

## Angular Contact Bearings Intro

### Single Row 7100 and 7200 Series

NTN-BCA® manufactures single row, angular contact ball bearings in the extra light and light series. The extra light is identified as the 7100 series and the light as the 7200 series. These bearings are made to the same standard metric boundary dimensions as the corresponding NTN-BCA®, 100 and 200 series Conrad bearings. However, they are assembled with a maximum number of balls.

Single row angular contact bearings are designed with high shoulders on the thrust side of both the inner and outer rings. The depth of the groove opposite the thrust shoulder is sufficient for the retention of the parts so that the rings will not separate during handling or installation.

Angular contact bearings are recommended for applications where there are high radial and thrust loads with the thrust load predominating. They may also be used in applications where pure thrust loads exist. However, since the high shoulders on the inner and outer rings are on opposite sides, it is obvious that angular contact bearings can take thrust from only one direction.

As a general rule, when angular contact bearings are used to support a shaft, a bearing must be used at each end of the shaft with their angles of contact opposed; however, these bearings need not be equal size. The arrangement is usually required because angular contact bearings must have their initial axial looseness removed in order to assume the correct angle of contact for which they were designed. The most common method of adjustment includes the use of locknuts, spacers and shims to establish the proper running fit. It is important that the adjustment remove only the original looseness, as excessive tightening may result in premature bearing failure due to severe preloading. In addition to facilitating proper adjustment, this arrangement allows thrust to be taken from either direction, a requirement in the majority of applications.

### Single Row 9000 Series (Split Inner Ring)

The split inner ring series bearing is a single row metric size, angular contact ball bearing dimensionally interchangeable with the 7100 and 7200 series. The split inner ring design provides high thrust capacity in both directions.

The split inner ring design consists of a solid one-piece outer ring and a split two-piece inner ring. The split inner ring allows the assembly of the maximum number of balls with full uninterrupted race shoulders remaining on both sides. This type of design provides maximum load carrying capacity for reversing thrust loads or axial loads in one direction only. The split inner ring series can be obtained with “gothic arch” outer ring raceways to minimize end-play. Because the inner rings are separable, special care is required when mounting. It is necessary to provide clamping for both inner ring halves.

Some typical applications using 9000 series bearings are given below:

#### Deep Well Pumps

In these applications maximum thrust capacity is required in one direction along with reversing thrust capability of lesser magnitude in the opposite direction. This can be

accomplished by using a 9000 series bearing in conjunction with a duplex set of 7000 series bearings.

#### Torque Converters

Maximum thrust capacity in both directions is required and normally end play must be held to a minimum.

#### Any Application

Where high reversing thrust loads are encountered and width space is limited.

NTN-BCA® manufactures numerous sizes of 9000 series split inner ring bearings. For complete information concerning availability, application, and/or mounting, contact NTN-BCA®.

### Double Row 5200 & 5300 Series

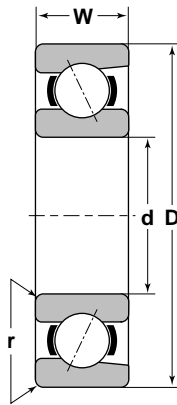
NTN-BCA® manufactures double-row, angular contact ball bearings in light and medium series. The light series is identified as the 5200 series and the medium series as the 5300 series. NTN-BCA® double row bearings are made to the same Anti-Friction Bearing Manufacturers' Association (ABMA) standard metric boundary dimensions for bore and outside diameter as the corresponding NTN-BCA® 200 and 300 series Conrad type bearings. The individual widths, however, are greater than the corresponding Conrad bearing size and made to inch dimensions.

NTN-BCA® double row ball bearings meet the features of two angular contact bearings mounted in duplex form but with lesser overall width. This allows for a simplified mounting procedure for the installer. Many NTN-BCA® double row bearings are manufactured with maximum capacity type ball complements. Therefore, they have much greater capacity than a comparable single row bearing. Filling slots, when incorporated, are accurately located so that there is no possibility of objectionable interference under any loading conditions. Double row ball bearings can also carry any combination of radial and thrust loads.

One distinguishing feature of the NTN-BCA® “KE” design is a steel — as opposed to nylon — retainer. NTN-BCA® 5200KE and 5300KE series double row bearings are designed so that the angles of contact have their vertex outside the bearing. This type of design creates the maximum effective spread between the rows and consequently increases the resistance to overturning moments. As a result, when a “KE” Series bearing is assembled, it has the high rigidity required to resist axial, radial and overturning loads effectively. The KE series are non-loading groove type and are assembled identically to the 200 and 300 series Conrad bearing.

NTN-BCA® 5200W and 5300W series double row bearings are designed so that the angles of contact have their vertex inside the bearing. Construction of this type insures enough flexibility to compensate for inaccuracies of the mounting without sacrificing the rigidity required in the large majority of applications. However, this type of bearing should not be used as a single bearing mounting because it is not designed to provide sufficient resistance to overturning moments. The W series double row bearings are manufactured with filling slots on one side only and a maximum capacity type ball complement.

## 7100—Extra Light Single Row Series



Bearing Number	Bore	Outside Diameter	Width	Fillet Radius	Basic Load Ratings	
	$d$	$D$	$W$	$r$ ❶	Dynamic $C$	Static $C_o$
Inch/mm					lbs/N	
§ 7119T	3.7402 95	5.7087 145	.9449 24	.060	13600 60520	12060 53660
§ 7119TG	3.7402 95	5.7087 145	.9449 24	.060	13600 60520	12060 53660
7119TLⓂ	3.7402 95	5.7087 145	.9449 24	.060	13600 60520	12060 53660
§ 7119TLGⓂ	3.7402 95	5.7087 145	.9449 24	.060	13600 60520	12060 53660
7122TLVGⓂ	4.3307 110	6.6929 170	1.1024 28	.080	18430 81970	16360 72750
§ 7124A	4.7224 120	7.0866 180	1.1024 28	.080	18970 84380	17940 79800

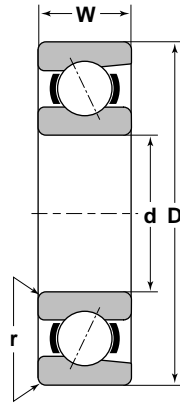
❶ BEARING CORNER RADII WILL CLEAR MAXIMUM FILLET RADIUS SHOWN.

Ⓜ SNAP RING O.D.  $5 \frac{1}{16}$ ", WIDTH .109, OFFSET .250

Ⓜ SNAP RING O.D.  $7 \frac{3}{16}$ ", WIDTH .120, OFFSET .261

§ NOT NECESSARILY A STOCK ITEM – CHECK FOR AVAILABILITY.

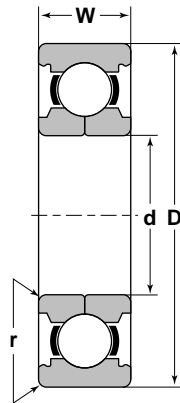
## 7200—Light Single Row Series



Bearing Number	Bore	Outside Diameter	Width	Fillet Radius	Basic Load Ratings		Limiting Speed	
	$d$	$D$	$W$	$r$ ①	Dynamic $C$	Static $C_o$	Grease	Oil
	Inch/mm				lbs/N		RPM	
7205TA	.9843 25	2.0472 52	.5906 15	.040	3150 14010	1760 7830	10,000	12,000
7214ENA	2.7559 70	4.9213 125	.9449 24	.060	13980 62200	9890 43990	3,600	4,300
7215EBA	2.9528 75	5.1181 130	.9843 25	.060	14880 66180	11080 49270	3,300	4,000

① BEARING CORNER RADII WILL CLEAR MAXIMUM FILLET RADIUS SHOWN.

## Single Row Series – 9000 (Split Inner Ring)



Bearing Number	Bore	Outside Diameter	Width	Fillet Radius	Basic Load Ratings	
	d	D	W	r ❶	Dynamic C	Static C <sub>o</sub>
Inch/mm					lbs/N	
9119-K	3.7402 95	5.7087 145	.9449 24	.060	26000 116000	31500 140000
9122-KML®	4.3307 110	6.6929 170	1.1024 28	.080	33500 149000	41500 186000
9205-A	.9843 25	2.0472 52	.5906 15	.040	5900 26300	4600 20500
§ 9209-K	1.7717 45	3.3465 85	.7480 19	.040	11800 52500	11000 50000
9215-KN	2.9528 75	5.1181 130	.9843 25	.060	23100 103000	24400 108000
9217-K	3.3465 85	5.9055 150	1.1024 28	.080	36000 160000	37500 167000
9218-K	3.5433 90	6.2992 160	1.1811 30	.080	41000 183000	43500 193000
§ 9218-KL ❸	3.5433 90	6.2992 160	1.1811 30	.080	41000 183000	43500 193000
9218-KM	3.5433 90	6.2992 160	1.1811 30	.080	41000 183000	43500 193000
9218-KMLB ❹	3.5433 90	6.2992 160	1.1811 30	.080	41000 183000	43500 193000
9222-KM	4.3307 110	7.8740 200	1.4961 38	.080	59500 26400	68500 30500
§ 9308-K	1.5748 40	3.5433 90	.9055 23	.060	18400 82000	14800 65500
9308-KL ❺	1.5748 40	3.5433 90	.9055 23	.060	18400 82000	14800 65500
9309-K	1.7717 45	3.9370 100	.9843 25	.060	21900 100000	25900 115000
9311-K	2.1654 55	4.7244 120	1.1417 29	.080	29200 130000	25900 115000
9311-KL ❻	2.1654 55	4.7244 120	1.1417 29	.080	29200 130000	25900 115000
§ 9313-KN	2.5591 65	5.5118 140	1.2992 140	.080	34000 151000	30000 134000

❶ BEARING CORNER RADII WILL CLEAR MAXIMUM FILLET RADIUS SHOWN.

❷ SNAP RING O.D. 7 <sup>3</sup>/<sub>16</sub>" , WIDTH .120, OFFSET .261"

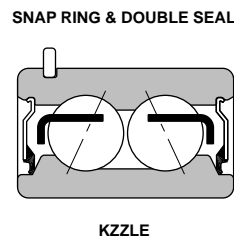
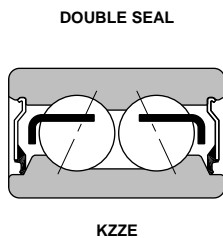
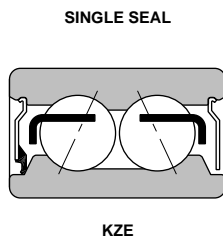
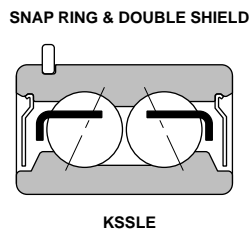
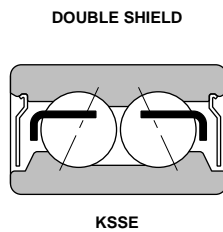
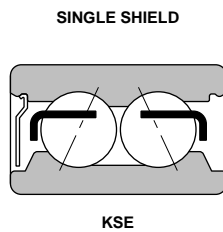
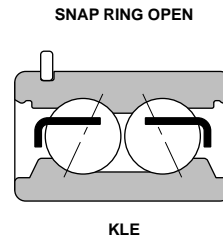
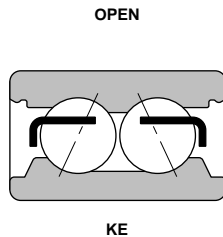
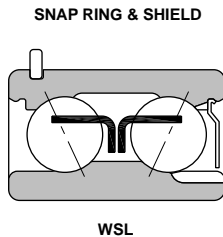
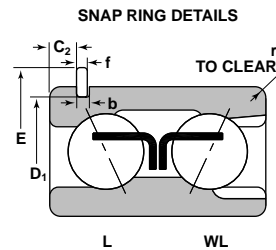
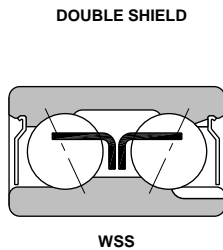
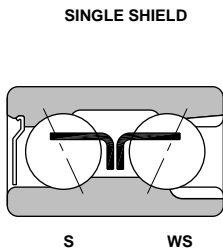
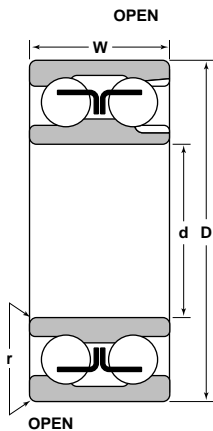
❸ SNAP RING O.D. 6 <sup>4</sup>/<sub>64</sub>" , WIDTH .109, OFFSET .297"

❹ SNAP RING O.D. 3 <sup>5</sup>/<sub>64</sub>" , WIDTH .095, OFFSET .220"

❺ SNAP RING O.D. 5 <sup>3</sup>/<sub>32</sub>" , WIDTH .109, OFFSET .265"

§ NOT NECESSARILY A STOCK ITEM – CHECK FOR AVAILABILITY.

**Double Row – Series 5200 & 5300**



## Double Row – Series 5200 & 5300

Bearing Number	Bore	Outside Diameter	Width	Fillet Radius	Basic Load Ratings		Snap Ring Groove Dimensions			Snap Ring Dimensions		Limiting Speed	
	d	D	W	r <sup>Ⓛ</sup>	C	C <sub>0</sub>	D <sub>1</sub> (max)	C <sub>2</sub> (max)	b (min)	E	f	Grease	Oil
	Inch/mm				lbs/N		Inch/mm						RPM
5120-V (K-style contact angle)	3.9370 100	5.9055 150	1.7323	.060	26200 117000	33000 147000	—	—	—	—	—	2,000	2,600
5205-K	.9843 25	2.0472 52	.8125	.040	4820 21420	3320 14750	1.958	.081	.053	2 17/64	.042	8,000	10,000
5205-KE	.9843 25	2.0472 52	.8125	.040	4820 21420	3320 14750	1.958	.081	.053	2 17/64	.042	8,000	10,000
5206-K	1.1811 30	2.4409 62	.9375	.040	6690 29740	4770 21210	2.347	.082	.075	2 21/32	.065	6,700	8,300
5206-KE	1.1811 30	2.4409 62	.9375	.040	6690 29740	4770 21210	2.347	.082	.075	2 21/32	.065	6,700	8,300
5207-KE	1.3780 35	2.8346 72	1.0625	.040	7710 34280	5710 25410	2.709	—	.075	3 5/64	.065	5,700	7,100
5207-W	1.3780 35	2.8346 72	1.0625	.040	8930 39710	7750 34460	2.709	—	.075	3 5/64	.065	5,700	7,100
5208-KE	1.5748 40	3.1496 80	1.1875	.040	9980 44390	7530 33510	3.024	.098	.075	3 13/32	.065	5,000	6,300
5208-W	1.5748 40	3.1496 80	1.1875	.040	11810 52520	10450 46480	3.024	.098	.075	3 13/32	.065	5,000	6,300
5209-KE	1.7717 45	3.3465 85	1.1875	.040	10680 47480	8590 38210	3.221	—	.075	3 19/32	.065	4,400	5,600
5209-W	1.7717 45	3.3465 85	1.1875	.040	12300 54720	11420 50810	3.221	—	.075	3 19/32	.065	4,400	5,600
5210-KE	1.9685 50	3.5433 90	1.1875	.040	10620 47260	8760 38950	3.417	.113	.106	3 31/64	.095	4,000	5,000
5210-W	1.9685 50	3.5433 90	1.1875	.040	12750 56700	12420 55230	3.417	.113	.106	3 31/64	.095	4,000	5,000
5211-KE	2.1654 55	3.9370 100	1.3125	.060	13330 59310	11160 49660	3.811	.113	.106	4 3/16	.095	3,600	4,500
5211-W	2.1654 55	3.9370 100	1.3125	.060	16280 72400	16120 71700	3.811	.113	.106	4 3/16	.095	3,600	4,500
5212-KE	2.3622 60	4.3307 110	1.4375	.060	16310 72540	13880 61740	4.205	.113	.106	4 37/64	.095	3,300	4,200
5212-W	2.3622 60	4.3307 110	1.4375	.060	18080 80420	18310 81440	4.205	.113	.106	4 37/64	.095	3,300	4,200
5215-W	2.9528 75	5.1181 130	1.6250	.060	25150 111860	27050 120310	4.930	.113	.122	5 1/2	.109	2,700	3,300
§ 5216-KE	3.1496 80	5.5118 140	1.7500	.080	23350 104000	22700 101000	5.324	.146	.122	—	—	2,200	3,100
§ 5218-W	3.5433 90	6.2992 160	2.0625	.080	39030 172590	42480 188950	6.111	.146	.122	6 43/64	.109	2,200	2,800
5304-KE	.7874 20	2.0472 52	.8750	.040	4800 21350	2950 13120	1.958	.081	.053	2 17/64	.042	8,800	11,000
5305-KE	.9843 25	2.4409 62	.10000	.040	6170 27460	4170 18570	2.347	.082	.075	2 21/32	.065	7,000	8,800
§ 5305-W	.9843 25	2.4409 62	.10000	.040	8800 39000	6550 29000	2.347	.082	.075	2 21/32	.065	7,000	8,800
5306-KE	1.1811 30	2.8346 72	1.1875	.040	9200 40910	6350 28250	2.709	—	.075	3 5/64	.065	5,900	7,300
5306-W	1.1811 30	2.8346 72	1.1875	.040	11370 50590	8730 38840	2.709	—	.075	3 5/64	.065	5,900	7,300
5307-KE	1.3780 35	3.1496 80	1.3750	.060	11520 51230	8140 36230	3.024	.098	.075	3 13/32	.065	5,000	6,200
5307-W	1.3780 35	3.1496 80	1.3750	.060	6400 28460	5310 23640	3.024	.098	.075	3 13/32	.065	5,000	6,200

Ⓛ BEARING CORNER RADII WILL CLEAR MAXIMUM FILLET RADIUS SHOWN.

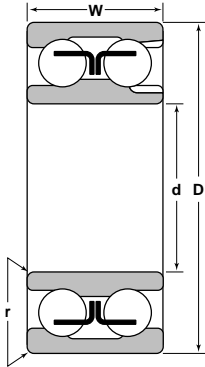
§ NOT NECESSARILY A STOCK ITEM – CHECK FOR AVAILABILITY.

## Double Row – Series 5200 & 5300 Continued

Bearing Number	Bore	Outside Diameter	Width	Fillet Radius	Basic Load Ratings		Snap Ring Groove Dimensions			Snap Ring Dimensions		Limiting Speed	
	d	D	W	r <sup>①</sup>	Dynamic C	Static C <sub>0</sub>	D <sub>1</sub> (max)	C <sub>2</sub> (max)	b (min)	E	f	Grease	Oil
	Inch/mm				lbs/N		Inch/mm						RPM
5308-KE	1.5748 40	3.5433 90	1.4375	.060	14080 62640	10210 45410	3.417	.113	.106	3 5 <sup>1</sup> / <sub>64</sub>	.095	4,400	5,500
5308-W	1.5748 40	3.5433 90	1.4375	.060	16000 71150	13810 61450	3.417	.113	.106	3 5 <sup>1</sup> / <sub>64</sub>	.095	4,400	5,500
5309-KE	1.7717 45	3.9370 100	1.5625	.060	16740 74480	13040 58020	3.811	.113	.106	4 3 <sup>1</sup> / <sub>16</sub>	.095	3,900	4,900
5309-W	1.7717 45	3.9370 100	1.5625	.060	19540 86930	17250 76710	3.811	.113	.106	4 3 <sup>1</sup> / <sub>16</sub>	.095	3,900	4,900
5310-KE	1.9685 50	4.3307 110	1.7500	.080	19880 88430	15050 66960	4.205	.113	.106	4 3 <sup>7</sup> / <sub>64</sub>	.095	3,500	4,400
5310-W	1.9685 50	4.3307 110	1.7500	.080	24080 107130	21060 93680	4.205	.113	.106	4 3 <sup>7</sup> / <sub>64</sub>	.095	3,500	4,400
5311-KE	2.1654 55	4.7244 120	1.9375	.080	24740 110030	19020 84600	4.536	—	.122	5 3 <sup>1</sup> / <sub>32</sub>	.109	3,200	4,000
5311-W	2.1654 55	4.7244 120	1.9375	.080	16280 72400	16120 71700	4.536	—	.122	5 3 <sup>1</sup> / <sub>32</sub>	.109	3,200	4,000
5312-W	2.3622 60	5.1181 130	2.1250	.080	34780 154700	31280 139140	4.930	.113	.122	5 1 <sup>1</sup> / <sub>2</sub>	.109	2,900	3,700
5313-W	2.5591 65	5.5118 140	2.3125	.080	39560 175970	36160 160830	5.324	.146	.122	5 5 <sup>7</sup> / <sub>64</sub>	.109	2,700	3,300
5314-W	2.7559 70	5.9055 150	2.5000	.080	47180 209850	43510 193540	5.718	.146	.122	6 9 <sup>1</sup> / <sub>32</sub>	.109	2,600	3,200

① BEARING CORNER RADII WILL CLEAR MAXIMUM FILLET RADIUS SHOWN.

## Double Row Ball Bearing—Specials



Bearing Number	Bore	Outside Diameter	Width	Special Features
	d	D	W	
Inch/mm				
5008-KFF	1.5748 40	2.4409 62	.9449	O.R. Width .8125 Air Conditioner Bearing.
§ 5206-KTTAN	1.0005 —	2.4409 62	2.3700	Basic 5206-KFF with 1.1250 O.R. Width, 2.3700 I.R. Width 1 Bore, 2 Holes in I.R. Re-lubricatable.
§ 5206-KTTN	1.0005 —	2.4409 62	2.3700	Basic 5206-KTTAN Pre-lubricated.
5208-VFH	1.5748 40	3.1496 80	1.1875	Basic 5208-VF with Fractured O.R. for Mast Guides. See Mast and Chain Guide Section.
5208-VFFH	1.5748 40	3.1496 80	1.1875	Basic 5208-VFH Double Sealed. See Mast and Chain Guide Section.
§ 5209-WSSLH	1.7717 45	3.3465 85	1.1860	Basic 5209-WSSL with 1.1860 Width and Re-lube Hole.
§ 5209-WSSLOH	1.7717 45	3.3465 85	1.1860	Basic 5209-WSSLH less Snap Ring.
§ 5210-VFFA	1.9685 50	3.8940 —	1.4005	Basic 5210-VFF with 3.8940 O.D., 1.4005 Width, .110 Groove in O.D., Special Bore Corners. See Mast and Chain Guide Section.
§ 5211-VR	2.1654 55	3.9370 100	1.5180	Basic 5210-V with 1.3800 O.R. width and One R Seal For Mast Guides. See Mast and Chain Guide Section.
§ 5211-WSVL	2.1654 55	3.9370 100	1.3125	Basic 5211-WSL with Snap Ring and Shield on Side Opposite loading Slot.
§ 5211-WT	2.1654 55	3.9370 100	1.3125	Basic 5211-W with .040 Bore Corners.
§ 5212-WLAB	2.3622 60	4.3307 110	1.4375	Basic 5212-WLA with .0001-.0008 Radial Clearance.
§ 5212-WLB	2.3622 60	4.3307 110	1.4375	Basic 5212-WL with .0001-.0008 Radial Clearance.
5212-VFF	2.3622 60	4.3307 110	1.4375	See Mast and Chain Guide Section.
5213-VFF	2.3622 60	4.3307 110	1.4375	See Mast and Chain Guide Section.
§ 5215-WH	2.9528 75	5.1181 130	1.6250	Basic 5215-W with Hardened Retainer and .0001-.0008 Radial Clearance.
§ 5308-VF	— —	— —	— —	See 5308-VFA
§ 5308-VFA	1.5748 40	3.5433 90	1.4375	Basic 5308-VF with Fractured O.R. for Mast Guides. See Mast and Chain Guide Section.
§ 5308-VFF	— —	— —	— —	See 5308-VFFA. See Mast and Chain Guide Section.
§ 5308-VFFA	1.5748 40	3.5433 90	1.4375	Basic 5308-VFA with two F Seals. See Mast and Chain Guide Section.
§ 5309-WSVLV	1.7717 45	3.9370 100	1.5625	Basic 5309-WSL with Snap Ring on Loading Slot Side and Shield on Opposite Side.
§ 5309-W8L	1.5748 40	3.9370 100	1.5625	Basic 5309-WL with 40mm Bore.
5310-WA	1.9685 50	4.3307 110	1.8750	Basic 5310-W with 1.8750 I.R. Width, Angle of Contact 35° One Side, 20° One Side.
§ 5310-WB	— —	— —	— —	See 5310-WA
5310-WLB	1.7717 45	4.3307 110	1.7500	Basic 5310-WL with 45mm Bore.
§ 5311-VFF	— —	— —	— —	See 5311-VFFA. See Mast and Chain Guide Section in Tires Only.
§ 5311-VFFA	2.1654 55	4.7244 120	1.9375	Basic 5311-VF with Fractured O.R. for Mast Guides. See Mast and Chain Guide Section in Tires Only.
§ 5311-VZZZA	2.1654 55	4.7244 120	1.9375	Basic 5311-VFFA with Two Z Seals. See Mast and Chain Guide Section in Tires Only.
§ 5311-WAX	2.1654 55	4.7244 120	1.9375	Basic 5311-W with Class 0 Fit.
5312-WLAB	2.3622 60	5.1181 130	2.1250	Basic 5312-WLA, Heat Stabilized Rings.
5312-WLB	2.3622 60	5.1181 130	2.1250	Basic 5312-WL Heat Stabilized Rings.

Ⓞ AG BEARING SPECIALS. CONTACT YOUR NTN SALES REPRESENTATIVE FOR FURTHER INFORMATION ON SPECIALS.

§ NOT NECESSARILY A STOCK ITEM – CHECK FOR AVAILABILITY.