

# Rolling Bearings for Continuous Casters

Long-Life, Highly Reliable and Cost-Effective  
Split Roller Bearing Units, Sealed-Clean Roller Bearings  
and Cylindrical Roller Bearings with Aligning Rings.





# NSK Bearings Significantly Improve the Performance of Continuous Casters

Specially-designed bearings for continuous caster rolls have been developed based on advanced technology and extensive experience.

Their long life and high reliability reduce operating costs and increase caster productivity.

## Features and Benefits of NSK Caster Bearings

### NSK Split Roller Bearing Units for Segmented Drive Rolls

Long-Life, High-Reliability

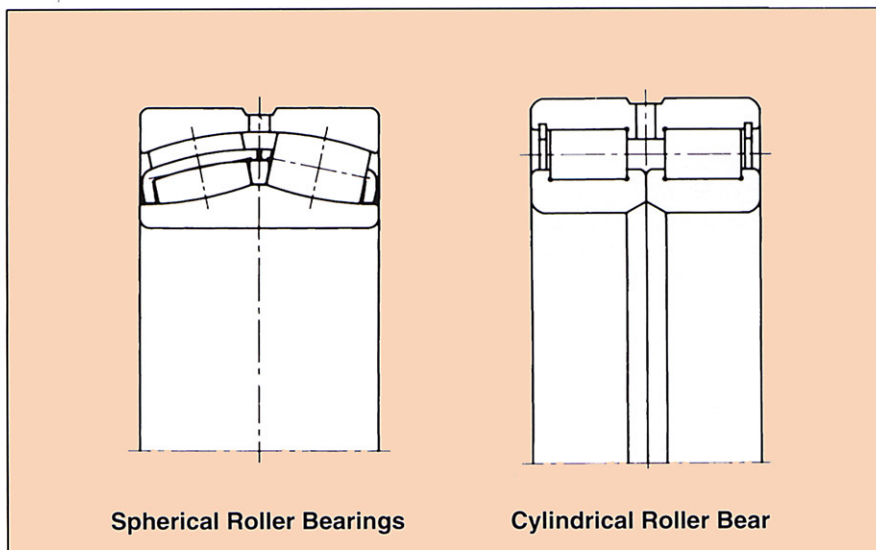
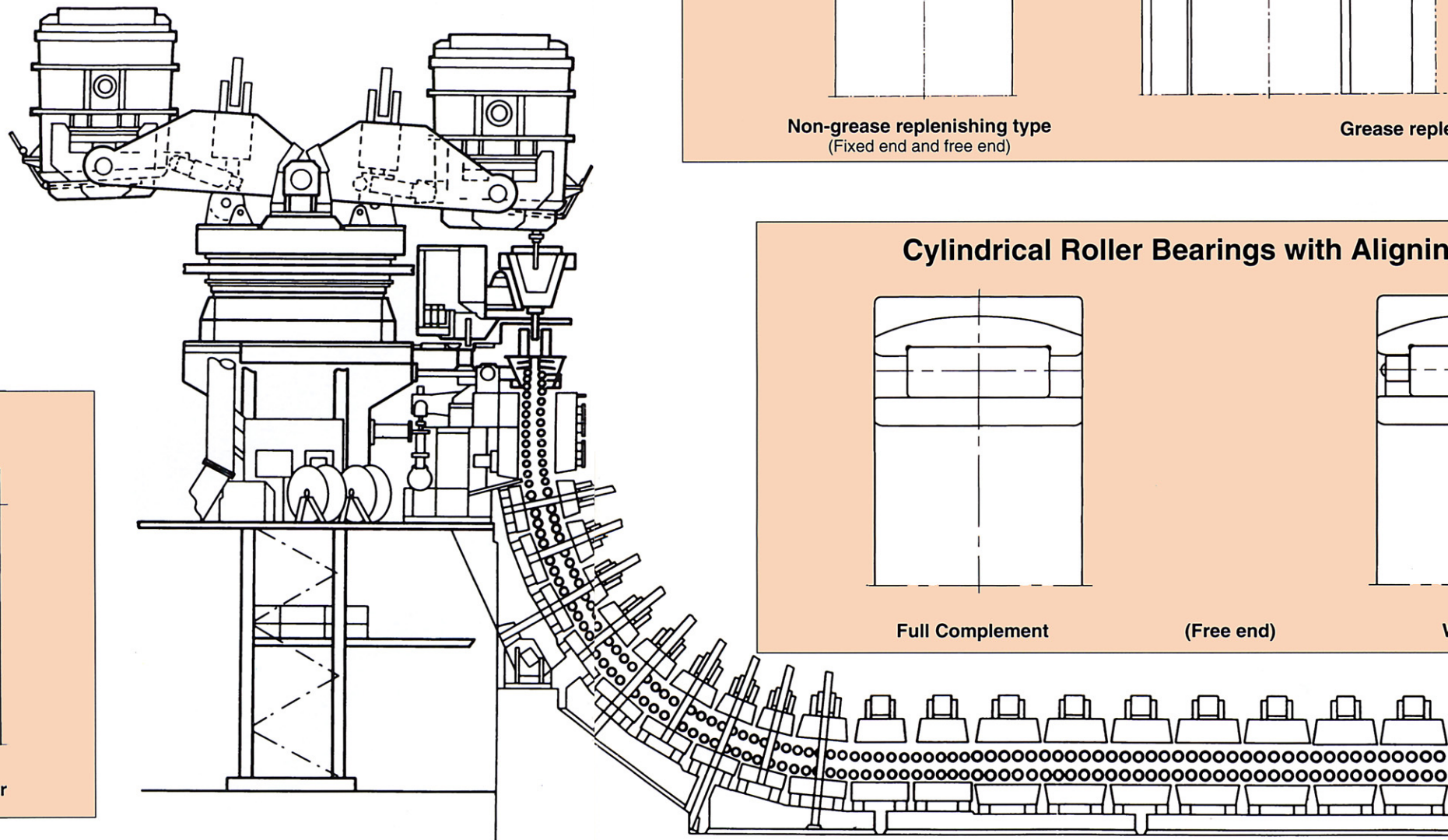
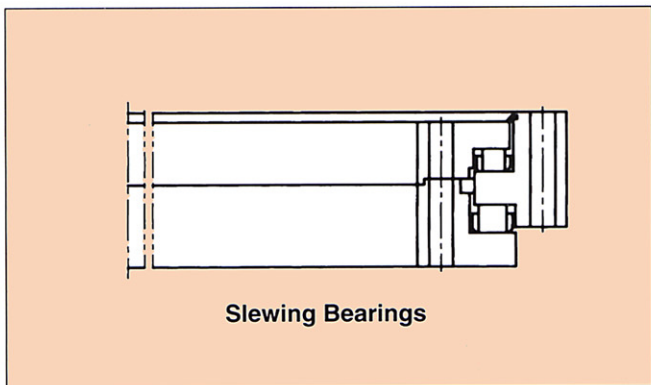
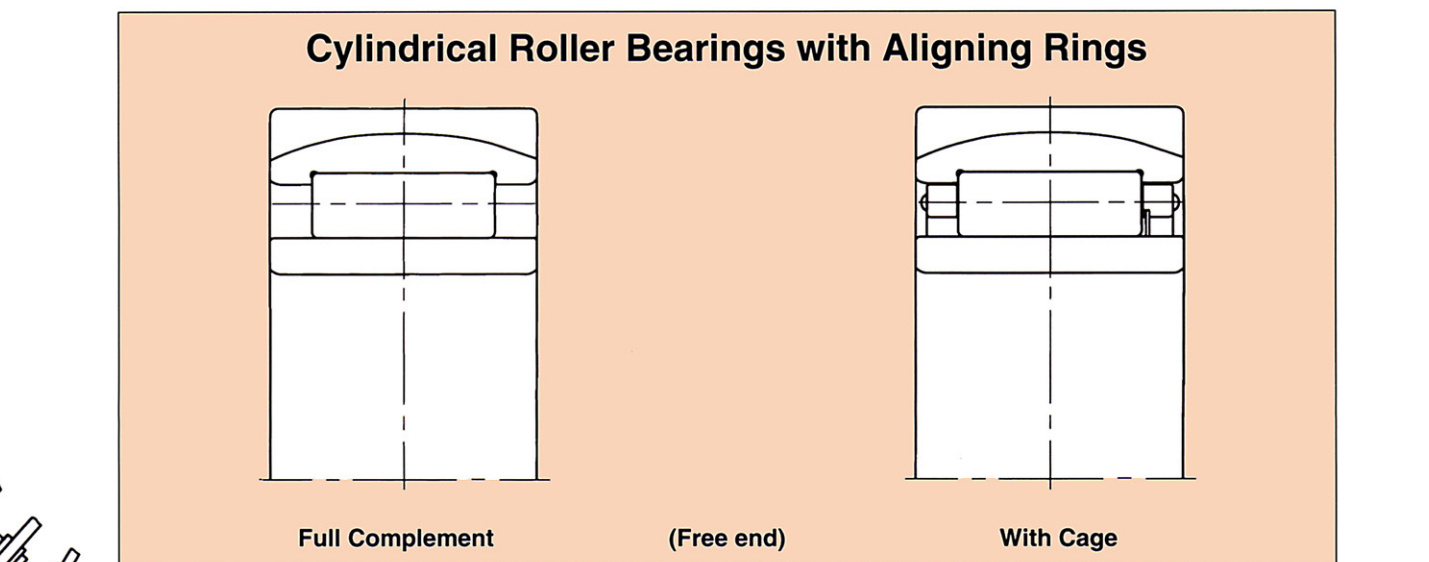
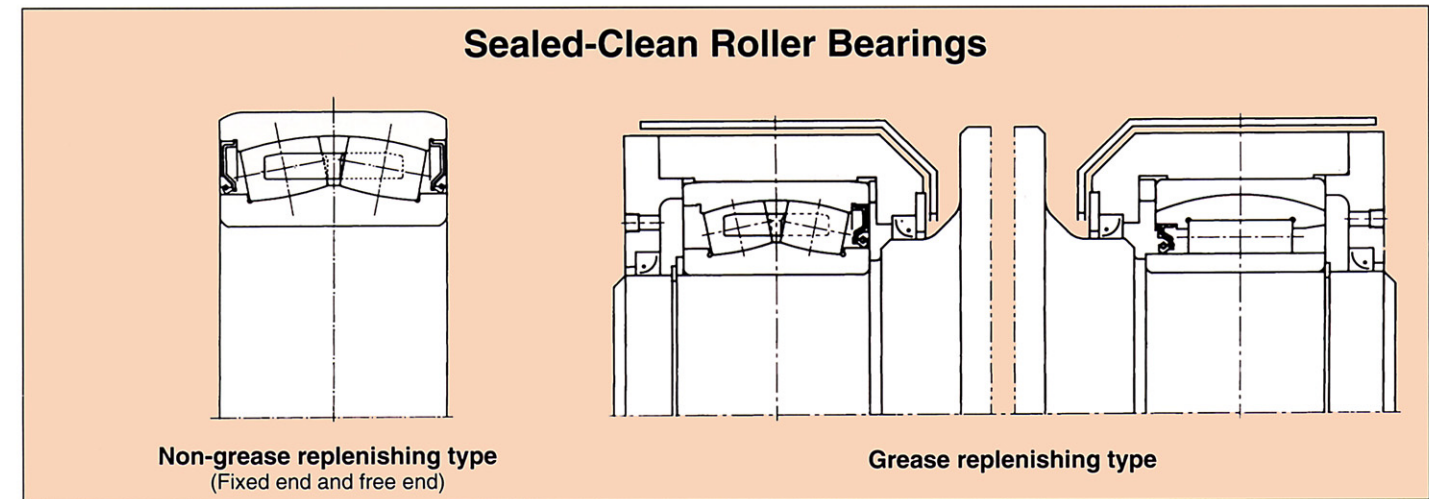
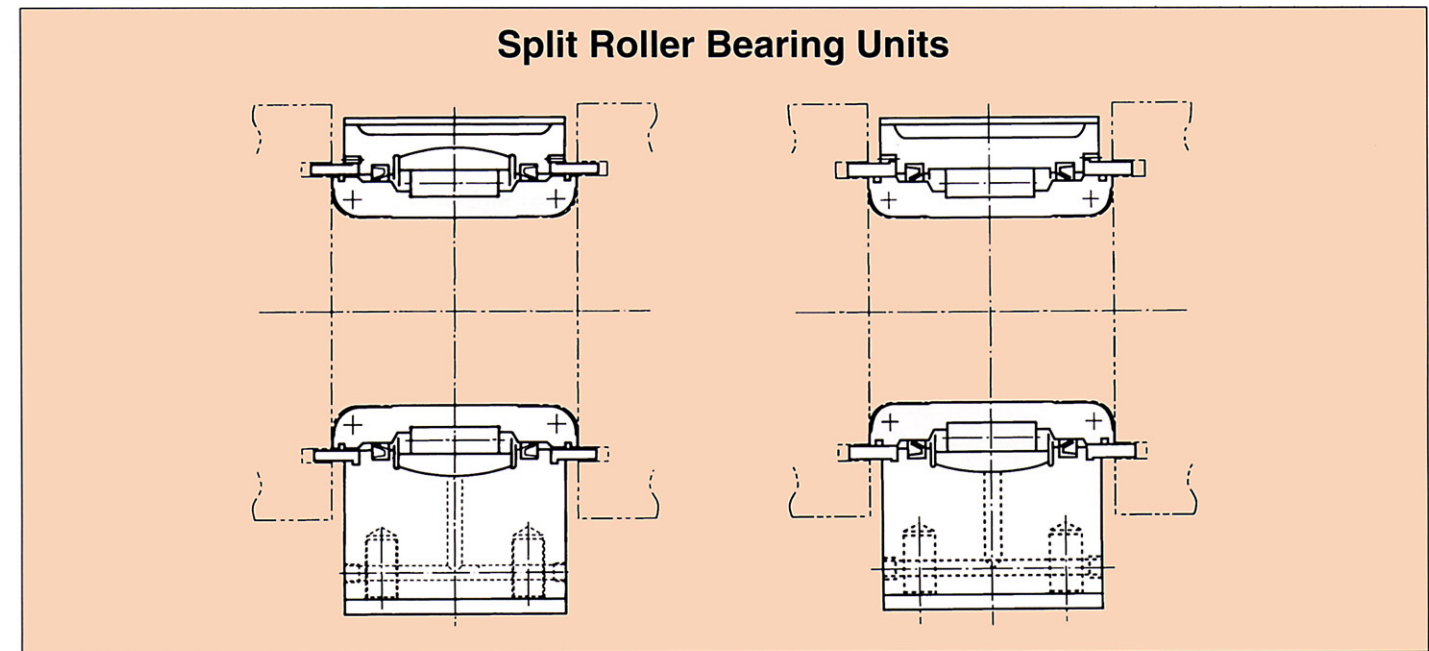
### NSK Sealed-Clean Roller Bearings

Long-Life, Reduced Grease Consumption, Extended Maintenance Intervals

### NSK Cylindrical Roller Bearings with Aligning Rings

Long-Life, High Load Capacity

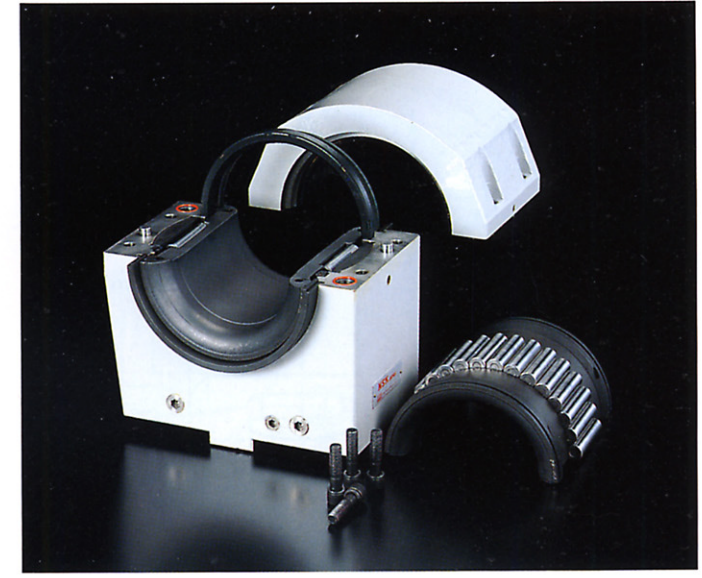
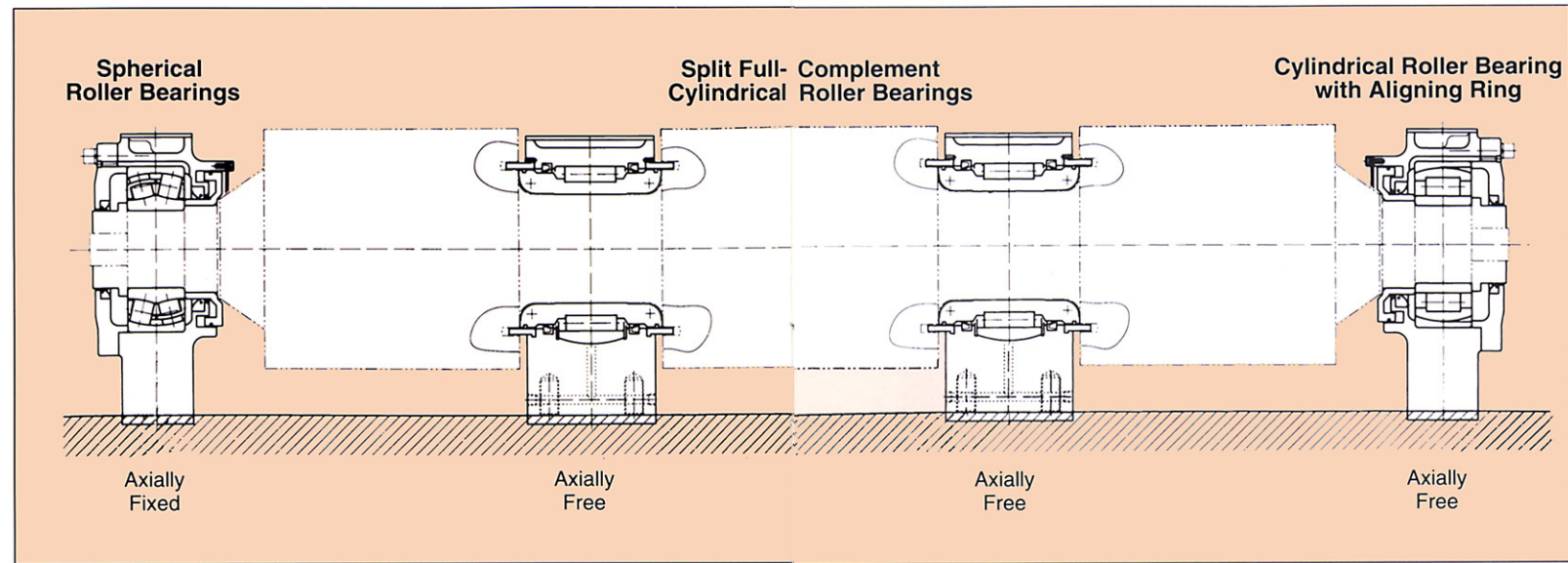
Other NSK bearings widely used in continuous casters are slewing bearings for ladle turrets, spherical roller bearings, and cylindrical roller bearings for various roll supports.



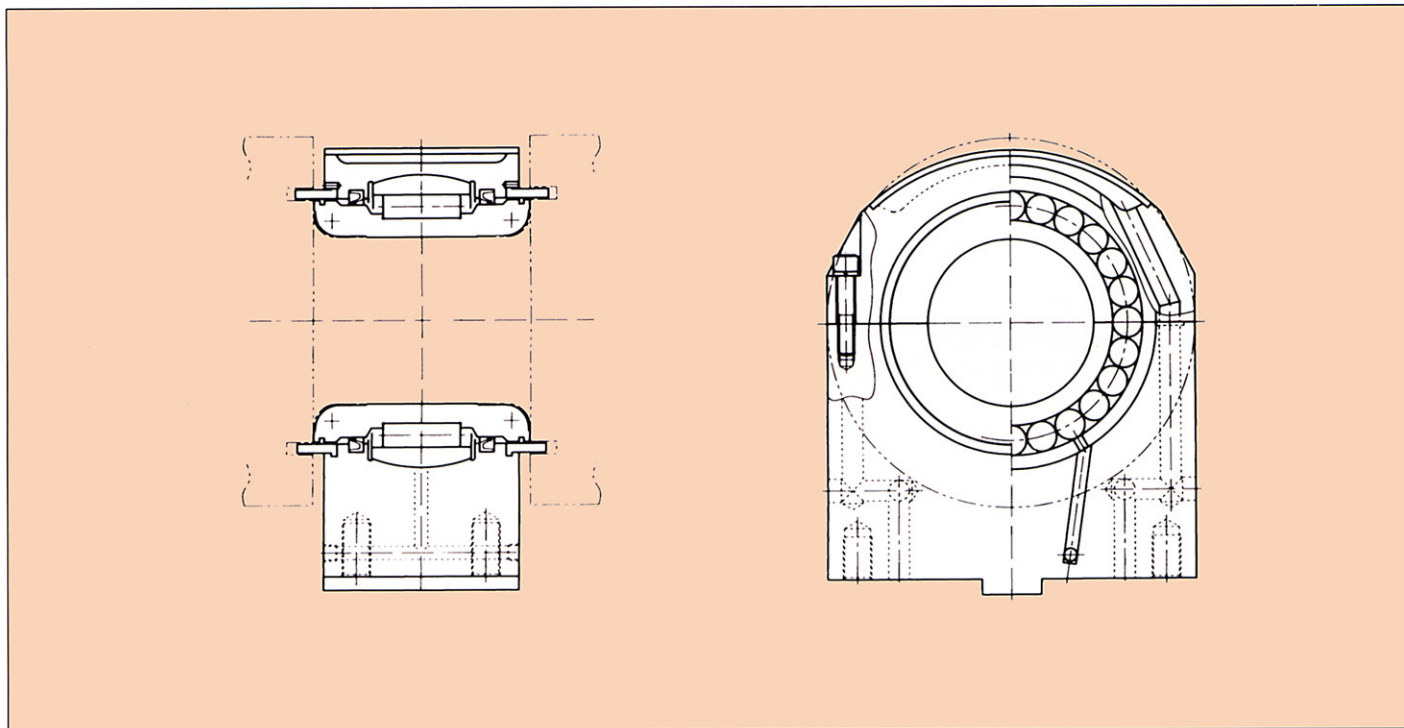


# NSK Split Roller Bearing Units for Segmented Drive Rolls (US Pat. 4671682)

Split roller bearing units significantly simplify the design and mounting of segmented drive rolls and facilitate easy bearing replacement.



## Features of Split Roller Bearing Units



### High Load Capacity

High load capacity with full complement design.

### Highly Effective Seals

Multiple seals including special single-split oil seals, self-lubricating seal rings, and labyrinth rings between the roll side faces and a bearing are installed.

### Uniform Stress Distribution

Optimum crowning of roller rolling surfaces.

### Smooth Aligning

Aligning capability assured by spherical surfaces between bearing periphery and housing bore.

### Directly Coupled Inner Ring Segments

Improved bearing accuracy and ease of assembly. Smooth sliding surface for split seals.

### Water-Cooled Jackets

Highly-effective cooling within a limited space.

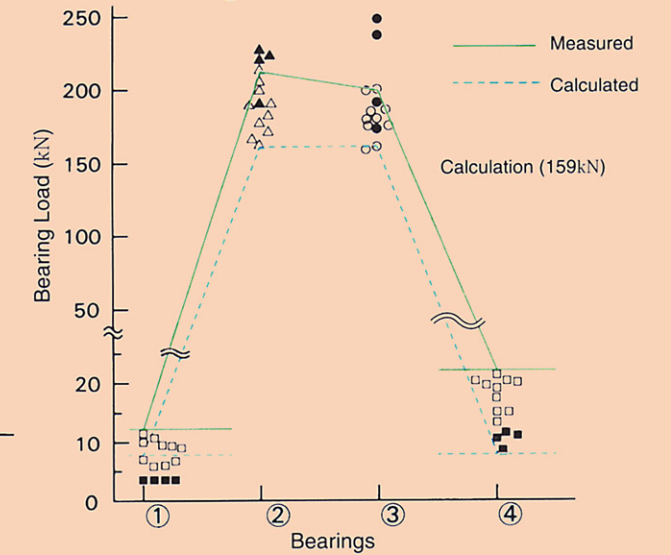
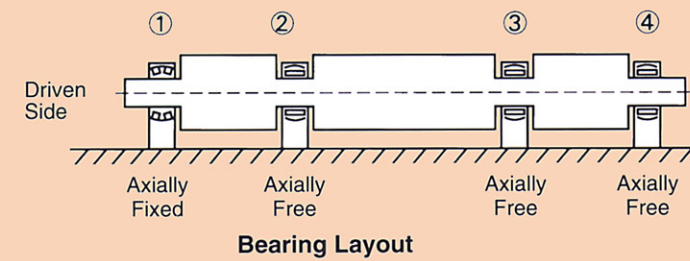
### Special Surface Treatment

Surface treatments improve initial bearing lubrication, reduce wear of the aligning spherical surfaces, and prevent rust.

## Measurement of Actual Loads on Guide Roll Bearings in Continuous Casters

In order to determine the actual loads on bearings, tests were conducted to compare calculated results with actual loads measured in a caster.

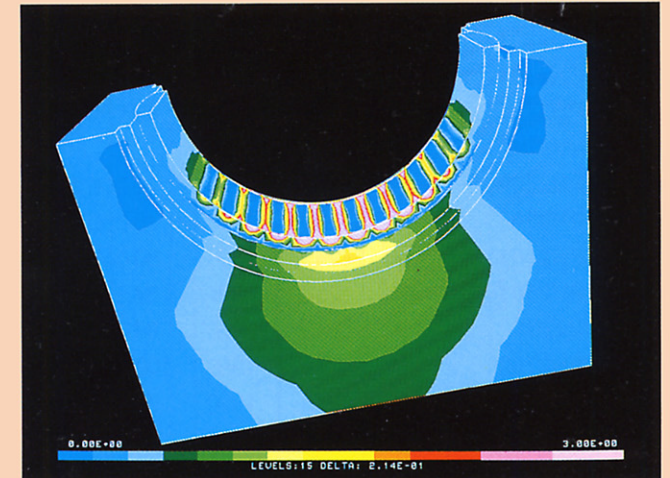
Application : Guide Rolls  
 Bearing ① : Spherical Roller Bearings  
 Bearings ② and ③ : Split Cylindrical Roller Bearings  
 Bearing ④ : Cylindrical Roller Bearings with Aligning Rings.



## Finite Element Method Analysis of Split Bearing Units for Guide Rolls

We have determined the optimum unit design regarding load distribution, life, and rigidity using FEM analysis.

Application : Guide Rolls ( $\phi$  270 Rolls)  
 Bearing : 130 RNP 2001  
 Plummer Block : 130 PCR 2701





# NSK Split Cylindrical Roller Bearing Units

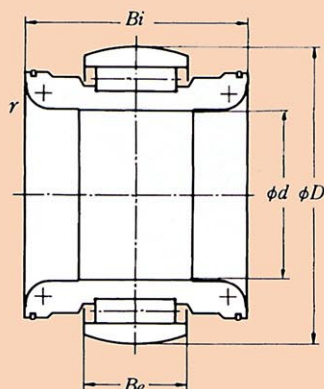


Fig. 1

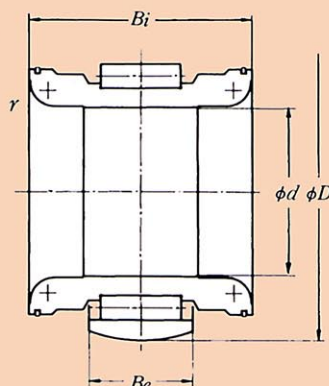
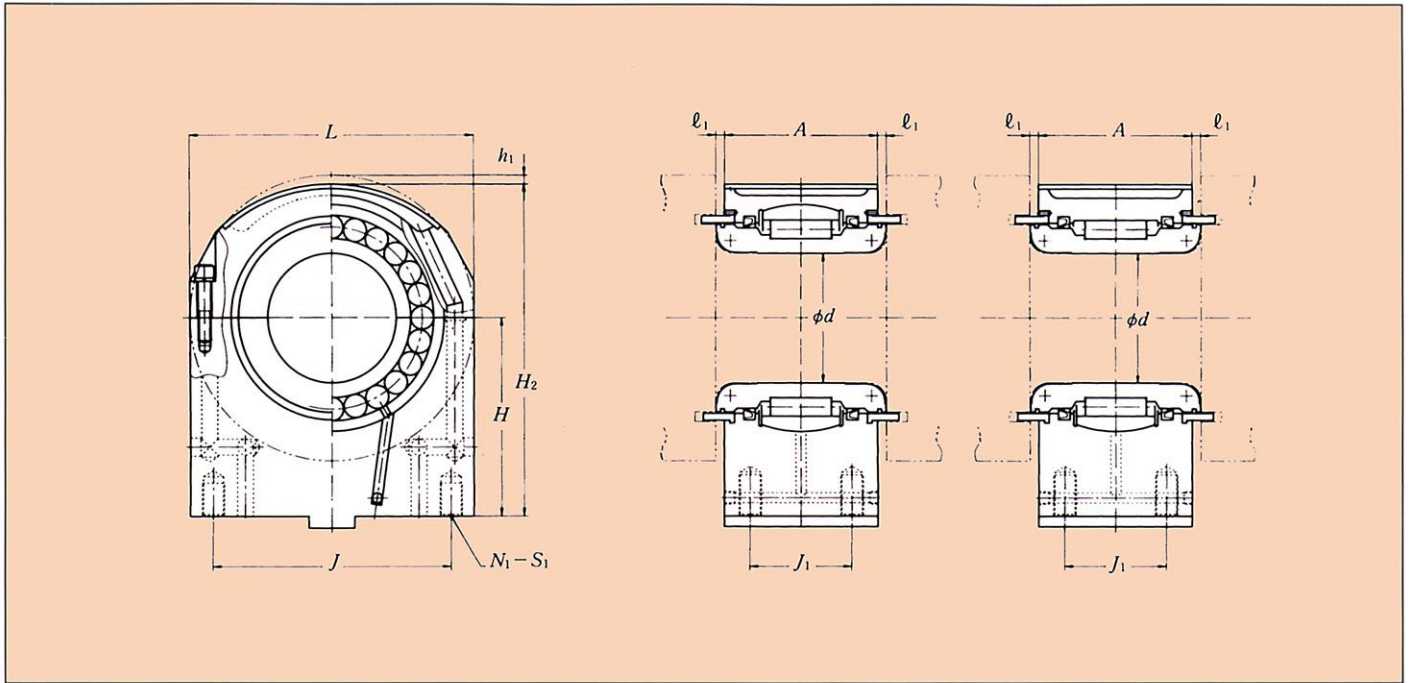


Fig. 2

Bearing Numbers	Boundary Dimensions (mm)					Basic Load Ratings				Roll Diameter (mm)	Fig. Numbers
	$d$	$D$	$Bi$	$Be$	$r$	$C_r$ (kN)	$C_{or}$ (kN)	$C_r$ (kgf)	$C_{or}$ (kgf)		
100RNPH1801	100	185	169	74	15	475	950	48 500	96 500	225	2
110RNPH1801	110	180	137	49	15	272	570	27 700	58 500	230	2
110RNPH1802	110	180	149	60	20	390	865	40 000	88 000	250	1
110RNPH2001	110	200	179	80	20	535	1 090	54 500	111 000	250	2
115RNPH2001	115	205	202	98	15	625	1 460	63 500	148 000	240	2
120RNPH1901	120	195	157	66	20	410	950	42 000	97 000	250	2
130RNPH2001	130	205	129	60	20	455	1 030	46 500	105 000	270	1
130RNPH2101	130	215	174	75	20	540	1 190	55 000	121 000	280	1
130RNPH2201	130	225	189	90	20	670	1 460	68 500	148 000	280	2
140RNPH2102	140	215	162	60	20	415	950	42 500	97 000	270	2
140RNPH2103	140	215	189	74	2.5	490	1 170	50 000	119 000	265	2
140RNPH2302	140	235	139	60	20	550	1 120	56 000	114 000	300	1
140RNPH2401	140	245	184	85	20	710	1 510	72 500	154 000	310	1
145RNPH2201	145	225	179	76	20	560	1 340	57 000	137 000	280	2
145RNPH2301	145	230	196	76	20	630	1 440	64 500	147 000	280	2
145RNPH2401	145	240	208	89	20	765	1 780	78 000	182 000	295	2
150RNPH2302	150	230	157	70	17.5	570	1 380	58 000	141 000	280	2
150RNPH2303	150	230	199	78	2.5	555	1 340	56 500	136 000	280	2
150RNPH2401	150	245	159	80	20	680	1 550	69 500	158 000	280	2
150RNPH2501	150	250	189	84	20	735	1 640	75 000	167 000	320	2
150RNPH2701	150	270	205	84	20	885	1 750	90 000	179 000	350	1
150RNPH2702	150	275	199	100	20	945	1 970	96 500	201 000	330	2
155RNPH2401	155	245	199	88	20	740	1 720	75 000	176 000	300	2
160RNPH2502	160	255	199	90	20	735	1 730	75 000	176 000	310	2
170RNPH2601	170	265	214	100	20	880	2 050	89 500	209 000	330	1



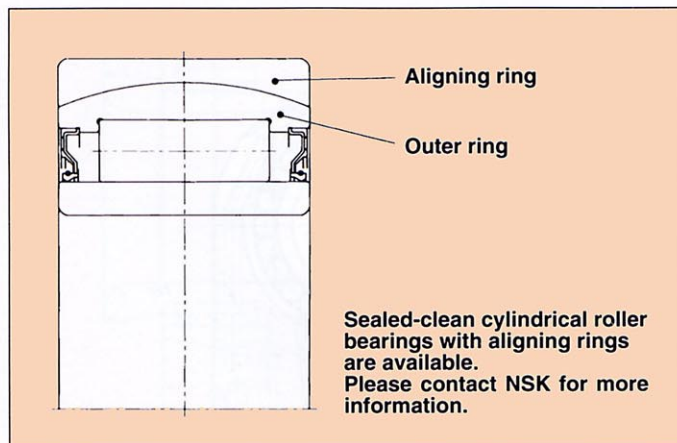
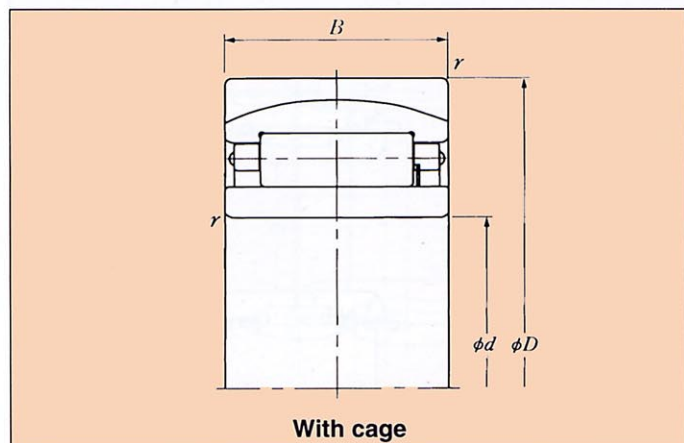


Plummer Block Numbers	Shaft Dia. (mm)	Dimensions (mm)									
	<i>d</i>	<i>L</i>	<i>A</i>	<i>H</i>	<i>h</i> <sub>1</sub>	<i>H</i> <sub>2</sub>	<i>l</i> <sub>1</sub>	<i>J</i>	<i>J</i> <sub>1</sub>	<i>N</i> <sub>1</sub>	<i>S</i> <sub>1</sub>
100PCR2201	100	235	152	132	10	234.5	9	165	100	4	M20
110PCR2301	110	230	120	160	10	265	9.5	140	—	2	M30
110PCR2501	110	250	139	150	11.5	263.5	5.5	—	—	1	M36
110PCR2502	110	250	156	150	11.5	263.5	12	—	—	1	M36
115PCR2401	115	245	183	190	10	300	10	150	—	2	M24
120PCR2501	120	250	142	165	11.5	278.5	9	190	90	4	M24
130PCR2701	130	265	118	190	11.5	313.5	6	195	65	4	M30
130PCR2801	130	280	156	160	10	290	9.5	200	100	4	M24
130PCR2802	130	280	172	180	11.5	308.5	9	220	110	4	M30
140PCR2701	140	270	145	180	10	305	9.5	170	—	2	M30
140PCR2601	140	265	174	175	7.5	300	8	230	130	4	M20
140PCR3001	140	300	118	210	11.5	348.5	6	220	65	4	M36
140PCR3101	140	310	166	175	10	320	9.5	220	110	4	M24
145PCR2801	145	280	162	250	10	380	9	220	100	4	M30
145PCR2802	145	280	183	260	10	390	7	220	123	4	M30
145PCR2901	145	295	195	270	10	407.5	7	230	130	4	M30
150PCR281	150	280	145	170	10	300	6.5	96	—	2	φ 26
150PCR2801	150	280	184	175	10	305	8	230	140	4	M20
150PCR280	150	330	144	310	10	440	8	350	260	4	φ 33
150PCR3201	150	320	168	220	11.5	368.5	11	240	90	4	M36
150PCR350	150	350	193	185	15	345	6.5	200	140	4	M30
150PCR3301	150	330	182	220	11.5	373.5	9	260	110	4	M36
155PCR3001	155	300	182	260	10	400	9	240	110	4	M30
160PCR3101	160	310	178	185	16.5	323.5	11	150	—	2	M30
170PCR3301	170	320	194	290.5	10	445.5	10.5	260	340	4	φ 26



# NSK Cylindrical Roller Bearings with Aligning

## Features of Cylindrical Roller Bearings with Aligning Rings



### High Load Capacity

Full complement type enables highest load capacity within the space limitation.

Cage type enables higher load capacity within limited space and easy handling.

### Smooth Angular Aligning

Smooth aligning assured by tight control of spherical surface tolerances of bearing outer rings and aligning rings.

Edge load on rollers caused by misalignment or roll expansion/contraction is eliminated.

### Uniform Stress Distribution

Optimum crowning of roller rolling surfaces.

### Special Surface Treatment

Surface treatments improve initial bearing lubrication, reduce wear of the aligning spherical surfaces, and prevent rust.

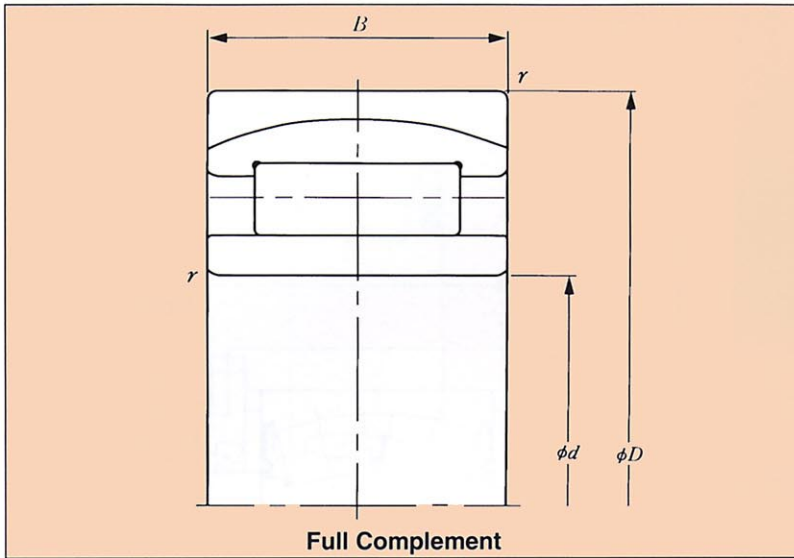
## Cylindrical Roller Bearings with Aligning Rings (with cage)

Boundary Dimensions (mm)				Bearing Numbers	Basic Load Ratings			
$d$	$D$	$B$	$r$ (min)		$C_r$ (kN)	$C_{0r}$ (kN)	$C_r$ (kgf)	$C_{0r}$ (kgf)
110	180	69	2	<b>110RUB41</b>	271	490	27 600	50 000
120	180	60	2	<b>120RUB40</b>	247	495	25 200	50 500
	200	80	2	<b>120RUB41</b>	370	680	38 000	69 500
	215	76	2.1	<b>120RUB32</b>	435	735	44 000	75 000
130	210	80	2	<b>130RUB41</b>	380	715	39 000	73 000
	230	80	3	<b>130RUB32</b>	490	825	50 000	84 000
140	210	69	2	<b>140RUB40</b>	330	670	33 500	68 500
	225	85	2.1	<b>140RUB41</b>	435	830	44 500	84 500
150	225	75	2.1	<b>150RUB40</b>	375	755	38 500	77 000
	250	100	2.1	<b>150RUB41</b>	540	1 040	55 500	106 000
	270	96	3	<b>150RUB32</b>	690	1 210	70 500	124 000
160	270	109	2.1	<b>160RUB41</b>	690	1 260	70 500	129 000
	290	104	3	<b>160RUB32</b>	795	1 370	81 000	139 000
170	280	109	2.1	<b>170RUB41</b>	710	1 330	72 500	136 000
	310	110	4	<b>170RUB32</b>	915	1 590	93 500	162 000
180	280	100	2.1	<b>180RUB40</b>	635	1 300	65 000	132 000
	300	118	3	<b>180RUB41</b>	755	1 460	77 000	149 000
190	290	100	2.1	<b>190RUB40</b>	650	1 360	66 500	138 000
	340	120	4	<b>190RUB32</b>	1 050	1 870	107 000	191 000
200	310	109	2.1	<b>200RUB40</b>	770	1 540	78 500	157 000
	340	140	3	<b>200RUB41</b>	1 080	2 200	111 000	224 000

Note : Bearings other than those shown here are available, please contact NSK.



# Rings for Continuous Casters



## Cylindrical Roller Bearings with Aligning Rings (full complement)

Boundary Dimensions (mm)				Bearing Numbers	Basic Load Ratings			
<i>d</i>	<i>D</i>	<i>B</i>	<i>r</i> (min)	Free end	<i>C<sub>r</sub></i> (kN)	<i>C<sub>0r</sub></i> (kN)	<i>C<sub>r</sub></i> (kgf)	<i>C<sub>0r</sub></i> (kgf)
110	180	69	2	<b>110RUB41APV</b>	375	805	38 000	82 000
	200	69.8	2.1	<b>110RUB32APV</b>	440	805	45 000	82 000
120	180	60	2	<b>120RUB40APV</b>	305	715	31 000	73 000
	200	80	2	<b>120RUB41APV</b>	450	985	46 000	100 000
	215	76	2.1	<b>120RUB32APV</b>	510	990	52 000	101 000
130	200	69	2	<b>130RUB40APV</b>	405	935	41 500	95 500
	210	80	2	<b>130RUB41APV</b>	480	1 050	49 000	107 000
	230	80	3	<b>130RUB32APV</b>	585	1 090	60 000	111 000
140	210	69	2	<b>140RUB40APV</b>	420	990	42 500	101 000
	225	85	2.1	<b>140RUB41APV</b>	545	1 230	56 000	125 000
	250	88	3	<b>140RUB32APV</b>	715	1 390	73 000	142 000
150	225	75	2.1	<b>150RUB40APV</b>	435	1 070	44 500	109 000
	250	100	2.1	<b>150RUB41APV</b>	710	1 620	72 500	165 000
	270	96	3	<b>150RUB32APV</b>	815	1 640	83 000	168 000
160	240	80	2.1	<b>160RUB40APV</b>	490	1 200	50 000	122 000
	270	109	2.1	<b>160RUB41APV</b>	855	1 830	87 500	186 000
	290	104	3	<b>160RUB32APV</b>	960	1 890	98 000	193 000
170	260	90	2.1	<b>170RUB40APV</b>	640	1 520	65 500	155 000
	280	109	2.1	<b>170RUB41APV</b>	875	1 900	89 000	194 000
	310	110	4	<b>170RUB32APV</b>	1060	2 090	108 000	213 000
180	280	100	2.1	<b>180RUB40APV</b>	785	1 870	80 500	191 000
	300	118	3	<b>180RUB41APV</b>	940	2 120	95 500	217 000
	320	112	4	<b>180RUB32APV</b>	1090	2 190	111 000	223 000
190	290	100	2.1	<b>190RUB40APV</b>	810	1 980	83 000	202 000
	320	128	3	<b>190RUB41APV</b>	1120	2 480	114 000	253 000
	340	120	4	<b>190RUB32APV</b>	1210	2 430	123 000	248 000
200	310	109	2.1	<b>200RUB40APV</b>	960	2 250	97 500	230 000
	340	140	3	<b>200RUB41APV</b>	1300	2 930	132 000	299 000
	360	128	4	<b>200RUB32APV</b>	1320	2 760	134 000	281 000

Note : Bearings other than those shown here are available, please contact NSK.



# NSK Sealed-Clean Roller Bearings for Continuous

Application of NSK sealed-clean bearings assures lower operating cost and higher productivity.

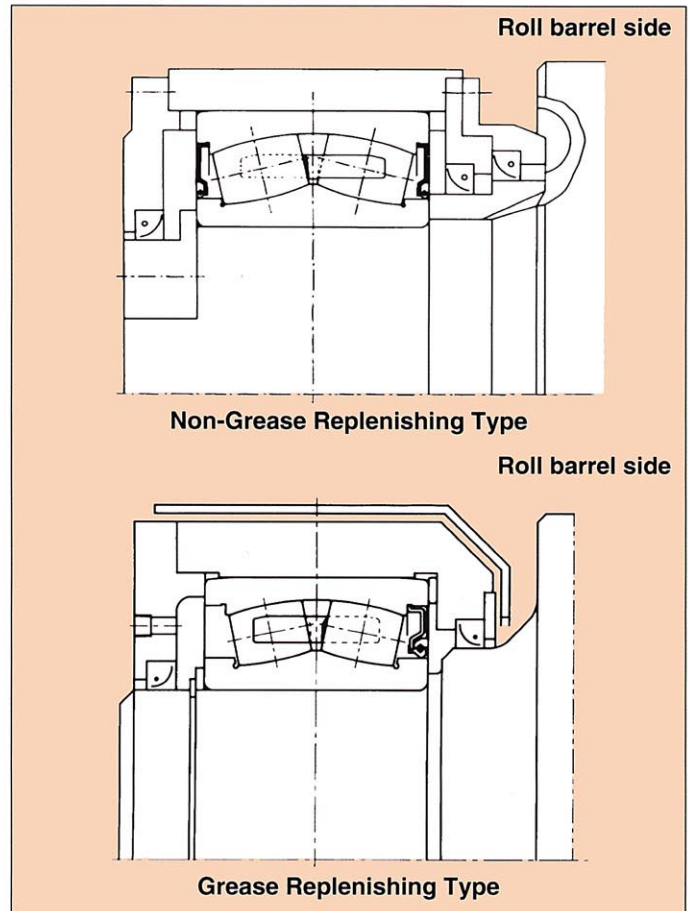
**Higher Reliability**  
**Lower Maintenance Costs**  
**Clean Surroundings**

## Non-Grease Replenishing Type [Double Seals]

- Factory packed with special long-life grease.
- Target maintenance interval is one year.
- Prevention of sudden failure due to clogging of grease line.
- Great reduction in grease consumption.
- No contamination of surroundings.

## Grease Replenishing Type [Single Seal]

- Bearing seal at roll barrel side provides positive sealing.
- Grease replenishment from the roll ends provides supplementary sealing.
- Long life and extension of maintenance intervals by improved seals which prevent the entry of water, steam, and scale.
- Remarkable reduction in amount of replenished grease compared with open bearings.



## Features of Sealed-Clean Spherical Roller Bearings

### High Load Capacity

- Special internal design and compact seals for continuous casters minimize reduction in load capacity compared with standard open-type bearings.
- The bearing boundary dimensions are exactly the same as standard open-type bearings; therefore, no structural changes around the bearings are necessary.

### Superior Bearing Steel

- Long life from using specially developed ultra-pure vacuum-degassed steel.
- Dimensional stabilization treatment depending on the operating temperature.

### Selection of Optimum Internal Clearance

- Optimum load distribution on rollers by determining the proper internal clearance.

### Uniform Contact between Rollers and Raceways

- Symmetrical rollers eliminate edge loads in the contact areas between the rollers and raceways when heavy loads are applied.

### Special Chamfers

- Special chamfer profiles of the outer ring outside surfaces enable smooth axial movement of free-end bearings.

### Effective Seals for Continuous Casters

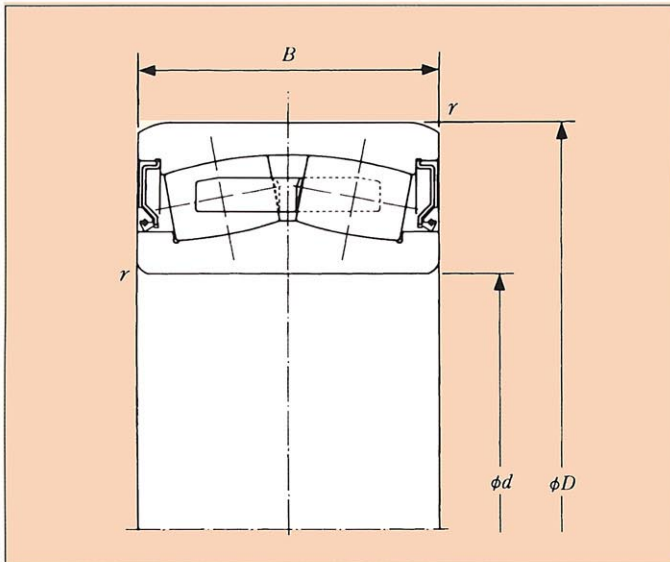
- Contact seals with garter springs effectively prevent the entry of water and scale.
- Two seal materials are available depending on the operating temperature.  
Less than 110°C : Nitrile rubber  
Higher than 110°C : Fluorine rubber

### Special Packed Grease

- The factory packed grease is a special heat- and pressure-resistant lubricant developed for continuous casters.



# Casters



## Sealed-Clean Spherical Roller Bearings (Non-Grease Replenishing Type)

Bearing Numbers	Boundary Dimensions (mm)				Basic Load Ratings				Original Bearing Numbers
	$d$	$D$	$B$	$r$ (min)	$C_r$ (kN)	$C_{or}$ (kN)	$C_r$ (kgf)	$C_{or}$ (kgf)	
110SLE414FF	110	180	69	2	385	630	39 500	64 000	24122C
120SLE404FF	120	180	60	2	330	555	33 500	57 000	24024C
120SLE414FF	120	200	80	2	510	810	52 000	82 500	24124C
130SLE404FF	130	200	69	2	425	710	43 500	72 500	24026C
130SLE414FF	130	210	80	2	525	855	53 500	87 500	24126C
140SLE404FF	140	210	69	2	445	775	45 500	79 000	24028C
140SLE414FF	140	225	85	2.1	605	1 010	61 500	103 000	24128C
150SLE404FF	150	225	75	2.1	515	890	52 500	91 000	24030C
150SLE414FF	150	250	100	2.1	800	1 330	82 000	136 000	24130C
160SLE404FF	160	240	80	2.1	605	1 040	61 500	106 000	24032C
160SLE414FF	160	270	109	2.1	970	1 620	98 500	166 000	24132C
170SLE404FF	170	260	90	2.1	760	1 420	77 500	145 000	24034C
170SLE414FF	170	280	109	2.1	1 000	1 720	102 000	175 000	24134C
180SLE404FF	180	280	100	2.1	880	1 590	90 000	162 000	24036C
180SLE414FF	180	300	118	3	1 120	1 920	115 000	196 000	24136C
190SLE404FF	190	290	100	2.1	900	1 660	91 500	169 000	24038C
190SLE414FF	190	320	128	3	1 320	2 210	134 000	226 000	24138C
200SLE404FF	200	310	109	2.1	1 110	2 110	113 000	215 000	24040C
200SLE414FF	200	340	140	3	1 550	2 670	158 000	273 000	24140C

Notes: 1. Bearings other than those shown here are available, please contact NSK.  
2. Grease replenishing type is also available, please contact NSK