Hollow Shafts / End-Washers for Linear Shafts

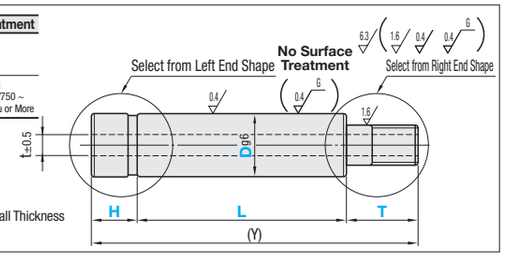
Shaft Ends Configurable

Type	M Material	H Hardness	S Surface Treatment
FSPJ	SUJ2 Equivalent	Effective Hardened Depth of Induction Hardening P.112 58HRC~	-
FPSPJ			Hard Chrome Plating Plating Hardness: HV750 ~ Plating Thickness: 5μ or More

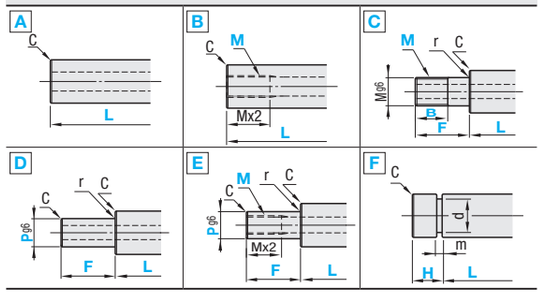
About Hollow Shaft Wall Thickness Deviations See P.111

(Y) dimensions need to be (Y)≤Dx50. (Y)≤1500

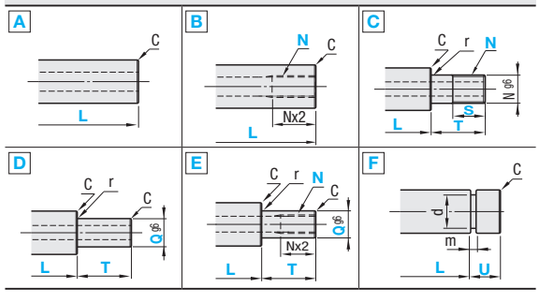
L Dimension Tolerance, Circularity, Straightness, Perpendicularity, Wall Thickness Deviations and Changes in Hardness P.111, P.216



Left End Shape



Right End Shape



Machining Conditions

A No alteration condition for Shape.

B
- When D=6, M=3
- 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 to D=50.
- One End Tapped Hollow Shafts See P.215
- L≥M(N)x4

C

D	r
6~30	0.3 or Less
35~50	0.5 or Less

- When 6≤D≤20
  t+4≤M(N)≤D
- When 25≤D≤40
  t+6≤M(N)≤D
- Not applicable to D=50.
- Both Ends Threaded Hollow See P.217

B, S≤Pitchx3 is required.

D

D	r
6~30	0.3 or Less
35~50	0.5 or Less

One End Stepped Hollow See P.221

E

D	r
6~30	0.3 or Less
35~50	0.5 or Less

P(Q)≥M(N)+4

F

Retaining Ring Detailed Dimensions See P.820

When only one end requires alteration, select Shape A for the opposite end.

Part Number			Selection	t	0.5mm Increment		1mm Increment			Selection	C
Type	Left End Shape	Right End Shape	D		L	F, T	B, S	H, U	P, Q	M, N (Coarse)	
FSPJ FPSPJ	A B C D E F	A B C D E F	6	2	20.0~1500.0 (L≤Dx50)	2≤F≤P(M)x5 2≤T≤Q(N)x5	2≤B≤Mx3 2≤S≤Nx3 B≤F-2 S≤T-2 (When M, N≤6) B≤F-3 S≤T-3 (When M, N≤8, 10) B≤F-5 S≤T-5 (When M, N≥12)	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	t+4≤P, Q<D	3	0.5 or less when D<20, 1.0 or less when D≥20
			8	3						4	
			10	4						5	
			12	6						6	
			13	7						8	
			16	10						10	
			20	14						12	
			25	16						16	
			30	17						20	
			35	19						24	
			40	20						30	
			50	26							

Specify t<M, or t<N.

Ordering Example

Part Number: Type (Left End / Right End) - D - L - F - M - B - T - N - S - H - U - P - Q

FSPJ A C - D12 - L100 - T20 - N6 - S12

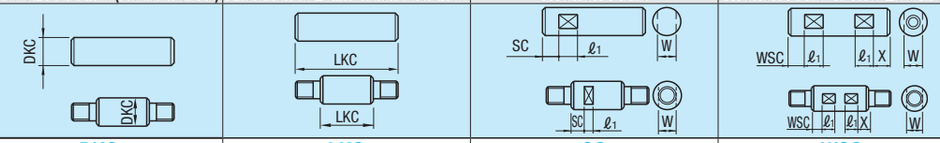
Type	D	Material Unit Price Left End: Shape A Right End: Shape A											Shaft End Alteration Unit Price				
		Min. L ~ 50	50.5~100	100.5~150	150.5~200	200.5~300	300.5~400	400.5~500	500.5~600	600.5~800	800.5~1000	1000.5~1200	1200.5~1500	B	C	D	E	F
FSPJ	6~10								-	-	-	-	-					
	12, 13										-	-	-					
	16, 20											-	-					
	25																	
	30																	
	35																	
	40																	
	50	-																
FPSPJ	6~10								-	-	-	-	-					
	12, 13										-	-	-					
	16, 20											-	-					
	25																	
	30																	
	35																	
	40																	
	50	-																

Alterations

Part Number: 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	Wrench Flats at Two Locations
Code	DKC	LKC	SC	WSC
Spec.	O.D. tolerance is altered to h5. Ordering Code DKC	Changes L tolerance. Ordering Code LKC	Adds wrench flats. Ordering Code SC5	Adds Wrench Flats at two locations. Ordering Code WSC12-X8



Revise O.D. Tolerance (Precision Grade) — Spec.

D	h5 Tolerance
6	0 / -0.005
8, 10	0 / -0.006
12~16	0 / -0.008
20~30	0 / -0.009
35~50	0 / -0.011

Not applicable to FPSPJ.

Alteration to L dimension tolerance — Spec.

L<200··· L±0.03
200≤L<500 ··· L±0.05
L≥500··· L±0.1

For use of LKC L dimensions can be specified in 0.1mm increment.

Not applicable when D-M(N)≤2 for Shape C.

Not applicable when D-P(Q)≤2 for Shape E.

Wrench Flats — Spec.

SC=1mm Increment

SC+ℓ1≤L

SC=0 or SC≥1

When selecting Shape B
When D≤25,
SC≥Mx2
SC+ℓ1≤L-Nx2

D	W	ℓ1
6	5	8
8	7	
10	8	
12	10	10
13	11	
16	14	

D	W	ℓ1
20	17	10
25	22	
30	27	15
35	30	
40	36	20
50	41	

Wrench Flats at Two Locations — Spec.

WSC, X=1mm Increment

WSC+X+ℓ1x2≤L

WSC=0 or WSC≥1

X=0 or X≥1

When selecting Shape B
WSC+X+ℓ1x2≤L
WSC≥Mx2
X≥Nx2

Orientation between two wrench flats is not coplanar.

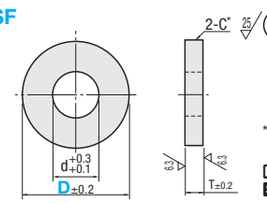
D	W	ℓ1
6	5	8
8	7	
10	8	
12	10	10
13	11	
16	14	

D	W	ℓ1
20	17	10
25	22	
30	27	15
35	30	
40	36	20
50	41	

Alterations may lower hardness. See P.112

End-Washers for Linear Shafts

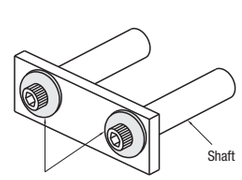
WSF



*D=16 or Less: C0.2 or Less
D=20 or More: C0.5 or Less

M Material: S45C Equivalent

S Surface Treatment: Black Oxide



End-Washer for Linear Shafts

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

Ordering Example

Part Number: WSF10

For Washers other than above, see P.2-113.