

## B-1-4 Procedures to Select Ball Screw

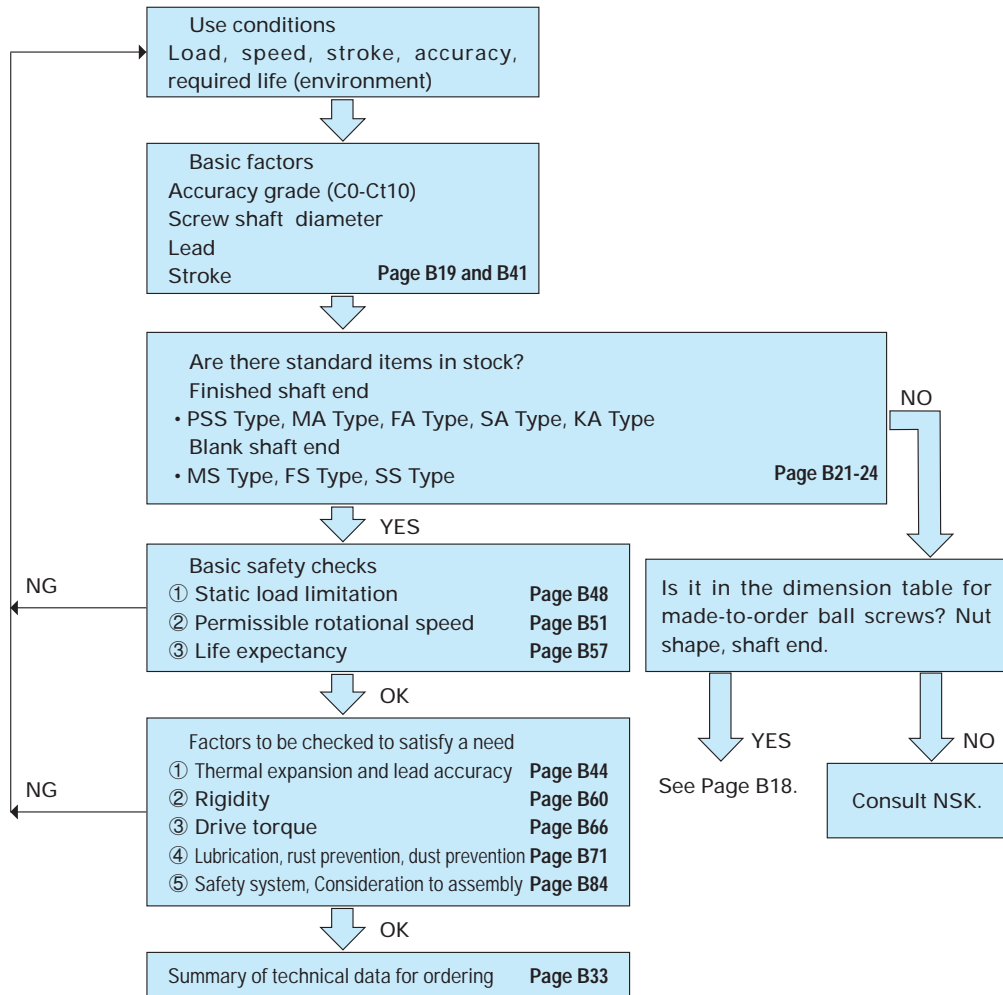
### B-1-4.1 Flow Chart for Selection

When selecting a ball screw, you have to review a variety of use conditions and requirements such as applied loads, speeds, motion strokes, positioning accuracy, required life and operating environment. You require a multiple inspection because some of these conditions force a ball screw to have conflicting characteristics.

#### (1) Standard ball screw

The chart below is one of the selection methods. To take advantage of prompt delivery and reasonable prices, this method focuses on the standardized ball screws that are available in stock.

NSK offers a ball screw selection program, and also has a service to select appropriate items using data file compiled by our knowledge and experience.

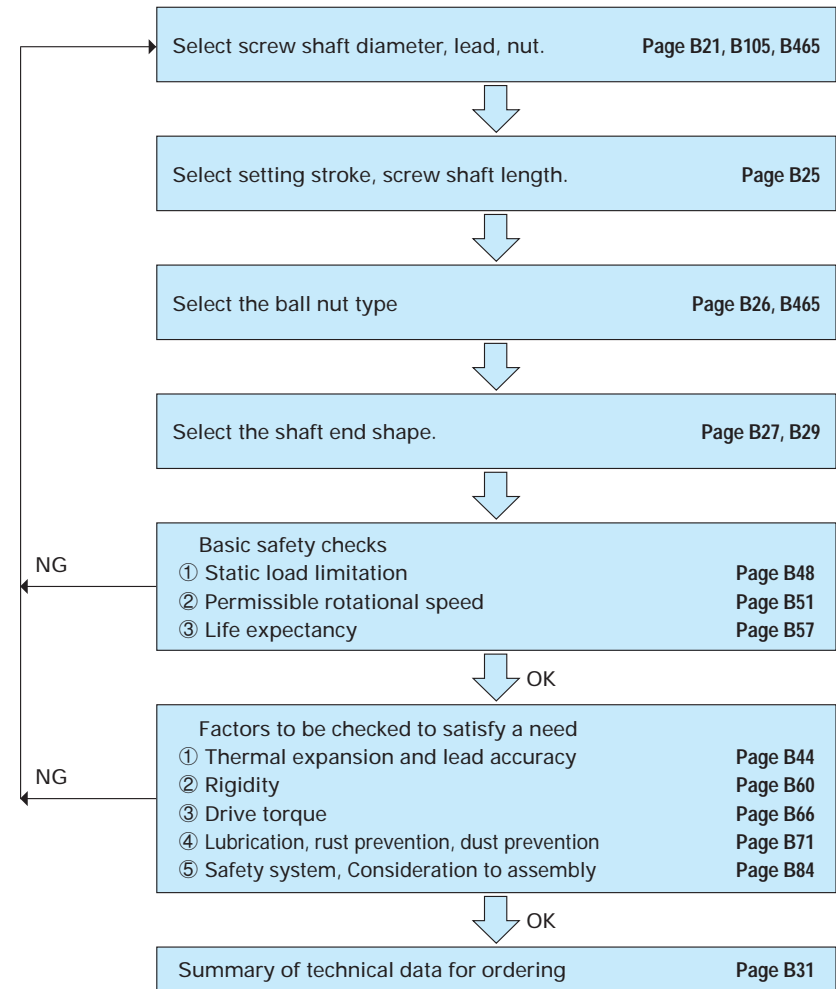


#### (2) Made-to-order ball screws

Dimensions and specifications can be decided individually for the application-oriented ball screws and standard nut ball screws. Procedures are as follows. Refer to the selection exercises on Page B87.

Table 4.4 is "Combinations of screw shaft diameter and leads for basic type ball screw." Please consult

NSK if you require the types that are not listed in the Table.



B-1-4.2 Accuracy Grades

Table 4.1 shows examples of how to select accuracy grade for a specific use. These practical cases are based on NSK's experience. Circle indicates the range of the accuracy grade in actual use. A double circle indicates accuracy grades most frequently used among cases marked with a single circle. These

symbols help to select the accuracy grade of ball screws temporarily. To confirm whether a specific ball screw accuracy grade satisfies requirements in positioning accuracy in actual use, refer to "Technical Description" and "Mean travel deviation and travel variation." (Page B42)

Table 4.1 Accuracy grades of ball screw and their application

Application		NC machine tools																							
		Lathe		Milling machine Boring machine		Machining center		Drilling machine		Jig boring machine		Grinder		Electric discharge machine		Wire cutting Electric discharge machine		Punch press		Laser cutting machine		Woodworking machine			
Name of axis		X	Z	XY	Z	XY	Z	XY	Z	XY	Z	XY	Z	XY	Z	XY	Z	XY	Z	XY	Z				
Accuracy grade	C0	○								○	○	○													
	C1	○		○		○				⊙	⊙	○	○	○		○	○								
	C2	○		○	○	○	○					⊙	○	○	○	○	○								
	C3	⊙	○	⊙	○	○	○	○				⊙	⊙	⊙	⊙	⊙	○	○	○	○	○				
	C5	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙							⊙	⊙	⊙	⊙	⊙	⊙	⊙			
	Ct7									○												○			
	Ct10																						○		
Application		Semiconductor/associated industry						Industrial robots						Steel mills equipment		Plastic injection molding machine		Three-dimensional coordinate measuring machine		Office machine		Image processing equipment		Nuclear power	
		General industrial machines, Machines for specific use		Lithographic machine	Chemical processing equipment	Wire bonder	Prober	Electric component mounted device	Printed circuit board drilling machine	Cartesian type		Articulate type		SCARA type											
Name of axis								Assembly other purposes	Assembly other purposes																
Accuracy grade	C0		○			○																			
	C1		⊙		⊙	⊙		○																	
	C2				○	⊙	○	○																	
	C3	○		○			⊙	○		○		○										○		○	
	C5	⊙		○			⊙	⊙	⊙	⊙	⊙	⊙	⊙									⊙		⊙	
	Ct7	⊙		⊙				○	⊙	○	⊙	⊙										○		⊙	
	Ct10	○		○					○														○		

B-1-4.3 Axial Play

Table 4.2 indicates combinations of NSK ball screw accuracy grades and axial play. Select an axial play which satisfies the required accuracy in backlash, positioning and repeatability. Ranges of available ball thread effective length in relation to accuracy grade and axial play are shown in Table 4.3. Please note that if the effective length exceeds the range, the

axial play may become partially negative (preloaded condition).

For axial play of Ct10 grade (ball screws for transfer equipment), refer to the R series dimension tables.

Table 4.2 Combinations of accuracy grades and axial play

Axial play	Z	T	S	N	L
	0 mm (Preload)	0.005 mm or less	0.020 mm or less	0.050 mm or less	0.3 mm or less
<b>C0</b>	C0Z	C0T	—	—	—
<b>C1</b>	C1Z	C1T	—	—	—
<b>C2</b>	C2Z	C2T	—	—	—
<b>C3</b>	C3Z	C3T	C3S	—	—
<b>C5</b>	C5Z	C5T	C5S	C5N	—
<b>Ct7</b>	—	—	C7S	C7N	—

Table 4.3 Maximum effective thread length in combination of accuracy grade and axial play

Unit: mm

Screw shaft diameter	Effective length of the screw thread (maximum)				
	Axial play T (0.005 mm or under)		Axial play S (0.020 mm or under)		
	C0 - C3	C5	C3	C5	Ct7
4 - 6	80	100	80	100	—
8 - 10	250	200	250	300	—
12 - 16	500	400	500	600	700
20 - 25	800	700	1000	1000	1000
32 - 40	1000	800	2000	1500	1500
50 - 63	1200	1000	2500	2000	2000
80 - 125	—	—	4000	3000	3000

Remarks: Refer to Table 4.8 (Page B25) for the available length of screw shaft (maximum length). Also, axial play of code N does not become partial negative play if it is within the available range of effective ball thread length.



(2) Standard ball screw

Table 4.6 and 4.7 show combinations of ball screw shaft diameter and leads, and range of stroke. From these tables, select closest values to the shaft diameter, lead, and stroke which had been selected

previously. Also, confirm detailed specifications and sizes in "Dimensional table of standard ball screw" (Page B217).

Table 4.6 Screw shaft diameter, lead and stroke of standard ball screw

Shaft dia.	Lead	Stroke												
		-50	-100	-150	-200	-250	-300	-350	-400	-450	-500	-550	-600	-650
4	1	○	○△											
6	1	○	○△											
8	1		○△	○△										
	1.5		○△	○△										
10	2		○△	○△										
	2.5		○△	○△										
	4		○△	○△										
	5	●	●	●										
	10	●	●	●										
12	2		○△	○△										
	2.5		○△	○△										
	5	●	●	●										
	10	●	●	●										
14	5		○△	○△										
	8		○△	○△										
	10		○△	○△										
15	20		○△	○△										
	30		○△	○△										
	40		○△	○△										
16	2		○△	○△										
	2.5		○△	○△										
	5		○△	○△										
	16		○△	○△										
20	4		○△	○△										
	5		○△	○△										
	10		○△	○△										
	20		○△	○△										
	30		○△	○△										
	40		○△	○△										
25	4		○△	○△										
	5		○△	○△										
	6		○△	○△										
	10		○△	○△										
	20		○△	○△										
28	5		○△	○△										
	6		○△	○△										
	10		○△	○△										
32	8		○△	○△										
	10		○△	○△										
	25		○△	○△										
36	10		○△	○△										
	5		○△	○△										
40	8		○△	○△										
	10		○△	○△										
	12		○△	○△										
45	10		○△	○△										
50	10		○△	○△										

See Table 4.7 for KA Type in stainless steel product

Table 4.7 Screw shaft diameter, lead and stroke of KA type in stainless steel product

Unit: mm

Shaft dia.	Lead	Stroke								
		-150	-200	-250	-300	-350	-450	-500	-650	-1050
6	1	●								
8	1		●							
	2		●							
10	2			●						
	4	●				●				
12	2	●								
	5			●				●		
	10				●			●		
15	10							●		●
	20							●		●
16	2	●					●			
20	20							●		●

●mark: PSS type; ○mark: MA type, FA type, SA type; △mark: MS type, FS type, SS type

Unit: mm

Shaft dia.	Lead	Stroke															
		-700	-750	-800	-850	-900	-950	-1100	-1200	-1300	-1400	-1500	-1700	-2100	-3000		
6	1																
8	1																
8	1.5																
8	2																
10	2																
10	2.5																
10	4																
10	5																
10	10																
12	2																
12	2.5																
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36	10																
36	5																
40	8																
40	10																
40	12																
45	10																
50	10																

**B-1-4.5 Manufacturing Capability for Screw Shaft**

Table 4.8 shows the manufacturing capability for the screw shaft overall length for each accuracy grade. The capability of large ball screw whose shaft diameter exceeds 100 mm is limited due to the

weight. Please consult NSK in such a case. (\*) Also consult NSK if the screw shaft size you desire exceeds the size listed in Table 4.8.

**Table 4.8 Manufacturing capability of screw shaft**

Unit: mm

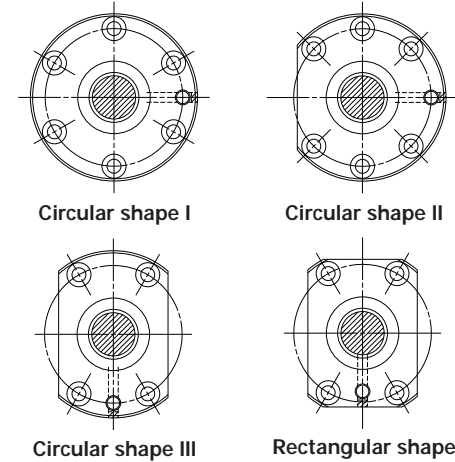
Accuracy grade Screw shaft diameter	C0	C1	C2	C3	C5	Ct7	Ct10
4	90	110	120	140	140	140	—
6	150	180	200	250	250	250	—
8	240	280	340	340	340	340	—
10	350	400	500	500	500	550	800
12	450	500	650	700	750	800	800
14	600	650	750	800	1000	1000	1000
15	600	700	800	900	1250	1250	1500
16	600	750	900	1000	1500	1500	1500
18	—	—	—	—	—	—	1500
20	850	1000	1200	1400	1900	1900	2000
25	1100	1400	1600	1900	2500	2500	2500
28	1100	1400	1600	1900	2500	2500	2500
32	1500	1750	2250	2500	3200	3200	3000(4000)
36	1500	1750	2250	2500	3200	3500	3000
40	2000	2400	3000	3400	3800	4300	4000(5000)
45	2000	2400	3000	3400	4000	4500	4000
50	2000	3200	4000	4500	5000	5750	4000
63	2000	4000	5000	6000	6800	7700	—
80	—	4000	6300	8200	9200	10000	—
*100	—	4000	6300	10000	12500	13500	—
*120	—	—	—	—	—	13500	—
*125	—	—	—	10000	13500	13500	—
*140	—	—	—	—	—	10000	—
*160	—	—	—	—	—	8000	—
*200	—	—	—	—	—	5000	—

**Remarks:** 1. Values in parentheses of Ct10 are applicable to the ultra high helix lead ( $l/d \geq 2$ ). Refer to dimension tables in B203 and following pages for details.  
2. Please note that the range for small leads (3 mm or under) are also limited by the screw length.

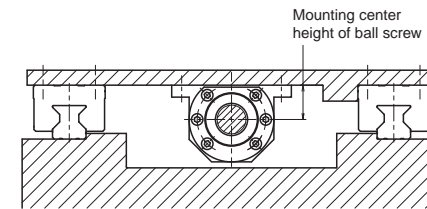
**B-1-4.6 Outside Shapes of Ball Nut**

**(1) Flange shape**

Fig. 4.1 shows the available flange shape. Select the appropriate shape according to the nut installation condition. (Fig. 4.2)



**Fig. 4.1 Flange shape**

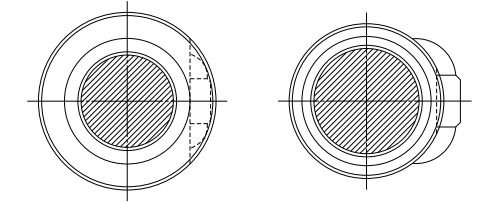


**Fig. 4.2 Installation example**

**(2) Shapes of nut cross section**

Cross-section of nuts are shown in Fig. 4.3. For detailed dimensions, refer to "Dimension table of nut."

- ① **Circular (round)**  
The ball recirculation components are contained inside the circumference of the nut. It can be inserted in a round hole.
- ② **Tube-projecting type**  
This shape is unique to the tube recirculation type. The nut outside diameter is small. However some recess must be given for housing because the ball recirculation tube protrudes from the circumference of the nut.



**Fig. 4.3 Shape of the cross section of nut**

B-1-4.7 Shaft End Configuration

(1) Standard shaft end dimensions

Table 4.9 and 4.10 show shaft end types for NSK standard support units.

Refer to the dimension tables below when designing shaft ends of standard ball screw.

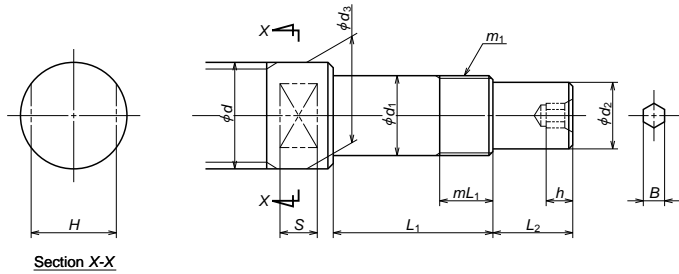


Fig. 4.4 Configuration of standard shaft end (drive side)

Table 4.9 Dimensions of shaft ends (drive side)

Unit: mm

Screw shaft diameter <i>d</i>	Bearing journal		Thread		Drive section		Seal section	Hexagon hole		Wrench flats		Support unit	
	Outside diameter <i>d</i> <sub>1</sub>	Length <i>L</i> <sub>1</sub>	Nominal spec. <i>m</i> <sub>1</sub>	Length <i>mL</i> <sub>1</sub>	Outside diameter <i>d</i> <sub>2</sub>	Length <i>L</i> <sub>2</sub>	Outside diameter <i>d</i> <sub>3</sub>	Width across flats <i>B</i>	Depth <i>h</i>	Width across flats <i>H</i>	Length <i>S</i>	Reference No.	
4	6	22.5	M6x0.75	7	4.5	7.5	9.5	—	—	8	4.5	WBK06-01A	WBK06-11
6	6	22.5	M6x0.75	7	4.5	7.5	9.5	—	—	8	4.5	WBK06-01A	WBK06-11
8	8	27	M8x1	9	6	10	11.5	—	—	10	5.5	WBK08-01A	WBK08-11
10	8	27	M8x1	9	6	10	11.5	—	—	10	5.5	WBK08-01A	WBK08-11
12	10	30	M10x1	10	8	15	14	—	—	12	6.5	WBK10-01A	WBK10-11
14	12	30	M12x1	10	10	15	15	4	6	12	6.5	WBK12-01A	WBK12-11
15	12	30	M12x1	10	10	15	15	4	6	12	6.5	WBK12-01A	WBK12-11
16	12	30	M12x1	10	10	15	15	4	6	12	6.5	WBK12-01A	WBK12-11
20	15	40	M15x1	15	12	20	19.5	5	7	17	8.5	WBK15-01A	WBK15-11
	17	81	M17x1	23	12	29	20	5	7	22	10	WBK17DF-31	
25	20	53	M20x1	16	15	27	25	6	8	22	10	WBK20-01	WBK20-11
	20	81	M20x1	23	15	39	25	6	8	22	10	WBK20DF-31	
28	20	53	M20x1	16	15	27	25	6	8	22	10	WBK20-01	WBK20-11
	20	81	M20x1	23	15	39	28	6	8	24	12	WBK20DF-31	
32	25	62	M25x1.5	20	20	33	32	8	10	27	12	WBK25-01	WBK25-11
	25	89	M25x1.5	26	20	51	32	8	10	27	12	WBK25DF-31	
	25	104	M25x1.5	26	20	51	32	8	10	27	12	WBK25DFD-31	
36	30	89	M30x1.5	26	25	61	36	10	12	30	13	WBK30DF-31	
	30	104	M30x1.5	26	25	61	36	10	12	30	13	WBK30DFD-31	
40	30	89	M30x1.5	26	25	61	40	10	12	—	—	WBK30DF-31	
	30	104	M30x1.5	26	25	61	40	10	12	—	—	WBK30DFD-31	
45	35	92	M35x1.5	30	30	63	45	12	14	—	—	WBK35DF-31	
	35	107	M35x1.5	30	30	63	45	12	14	—	—	WBK35DFD-31	
50	40	92	M40x1.5	30	35	78	50	14	18	—	—	WBK40DF-31	
	40	107	M40x1.5	30	35	78	50	14	18	—	—	WBK40DFD-31	

Low-profile support unit is available for compact FA PSS type.

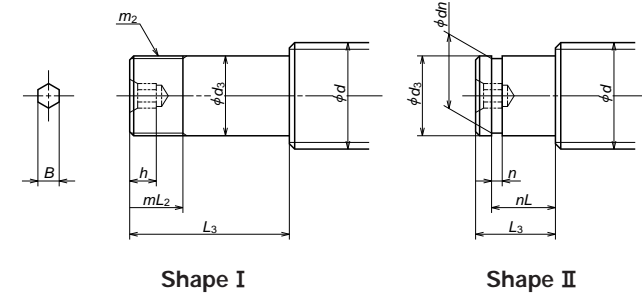


Fig. 4.5 Standard shaft end configuration (opposite to the drive side)

Table 4.10 Dimensions of shaft ends (opposite to the drive side)

Unit: mm

Screw shaft diameter <i>d</i>	Shape	Bearing journal		Thread for lock nut		Retainer ring groove			Hexagonal hole		Support unit	
		Outside diameter <i>d</i> <sub>1</sub>	Length <i>L</i> <sub>1</sub>	Nominal spec. <i>m</i> <sub>2</sub>	Length <i>mL</i> <sub>2</sub>	Width <i>n</i>	Groove diameter <i>dn</i>	Groove position <i>nL</i>	Width across flats <i>B</i>	Depth <i>h</i>	Reference No.	
8	II	6	9	—	—	0.8	5.7	6.8	—	—	WBK08S-01	
10	II	6	9	—	—	0.8	5.7	6.8	—	—	WBK08S-01	
12	II	8	10	—	—	0.9	7.6	7.9	—	—	WBK10S-01	
14	II	10	22(12)	—	—	1.15	9.6	9.15	4	6	WBK12S-01	
15	II	10	22(12)	—	—	1.15	9.6	9.15	4	6	WBK12S-01	
16	II	10	22(12)	—	—	1.15	9.6	9.15	4	6	WBK12S-01	
20	II	15	25(13)	—	—	1.15	14.3	10.15	5	7	WBK15S-01	
	II	20	19	—	—	1.35	19	15.35	6	8	WBK20S-01	
25	I	20	53	M20x1	16	—	—	—	6	8	WBK20-01	WBK20-11
	I	20	81	M20x1	23	—	—	—	6	8	WBK20DF-31	
	II	20	19	—	—	1.35	19	15.35	6	8	WBK20S-01	
28	I	20	53	M20x1	16	—	—	—	6	8	WBK20-01	WBK20-11
	I	20	81	M20x1	23	—	—	—	6	8	WBK20DF-31	
	II	25	20	—	—	1.35	23.9	16.35	8	10	WBK25S-01	
32	I	25	62	M25x1.5	20	—	—	—	8	10	WBK25-01	WBK25-11
	I	25	89	M25x1.5	26	—	—	—	8	10	WBK25DF-31	
36	II	25	20	—	—	1.35	23.9	16.35	10	12	(6205)	
	I	25	89	M25x1.5	26	—	—	—	10	12	WBK30DF-31	
40	II	30	22	—	—	1.75	28.6	17.75	10	12	(6206)	
	I	30	89	M30x1.5	26	—	—	—	10	12	WBK30DF-31	
45	II	35	25	—	—	1.75	33	18.75	12	14	(6207)	
	I	35	92	M35x1.5	30	—	—	—	12	14	WBK35DF-31	
50	II	40	25	—	—	1.95	38	19.95	14	18	(6208)	
	I	40	92	M40x1.5	30	—	—	—	14	18	WBK40DF-31	

(2) Shaft end configuration of R series ball screws for transfer equipment

Table 4.11 and 4.12 show shaft end types for R Series.

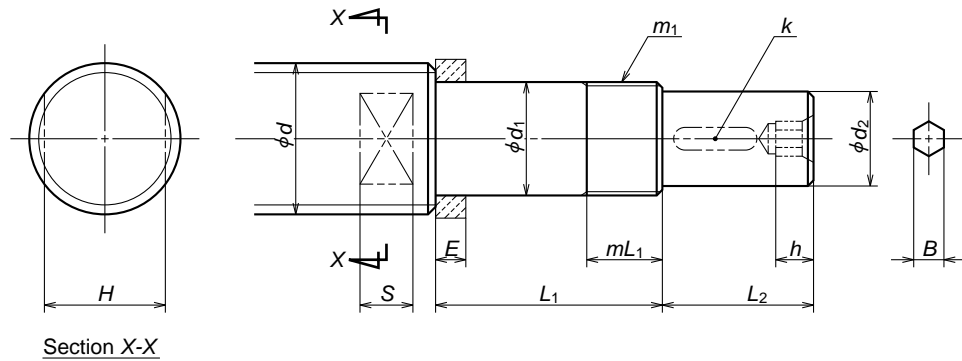


Fig. 4.6 R Series shaft end (drive side)

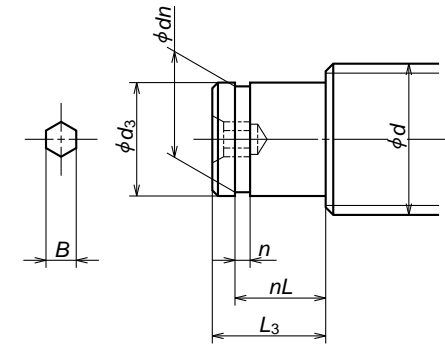


Fig. 4.7 Shaft end configuration of R Series (opposite to the drive side)

Table 4.11 Dimensions of R Series shaft ends (drive side)

Unit: mm

Screw shaft diameter <i>d</i>	Bearing journal		Thread for lock nut		Spacer Width <i>E</i>	Drive section			Hexagonal hole			Wrench flat		Support unit	
	Outside diameter <i>d<sub>1</sub></i>	Length <i>L<sub>1</sub></i>	Nominal spec <i>m<sub>1</sub></i>	Length <i>mL<sub>1</sub></i>		Outside diameter <i>d<sub>2</sub></i>	Length <i>L<sub>2</sub></i>	Key width <i>k</i>	Width across flats <i>B</i>	Depth <i>h</i>	Width across flats <i>H</i>	Length <i>S</i>	Reference No.		
10	6	27	M6×0.75	7	5.0	4.5	7.5	—	—	—	8	4.5	WBK06-01A	WBK06-11	
12	8	32	M8×1	9	5.5	6	10	—	—	—	10	5.5	WBK08-01A	WBK08-11	
14	10	35	M10×1	10	5.5	8	15	—	—	—	12	6.5	WBK10-01A	WBK10-11	
15	10	35	M10×1	10	5.5	8	15	—	—	—	12	6.5	WBK10-01A	WBK10-11	
16	12	35	M12×1	10	5.6	10	15	3	4	6	12	6.5	WBK12-01A	WBK12-11	
18	12	35	M12×1	10	5.6	10	15	3	4	6	12	6.5	WBK12-01A	WBK12-11	
20	15	50	M15×1	15	10	12	20	4	5	7	17	8.5	WBK15-01A	WBK15-11	
25	17	53	M17×1	17	7	15	27	5	6	8	22	10	WBK17-01A	—	
	20	64	M20×1	16	11	15	27	5	6	8	22	10	WBK20-01	WBK20-11	
28	20	64	M20×1	16	11	15	27	5	6	8	22	10	WBK20-01	WBK20-11	
32	25	76	M25×1.5	20	14	20	33	6	8	10	27	12	WBK25-01	WBK25-11	
36	25	76	M25×1.5	20	14	20	33	6	8	10	27	12	WBK25-01	WBK25-11	
40	30	89	M30×1.5	26	—	25	61	8	10	12	—	—	WBK30DF-31		
45	35	92	M35×1.5	30	—	30	63	8	12	14	—	—	WBK35DF-31		
50	35	92	M35×1.5	30	—	30	63	8	12	14	—	—	WBK35DF-31		

Note : The dimension *d<sub>1</sub>* shall be smaller enough than the minor diameter of the ball screw thread to provide sufficient shoulder surface for the spacer.

Refer to "B-II-14 Precautions for Designing Ball Screw (B84 page)".

Table 4.12 Dimensions of R Series shaft ends (opposite to the drive side)

Unit: mm

Screw shaft diameter <i>d</i>	Bearing journal		Retaining ring groove			Hexagonal hole		Support unit	
	Outside diameter <i>d<sub>3</sub></i>	Length <i>L<sub>3</sub></i>	Width <i>n</i>	Groove diameter <i>dn</i>	Groove position <i>nL</i>	Width across flats <i>B</i>	Depth <i>h</i>	Numbers in parentheses are bearing reference numbers.	
10	6	9	0.8	5.7	6.8	—	—	WBK08S-01(606)	
12	8	10	0.9	7.6	7.9	—	—	WBK10S-01(608)	
14	10	12	1.15	9.6	9.15	4	6	WBK12S-01(6000)	
15	10	12	1.15	9.6	9.15	4	6	WBK12S-01(6000)	
16	10	12	1.15	9.6	9.15	4	6	WBK12S-01(6000)	
18	10	12	1.15	9.6	9.15	4	6	WBK12S-01(6000)	
20	15	13	1.15	14.3	10.15	5	7	WBK15S-01(6002)	
25	17	16	1.15	16.2	13.15	6	8	WBK17S-01(6203)	
	20	19	1.35	19	15.35	6	8	WBK20S-01(6204)	
28	20	19	1.35	19	15.35	6	8	WBK20S-01(6204)	
32	25	20	1.35	23.9	16.35	8	10	WBK25S-01(6205)	
36	25	20	1.35	23.9	16.35	8	10	WBK25S-01(6205)	
40	30	22	1.75	28.6	17.75	10	12	(6206)	
45	35	23	1.75	33	18.75	12	14	(6207)	
50	35	23	1.75	33	18.75	12	14	(6207)	

## B-1-5 When Placing Orders

To avoid confusion, please use "reference number" or "specification number" when inquiring about desired ball screw specifications.

### ◇ Reference number:

Alpha-numeric codes are assigned to each ball screw. When placing order, please use this reference number.

### ◇ Specification number:

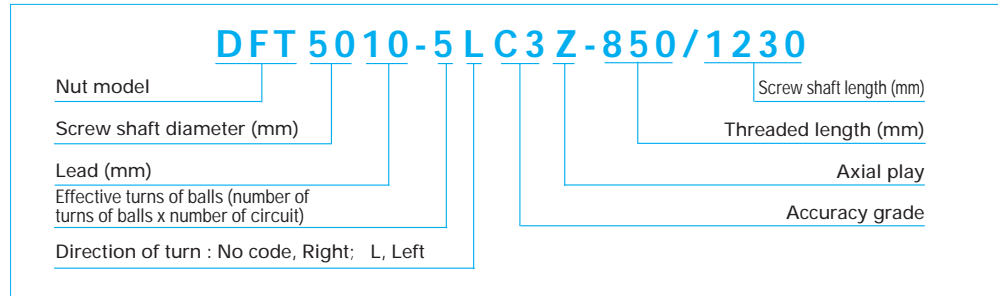
Specification factors are identified by alpha-numeric codes. Codes are for easy explanation of your requirements. (If you do not use these numbers, please itemize your requirements.)

### B-1-5.1 When Ordering Made-to-Order Ball Screws

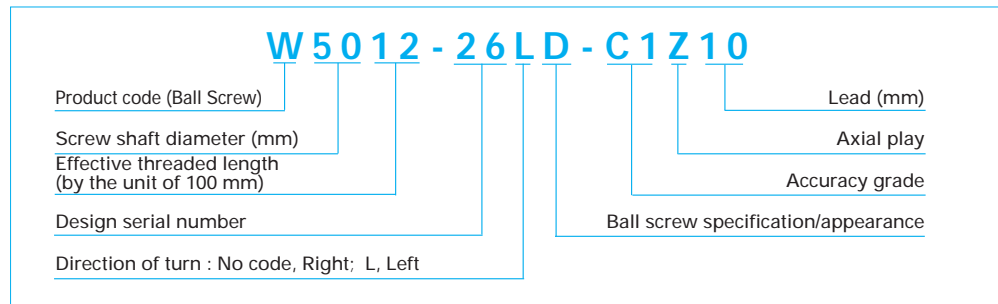
If you would like to discuss technical points regarding specifications, use the NSK ball screw technical data sheet as an aid (Page B36). For

high-load drive ball screws, use the technical sheet for NSK high-load drive ball screw.

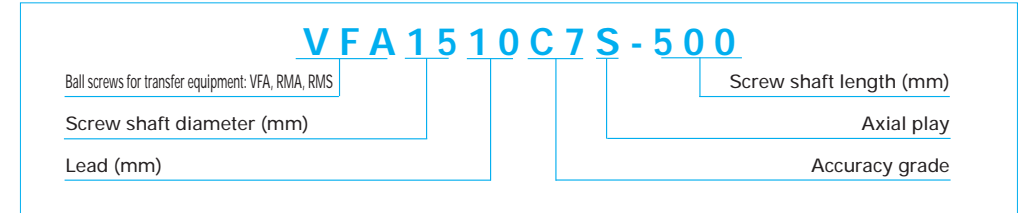
#### (1) Specification number of made-to-order ball screw



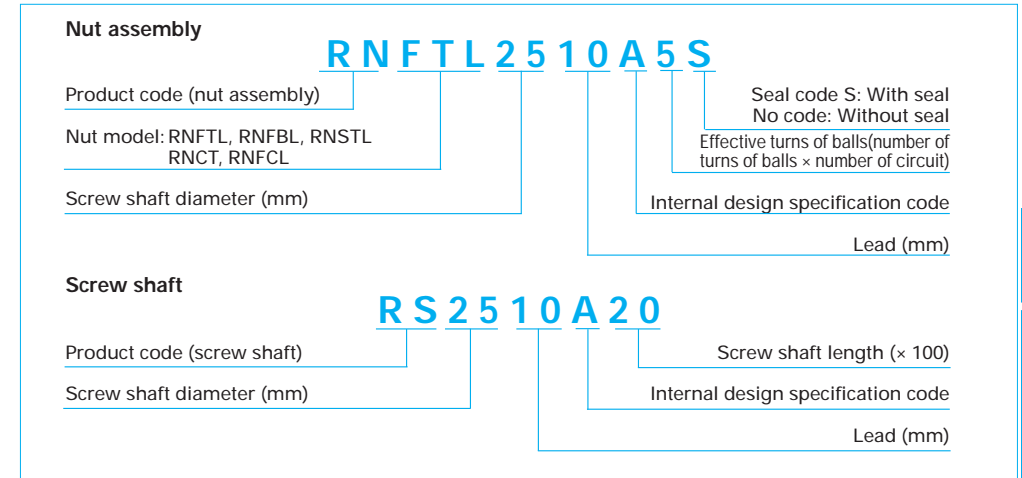
#### (2) Reference number of made-to-order ball screw



#### (3) Reference number of ball screws for transfer equipment with finished shaft end and blank shaft end



#### (4) Reference number of R series ball screws for transfer equipment





**NSK Ball Screw Technical Data Sheet (example)**

(2) Made-to-order ball screw

Company name \_\_\_\_\_ Date: Day Month Year \_\_\_\_\_  
 Address \_\_\_\_\_ Telephone \_\_\_\_\_  
 Person in charge \_\_\_\_\_ Section \_\_\_\_\_  
 Machine which uses the ball screw Machining center Model MC- Application Table left/right movement (X axis)  
 Drawing/rough sketch attached? Yes  No

**Use conditions**

Maximum load	9000 N	20 min <sup>-1</sup>	15 %	Operating conditions	Shaft rotation - Moving nut (Normal operation)
Load in normal use	4000 N	360 min <sup>-1</sup>	60 %		Shaft rotation - Moving shaft Back drive operation
Minimum load	2000 N	1000 min <sup>-1</sup>	25 %		Nut rotation - Moving nut Nut rotation - Moving shaft Oscillation
				Degree of vibration shock	Normal
Maximum rotational speed	1000 min <sup>-1</sup>			Required life	20000 h
Lubricant	Grease/oil (Brand name: <u>NSK GRS AS2</u> ) Maker: _____			Motor in use	Company A, Model 1
Seal	Yes	No		Control system	Company B, Model 2 ( resolution: 1µm)
Support bearing	Drive side <u>35TAC62DF</u>	Opposite to drive side <u>35TAC62DF</u>			
Guide way	<u>Rolling</u> Sliding ( <u>RA451500GM2-P4Z3-I</u> )				
Environment	Temperature (Normal temperature in degrees Celsius)	Dust	Humidity	Gas	Liquid (where?) Clean room In vacuum
Schedule for prototype	Day	Month	Year (approx.)	Quantity used	Piece
Date, going in production/Quantity	/Month	/Year	/Lot	per machine	

**Specification factors of the ball screw**

Screw shaft diameter	50 mm	Direction of turn	right	Accuracy grade	C2	Screw shaft length	880 mm	Preload	3000 N
Lead	10 mm	Effective turns of balls		Axial play	0 mm	Overall shaft length	1335 mm	Required torque	
Nut model	ZFT5010-10	Flange type	Circular I	Nut orientation	Same as shown in the dimension table			Opposite	

Supplemental explanation/requests

**NSK Ball Screw Technical Data Sheet (example)**

(2) Made-to-order ball screw

Company name \_\_\_\_\_ Date: Day Month Year \_\_\_\_\_  
 Address \_\_\_\_\_ Telephone \_\_\_\_\_  
 Person in charge \_\_\_\_\_ Section \_\_\_\_\_  
 Machine which uses the ball screw \_\_\_\_\_ Application \_\_\_\_\_  
 Drawing/rough sketch attached? Yes  No

**Use conditions**

Maximum load	N	min <sup>-1</sup>	%	Operating conditions	Shaft rotation - Moving nut Normal operation
Load in normal use	N	min <sup>-1</sup>	%		Shaft rotation - Moving shaft Back drive operation
Minimum load	N	min <sup>-1</sup>	%		Nut rotation - Moving nut Nut rotation - Moving shaft Oscillation
				Degree of vibration shock	
Maximum rotational speed	min <sup>-1</sup>			Required life	
Lubricant	Grease/oil (Brand name: _____ ) Maker: _____			Motor in use	
Seal	Yes	No		Control system	(resolution: _____ )
Support bearing	Drive side	Opposite to drive side			
Guide way	Rolling	Sliding ( _____ )			
Environment	Temperature (Normal temperature in degrees Celsius)	Dust	Humidity	Gas	Liquid (where?) Clean room In vacuum
Schedule for prototype	Day	Month	Year (approx.)	Quantity used	Piece
Date, going in production/Quantity	/Month	/Year	/Lot	per machine	

**Specification factors of the ball screw**

Screw shaft diameter		Direction of turn		Accuracy grade		Screw shaft length		Preload	
Lead		Effective turns of balls		Axial play		Overall shaft length		Required torque	
Nut model		Flange type		Nut orientation	Same as shown in the dimension table			Opposite	

Supplemental explanation/requests

# NSK Technical Data Sheet for NSK High-Load Drive Ball Screw

Made-to-order ball screw

Company name:	Date:	NSK sales office
Section:	Person in charge:	
Address:		

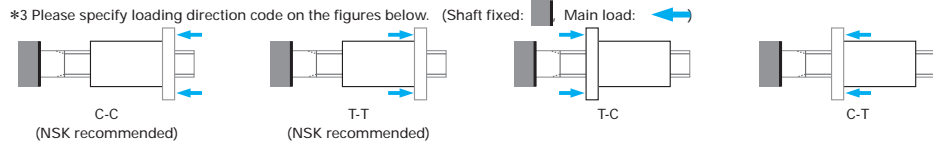
Name of machine\*1 : Electric injection molding machine; 30-ton capacity Application\*2 : Clamping axis

Drawing/rough sketch attached?:  Yes  No

\*1 Please specify capacity of the machine in case of injection molding machine or press.  
\*2 If the application is injection molding machine, please indicate the axis. (Examples: injection axis and clamping axis)

## 1. Use conditions

Operating conditions	<input checked="" type="checkbox"/> Shaft rotation — Moving nut	<input checked="" type="checkbox"/> Normal operation	Degree of vibration/impact	<input type="checkbox"/> Smooth operation without impact
	<input type="checkbox"/> Shaft rotation — Moving shaft	<input type="checkbox"/> Back drive operation		<input checked="" type="checkbox"/> Normal operation
Direction of load*3	<input type="checkbox"/> C-C <input checked="" type="checkbox"/> T-T <input type="checkbox"/> T-C	<input type="checkbox"/> C-T <input type="checkbox"/> Other	Mounting orientation	<input checked="" type="checkbox"/> Horizontal
	(Refer to figures below.)			<input type="checkbox"/> Vertical (Indicate the direction of gravity.)
Lubricant	<input checked="" type="checkbox"/> Grease (Brand name: <i>High-load grease with an extreme pressure additive</i> )	How to replenish lubricant	<input checked="" type="checkbox"/> Grease gun	<input type="checkbox"/> Automatic
Request for oil hole	<input checked="" type="checkbox"/> NSK recommended <input type="checkbox"/> Your request		(      cm <sup>3</sup> /      cycles)	
Necessity of seals	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	NSK S1 necessary?	<input checked="" type="checkbox"/> NSK recommended	<input type="checkbox"/> Not necessary
Environment	Temperature ( 40 deg)	Particles / <input type="checkbox"/> Yes (Size of particle : a) -0.1, b) over 0.1-0.3, c) over 0.3- , d) Ingredient: )	<input checked="" type="checkbox"/> No particle.	
Surface treatment	<input checked="" type="checkbox"/> Not required <input type="checkbox"/> Low-temperature chrome plating	<input type="checkbox"/> Fluoride low-temperature chrome plating	<input type="checkbox"/> Other	
Quantity in mass-production	/Month	/Year	/Lot	Quantity used per machine: 1 pcs./machine



## 2. Specifications

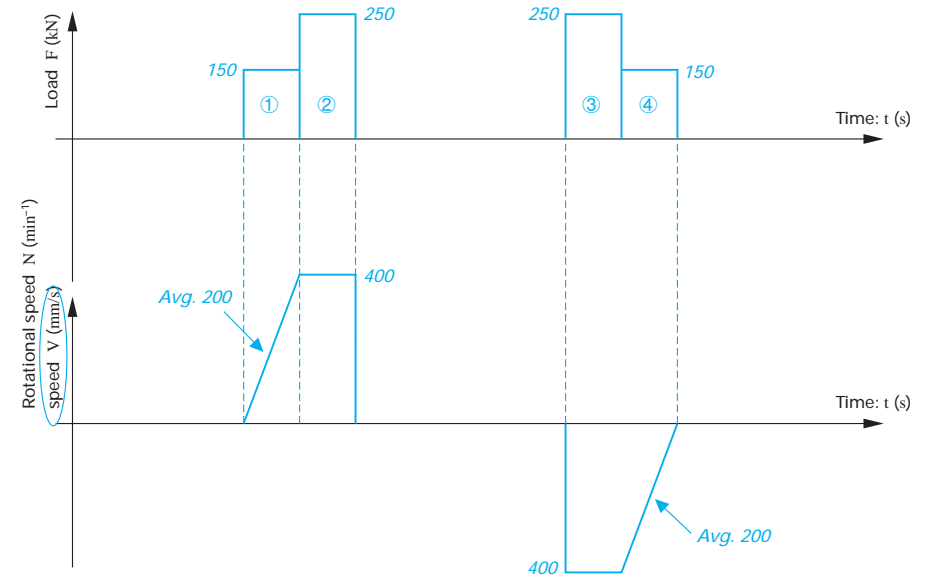
Shaft diameter	φ 140 mm	Lead	32 mm	Accuracy grade	Cl7	Axial play	0.050 or less mm max.
Nut model No.	HTF 14032-7.5-S1	Effective turns of balls	2.5 × 2	Direction of turn	right	Thread length / Overall shaft length	1000 / 1500

Special note / Requests

Please calculate the life as a continuous operation based on "3. Load chart".

# NSK Technical Data Sheet for NSK High-Load Drive Ball Screw

## 3. Load chart



	Axial load* F (kN)	Rotational speed or Average speed N (min <sup>-1</sup> )	V (mm/s)	Time t (s)	Stroke St (mm)	Remarks
1	150		200	0.5	100	
2	250		400	0.5	200	
3	250		400	0.5	200	
4	150		200	0.5	100	
5				Total: 2.0	Total: 600	
6						
7						
8						
9						
10						

Dynamic axial load (MAX.)\*: 250 (kN) Static axial load (MAX.)\* (at 0 mm/s): (kN)  
 Stroke in normal use: 300 (mm) Maximum stroke: 500 (mm)  
 Cycle time: 2.0 (s) Required life: 2500 (✓ h or  cycles)  
 \*If you use multiple ball screws in an axis, fill out the axial load per ball screw.

## 4. Plan to conduct the endurance test of the ball screw?

Actual data on the machine  Yes  N/A

Planning to check endurance (Date: *From the middle of December 2009*)  No (Reason: )

### Endurance of the ball screw

- (1) Mounting accuracy, load conditions, and lubricating conditions are the main factors affecting the ball screw fatigue life. Therefore, we recommend evaluating the influence of those factors on actual use of your machines.
- (2) A temperature rise caused by operational and environmental conditions may reduce the effectiveness of lubricant.

# NSK Technical Data Sheet for NSK High-Load Drive Ball Screw

Made-to-order ball screw

Company name:	Date:	NSK sales office
Section:	Person in charge:	
Address:		

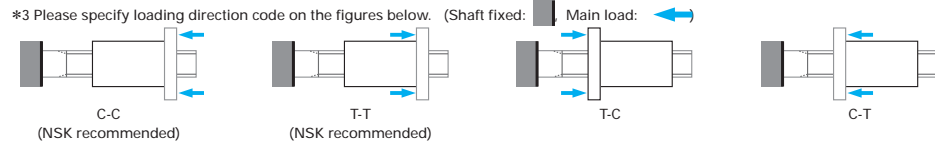
Name of machine\*1 : \_\_\_\_\_ Application\*2 : \_\_\_\_\_

Drawing/rough sketch attached?:  Yes  No

\*1 Please specify capacity of the machine in case of injection molding machine or press.  
 \*2 If the application is injection molding machine, please indicate the axis. (Examples: injection axis and clamping axis)

## 1. Use conditions

Operating conditions	<input type="checkbox"/> Shaft rotation — Moving nut	<input type="checkbox"/> Normal operation	Degree of vibration/impact	<input type="checkbox"/> Smooth operation without impact
	<input type="checkbox"/> Shaft rotation — Moving shaft	<input type="checkbox"/> Back drive operation		<input type="checkbox"/> Normal operation
Direction of load*3	<input type="checkbox"/> Nut rotation — Moving nut	<input type="checkbox"/> C-T <input type="checkbox"/> Other	Mounting orientation	<input type="checkbox"/> Operation associated with impact or vibration
	<input type="checkbox"/> Nut rotation — Moving shaft			<input type="checkbox"/> Oscillation
Lubricant	<input type="checkbox"/> Grease (Brand name: _____ Maker: _____)		How to replenish lubricant	<input type="checkbox"/> Vertical (Indicate the direction of gravity.)
Request for oil hole	<input type="checkbox"/> NSK recommended <input type="checkbox"/> Your request			<input type="checkbox"/> Grease gun <input type="checkbox"/> Automatic
Necessity of seals	<input type="checkbox"/> Yes <input type="checkbox"/> No		( _____ cm <sup>3</sup> / _____ cycles)	<input type="checkbox"/> NSK recommended
Environment	Temperature ( _____ deg)	Particles / <input type="checkbox"/> Yes (Size of particle : a) -0.1, b) over 0.1-0.3, c) over 0.3- _____ , d) Ingredient: _____ )		
		<input type="checkbox"/> No particle.		
Surface treatment	<input type="checkbox"/> Not required <input type="checkbox"/> Low-temperature chrome plating <input type="checkbox"/> Fluoride low-temperature chrome plating <input type="checkbox"/> Other			
Quantity in mass-production	/Month	/Year	/Lot	Quantity used per machine _____ pcs./machine



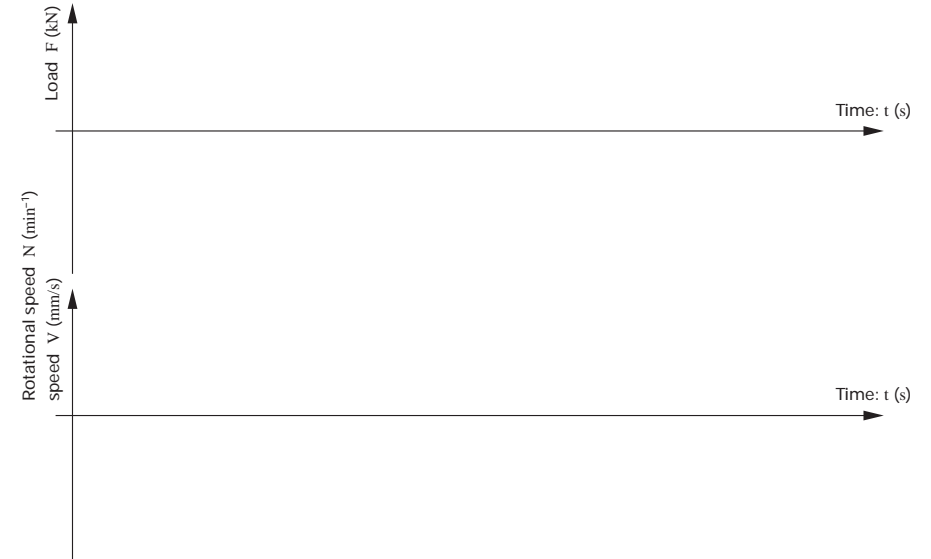
## 2. Specifications

Shaft diameter	φ _____ mm	Lead	_____ mm	Accuracy grade	_____	Axial play	_____ mm max.
Nut model No.	_____	Effective turns of balls	_____	Direction of turn	_____	Thread length / Overall shaft length	_____ / _____

Special note / Requests

# NSK Technical Data Sheet for NSK High-Load Drive Ball Screw

## 3. Load chart



	Axial load* F (kN)	Rotational speed or Average speed N (min <sup>-1</sup> )	V (mm/s)	Time t (s)	Stroke St (mm)	Remarks
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Dynamic axial load (MAX.)\*: \_\_\_\_\_ (kN)      Static axial load (MAX.)\* (at 0 mm/s): \_\_\_\_\_ (kN)  
 Stroke in normal use: \_\_\_\_\_ (mm)      Maximum stroke: \_\_\_\_\_ (mm)  
 Cycle time: \_\_\_\_\_ (s)      Required life: \_\_\_\_\_ (  h or  cycles )  
 \*If you use multiple ball screws in an axis, fill out the axial load per ball screw.

## 4. Plan to conduct the endurance test of the ball screw?

Actual data on the machine  Yes

N/A  Planning to check endurance (Date: \_\_\_\_\_ )

No (Reason: \_\_\_\_\_ )

### Endurance of the ball screw

- (1) Mounting accuracy, load conditions, and lubricating conditions are the main factors affecting the ball screw fatigue life. Therefore, we recommend evaluating the influence of those factors on actual use of your machines.
- (2) A temperature rise caused by operational and environmental conditions may reduce the effectiveness of lubricant.