

Metal Washers

Standard / Precision / High Precision Grade with Configurable Dimensions and Tolerances

Metal Washers – Standard / Precision / High Precision Grade with Configurable Dimensions and Tolerances

RoHS10

Part Number	Material	Surface Treatment	Hardness
AWSC	1045 Carbon Steel or Equivalent	—	—
AWSB		Black Oxide	
AWSM		Electroless Nickel Plating	
AWSS	304 Stainless Steel	—	45–50 HRC min.
AWSH	440C or 420 Stainless Steel	—	

Ⓢ Stainless Steel Hardened Type (AWSH) may be discolored by hardening.

*D=16 or Less: C0.2 or less
D=16.5 or More: C0.5 or less

T Dimension Tolerance Selectable Table			
A	±0.005	—	—
B	-0.1 -0.3	SB	-0.01 -0.03
C	+0.3 +0.1	SC	+0.03 +0.01
D	0 -0.2	SD	0 -0.02
E	+0.2 0	SE	+0.02 0

I.D./O.D. Selectable Tolerance, Configurable Dimensions

Part Number	T Tolerance	D	V 0.5 mm Increment	T 0.1 mm Increment
AWSC AWSB AWSM AWSS AWSH	High Precision Grade A	5.0–10.0 0.5 mm Increment	3.0–58.0	1.0–10.0
		10.5–20.0 0.5 mm Increment		
	Standard Grade B	21–30 1 mm Increment		
	C	31–40 1 mm Increment		
	D			
	E			
Precision Grade SB	41–50 1 mm Increment			
SD	51–60 1 mm Increment			
SE				

Part Number Example

Part Number	T Tolerance	D	V	T
AWSB	B	D20.0	V8.0	T5.0
AWSS	SB	D20.0	V8.0	T5.0

Ⓢ D≤60 → V≤D-2
D≥61 → V≤D-4
Ⓢ High Precision Grade (Tolerance A) is not available for AWSS.

Metal Washers

Flanged

Metal Washers – Flanged

RoHS10

Part Number	Material	Surface	Hardness
FTCSS	1018 Carbon Steel or Equivalent	—	—
FTCC		FTCMC	
FTCB	1045 Carbon Steel or Equivalent	Black Oxide	—
FTCM		FTCMM	
FTCSK	O1 Tool Steel	—	55 HRC min.
FTCSKB		Black Oxide	
FTCSKM	440C or 420 Stainless Steel	Electroless Nickel Plating	45–50 HRC min.
FTCS		FTCMS	

Ⓢ Stainless Steel Hardened Type (FTCSK / FTCSKB / FTCSKM / FTCS / FTCMS) may be discolored by hardening.

Circumference: C0.5 or less

Standard & Precision Grade

Part Number	D	H	V 0.5 mm Increment (V 3 or more)	T 0.1 mm Increment	L 0.1 mm Increment
Standard Grade FTCSS FTCC FTCB FTCM FTCSK FTCSKB FTCSKM FTCS	5.0–9.0 0.5 mm Increment	7.0–12.0 0.5 mm Increment	Selection 2 2.6 0.5 mm Increment 3.0–58.0	1.0–8.0	2.0–10.0
	9.5–20.0 0.5 mm Increment	11.5–25.0 0.5 mm Increment			
	21–30 1 mm Increment	23–40 1 mm Increment			
	31–40 1 mm Increment	33–50 1 mm Increment			
	41–50 1 mm Increment	43–60 1 mm Increment			
	51–60 1 mm Increment	53–70 1 mm Increment			

Ⓢ Machining Conditions Ⓢ T _S L-1			Ⓢ Machining Conditions of Material O1 Tool Steel (FTCSK / FTCSKB / FTCSKM) Ⓢ 2 _S T _S L-2		
D	H	V	D	H	V
When 5–20	D+2≤H≤Dx1.5	V≤D-2	When 5–10	D+2≤H≤Dx1.4	V≤D-2
When 21–40	D+2≤H≤Dx1.4	V≤D-4	When 10.5–30		V≤D-4
When 41–60	D+2≤H≤Dx1.2	V≤D-6	When 31–60	D+2≤H≤Dx1.2	V≤D-6

Part Number Example Part Number - D - H - V - T - L
FTCMS - D25 - H30 - V8.0 - T2.0 - L5.0

Part Number Alterations Part Number - D - H - V - T - L - (TCB / TCC / TCD / TCE / TSA / TSB / TSC / TSD / TSE / VKC / DKC / HKC)
FTCMM - D25 - H30 - V8.0 - T2.0 - L5.0 - TSC - VKC

Ⓢ When both Inner and Outer Diameter Tolerance Changes are specified, the concentricity is Ⓢ0.02. Ⓢ Not available for the Hardened Products.

Alterations	Code	Spec.	Alterations	Code	Spec.																												
I.D. Tolerance	VKC	Changes the I.D. Tolerance to H7. Ordering Code: VKC Machining Conditions Ⓢ D _z 6 V _z 3	O.D. Tolerance	DKC g6 HKC h7	Changes the O.D. Tolerance to g6 or h7. Ordering Code: DKC / HKC Machining Conditions Ⓢ When D _z 43, T _z 1.5. Ⓢ D _z 6																												
		<table border="1"> <thead> <tr> <th>D</th> <th>D-V</th> </tr> </thead> <tbody> <tr><td>6–10</td><td>D-V_z2</td></tr> <tr><td>10.5–20</td><td>D-V_z3</td></tr> <tr><td>21–30</td><td>D-V_z6</td></tr> <tr><td>31–40</td><td>D-V_z8</td></tr> <tr><td>41–50</td><td>D-V_z10</td></tr> <tr><td>51–60</td><td>D-V_z12</td></tr> </tbody> </table>	D	D-V	6–10	D-V _z 2	10.5–20	D-V _z 3	21–30	D-V _z 6	31–40	D-V _z 8	41–50	D-V _z 10	51–60	D-V _z 12			<table border="1"> <thead> <tr> <th>D</th> <th>D-V</th> </tr> </thead> <tbody> <tr><td>6–10</td><td>D-V_z2</td></tr> <tr><td>10.5–20</td><td>D-V_z3</td></tr> <tr><td>21–30</td><td>D-V_z6</td></tr> <tr><td>31–40</td><td>D-V_z8</td></tr> <tr><td>41–50</td><td>D-V_z10</td></tr> <tr><td>51–60</td><td>D-V_z12</td></tr> </tbody> </table>	D	D-V	6–10	D-V _z 2	10.5–20	D-V _z 3	21–30	D-V _z 6	31–40	D-V _z 8	41–50	D-V _z 10	51–60	D-V _z 12
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Ⓢ Not available for the Hardened Products (FTCSK / FTCSKB / FTCSKM / FTCS / FTCMS).

Alterations	Code	Negative Tolerance	Positive Tolerance	Zero Negative Tolerance	Zero Positive Tolerance
		TCB	TCC	TCD	TCE
Standard Class T Tolerance		Changes Shoulder Thickness Tolerance (T). T -0.1 -0.3 Ordering Code: TCB	Changes Shoulder Thickness Tolerance (T). T +0.3 +0.1 Ordering Code: TCC	Changes Shoulder Thickness Tolerance (T). T 0 -0.2 Ordering Code: TCD	Changes Shoulder Thickness Tolerance (T). T +0.2 0 Ordering Code: TCE
Precision Class T Tolerance		Changes Shoulder Thickness Tolerance (T). T ±0.025 Ordering Code: TSA	Changes Shoulder Thickness Tolerance (T). T -0.01 -0.06 Ordering Code: TSB	Changes Shoulder Thickness Tolerance (T). T 0 -0.05 Ordering Code: TSD	Changes Shoulder Thickness Tolerance (T). T +0.05 0 Ordering Code: TSE