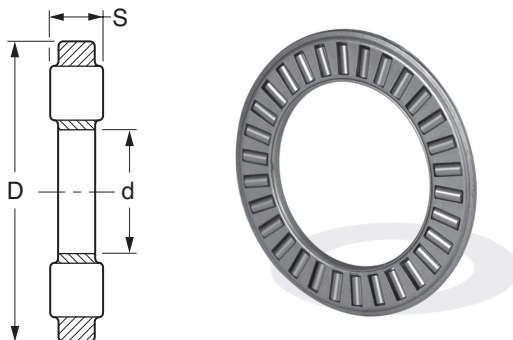


NEW
Axial Needle Roller
THRUST BEARINGS

- Steel Needles

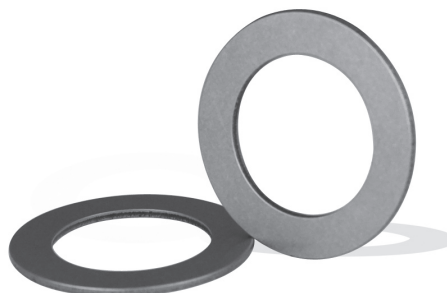
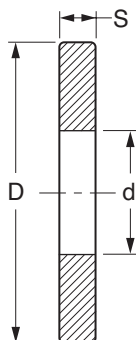


Catalog Number	d Bore	D Outside Dia.	S Width	Maximum Speed (rpm)	Load Rating N		Weight g
				Oil	Dynamic	Static	
BTHBNGMAXK0414TN*	4	14	2	18000	4380	7500	0.7
BTHBNGMAXK0515TN*	5	15		17000	4680	9100	0.8
BTHBNGMAXK0619TN*	6	19		16000	6740	15400	1
BTHBNGMAXK0821TN*	8	21	2	15000	7750	19000	2
BTHBNGMAXK1024	10	24		14000	9150	24500	3
BTHBNGMAXK1226	12	26		16000	9860	28600	3
BTHBNGMAXK1528	15	28	2	11000	11200	35500	4
BTHBNGMAXK1730	17	30		10000	11800	38600	4
BTHBNGMAXK2035	20	35		8500	12900	45600	5
BTHBNGMAXK2542	25	42	2	7000	13800	57800	7
BTHBNGMAXK3047	30	47		6000	15600	69500	8
BTHBNGMAXK3552	35	52		5500	16900	80100	10
BTHBNGMAXK4060	40	60	3	4700	27500	113500	16
BTHBNGMAXK4565	45	65		4300	29050	127600	18
BTHBNGMAXK5070	50	70		3900	31500	13800	20
BTHBNGMAXK5578	55	78	3	3500	37400	185000	28
BTHBNGMAXK6085	60	85		3200	43900	232500	33
BTHBNGMAXK6590	65	90		3000	45800	254600	35
BTHBNGMAXK7095	70	95	4	2900	53600	254400	60
BTHBNGMAXK75100	75	100		2700	54500	264600	61
BTHBNGMAXK80105	80	105		2600	55600	278500	63
BTHBNGMAXK85110	85	110	4	2400	57500	28800	67
BTHBNGMAXK90120	90	120		2300	72500	401000	86
BTHBNGMAXK100135	100	135		2000	90500	559500	104
BTHBNGMAXK110145	110	145	4	1900	96500	617500	122
BTHBNGMAXK120155	120	155	4	1700	101500	679600	131
BTHBNGMAXK130170	130	170	5	1600	132400	838900	205
BTHBNGMAXK140180	140	180	5	1500	137200	899600	219
BTHBNGMAXK150190	150	190		1400	142800	959000	232
BTHBNGMAXK160200	160	200		1300	147600	1015000	246

*Plastic Retainer Only

NEW
Axial
THRUST WASHERS

• Steel

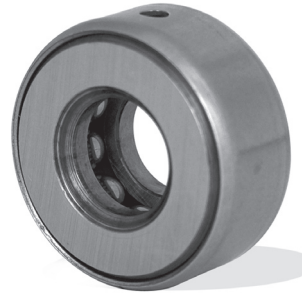
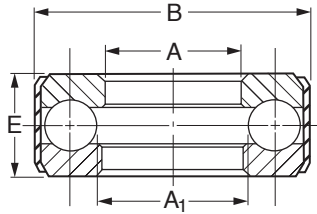


Catalog Number	d Bore	D Outside Dia.	S Width	Maximum Speed (rpm)	Weight g	Matching Bearing Designation
				Oil		
BTHBNGMAS0414	4	14	1	18000	1	BTHBNGMAXK0414TN
BTHBNGMAS0515	5	15		17000	1	BTHBNGMAXK0515TN
BTHBNGMAS0619	6	19		16000	2	BTHBNGMAXK0619TN
BTHBNGMAS0821	8	21	1	15000	2	BTHBNGMAXK0821TN
BTHBNGMAS1024	10	24		14000	3	BTHBNGMAXK1024
BTHBNGMAS1226	12	26		16000	3	BTHBNGMAXK1226
BTHBNGMAS1528	15	28	1	11000	3	BTHBNGMAXK1528
BTHBNGMAS1730	17	30		10000	4	BTHBNGMAXK1730
BTHBNGMAS2035	20	35		8500	5	BTHBNGMAXK2035
BTHBNGMAS2542	25	42	1	7000	7	BTHBNGMAXK2542
BTHBNGMAS3047	30	47		6000	8	BTHBNGMAXK3047
BTHBNGMAS3552	35	52		5500	9	BTHBNGMAXK3552
BTHBNGMAS4060	40	60	1	4700	12	BTHBNGMAXK4060
BTHBNGMAS4565	45	65		4300	13	BTHBNGMAXK4565
BTHBNGMAS5070	50	70		3900	14	BTHBNGMAXK5070
BTHBNGMAS5578	55	78	1	3500	18	BTHBNGMAXK5578
BTHBNGMAS6085	60	85		3200	22	BTHBNGMAXK6085
BTHBNGMAS6590	65	90		3000	24	BTHBNGMAXK6590
BTHBNGMAS7095	70	95	1	2900	25	BTHBNGMAXK7095
BTHBNGMAS75100	75	100		2700	27	BTHBNGMAXK75100
BTHBNGMAS80105	80	105		2600	28	BTHBNGMAXK80105
BTHBNGMAS85110	85	110	1	2400	29	BTHBNGMAXK85110
BTHBNGMAS90120	90	120		2300	39	BTHBNGMAXK90120
BTHBNGMAS100135	100	135		2000	50	BTHBNGMAXK100135
BTHBNGMAS110145	110	145	1	1900	55	BTHBNGMAXK110145
BTHBNGMAS120155	120	155		1700	59	BTHBNGMAXK120155
BTHBNGMAS130170	130	170		1600	65	BTHBNGMAXK130170
BTHBNGMAS140180	140	180	1	1500	79	BTHBNGMAXK140180
BTHBNGMAS150190	150	190		1400	84	BTHBNGMAXK150190
BTHBNGMAS160200	160	200		1300	89	BTHBNGMAXK160200



BANDED THRUST BEARINGS

- Banded Assembly
- Oil Hole
- Grooved Race
- Low Carbon Steel Band
- 52100 Chrome Steel Balls and Washers



Catalog Number	A Shaft Dia.	B O.D.	E Width	Dynamic Capacity lbf	Static Capacity lbf	A ₁	Max* Speed rpm
BTDASY-TB050121	.500	1.219	.563	3850	5600	.531	7000
BTDASY-TB056121	.563					.594	
BTDASY-TB062134	.625	1.344	.563	4100	6700	.656	6000
BTDASY-TB068134	.688					.719	
BTDASY-TB075146	.750	1.469	.563	4250	7300	.781	5500
BTDASY-TB081146	.813					.844	
BTDASY-TB087184	.875	1.844	.625	6600	12200	.906	4100
BTDASY-TB093184	.938					.969	
BTDASY-TB100196	1.000	1.969	.625	6700	13100	1.031	3800
BTDASY-TB106196	1.063					1.094	
BTDASY-TB112209	1.125	2.094	.625	6900	14000	1.156	3600
BTDASY-TB118209	1.188					1.219	
BTDASY-TB125234	1.250	2.344	.625	7200	15700	1.281	3200
BTDASY-TB131234	1.313					1.344	
BTDASY-TB137246	1.375	2.469	.625	7300	16600	1.406	3000
BTDASY-TB143246	1.438					1.469	
BTDASY-TB150259	1.500	2.594		7700	18300	1.531	2800

*Speed limit shown is for oil lubrication.

- Choice of carbon or stainless steel balls
- Retainers are lightweight and corrosion-resistant with natural lubricity
- Injection-molded, heat-stabilized nylon retainers that capture the balls in precision molded pockets for smooth, free-turning, quiet operation
- Precision-grade 100 tolerance ($\pm 0.0001"$, ± 0.0025 mm) hardened steel balls
- Hardened steel thrust washers

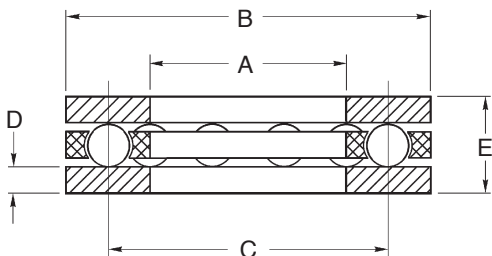
LOAD RATINGS FOR THRUST BEARINGS

Catalog Number		15 rpm	100 rpm	450 rpm	900 rpm	1200 rpm	1800 rpm	3600 rpm							
Carbon Steel	Stainless Steel	INCH (POUNDS)													
BTHASY-012	BTYASY-012	120	84	63	44	38	26	30	21	27	19	24	17	19	17
BTHASY-018	BTYASY-018	126	88	70	48	40	28	32	22	29	20	25	18	25	18
BTHASY-025	BTYASY-025	131	92	69	49	42	29	34	24	29	20	26	18	26	18
BTHASY-031	BTYASY-031	136	95	72	40	43	30	34	24	31	21	27	19	27	19
BTHASY-037	BTYASY-037	175	123	93	65	56	39	44	31	40	28	35	24	35	24
BTHASY-043	BTYASY-043	190	133	101	70	61	42	48	33	44	31	38	26	38	26
BTHASY-050	BTYASY-050	201	140	106	74	64	45	51	35	46	32	40	28	40	28
BTHASY-056	BTYASY-056	213	149	113	79	68	47	54	38	49	34	49	34	49	34
BTHASY-062	BTYASY-062	251	175	133	93	80	56	64	40	58	40	51	36	51	36
BTHASY-068	BTYASY-068	273	191	145	101	87	61	69	44	63	44	55	38	55	38
BTHASY-075	BTYASY-075	293	205	155	108	94	66	74	48	68	45	59	41	59	41
BTHASY-081	BTYASY-081	314	220	166	116	101	71	80	50	72	50	63	44	63	44
BTHASY-087	BTYASY-087	328	196	174	122	105	73	83	53	76	53	66	46	66	46
BTHASY-093	BTYASY-093	384	268	204	143	123	86	98	62	89	62	77	54	77	54
BTHASY-100	BTYASY-100	459	321	243	170	147	103	117	74	106	74	93	65	93	65
BTHASY-112	BTYASY-112	504	352	267	187	162	113	128	82	117	82	102	71	102	71
BTHASY-125	BTYASY-125	545	381	289	202	175	122	139	90	125	90	110	77	110	77
BTHASY-150	BTYASY-150	522	365	277	194	168	118	133	85	121	85	105	73	105	73
Carbon Steel	Stainless Steel	METRIC (POUNDS)													
BTHASYM512X	BTYASYM512X	126	88	70	49	40	28	32	20	29	20	25	17	25	17
BTHASYM614X	BTYASYM614X	131	91	69	48	42	29	34	20	29	20	26	18	26	18
BTHASYM717X	BTYASYM717X	136	95	72	40	43	30	34	21	31	21	27	19	27	19
BTHASYM816X	BTYASYM816X	136	95	72	50	43	30	34	21	31	21	27	19	27	19
BTHASYM1021	BTYASYM1021	175	122	93	65	56	39	44	28	40	28	35	24	35	24
BTHASYM1224	BTYASYM1224	201	140	106	74	64	44	51	32	46	32	40	28	40	28
BTHASYM1628	BTYASYM1628	251	175	133	93	80	56	64	40	58	40	51	35	51	35
BTHASYM1932	BTYASYM1932	293	205	155	108	94	65	74	47	68	47	59	41	59	41
BTHASYM2541	BTYASYM2541	459	321	243	170	147	103	117	74	106	74	93	65	93	65
BTHASYM2844	BTYASYM2844	504	352	267	187	162	113	128	82	117	82	102	71	102	71



Three-Piece Set THRUST BEARINGS & WASHERS

- Nylon Retainer



Materials

Carbon Steel		Stainless Steel	
Washer:	CR 1075 steel heat-treated to Rc 59-61	Type 410 steel heat-treated to Rc 38-42	
Ball:	Grade 100 S.A.E. 1018 steel with Rc 60 Minimum	Type 440C stainless steel with Rc 58-65	
Retainer:	HS nylon permitting continuous use up to 250°F	HS nylon permitting continuous use up to 250°F	

Catalog Number		A		B		D Thick- ness	C Ball Circle	Ball Size	Qty	E Height
		Bore	Tolerance	O.D.	Tolerance					
Carbon Steel	Stainless Steel	Washer				Ball			Bearing	
BTHASY-012	BTYASY-012	1/8	.128 – .133	7/16	.430 – .437	.050	.281	.0938	6	.190–.196
BTHASY-018	BTYASY-018	3/16	.191 – .195	1/2	.492 – .499		.344		7	
BTHASY-025	BTYASY-025	1/4	.253 – .258	9/16	.555 – .562		.406		8	
BTHASY-031	BTYASY-031	5/16	.316 – .321	5/8	.617 – .624		.469		9	
BTHASY-037	BTYASY-037	3/8	.378 – .383	13/16	.805 – .812	.062	.594	.1250	6	.245–.253
BTHASY-043	BTYASY-043	7/16	.441 – .446	7/8	.867 – .874		.656		7	
BTHASY-050	BTYASY-050	1/2	.503 – .508	15/16	.930 – .937		.719		8	
BTHASY-056	BTYASY-056	9/16	.566 – .571	1	.992 – .999		.781		9	
BTHASY-062	BTYASY-062	5/8	.628 – .635	1-1/8	1.115–1.124	.093	.875	.1563	6	.336–.348
BTHASY-068	BTYASY-068	11/16	.691 – .698	1-3/16	1.178–1.187		.938		7	
BTHASY-075	BTYASY-075	3/4	.753 – .760	1-1/4	1.240–1.249		1.000		8	
BTHASY-081	BTYASY-081	13/16	.816 – .823	1-5/16	1.303–1.312		1.063		9	
BTHASY-087	BTYASY-087	7/8	.878 – .885	1-3/8	1.365–1.374	1.125	10	.1875	9	.427–.447
BTHASY-093	BTYASY-093	15/16	.941 – .950	1-9/16	1.551–1.562	1.250	10			
BTHASY-100	BTYASY-100	1	1.003–1.012	1-5/8	1.613–1.624	1.313	12			
BTHASY-112	BTYASY-112	1-1/8	1.128–1.137	1-3/4	1.738–1.749	1.438	14			
BTHASY-125	BTYASY-125	1-1/4	1.253–1.262	1-7/8	1.863–1.874	1.563	14	.1813	14	
BTHASY-150	BTYASY-150	1-1/2	1.503–1.512	2-1/8	2.113–2.124	1.813	14			

NOTE: Thrust bearings and washers are available individually.
Contact the Customer Service Department for availability.

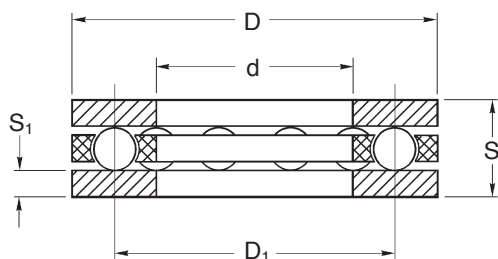
See page 59 for load ratings.

WASHER THICKNESS TOLERANCE

D	Tolerance
.050	.048 – .052
.062	.060 – .064
.093	.090 – .096
.125	.120 – .130

Three-Piece Set THRUST BEARINGS & WASHERS

- Nylon Retainer



Materials

Item	Carbon Steel	Stainless Steel
Washers:	CR 1075 steel heat-treated to HRC 59-61	Type 410 steel heat-treated to HRC 38-42
Balls:	Grade 100 S.A.E. 1018 steel with HRC 60 Minimum	Type 440C stainless steel with HRC 58-65
Retainer:	HS nylon permitting continuous use up to 120°C	HS nylon permitting continuous use up to 120°C

Catalog Number		d		D		S ₁ ^Δ Thick- ness	D ₁ Ball Circle	Ball Size	Qty	S Height
		Bore	Tolerance	O.D.	Tolerance					
Carbon Steel	Stainless Steel	Washer				Ball		Bearing		
BTHASYM512X	BTYASYM512X	5	5.08 – 5.21	12	11.96 – 11.78	1.27	8.7	2.38	7	4.82 – 5.02
BTHASYM614X	BTYASYM614X	6	6.07 – 6.20	14	13.97 – 13.79		10.3		8	
BTHASYM717X	BTYASYM717X	7	7.06 – 7.18	17	16.97 – 16.79		11.9		9	
BTHASYM816X	BTYASYM816X	8	8.08 – 8.20	16	15.96 – 15.80		11.9		9	
BTHASYM1021	BTYASYM1021	10	10.06 – 10.19	21	20.96 – 20.78	1.57	15.1	3.18	6	6.22 – 6.44
BTHASYM1224	BTYASYM1224	12	12.06 – 12.19	24	23.98 – 23.80		18.3		8	
BTHASYM1628	BTYASYM1628	16	16.07 – 16.26	28	27.97 – 27.74	2.36	22.2	4	6	8.56 – 8.88
BTHASYM1932	BTYASYM1932	19	19.08 – 19.25	32	31.98 – 31.75		25.4		8	
BTHASYM2541	BTYASYM2541	25	25.07 – 25.30	41	40.97 – 40.69	3.18	33.3	4.76	10	10.86 – 11.36
BTHASYM2844	BTYASYM2844	28	28.07 – 28.30	44	43.97 – 43.69		36.5		12	

NOTE: Thrust bearings and washers are available individually.
Contact the Customer Service Department for availability.

See page 59 for load ratings.

Δ WASHER THICKNESS TOLERANCE

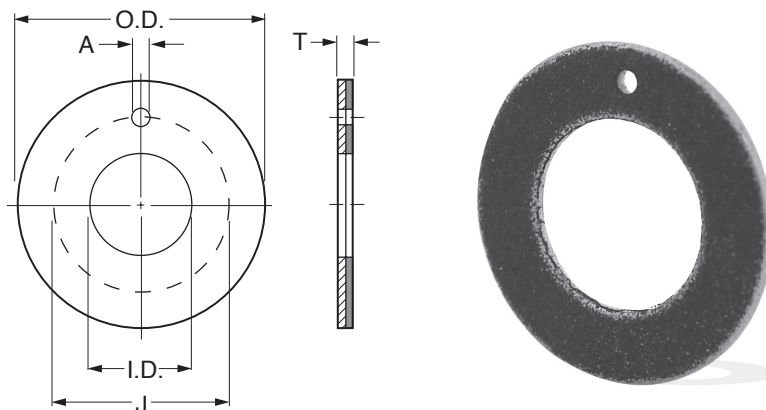
S₁ TOLERANCE:	1.27	(1.22–1.32)
	1.57	(1.52–1.63)
	2.36	(2.28–2.44)
	3.18	(3.05–3.30)



NEW

Self-Lubricating THRUST WASHERS

- Carbon Steel Backing • Self-Lubricating Liner • Maintenance-Free



Catalog Number	I.D. +.010	O.D. -.010	T + .0020	J Dowel Hole -.010	A
BTNWAS-TW06TH	.500	.875	.0585	.692	.067
BTNWAS-TW07TH	.562	1.000		.786	
BTNWAS-TW08TH	.625	1.125		.880	.099
BTNWAS-TW09TH	.687	1.187		.942	
BTNWAS-TW10TH	.750	1.125		1.005	
BTNWAS-TW11TH	.812	1.375		1.099	.130
BTNWAS-TW12TH	.875	1.500		1.192	
BTNWAS-TW14TH	1.000	1.750		1.380	.161
BTNWAS-TW16TH	1.125	2.000		1.567	
BTNWAS-TW18TH	1.250	2.125		1.692	
BTNWAS-TW20TH	1.375	2.250	1.817	.192	
BTNWAS-TW22TH	1.500	2.500	2.005		
BTNWAS-TW24TH	1.625	2.625	2.130		
BTNWAS-TW26TH	1.750	2.750	2.255		
BTNWAS-TW28TH	2.000	3.000	2.505		
BTNWAS-TW30TH	2.125	3.125	.0895	2.630	
BTNWAS-TW32TH	2.250	3.250		2.755	

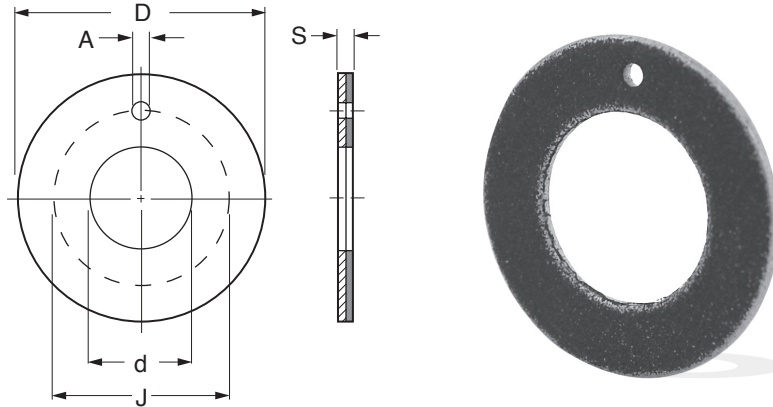
NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).



NEW

Self-Lubricating THRUST WASHERS

- Carbon Steel Backing • Self-Lubricating Liner • Maintenance-Free



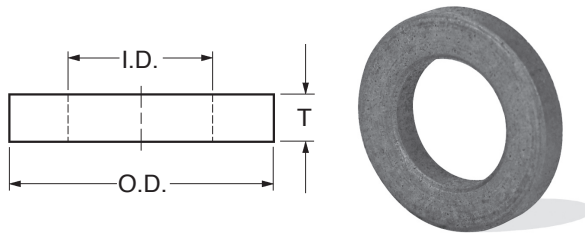
Catalog Number	d +0.25	D -0.25	S	J Dowel Hole ±0.12	A
BTNWASMTW1020M	10	20	1.500 1.450	—	—
BTNWASMTW1224M	12	24		18	1.87 1.62
BTNWASMTW1426M	14	26		20	2.37 2.12
BTNWASMTW1630M	16	30		22	
BTNWASMTW1832M	18	32		25	3.37 3.12
BTNWASMTW2036M	20	36		28	
BTNWASMTW2238M	22	38		30	
BTNWASMTW2442M	24	42		33	
BTNWASMTW2644M	26	44		35	4.37 4.12
BTNWASMTW2848M	28	48		38	
BTNWASMTW3254M	32	54	43		
BTNWASMTW3862M	38	62	50		
BTNWASMTW4266M	42	66	54	2.000 1.950	
BTNWASMTW4874M	48	74	61		
BTNWASMTW5278M	52	78	65		
BTNWASMTW6290M	62	90	76		

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).



Sintered Bronze THRUST WASHERS

- Sintered Bronze • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D.*	O.D. ^Δ	T ± .0025
BTNWAS-040602	.130	.370	1/16
BTNWAS-060802	.192	.495	1/16
BTNWAS-080702	.255	.4375	1/16
BTNWAS-080802	.255	.500	1/16
BTNWAS-081002	.255	.625	1/16
BTNWAS-101002	.315	.625	1/16
BTNWAS-101202	.315	.750	1/16
BTNWAS-121002	.385	.625	1/16
BTNWAS-121001			1/32
BTNWAS-121202	.380	.750	1/16
BTNWAS-121204			1/8
BTNWAS-141202	.440	.750	1/16
BTNWAS-141204			1/8
BTNWAS-161202	.505	.750	1/16
BTNWAS-161406	.505	.875	3/16
BTNWAS-161602			1/16
BTNWAS-161603	.510	1.000	3/32
BTNWAS-161604			1/8
BTNWAS-182002	.565	1.250	1/16
BTNWAS-182004			1/8
BTNWAS-201602	.628	1.000	1/16
BTNWAS-201604			1/8
BTNWAS-201902			1/16
BTNWAS-201903	.628	1.1875	3/32
BTNWAS-201904			1/8
BTNWAS-202002	.628	1.250	1/16
BTNWAS-202004			1/8
BTNWAS-212402	.656	1.500	1/16
BTNWAS-212404			1/8
BTNWAS-242002	.753	1.250	1/16
BTNWAS-242004			1/8
BTNWAS-242202			1/16
BTNWAS-242204	.753	1.375	1/8
BTNWAS-242208			1/4
BTNWAS-242503	.765	1.5625	3/32
BTNWAS-282402	.8905	1.500	1/16
BTNWAS-282404			1/8
BTNWAS-283204	.880	2.000	1/8

Continued on the next page

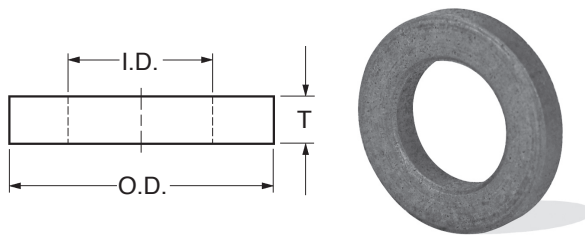
*I.D. Tolerances: up to & including 1.253 is ± .005

^ΔO.D. Tolerances: up to & including 1.500 is ± .010
over 1.500 & including 3.000 is ± .015



Sintered Bronze THRUST WASHERS

- Sintered Bronze • Oil-Impregnated • Self-Lubricating



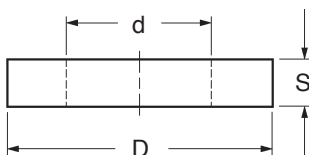
Catalog Number	I.D.*	O.D. ^Δ	T ± .0025
BTNWAS-283404	.8905	2.125	1/8
BTNWAS-322402			1/16
BTNWAS-322404	1.003	1.500	1/8
BTNWAS-322406			3/16
BTNWAS-322602			1/16
BTNWAS-322604	1.0155	1.625	1/8
BTNWAS-322608			1/4
BTNWAS-322802	1.012	1.750	1/16
BTNWAS-322804			1/8
BTNWAS-323204	1.016	2.000	1/8
BTNWAS-323206			3/16
BTNWAS-324604	1.0155	2.875	1/8
BTNWAS-343802	1.0625	2.375	1/16
BTNWAS-343804			1/8
BTNWAS-363004	1.140	1.875	1/8
BTNWAS-402704	1.253	1.690	1/8
BTNWAS-403202	1.265	2.000	1/16
BTNWAS-403204			1/8
BTNWAS-403802	1.265	2.375	1/16
BTNWAS-403804			1/8
BTNWAS-405302	1.255	3.312	1/16
BTNWAS-405304			1/8
BTNWAS-443104	1.379	1.940	1/8
BTNWAS-483204	1.503	2.000	1/8
BTNWAS-484004	1.503	2.505	1/8
BTNWAS-485606	1.510	3.500	3/16
BTNWAS-503904	1.578	2.4375	1/8
BTNWAS-563904	1.755	2.440	1/8
BTNWAS-564204	1.765	2.625	1/8
BTNWAS-624204	1.953	2.625	1/8
BTNWAS-644804			1/8
BTNWAS-644806	2.011	3.000	3/16
BTNWAS-644808			1/4
BTNWAS-655806	2.031	3.625	3/16
BTNWAS-805204	2.502	3.250	1/8
BTNWAS-886208	2.766	3.875	1/4

*I.D. Tolerances: up to & including 1.253 is ± .005
 over 1.253 & including 2.502 is ± .010
 over 2.502 is ± .015

^Δ O.D. Tolerances: up to & including 1.500 is ± .010
 over 1.500 & including 3.000 is ± .015
 over 3.000 is ± .020

Sintered Bronze THRUST WASHERS

- Sintered Bronze
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Catalog Number	d ±0.13	D ±0.25	S ±0.07
BTNWASM0316	3.2	9.5	1.6
BTNWASM0416	4.3	9.5	1.6
BTNWASM0516	5.3	12.5	1.6
BTNWASM0616	6.4	12.5	1.6
BTNWASM0816	8.4	19	1.6
BTNWASM1016	10.5	19	1.6
BTNWASM1032			3.2
BTNWASM1316	13	25	1.6
BTNWASM1332			3.2