

Linear Shafts

Hollow Shaft Ends Configurable Type

Linear Shafts – Hollow Shaft Ends Configurable Type

Type	Material	Hardness	Surface Treatment
FSPJ	52100 Bearing Steel Equivalent	Induction Hardening Effective Hardened Depth P.199 58 HRC min.	—
FPSPJ			Hard Chrome Plating Plating Hardness: 750 HV min. Plating Thickness 5µ or More

No Surface Treatment on machined areas

Select from Left End Shape $6.3 \sqrt{(1.6/0.4/0.4)^G}$

Select from Right End $0.4/0.4/1.6$

Ⓛ About hollow shaft wall thickness deviations. P.198
Ⓜ (Y) dimensions need to be $(Y) \leq DX50$. $(Y) \leq 1500$
Ⓝ Changes in circularity, straightness, perpendicularity, wall thickness deviations and hardness P.198.

RoHS 10

Left End Shape			Right End Shape		
A	B	C	A	B	C
D	E	F	D	E	F

Machining Conditions

Ⓛ No alteration condition for Shape **A**

B	C	D	E	F																		
When D=6, then M3 When 8≤D≤12, t+1≤M (N)≤D-3 When 13≤D≤25, t+2≤M (N)≤D-3 When 30≤D≤40, t+2≤M (N)≤D-7 Not applicable when D=50 One End Tapped Hollow Shafts P.276. L≥M (N)x4	<table border="1"> <thead> <tr> <th>D</th> <th>r</th> </tr> </thead> <tbody> <tr> <td>6-30</td> <td>0.3 or Less</td> </tr> <tr> <td>35-50</td> <td>0.5 or Less</td> </tr> </tbody> </table> When 6≤D≤20, t+4≤M (N)≤D When 25≤D≤40, t+6≤M (N)≤D Not applicable when D=50 Both Ends Threaded Hollow Shafts P.280. Ⓛ B and S≤Pitchx3 is required.	D	r	6-30	0.3 or Less	35-50	0.5 or Less	<table border="1"> <thead> <tr> <th>D</th> <th>r</th> </tr> </thead> <tbody> <tr> <td>6-30</td> <td>0.3 or Less</td> </tr> <tr> <td>35-50</td> <td>0.5 or Less</td> </tr> </tbody> </table> One End Stepped Hollow Shafts P.282.	D	r	6-30	0.3 or Less	35-50	0.5 or Less	<table border="1"> <thead> <tr> <th>D</th> <th>r</th> </tr> </thead> <tbody> <tr> <td>6-30</td> <td>0.3 or Less</td> </tr> <tr> <td>35-50</td> <td>0.5 or Less</td> </tr> </tbody> </table> P (Q)≥M (N)+4	D	r	6-30	0.3 or Less	35-50	0.5 or Less	For Retaining Ring Groove Detailed Dimensions P.853.
D	r																					
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Ⓛ When only one end requires alteration, for the opposite end please select shape **A**

Part Number			D	t	0.5mm Increments.		1 mm Increments			M / N (Coarse Thread)	C
Type	Left End Shape	Right End Shape			L	F / T	B / S	H / U	P / Q		
FSPJ FPSPJ	A B C D E F	A B C D E F	6	2	20.0-1500.0 (L≤DX5)	2≤F≤P (M)x5 2≤T≤Q(N)x5	2≤B≤Mx3 2≤S≤Nx3 B≤F-2 S≤T-2 (When M and N≤6)	2≤H / U (When D=6) 3≤H / U (When 6<D≤10) 4≤H / U (When 10<D≤20) 5≤H / U (When 20<D) H-U<L/2	D/4≤P / Q<D	3 4 5 6 8 10 12 16 20 24 30	When D<20, 0.5 or Less When D≥20, 1.0 or Less
			8	3							
			10	4							
			12	6							
			13	7							
			16	10							
			20	14							
			25	16							
			30	17							
			35	19							
			40	20							
			50	26							

Linear Shafts / Linear Shaft Washers

Shaft Ends Configurable Type, continued

Part Number Example

Type	Left End	Right End	D	L	F	M	B	T	N	S	H	U	P	Q
FSPJ	A	C	D12	L100					T20	N10	S12			

Part Number Alterations

Type	Left End	Right End	D	L	F	M	B	T	N	S	H	U	P	Q	(DKC...etc.)
FSPJ	A	C	D12	L100					T20	N6	S12				DKC

Alterations	Revise O.D. Tolerance (Precision Grade)	Alteration to L Dimension Tolerance	Wrench Flats	Add Wrench Flats at Two Locations																																																																																																		
DKC		LKC	SC	WSC																																																																																																		
Spec.	Outer diameter tolerance is altered to h5. Ordering Code: DKC <table border="1"> <thead> <tr> <th>D</th> <th>h5 Tolerance</th> </tr> </thead> <tbody> <tr> <td>6</td> <td>0</td> </tr> <tr> <td>8-10</td> <td>-0.005</td> </tr> <tr> <td>12-16</td> <td>-0.006</td> </tr> <tr> <td>20-30</td> <td>-0.008</td> </tr> <tr> <td>35-50</td> <td>-0.009</td> </tr> <tr> <td></td> <td>-0.011</td> </tr> </tbody> </table> Ⓛ Not applicable to FPSPJ.	D	h5 Tolerance	6	0	8-10	-0.005	12-16	-0.006	20-30	-0.008	35-50	-0.009		-0.011	Changes L Tolerance. Ordering Code: LKC Ⓛ L<200 → L±0.03 200≤L<500 → L±0.05 L≥500 → L±0.1 Ⓛ When using LKC, L dimensions can be specified in 0.1 mm increments. Ⓛ C Shape When D-M (N)≤2 Ⓛ E Shape Not applicable when D-P (Q)≤2	Adds a wrench flat. Ordering Code: SC5 Ⓛ SC=1 mm Increment Ⓛ SC+ℓ₁≤L SC=0 or SC≥1 Ⓛ When selecting Shape B When D≤25, SC=Mx2 SC+ℓ₁≤L-Nx2 <table border="1"> <thead> <tr> <th>D</th> <th>W</th> <th>ℓ₁</th> <th>D</th> <th>W</th> <th>ℓ₁</th> </tr> </thead> <tbody> <tr> <td>6</td> <td>5</td> <td>8</td> <td>20</td> <td>17</td> <td>10</td> </tr> <tr> <td>8</td> <td>7</td> <td>8</td> <td>25</td> <td>22</td> <td>10</td> </tr> <tr> <td>10</td> <td>8</td> <td>10</td> <td>30</td> <td>27</td> <td>15</td> </tr> <tr> <td>12</td> <td>10</td> <td>10</td> <td>35</td> <td>30</td> <td>15</td> </tr> <tr> <td>13</td> <td>11</td> <td>10</td> <td>40</td> <td>36</td> <td>20</td> </tr> <tr> <td>16</td> <td>14</td> <td>10</td> <td>50</td> <td>41</td> <td>20</td> </tr> </tbody> </table>	D	W	ℓ₁	D	W	ℓ₁	6	5	8	20	17	10	8	7	8	25	22	10	10	8	10	30	27	15	12	10	10	35	30	15	13	11	10	40	36	20	16	14	10	50	41	20	Wrench flats are added at two locations. Ordering Code: WSC12-X8 Ⓛ WSC, (X)=Specified in 1 mm increments Ⓛ WSC+X+ℓ₁, x2≤L WSC=0 or WSC≥1 X=0 or X≥1 Ⓛ When selecting Shape B WSC+X+ℓ₁, x2≤L WSC≥Mx2 X≥Nx2 Ⓛ Two wrench flat alterations will not be oriented in a coplanar relationship. <table border="1"> <thead> <tr> <th>D</th> <th>W</th> <th>ℓ₁</th> <th>D</th> <th>W</th> <th>ℓ₁</th> </tr> </thead> <tbody> <tr> <td>6</td> <td>5</td> <td>8</td> <td>20</td> <td>17</td> <td>10</td> </tr> <tr> <td>8</td> <td>7</td> <td>8</td> <td>25</td> <td>22</td> <td>10</td> </tr> <tr> <td>10</td> <td>8</td> <td>10</td> <td>30</td> <td>27</td> <td>15</td> </tr> <tr> <td>12</td> <td>10</td> <td>10</td> <td>35</td> <td>30</td> <td>15</td> </tr> <tr> <td>13</td> <td>11</td> <td>10</td> <td>40</td> <td>36</td> <td>20</td> </tr> <tr> <td>16</td> <td>14</td> <td>10</td> <td>50</td> <td>41</td> <td>20</td> </tr> </tbody> </table>	D	W	ℓ₁	D	W	ℓ₁	6	5	8	20	17	10	8	7	8	25	22	10	10	8	10	30	27	15	12	10	10	35	30	15	13	11	10	40	36	20	16	14	10	50	41	20
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Ⓛ Alterations may lower hardness. P.199

Linear Shaft Washers

Type	Material	Surface Treatment
WSF	1045 Carbon Steel Equivalent	Black Oxide

RoHS 10

Part Number Example

Part Number	D	d	T
WSF	10	3	3
	12	4	
	13	5	
	16	6	
	20	8	
	5	25	10
		30	12
		35	12
		40	16
		50	16

Ⓛ For Washers other than above, refer to P.2306.

Part Number Example

Part Number
WSF10

Application Example

End-Washer for Linear Shaft