



Metal Washers

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

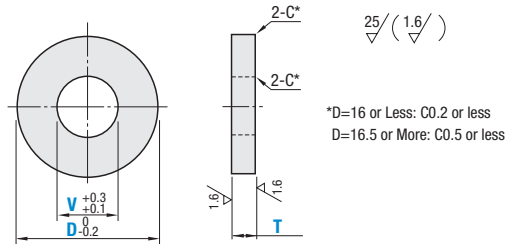
Metal Washers – Standard / Precision / High Precision Grade with Configurable Dimensions and Tolerances



RoHS 10

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 C D E	21–30 1 mm Increment		
		31–40 1 mm Increment		
		41–50 1 mm Increment		
	Precision Grade SB SC SD SE	51–60 1 mm Increment		



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

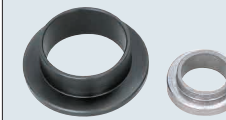
Ⓢ D≤60 → V≤D-2
D≥61 → V≤D-4
Ⓢ High Precision Grade (Tolerance A) is not available for AWSS.

Alterations	Code	Spec.
Outer diameter and inner diameter C chamfering additional machining (One location on each side)	CC WCC (OD) CV WCV (ID)	The C surface is added to the outer and inner diameters. Ordering Code: CC1.5/WCC2.5, CV1.5/WCV2.5 0.5mm Increments Ⓢ T-CC · 2WCC, CV · 2WCV≥5 Ⓢ D≤20 Ⓢ D≤16: (D-V)/2-0.7>CV · WCV, CC · WCC Ⓢ D≥16.5: (D-V)/2-1>CV · WCV, CC · WCC Ⓢ CC/WCC and CV/WCV cannot be used together.
Inner diameter change (0.1mm unit Designation)	WVE	Ordering Code: WVE15.2 0.1mm Increments Ⓢ WVE>13 Ⓢ T≥(5 AWSH only) Ⓢ Cannot be used with VKC.

Metal Washers

Flanged

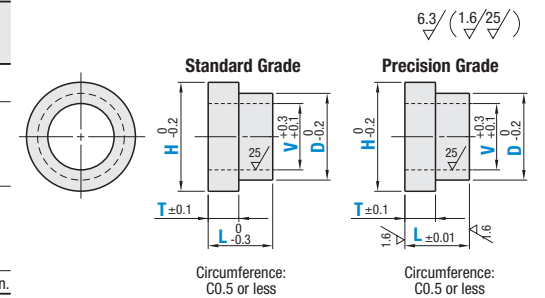
Metal Washers – Flanged



RoHS 10

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

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



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	Precision Grade FTCMC FTCMB FTCMM FTCMS	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≤L-1

D	H	V
When 5–20	D+2≤H≤Dx1.5	V≤D-2
When 21–40	D+2≤H≤Dx1.4	V≤D-4
When 41–60	D+2≤H≤Dx1.2	V≤D-6

Ⓢ Machining Conditions of Material O1 Tool Steel (FTCSK / FTCSKB / FTCSKM) Ⓢ 2≤T≤L-2

D	H	V
When 5–10	D+2≤H≤Dx1.4	V≤D-2
When 10.5–30	D+2≤H≤Dx1.4	V≤D-4
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.
I.D. Tolerance	VKC	Changes the I.D. Tolerance to H7. Ordering Code: VKC Machining Conditions Ⓢ D≥6 V≥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≥43, T≥1.5. Ⓢ D≥6

Ⓢ 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	Ⓢ Available for Standard Grade	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	Ⓢ Available for Precision Grade	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