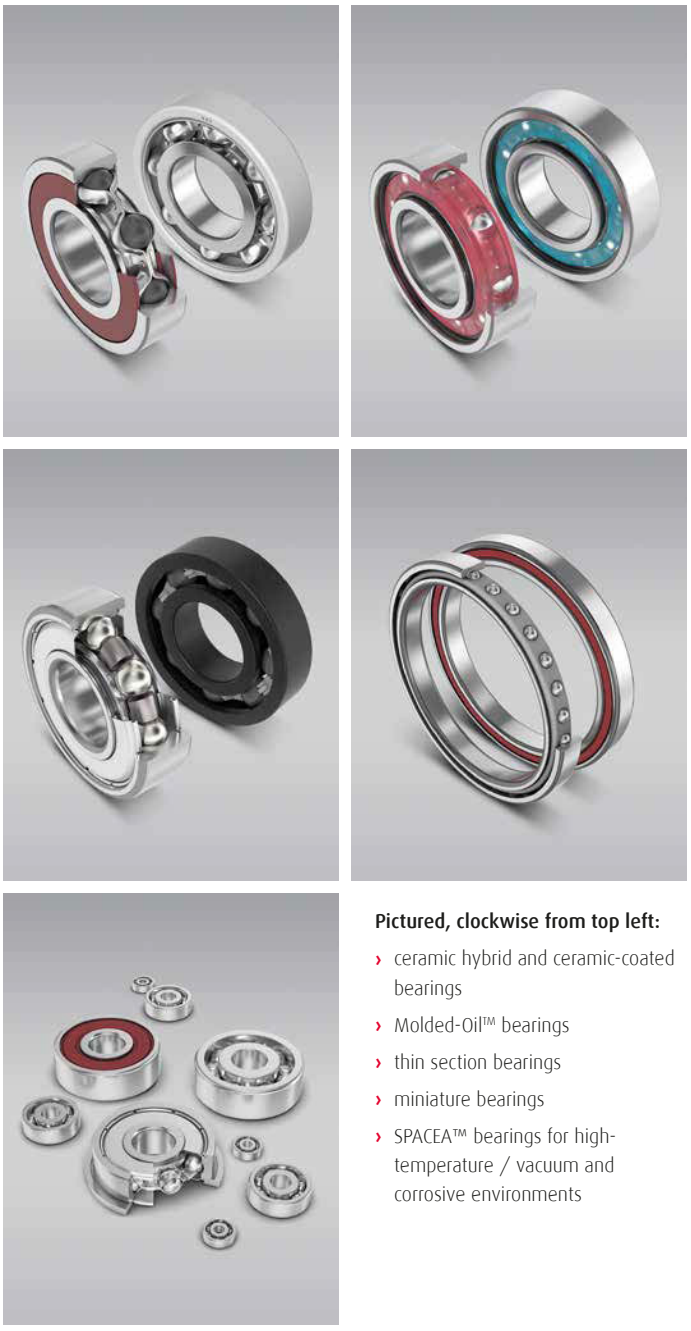
Temperature ranges shown are general recommendations and do not reflect absolute limits. When operating outside of these ranges, consultation with NSK or the grease manufacturer is recommended.

Additional grease types and formulations (thickeners, base oils, additive chemistry) are available - contact NSK.

FOR SPECIAL APPLICATIONS AND ENVIRONMENTS

When meeting the practical need for smooth, reliable motion can only be achieved through extraordinary design measures and product innovation, NSK brings our core technologies to bear to deliver specifically optimized and highly-tailored deep groove ball bearing products that include:

- **Industrial machinery solutions** to contend with challenges such as current transmission, corrosion, lubrication and wear, with special design deep groove ball bearings including:
  - ceramic hybrid and HDY2 ceramic-coated bearings
  - ES1 stainless steel bearings
  - Molded-Oil™ / solid lubricant bearings
  - Creep-Free Bearings™
- **NSK SPACEA™ bearings**, optimized for operating environments that are too severe for standard bearings, utilizing super-engineered materials, advanced lubricants and surface treatments to deliver high performance and reliability to challenging conditions that include:
  - vacuum
  - clean-room
  - corrosive
  - high temperature
  - sanitary
  - non-magnetic
  - contamination
- **Thin Section bearings** that deliver compact, lightweight, high-speed and low-torque solutions for robot axes and speed reducers, harmonic drives and medical devices
- **Extra Small and Miniature bearings** of conventional design or with flanged outer rings, with thin-walled cross-sections, or with special geometry for synchro motors, turbomachinery, medical handpieces and measuring instruments



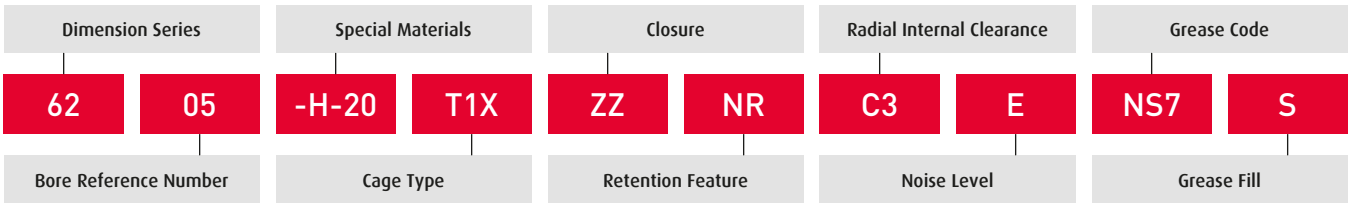
Pictured, clockwise from top left:

- ceramic hybrid and ceramic-coated bearings
- Molded-Oil™ bearings
- thin section bearings
- miniature bearings
- SPACEA™ bearings for high-temperature / vacuum and corrosive environments

NSK

DESIGNATION SYSTEM

SINGLE ROW DEEP GROOVE BALL BEARINGS



DESIGNATION		ATTRIBUTE
Dimensional series	68	metric, ultra-thin section
	69	metric, extra-thin section
	160	metric, thin section
	60	metric, extra light series
	62	metric, light series
	63	metric, medium series
	BL2	maximum type, light series
	BL3	maximum type, medium series
Bore reference number		for extra-small / miniature: multiply x 1 for bore diameter in mm for reference number: 00 = 10 mm bore diameter; 01 = 12; 02 = 15; 03 = 17 for reference number 04 to 96: multiply x 5 500 mm and greater are expressed as /500 = 500 mm, etc.
Special materials	-H-20	stainless steel rings and balls
	SN24	ceramic balls
Cage type	blank	pressed steel cage
	M, MR	machined brass cage
	T1X	polyamide resin cage
Closure	blank	open bearing
	Z	non-contact shield, one side only
	ZZ	non-contact shield, both sides
	V	non-contact seal, one side only
	VV	non-contact seal, both sides
	DW	light-contact seal, one side only
	DDW	light-contact seal, both sides
	DU	contact seal, one side only
	DDU	contact seal, both sides

DESIGNATION		ATTRIBUTE
Retention feature	blank	standard outer ring
	N	snap ring groove in outer ring
	NR	snap ring groove with snap ring
Radial internal clearance	C2	tighter than normal clearance
	blank	normal clearance (CN)
	CM	special clearance for electric motors
	C3	greater than normal clearance
	C4	greater than C3
	C5	greater than C4
Noise level	blank	standard noise quality
	E	NSK electric motor noise quality
	ER	NSK critical noise quality
Grease code [1]	AS2	Shell Alvania S2
	B32	Beacon 325
	EA6	NSK Grease EA5
	EA7	NSK Grease EA6
	EA9	NSK Grease EA9
	EEM	Exxon Mobil Polyrex EM
	LGU	NSK Grease LGU
	NS7	NS Hi-Lube
Grease fill	L	light fill
	S	standard fill
	H	heavy fill

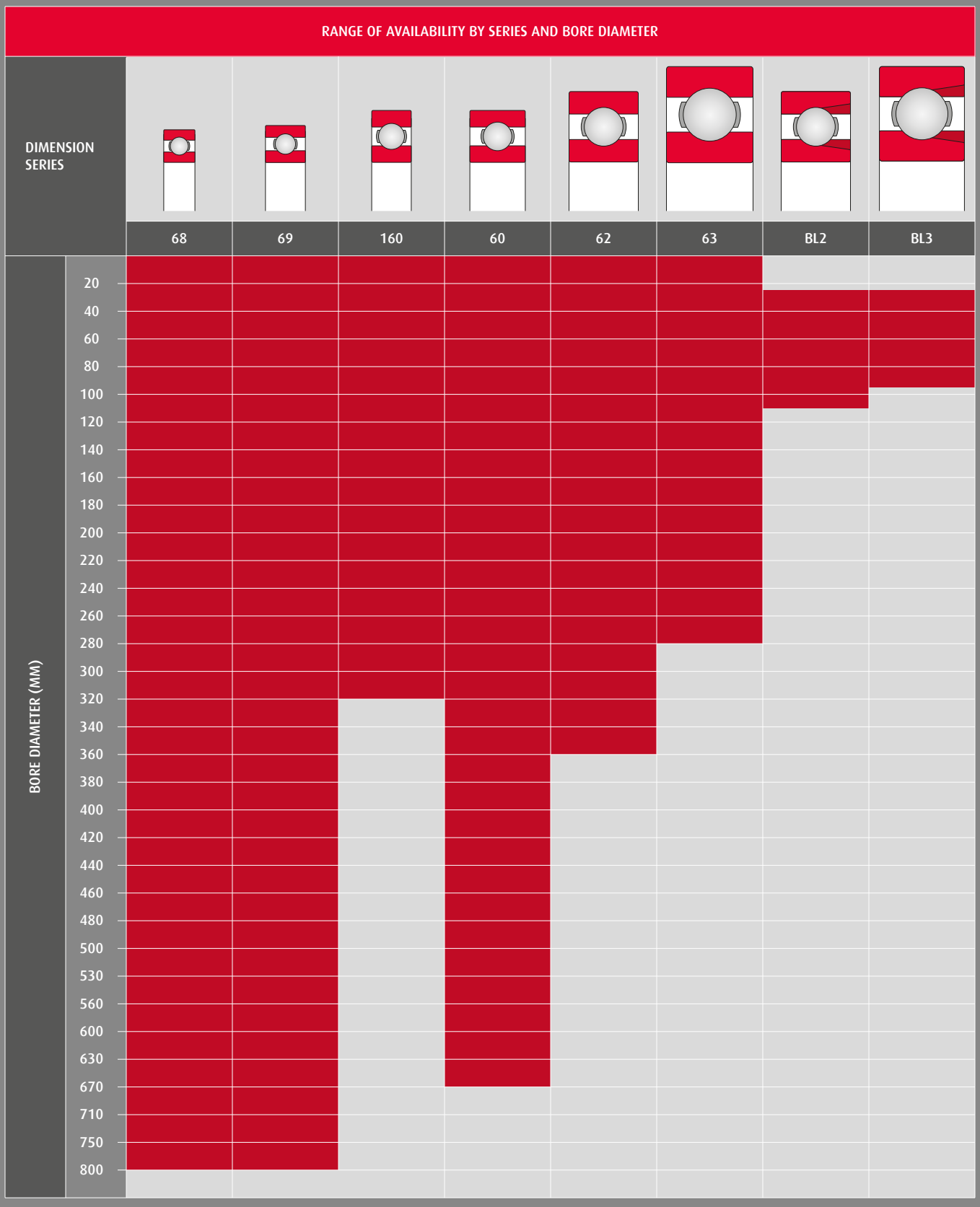
1) Grease codes shown are indicative of the range of NSK greases available for general industrial machinery, for electric motors, for extreme temperatures and for special environments.

Additional greases are available - contact NSK.

RANGE OF AVAILABILITY

DIMENSION SERIES AND BORE SIZE

NSK



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