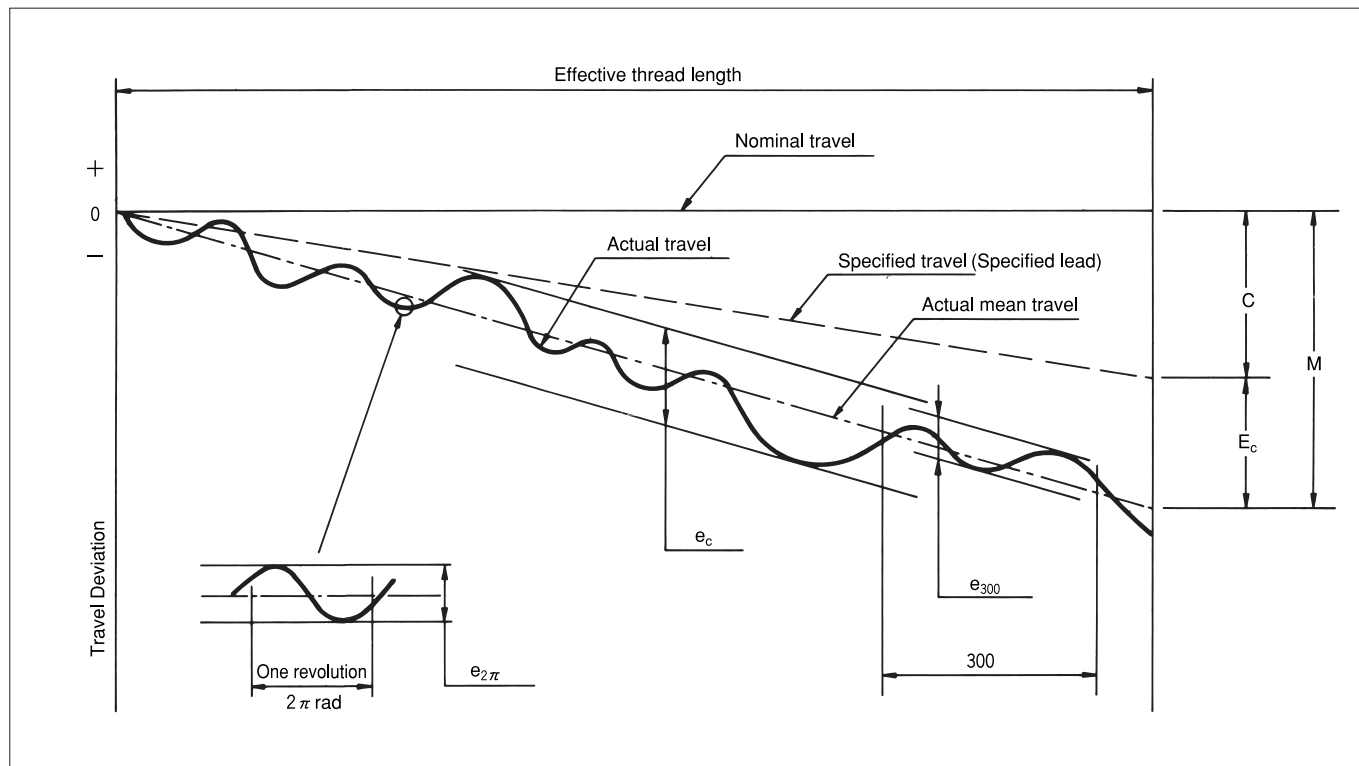


TECHNICAL DATA OF BALL SCREWS

LEAD ACCURACY

The lead accuracy of precision ball screws is defined by the following characteristics in accordance with JIS Standard.

The permissible values are shown in Table 2 and 3



•TERMS AND DEFINITIONS

Specified Lead

In general, same as the nominal lead. However, it sometimes represents a nominal lead value corrected consciously when the purpose of application so requires. (Example:Nominal lead 10mm→Specified lead 9.9995mm)

Specified Travel Target Value“C”

This is a target value of the cumulative lead to be preset where contraction and expansion of the screw shaft due to the temperature change or some external load should be considered. This value will be determined by experiments or experiences if necessary. For presetting procedures, see the specified travel setting procedures in page 406.

Actual Travel

A travel obtained by successive measurement of an actual ball screw or by measurement on a section including the axial line of the screw shaft.

Actual Mean Travel“M”

A straight line representing the trend of actual travel. It is obtained by the least-squares method or an approximation similar to this method using the curve representing the actual travel corresponding to the effective travel of a nut or the effective thread length of the screw shaft.

Actual Mean Travel Deviation“E_c”

A value obtained by subtracting the specified travel target value (C) from the actual mean travel (M).

Variation

The maximum difference of the actual travel contained between two lines drawn parallel to the actual mean travel. It is prescribed by e_c , e_{300} , $e_{2\pi}$.

e_c :Variation for the effective travel of nut or the effective thread length of screw shaft.

e_{300} :Variation for a length of 300mm arbitrarily taken within the effective thread length of screw shaft.

$e_{2\pi}$:Variation for one revolution (2π rad) made within the effective thread length of screw shaft.

•MEAN TRAVEL DEVIATION AND PERMISSIBLE VALUES FOR VARIATION

•Precision Ball Screw

Table 2 Mean travel deviation ($\pm E_c$) and permissible values for variation (e_c)

(Unit: μm)

Accuracy grade		C0		C1		C2		C3		C4		C5	
Effective thread length (mm)	Over or less	$\pm E_c$	e_c	$\pm E_c$	e_c	$\pm E_c$	e_c	$\pm E_c$	e_c	$\pm E_c$	e_c	$\pm E_c$	e_c
		-	315	4	3.5	6	5	9	6	12	8	15	11
315	400	5	3.5	7	5	10	7	13	10	17	13	25	20
400	500	6	4	8	5	11	7	15	10	19	13	27	20
500	630	6	4	9	6	12	9	16	12	20	16	30	23
630	800	7	5	10	7	14	10	18	13	24	17	35	25
800	1000	8	6	11	8	16	11	21	15	28	19	40	27
1000	1250	9	6	13	9	18	12	24	16	32	21	46	30
1250	1600	11	7	15	10	21	13	29	18	38	24	54	35
1600	2000			18	11	26	15	35	21	46	28	65	40
2000	2500			22	13	31	18	41	24	54	32	77	46
2500	3150			26	15	37	21	50	29	66	38	93	54
3150	4000			32	18	43	24	62	35	80	46	115	65
4000	5000							76	41	97	54	140	77
5000	6000											170	93

Table 3 Permissible values for variation

(Unit: μm)

Accuracy grade	C0		C1		C2		C3		C4		C5	
Item	e_{300}	$e_{2\pi}$	e_{300}	$e_{2\pi}$	e_{300}	$e_{2\pi}$	e_{300}	$e_{2\pi}$	e_{300}	$e_{2\pi}$	e_{300}	$e_{2\pi}$
Permissible value	3.5	3	5	4	6	5	8	6	11	7	18	8

•Commerical Grade Ball Screw

The travel deviation of ordinary ball screws is prescribed by the permissible value for a length of 300mm arbitrarily taken within the effective thread length of screw shaft in accordance with JIS Standard.

Table 4 Permissible values for cumulative lead error

(Unit:mm)

Accuracy grade	C7	C10
Travel deviation	0.05/300	0.21/300

•ACCURACY GRADE AND AXIAL CLEARANCE

The relationship between the accuracy grade and the axial clearance is classified by the respective combinations as shown in Table 5.

Table 5 Accuracy grade and axial clearance

(Unit:mm)

Accuracy grade		C0	C1	C2	C3	C4	C5	C7	C10
Axial clearance	0	Double nut	C0S	C1S	C2S	C3S	C4S	C5S	-
	0	Single nut	C0S	C1S	C2S	C3S	C4S	C5S	-
	0.005 or less		-	C1F	C2F	C3F	C4F	C5F	-
	0.030 or less		-	-	-	-	C4M	C5M	C7M
0.200 or less	-	-	-	-	-	-	-	C7L	C10L

•ACCURACY GRADE AND MANUFACTURABLE SCREW SHAFT LENGTH

When the slenderness ratio (shaft length per shaft diameter) is large, it is sometimes difficult to manufacture a ball screw with the desired accuracy. The following table shows the maximum length of screw shafts of each accuracy grade that can be manufactured in the standard process. When ball screws exceeding the manufacturable range are required, consult KURODA.

Table 6 Accuracy grade and manufacturable range of screw shaft length

(Unit:mm)

Accuracy grade	Nominal screw shaft diameter																
	4	6	8	10	12	15•16	20	25	28	32	36	40	45	50	55	63	80•100•125
C0	90	160	240	340	420	500	800	1100	1200	1600	1800	2000	2000	2000	2000	2000	-
C1	120	180	280	400	500	600	900	1300	1500	1800	2000	2200	2300	2800	3000	3000	3000
C2	120	180	280	400	500	600	1100	1600	1800	2200	2500	2800	3000	3600	4000	4500	4500
C3	140	210	340	480	600	700	1400	1800	2000	2500	2800	3200	3600	4000	5000	5200	5500
C4	140	210	340	480	600	800	1400	1800	2000	2500	2800	3200	3600	4000	5000	5200	5500
C5	140	210	340	500	700	1300	1600	2000	2200	2800	3100	3600	4100	4500	5700	5700	5700
C7	-	-	340	500	700	1300	1800	2300	2600	3200	3600	4600	5000	5700	5700	5700	5700
C10	-	-	-	-	1300	1800	2300	2600	3600	4000	4600	5200	5700	5700	5700	5700	5700

(Note) When the lead is larger than the nominal screw shaft diameter, the manufacturable accuracy grade is C3-C10.