

# Special Rolling Bearings



## Special Rolling Bearings

KINEX produces, except a large number of types and sizes of standardized rolling bearings of both basic and modified designs presented in the preceding sections, a great number of special rolling bearings.

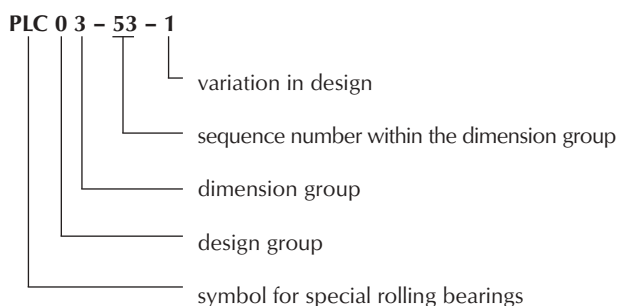
These bearings are intended for rolling bearing applications in machines, instruments and devices in various industrial branches, where their specific properties are used and where usage of current standardized bearings is impossible for various reasons.

The special rolling bearings can be also applied for other bearing arrangements than those they are originally intended for.

All technical specifications and the other data necessary for the calculation and design of special bearing assemblies are indicated in dimension tables. An exception is made for special single row ball bearings of type LGVZ with flexible rings, of unusual design, and therefore the current calculations and instructions for this bearing arrangement design are not valid. Basic calculations for bearing selection as well as the general design data conforming to values valid for standardized bearings are given in the publication Rolling Bearings ZVL, ZKL TKS 3/97 E.

## Designation

The special rolling bearings of non-standardized dimensions, apart from the exceptions shown further, are designated by the following scheme:



## Konstrukčná skupina

Symbol Meaning

Example of designation

0	Single row ball bearings
4	Single row cylindrical roller bearings; needle roller bearings
5	Multi-row cylindrical roller bearings
7	Vretená (špeciálne dvojradové guľkové)

PLC 03-33
PLC 44-13
PLC 52-2
PLC 72-2

### Dimension Group

The dimension group is indicated by a numerical symbol from 1 to 12 according to the outer bearing diameter D.

Symbol	D (mm)		Symbol	D (mm)	
	over	up to		over	up to
<b>1</b>	–	22	<b>6</b>	80	100
<b>2</b>	22	30	<b>7</b>	100	120
<b>3</b>	30	50	<b>8</b>	120	160
<b>4</b>	50	65	<b>9</b>	160	200
<b>5</b>	65	80	<b>10</b>	200	270

### Sequence Number in Dimension Group

The bearings of each dimension group are successively indicated by a sequence number starting with 1. The symbol for sequence number and symbols for a design and dimension group are separated by a dash.

### Variation in Design

Design difference from the basic and/or original design, expressed by a sequence number is indicated by a sequence number beginning with 1 within the dimension group. The symbol for difference in design is separated from preceding symbol for sequence number within the dimension group by a dash.

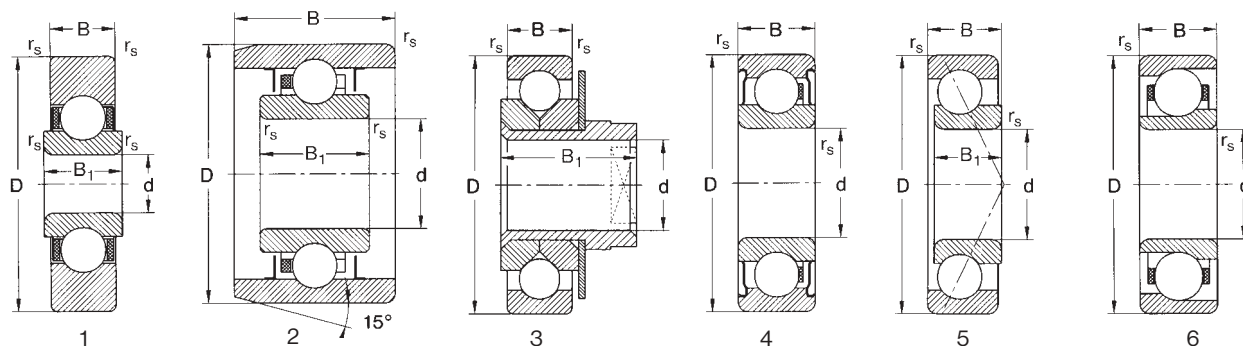
The symbol is only introduced for the designation of these bearings if the basic or original design has been changed. An exception from the above mentioned designation are single row ball bearings of LGVZ type with flexible rings and single row cylindrical roller bearings of VL type.

This section does not deal with special rolling bearings intended for aviation and special technology and rolling bearings for motor vehicles. These bearings are introduced in the following chapters.

### Cages

- J – pressed steel cage, rolling element centered (6034)
- TNG – machined cage made of polyamide or similar plastic with glass fibres, rolling elements centered
- TNGH – machined cage made of polyamide or similar plastic with glass fibres, rolling elements centered one-piece open-type
- TNH – machined cage made of polyamide or similar plastic, rolling elements centered, one-piece open-type

## Special Single Row Ball Bearings of PLC Type



d	Dimensions				Basic load rating		Limiting speed		Bearing designation	Fig.	Mass	Shields	Cage	Radial clearance		Tolerance class
	D	B	B <sub>1</sub>	r <sub>s</sub> min	C <sub>r</sub>	C <sub>0r</sub>	for grease	with oil						min	max	
mm					kN		min <sup>-1</sup>				kg		μm			
6	48	6,0	7	0,3	2,070	0,944	20 000	24 000	PLC 03-78	1	0,0800	-	TNH	8	23	P0
7	19	18,0	10	0,3	2,820	1,080	35 000	-	PLC 01-45	2	0,0158	-2ZR	TNH	8	15	P4
10,4	35	10,0	26	0,3	4,820	1,360	12 600	17 000	1) PLC 03-79	3	0,0694	-	-	20	75	P0
11,088	30	9,0	-	0,6	6,047	2,510	17 000	32 000	PLC 02-24	4	0,0310	-2RS	TNG	11	25	P0
12	32	6,5	6	0,4	8,400	3,950	2) 3)		PLC 03-81	5	0,0250	-	-	22	31	P0
	32	8,0	6	0,4	8,400	3,950	2) 3)		PLC 03-81-1	5	0,0270	-	-	22	31	P0
13	30	7,0	-	0,3	4,470	0,980	24 000	28 000	PLC 02-39	6	0,0200	-	TNG	26	64	P0
15	35	8,0	-	0,3	5,840	1,300	21 000	25 000	PLC 03-88	6	0,0310	-	TNG	61	112	P0

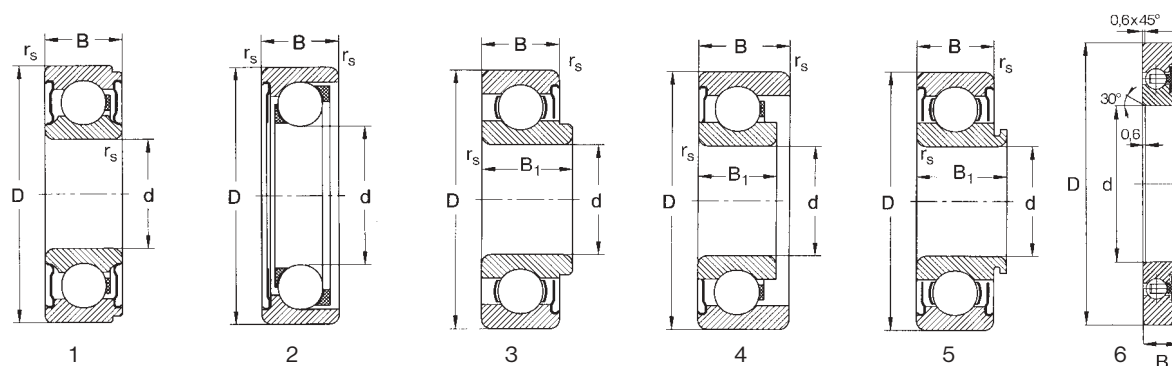
- 1) Single row ball bearings with three point contact
- 2) Bearings for oscillating motion or for low speeds
- 3) Single row angular contact ball bearings

Identification symbol of the producer: S

### Radial Equivalent Dynamic and Static Load

The methods of calculation correspond to a relevant basic rolling bearing type.

## Special Single Row Ball Bearings of PLC Type



d	D	Dimensions			Basic load rating		Limiting speed		Bearing designation	Fig.	Mass	Shields	Cage	Radial clearance		Tolerance class
		B	B <sub>1</sub>	r <sub>s</sub> min	C <sub>r</sub>	C <sub>0r</sub>	for lubrication with grease	with oil						min	max	
mm					kN		min <sup>-1</sup>				kg			μm		
16	30	8	-	0,3	3,410	2,023	14 000	-	PLC 02-23	1	0,0208	-2RS	TNGH	12	17	P0
16,155	27,6	8	-	0,3	1,880	0,355	16 000	-	4) PLC 02-32	2	0,0128	RS	TNGH	-	-	P6
17	30	10	8	0,3	5,400	2,480	13 000	21 000	PLC 02-35	4	0,0200	RSR	TNG	3	13	P0
	47	12	15	0,6	10,000	5,840	14 000	-	PLC 03-53-2	5	0,1040	-2ZR	J	5	20	P0
20	47	12	15	0,6	10,000	5,840	14 000	17 000	PLC 03-53-1	3	0,1050	ZR	J	5	20	P0
36	58	8	-	0,6	8,190	6,700	-	10 000	PLC 04-65-1	6	0,0730	Z	TNGH	20	35	P0
	65	8	-	0,6	8,190	6,700	-	10 000	PLC 04-66-1	6	0,1480	Z	TNGH	20	35	P0

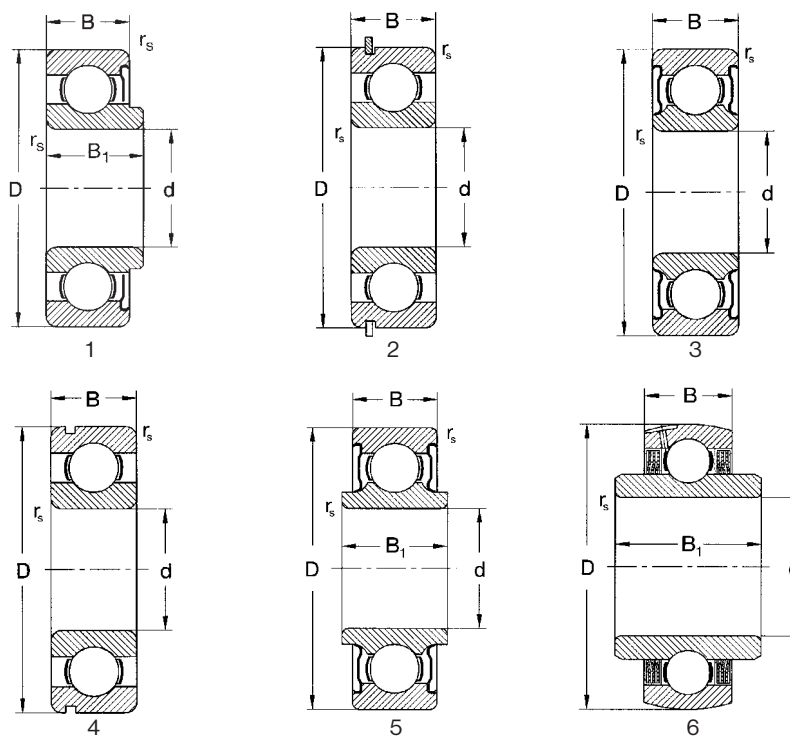
4) Single row angular contact ball bearings without inner ring

Identification symbol of the producer: S

### Radial Equivalent Dynamic and Static Load

The methods of calculation correspond to a relevant basic rolling bearing type.

## Special Single Row Ball Bearings of PLC Type



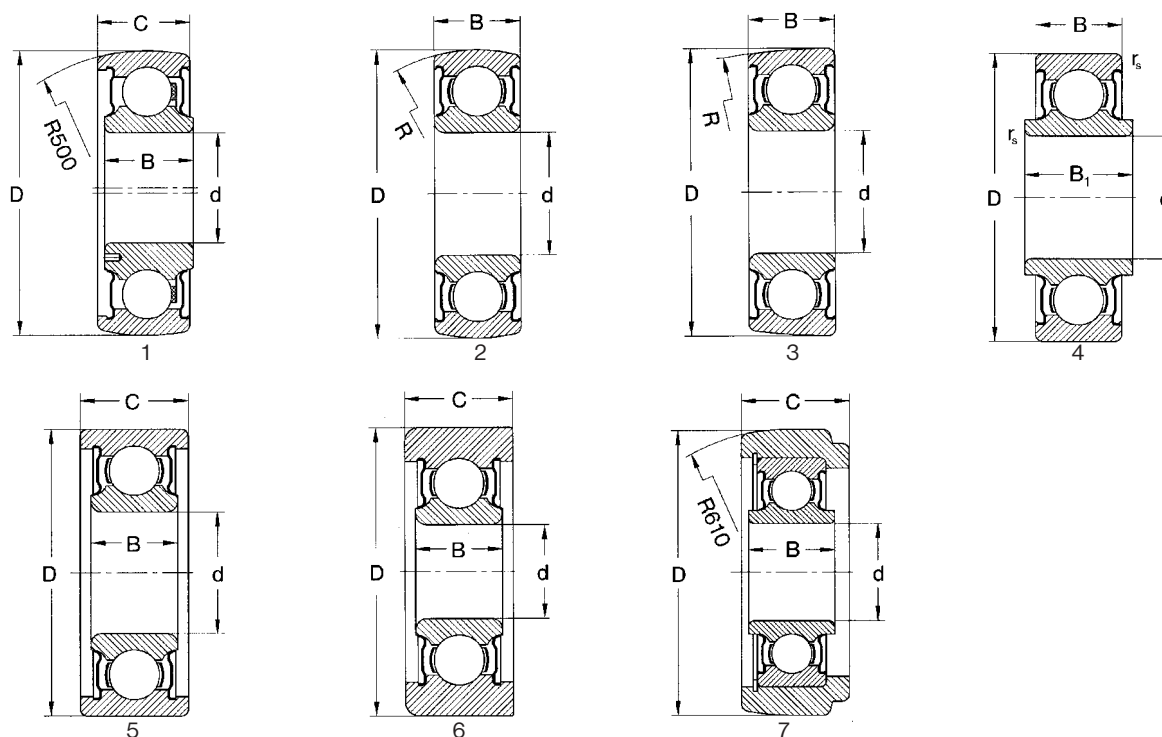
Dimensions					Basic load rating		Limiting speed		Bearing designation	Fig.	Mass	Shields	Cage	Radial clearance		Tolerance class
d	D	B	B <sub>1</sub>	r <sub>s</sub> min	C <sub>r</sub>	C <sub>0r</sub>	for lubrication with grease	oil						min	max	
mm					kN		min <sup>-1</sup>				kg			μm		
25	47	12	15	0,6	10,000	5,840	14 000	17 000	PLC 03-53	1	0,080	ZR	J	5	20	P0
35	80	17	-	1,1	25,600	15,300	9 400	11 000	PLC 05-207	2	0,590	-	J	6	20	P0
	85	17	-	1,1	25,600	15,300	6 300	-	PLC 06-205	3	0,600	-2RS	J	8	18	P0
	90	23	-	1,5	40,600	23,700	7 900	9 400	PLC 06-6-2	4	0,660	-	J	6	20	P0
40	72	17	22	0,6	16,800	11,400	5 600	-	PLC 05-28	5	-	-	J	6	20	P0
55	100	33	55	1,1	43,000	29,300	4 200	-	PLC 06-11	6	1,26	2RS	J	23	43	P0

Identification symbol of the producer: N

### Radial Equivalent Dynamic and Static Load

The methods of calculation correspond to a relevant basic rolling bearing type.

## Single Row Deep Groove Ball Bearings – Pulleys



Dimensions				Basic load rating		Limiting speed	Bearing designation	Mass	Fig.
d	D	B	C	dynamic $C_r$	static $C_{0r}$				
mm				kN		min <sup>-1</sup>		kg	
17	56,00	18,0	19,60	14,10	7,94	8 200	PLC 04-53	0,240	1 1)
20	52,00	14,0	-	12,80	6,31	9 500	PLC 04-200	0,117	2 2)
25	62,00	15,0	-	14,10	7,08	8 200	PLC 04-201	0,225	2 2)
30	70,00	22,0	-	19,40	11,20	7 000	PLC 05-211	0,456	2 6)
	70,15	20,0	-	19,60	13,70	6 000	MR433	0,460	3 6)
	71,15	22,0	-	19,60	13,70	5 900	MR434	0,480	3 6)
	72,00	16,0	-	19,60	10,00	7 300	PLC 05-200	0,320	2 3)
	75,00	21,0	-	29,80	15,80	5 700	PLC 05-214	0,420	
	78,00	22,0	-	19,40	11,20	7 000	PLC 05-212	0,456	2 6)
	78,00	22,0	-	19,60	13,70	5 600	MR435	0,470	3 6)
	79,00	22,0	-	19,60	19,60	5 600	MR436	0,475	3 6)
	80,00	37,0	18,00	32,90	20,00	5 600	PLC 05-19	0,559	4
82,00	19,0	29,00	30,00	15,80	6 700	PLC 06-20	0,650	5	
32	80,00	23,0	-	33,30	19,20	5 200	PLC 05-215	0,520	
35	72,00	17,0	-	16,00	10,20	5 600	MR457	0,284	2 5)
	80,00	127,0	-	25,60	13,90	6 100	PLC 05-201	0,450	2 4)
	84,50	17,0	25,00	25,60	15,30	6 300	PLC 06-3-1	0,591	6
	85,00	17,0	25,00	25,60	15,30	6 300	PLC 06-3	0,609	6
	85,00	23,0	-	33,30	19,20	5 000	PLC 06-206	0,550	
	91,00	20,0	31,85	25,60	15,30	9 400	PLC 06-22	0,878	7
	101,50	21,0	30,00	33,50	19,20	5 600	PLC 07-2	1,180	6
	101,67	21,0	28,38	33,50	19,20	5 600	PLC 07-2-1	1,150	6
110,80	20,0	30,15	25,60	15,30	5 600	PLC 07-25	1,074	7	
40	92,00	25,0	-	40,70	23,90	4 500	PLC 06-207	0,720	
	114,00	23,0	28,00	40,60	23,70	7 900	PLC 07-24	1,480	6
	114,00	23,0	31,75	40,60	23,70	7 900	PLC 07-23	1,580	6
45	120,00	37,0	23,00	57,30	39,80	3 500	PLC 07-20	1,270	4
	127,06	24,5	31,75	53,10	31,60	4 700	PLC 08-18	2,100	6

1) Eccentric bore

2) R = 62 • 3) R = 72 • 4) R = 80 • 5) R = 200 • 6) R = 500

Identification symbol of the producer: N

### Special Single Row Ball Bearings of LGVZ Type with Flexible Rings

The single row ball bearings of LGVZ type with flexible rings differ in function from bearings acting in current bearing arrangements and so specific properties are required from them, different from bearings of a current design. It concerns flexible rings enabling operation ovality and a cage corresponding therets small cross section and high dimension and operating accuracy especially of outer ring. Bearings are intended especially for bearing assemblies of wave speed reducers in harmonic drive gears of robots and manipulators.

#### Boundary dimensions

The boundary dimensions of single row ball bearings with flexible rings are indicated in the dimension table and do not correspond to the international standard ISO 15.

#### Operation ovality

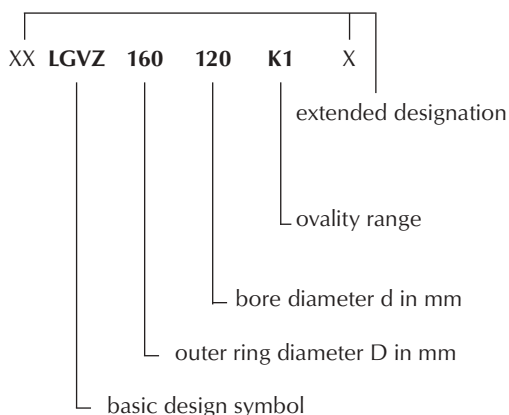
Both rings in single row ball bearings with flexible rings have substantially lower thickness in comparison with the bearings of a similar size and current design, which enables the operation ovality denoted by the symbol  $O$ . The values of operation ovality of inner ring defined by the relationship  $O = (d_{max} - d_{min})/2$  are indicated in the dimension table. The bearings of basic design are intended for standard ovality range. The size of ovality range in basic design is not designated. Different ovality range is designated by symbols K1 and K2.

#### Operating temperature

Bearings are intended for operating temperatures up to 95 °C, in short intervals up to 110 °C. Requirements on increased operating temperatures should be consulted.

#### Designation

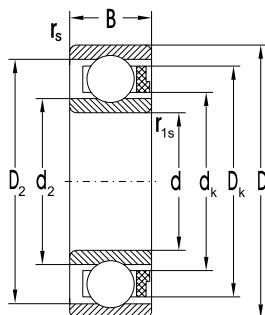
Designation of single row ball bearings with flexible rings consists of letters and digits according to the following scheme:



Example of designation: **LGVZ160120K1 C3**

## Special Single Row Ball Bearings of LGVZ Type with Flexible Rings

d = 37 – 120 mm



Dimensions					Ring dimensions		Cage dimensions		Ovality range		Dynamic load rating $C_r$	Limiting speed for lubrication with oil		Bearing designation	Mass
d	D	B	$r_s$ min	$r_{1s}$ min	$D_2$ min	$d_2$ max	$D_k$ max	$d_k$ min	$\sigma = \frac{d_{max} - d_{min}}{2}$ max	$\sigma = \frac{d_{max} - d_{min}}{2}$ min		1)	2)		
mm											kN	min <sup>-1</sup>		kg	
37	50	8	0,30	0,10	47,9	39,5	47,0	40,4	0,66	0,4	8,25	7 100	9 400	LGVZ5037	0,03
45	60	9	0,30	0,10	57,5	47,7	56,5	48,8	0,80	0,5	11,40	6 000	7 900	LGVZ6045	0,05
60	80	12	0,40	0,15	76,6	64,1	75,4	65,4	1,00	0,7	17,80	4 500	6 000	LGVZ8060	0,10
76	100	15	0,50	0,20	95,9	80,5	94,5	82,0	1,20	0,8	25,60	3 500	4 700	LGVZ10076	0,20
90	120	18	0,60	0,20	115,1	95,5	113,3	97,4	1,60	1,2	39,80	3 000	3 800	LGVZ12090	0,37
120	160	24	0,90	0,40	153,2	128,0	151,0	130,4	2,00	1,5	61,90	2 200	3 000	LGVZ160120	0,89

1) permanent

2) in short intervals

Identification symbol of the producer: S



### Special Single Row Cylindrical Roller Bearings without Inner Ring of VL Type

The cylindrical roller bearings of type VL are intended for bearing arrangements of textile spindles. The boundary dimensions do not correspond to the International Standard ISO 15.

Bearings are equipped with cages made of brass sheet (designation Y is not indicated).

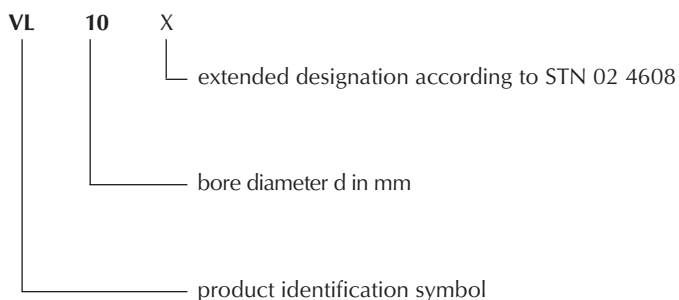
More and more bearings are supplied with plastic cages of standard design, because certain specific properties of plastics such as high elasticity, low density and good sliding characteristics make these materials suitable for up-to-date rolling bearing cages. Cages made of these materials are suitable for temperatures from -40 °C up to 120 °C (TNG).

The bearings of sizes VL 10 to VL 25 can be supplied with a machined brass cage (M), e. g.: VL10M.

Static and dynamic load ratings are stated under the following conditions: raceway on the shaft the nominal raceway diameter of which corresponds to the nominal diameter with a deviation of 0 to -0.015 mm, maximum ovality and conicity of 2 µm, maximum surface roughness  $R_a = 0.08$ , hardness HRC = 61 to 65.

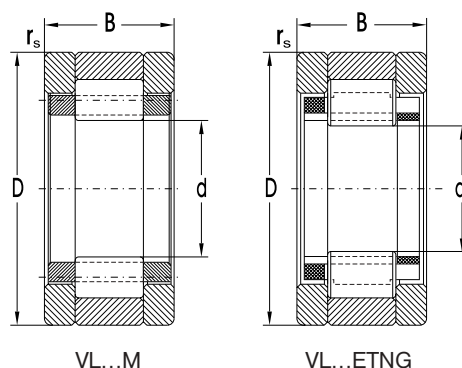
### Designation

The designation of special single row cylindrical roller bearings of VL type consists of letters and digits according to the following scheme:



Example of designation: **VL 14ETNG**

## Special Single Row Cylindrical Roller Bearings of VL Type



Dimensions				Basic load rating		Limiting speed for lubrication with		Bearing designation	Mass	Cage	Off-size					
d	D	B	r <sub>s</sub> min	dynamic C <sub>r</sub>	static C <sub>0r</sub>	grease	oil				Δdmp <sup>1)</sup>		ΔDmp <sup>2)</sup>		ΔBs	
mm				kN		min <sup>-1</sup>		kg			μm					
											max	min	max	min	max	min
6,80	14,7	9	0,4	4,06	2,87	45 000	50 000	PLC 41-20	0,006	TNG	+18	+10	+10	0	+100	-60
7,80	16	9	0,4	3,91	3,35	35 000	40 000	PLC 41-19	0,007	TNG	+18	+10	+10	0	+70	-30
	18	9	0,4	4,22	2,82	34 000	39 000	VL7,8ETNG	0,010	TNG	+28	+16	+10	0	+70	-30
8,11	18	9	0,4	4,30	2,87	34 000	39 000	VL8,1ETNG	0,010	TNG	+10	0	+8	0	+70	-30
8,80	20	10	0,4	5,01	3,55	32 000	37 000	VL8,8ETNG	0,011	TNG	+33	+23	+7	0	+70	-30
10	22	12	0,6	6,81	4,55	21 000	25 000	VL 10M	0,0210	M	+42	+25	+10	0	+70	-30
	22	12	0,6	7,50	5,21	30 000	35 000	VL 10ETNG	0,0200	TNG	+42	+25	+10	0	+70	-30
12	26	14	0,6	11,00	7,79	18 000	21 000	VL 12M	0,0320	M	+42	+25	+10	0	+70	-30
	26	14	0,6	12,10	8,91	25 000	30 000	VL 12ETNG	0,0310	TNG	+42	+25	+10	0	+70	-30
14	25	13	0,4	11,90	10,00	27 000	32 000	PLC 42-11	0,022	TNG	+42	+25	+10	0	0	-120
	30	14	0,6	12,30	8,74	15 000	18 000	VL 14M	0,0143	M	+42	+25	+10	0	+70	-30
	30	14	0,6	13,60	10,00	22 000	27 000	VL 14ETNG	0,0420	TNG	+42	+25	+10	0	+70	-30
16	35	17	0,6	16,50	12,30	13 000	16 000	VL 16M	0,0730	M	+42	+25	+10	0	+70	-30
18	36	17	0,6	17,10	14,40	12600	15 000	VL 18M	0,0760	M	+42	+25	+10	0	+70	-30
20	40	19	0,6	20,30	17,40	12 000	14 000	VL 20M	0,1070	M	+42	+25	+10	0	+70	-30
25	48	19	0,6	24,60	22,80	9 400	11 000	VL 25M	0,1550	M	+42	+25	+10	0	+70	-30

- 1) Tolerance of circle inscribed to rolling elements  
 2) For separate thrust collars ΔDmp -150/-50 μm

Identification symbol of the producer: S

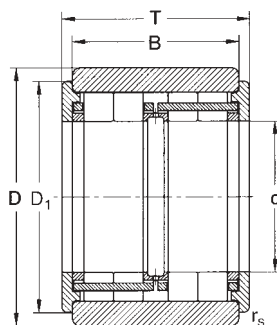
### Radial equivalent dynamic load

$$P_r = F_r$$

### Radial equivalent static load

$$P_{0r} = F_r$$

## Special Multi Row Cylindrical Roller Bearings



Dimensions						Basic load rating		Limiting speed for lubrication with oil	Bearing designation	Mass	Cage	Off-size					
d	D	B	T	$r_s$ min	$D_1^{3)}$	$C_r^{1)}$	$C_{or}^{1)}$					$\Delta dmp^{2)}$		$\Delta Dmp$		$\Delta Bs$	
mm						kN		min <sup>-1</sup>		kg		$\mu m$					
max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min		
65	120	88	78	2	104	208	216	7 100	PLC 56-2	4,85	M	+30	+15	0	-15	0	-300

1)  $C_r$  or  $C_{or}$  values are valid on the assumption that the hardness of inner raceway on shaft is 59 to 63 HRC

2) Tolerance of inscribed circle to rolling elements

3) For separate thrust collars  $\Delta dmp +120/+40 \mu m$  and  $\Delta Dmp 0/-120 \mu m$

Identification symbol of the producer: S

### Radial equivalent dynamic load

$$P_r = F_r$$

### Radial equivalent static load

$$P_{or} = F_r$$