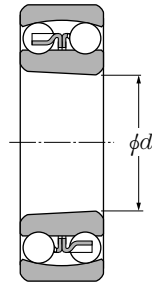
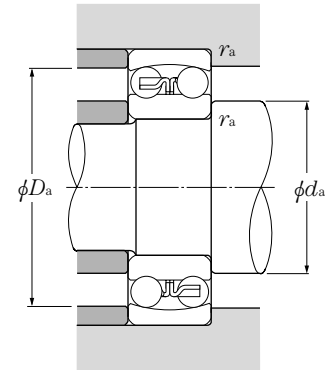


Cylindrical bore



Tapered bore



**d** 10 ~ 35mm

	Boundary dimensions				Basic load ratings				Limiting speeds		Bearing numbers		Abutment and fillet dimensions		
	mm				dynamic	static	dynamic	static	min <sup>-1</sup>		cylindrical bore	tapered <sup>2)</sup> bore	$d_a$	$D_a$	$r_{as}$
<i>d</i>	<i>D</i>	<i>B</i>	$r_{s \min}^{1)}$	$C_r$	$C_{or}$	$C_r$	$C_{or}$	grease	oil			min	max	max	
<b>10</b>	30	9	0.6	5.55	1.19	570	121	22 000	28 000	<b>1200S</b>	—	14.0	26.0	0.6	
	30	14	0.6	7.45	1.59	760	162	24 000	28 000	<b>2200S</b>	—	14.0	26.0	0.6	
	35	11	0.6	7.35	1.62	750	165	20 000	24 000	<b>1300S</b>	—	14.0	31.0	0.6	
	35	17	0.6	9.20	2.01	935	205	18 000	22 000	<b>2300S</b>	—	14.0	31.0	0.6	
<b>12</b>	32	10	0.6	5.70	1.27	580	130	22 000	26 000	<b>1201S</b>	—	16.0	28.0	0.6	
	32	14	0.6	7.75	1.73	790	177	22 000	26 000	<b>2201S</b>	—	16.0	28.0	0.6	
	37	12	1	9.65	2.16	985	221	18 000	22 000	<b>1301S</b>	—	17.0	32.0	1	
	37	17	1	12.1	2.73	1 240	278	17 000	22 000	<b>2301S</b>	—	17.0	32.0	1	
<b>15</b>	35	11	0.6	7.60	1.75	775	179	18 000	22 000	<b>1202S</b>	—	19.0	31.0	0.6	
	35	14	0.6	7.80	1.85	795	188	18 000	22 000	<b>2202S</b>	—	19.0	31.0	0.6	
	42	13	1	9.70	2.29	990	234	16 000	20 000	<b>1302S</b>	—	20.0	37.0	1	
	42	17	1	12.3	2.91	1 250	296	14 000	18 000	<b>2302S</b>	—	20.0	37.0	1	
<b>17</b>	40	12	0.6	8.00	2.01	815	205	16 000	20 000	<b>1203S</b>	—	21.0	36.0	0.6	
	40	16	0.6	9.95	2.42	1 010	247	16 000	20 000	<b>2203S</b>	—	21.0	36.0	0.6	
	47	14	1	12.7	3.20	1 300	325	14 000	17 000	<b>1303S</b>	—	22.0	42.0	1	
	47	19	1	14.7	3.55	1 500	365	13 000	16 000	<b>2303S</b>	—	22.0	42.0	1	
<b>20</b>	47	14	1	10.0	2.61	1 020	266	14 000	17 000	<b>1204S</b>	<b>1204SK</b>	25.0	42.0	1	
	47	18	1	12.8	3.30	1 310	340	14 000	17 000	<b>2204S</b>	<b>2204SK</b>	25.0	42.0	1	
	52	15	1.1	12.6	3.35	1 280	340	12 000	15 000	<b>1304S</b>	<b>1304SK</b>	26.5	45.5	1	
	52	21	1.1	18.5	4.70	1 880	480	11 000	14 000	<b>2304S</b>	<b>2304SK</b>	26.5	45.5	1	
<b>25</b>	52	15	1	12.2	3.30	1 250	335	12 000	14 000	<b>1205S</b>	<b>1205SK</b>	30.0	47.0	1	
	52	18	1	12.4	3.45	1 270	350	12 000	14 000	<b>2205S</b>	<b>2205SK</b>	30.0	47.0	1	
	62	17	1.1	18.2	5.00	1 850	510	10 000	13 000	<b>1305S</b>	<b>1305SK</b>	31.5	55.5	1	
	62	24	1.1	24.9	6.60	2 530	675	9 500	12 000	<b>2305S</b>	<b>2305SK</b>	31.5	55.5	1	
<b>30</b>	62	16	1	15.8	4.65	1 610	475	10 000	12 000	<b>1206S</b>	<b>1206SK</b>	35.0	57.0	1	
	62	20	1	15.3	4.55	1 560	460	10 000	12 000	<b>2206S</b>	<b>2206SK</b>	35.0	57.0	1	
	72	19	1.1	21.4	6.30	2 190	645	8 500	11 000	<b>1306S</b>	<b>1306SK</b>	36.5	65.5	1	
	72	27	1.1	32.0	8.75	3 250	895	8 000	10 000	<b>2306S</b>	<b>2306SK</b>	36.5	65.5	1	
<b>35</b>	72	17	1.1	15.9	5.10	1 620	520	8 500	10 000	<b>1207S</b>	<b>1207SK</b>	41.5	65.5	1	
	72	23	1.1	21.7	6.60	2 210	675	8 500	10 000	<b>2207S</b>	<b>2207SK</b>	41.5	65.5	1	
	80	21	1.5	25.3	7.85	2 580	800	7 500	9 500	<b>1307S</b>	<b>1307SK</b>	43.0	72.0	1.5	
	80	31	1.5	40.0	11.3	4 100	1 150	7 100	9 000	<b>2307S</b>	<b>2307SK</b>	43.0	72.0	1.5	

1) Smallest allowable dimension for chamfer dimension  $r$ . 2) "K" indicates bearings have tapered bore with a taper ratio of 1: 12.

**Equivalent bearing load**  
**dynamic**

$$P_r = XF_r + YF_a$$

$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y <sub>1</sub>	0.65	Y <sub>2</sub>

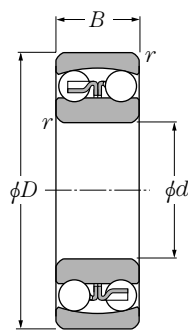
**static**

$$P_{or} = F_r + Y_o F_a$$

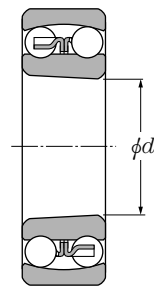
For values of  $e$ ,  $Y_1$ ,  $Y_2$  and  $Y_o$  see the table below.

Constant <i>e</i>	Axial load factors			Mass kg (approx.)
	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>o</sub>	
0.32	2.00	3.10	2.10	0.033
0.64	0.98	1.50	1.00	0.042
0.35	1.80	2.80	1.90	0.057
0.71	0.89	1.40	0.93	0.077
0.36	1.80	2.70	1.80	0.039
0.58	1.10	1.70	1.10	0.048
0.33	1.90	2.90	2.00	0.066
0.60	1.10	1.60	1.10	0.082
0.32	2.00	3.10	2.10	0.051
0.50	1.30	1.90	1.30	0.055
0.33	1.90	2.90	2.00	0.093
0.51	1.20	1.90	1.30	0.108
0.31	2.00	3.10	2.10	0.072
0.50	1.30	1.90	1.30	0.085
0.32	2.00	3.10	2.10	0.130
0.51	1.20	1.90	1.30	0.150
0.29	2.20	3.40	2.30	0.120
0.47	1.30	2.10	1.40	0.133
0.29	2.20	3.40	2.30	0.15
0.50	1.20	1.90	1.30	0.193
0.28	2.30	3.50	2.40	0.140
0.41	1.50	2.40	1.60	0.150
0.28	2.30	3.50	2.40	0.255
0.47	1.40	2.10	1.40	0.319
0.25	2.50	3.90	2.60	0.220
0.38	1.60	2.50	1.70	0.249
0.26	2.40	3.70	2.50	0.385
0.44	1.40	2.20	1.50	0.480
0.23	2.70	4.20	2.80	0.320
0.37	1.70	2.60	1.80	0.378
0.26	2.50	3.80	2.60	0.510
0.46	1.40	2.10	1.40	0.642

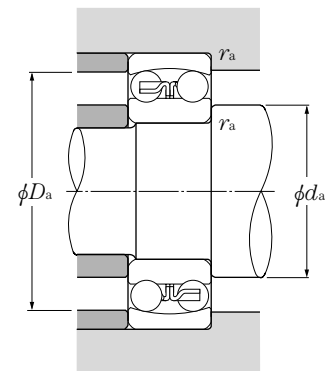




Cylindrical bore



Tapered bore



**d** 40 ~ 75mm

	Boundary dimensions				Basic load ratings				Limiting speeds		Bearing numbers		Abutment and fillet dimensions		
	mm				dynamic	static	dynamic	static	min <sup>-1</sup>		cylindrical bore	tapered <sup>2)</sup> bore	<i>d</i> <sub>a</sub> min	<i>D</i> <sub>a</sub> max	<i>r</i> <sub>as</sub> max
<i>d</i>	<i>D</i>	<i>B</i>	<i>r</i> <sub>s min<sup>1)</sup></sub>	<i>C</i> <sub>r</sub>	<i>C</i> <sub>or</sub>	<i>C</i> <sub>r</sub>	<i>C</i> <sub>or</sub>	grease	oil						
<b>40</b>	80	18	1.1	19.3	6.50	1 970	665	7 500	9 000	<b>1208S</b>	<b>1208SK</b>	46.5	73.5	1	
	80	23	1.1	22.4	7.35	2 290	750	7 500	9 000	<b>2208S</b>	<b>2208SK</b>	46.5	73.5	1	
	90	23	1.5	29.8	9.70	3 050	990	6 700	8 500	<b>1308S</b>	<b>1308SK</b>	48.0	82.0	1.5	
	90	33	1.5	45.5	13.5	4 650	1 380	6 300	8 000	<b>2308S</b>	<b>2308SK</b>	48.0	82.0	1.5	
<b>45</b>	85	19	1.1	22.0	7.35	2 240	750	7 100	8 500	<b>1209S</b>	<b>1209SK</b>	51.5	78.5	1	
	85	23	1.1	23.3	8.15	2 380	830	7 100	8 500	<b>2209S</b>	<b>2209SK</b>	51.5	78.5	1	
	100	25	1.5	38.5	12.7	3 900	1 300	6 000	7 500	<b>1309S</b>	<b>1309SK</b>	53.0	92.0	1.5	
	100	36	1.5	55.0	16.7	5 600	1 700	5 600	7 100	<b>2309S</b>	<b>2309SK</b>	53.0	92.0	1.5	
<b>50</b>	90	20	1.1	22.8	8.10	2 330	830	6 300	8 000	<b>1210S</b>	<b>1210SK</b>	56.5	83.5	1	
	90	23	1.1	23.3	8.45	2 380	865	6 300	8 000	<b>2210S</b>	<b>2210SK</b>	56.5	83.5	1	
	110	27	2	43.5	14.1	4 450	1 440	5 600	6 700	<b>1310S</b>	<b>1310SK</b>	59.0	101	2	
	110	40	2	65.0	20.2	6 650	2 060	5 000	6 300	<b>2310S</b>	<b>2310SK</b>	59.0	101	2	
<b>55</b>	100	21	1.5	26.9	10.0	2 750	1 020	6 000	7 100	<b>1211S</b>	<b>1211SK</b>	63.0	92.0	1.5	
	100	25	1.5	26.7	9.90	2 720	1 010	6 000	7 100	<b>2211S</b>	<b>2211SK</b>	63.0	92.0	1.5	
	120	29	2	51.5	17.9	5 250	1 820	5 000	6 300	<b>1311S</b>	<b>1311SK</b>	64.0	111	2	
	120	43	2	76.5	24.0	7 800	2 450	4 800	6 000	<b>2311S</b>	<b>2311SK</b>	64.0	111	2	
<b>60</b>	110	22	1.5	30.5	11.5	3 100	1 180	5 300	6 300	<b>1212S</b>	<b>1212SK</b>	68.0	102	1.5	
	110	28	1.5	34.0	12.6	3 500	1 290	5 300	6 300	<b>2212S</b>	<b>2212SK</b>	68.0	102	1.5	
	130	31	2.1	57.5	20.8	5 900	2 130	4 500	5 600	<b>1312S</b>	<b>1312SK</b>	71.0	119	2	
	130	46	2.1	88.5	28.3	9 000	2 880	4 300	5 300	<b>2312S</b>	<b>2312SK</b>	71.0	119	2	
<b>65</b>	120	23	1.5	31.0	12.5	3 150	1 280	4 800	6 000	<b>1213S</b>	<b>1213SK</b>	73.0	112	1.5	
	120	31	1.5	43.5	16.4	4 450	1 670	4 800	6 000	<b>2213S</b>	<b>2213SK</b>	73.0	112	1.5	
	140	33	2.1	62.5	22.9	6 350	2 330	4 300	5 300	<b>1313S</b>	<b>1313SK</b>	76.0	129	2	
	140	48	2.1	97.0	32.5	9 900	3 300	3 800	4 800	<b>2313S</b>	<b>2313SK</b>	76.0	129	2	
<b>70</b>	125	24	1.5	35.0	13.8	3 550	1 410	4 800	5 600	<b>1214S</b>	—	78.0	117	1.5	
	125	31	1.5	44.0	17.1	4 500	1 740	4 500	5 600	<b>2214S</b>	—	78.0	117	1.5	
	150	35	2.1	75.0	27.7	7 650	2 830	4 000	5 000	<b>1314S</b>	—	81.0	139	2	
	150	51	2.1	111	37.5	11 300	3 850	3 600	4 500	<b>2314S</b>	—	81.0	139	2	
<b>75</b>	130	25	1.5	39.0	15.7	4 000	1 600	4 300	5 300	<b>1215S</b>	<b>1215SK</b>	83.0	122	1.5	
	130	31	1.5	44.5	17.8	4 550	1 820	4 300	5 300	<b>2215S</b>	<b>2215SK</b>	83.0	122	1.5	
	160	37	2.1	80.0	30.0	8 150	3 050	3 800	4 500	<b>1315S</b>	<b>1315SK</b>	86.0	149	2	
	160	55	2.1	125	43.0	12 700	4 400	3 400	4 300	<b>2315S</b>	<b>2315SK</b>	86.0	149	2	

1) Smallest allowable dimension for chamfer dimension *r*. 2) "K" indicates bearings have tapered bore with a taper ratio of 1: 12.

### Equivalent bearing load dynamic

$$P_r = X F_r + Y F_a$$

$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	$Y_1$	0.65	$Y_2$

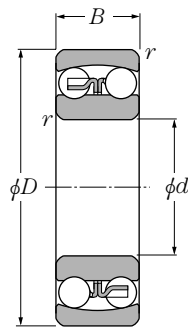
### static

$$P_{0r} = F_r + Y_0 F_a$$

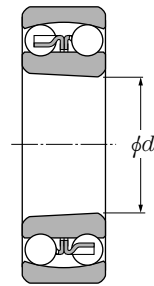
For values of  $e$ ,  $Y_1$ ,  $Y_2$  and  $Y_0$  see the table below.

Constant $e$	Axial load factors			Mass kg (approx.)
	$Y_1$	$Y_2$	$Y_0$	
0.22	2.8	4.3	2.9	0.415
0.33	1.9	3.0	2.0	0.477
0.24	2.6	4.0	2.7	0.715
0.43	1.5	2.3	1.5	0.889
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0.21	3.0	4.7	3.1	0.465
0.30	2.1	3.2	2.2	0.522
0.25	2.6	4.0	2.7	0.955
0.41	1.5	2.4	1.6	1.200
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0.21	3.1	4.7	3.2	0.525
0.28	2.2	3.4	2.3	0.564
0.23	2.7	4.2	2.8	1.250
0.42	1.5	2.3	1.6	1.580
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0.20	3.2	4.9	3.3	0.705
0.28	2.3	3.5	2.4	0.746
0.23	2.7	4.2	2.8	1.600
0.41	1.5	2.4	1.6	2.030
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0.18	3.4	5.3	3.6	0.900
0.28	2.3	3.5	2.4	1.030
0.23	2.8	4.3	2.9	2.030
0.40	1.6	2.4	1.6	2.570
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0.17	3.7	5.7	3.8	1.150
0.28	2.3	3.5	2.4	1.400
0.23	2.7	4.2	2.9	2.540
0.39	1.6	2.5	1.7	3.200
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0.18	3.4	5.3	3.6	1.300
0.26	2.4	3.7	2.5	1.520
0.22	2.8	4.4	3.0	3.190
0.38	1.7	2.6	1.8	3.900
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0.17	3.6	5.6	3.8	1.410
0.25	2.5	3.9	2.6	1.600
0.22	2.8	4.4	2.9	3.650
0.38	1.6	2.5	1.7	4.770

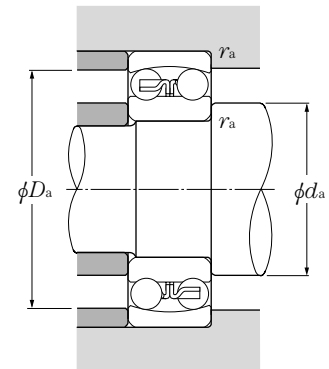




Cylindrical bore



Tapered bore



**d** 80 ~ 110mm

	Boundary dimensions				Basic load ratings				Limiting speeds		Bearing numbers		Abutment and fillet dimensions		
	mm				dynamic kN	static kN	dynamic kgf	static kgf	min <sup>-1</sup>		cylindrical bore	tapered <sup>2)</sup> bore	<i>d</i> <sub>a</sub> min	<i>D</i> <sub>a</sub> max	<i>r</i> <sub>as</sub> max
<i>d</i>	<i>D</i>	<i>B</i>	<i>r</i> <sub>s min</sub> <sup>1)</sup>	<i>C</i> <sub>r</sub>	<i>C</i> <sub>or</sub>	<i>C</i> <sub>r</sub>	<i>C</i> <sub>or</sub>	grease	oil						
<b>80</b>	140	26	2	40.0	17.0	4 100	1 730	4 000	5 000	<b>1216S</b>	<b>1216SK</b>	89	131	2	
	140	33	2	49.0	19.9	5 000	2 030	4 000	5 000	<b>2216S</b>	<b>2216SK</b>	89	131	2	
	170	39	2.1	89.0	33.0	9 100	3 400	3 600	4 300	<b>1316S</b>	<b>1316SK</b>	91	159	2	
	170	58	2.1	130	45.0	13 200	4 600	3 200	4 000	<b>2316S</b>	<b>2316SK</b>	91	159	2	
<b>85</b>	150	28	2	49.5	20.8	5 050	2 120	3 800	4 500	<b>1217S</b>	<b>1217SK</b>	94	141	2	
	150	36	2	58.5	23.6	5 950	2 400	3 800	4 800	<b>2217S</b>	<b>2217SK</b>	94	141	2	
	180	41	3	98.5	38.0	10 000	3 850	3 400	4 000	<b>1317S</b>	<b>1317SK</b>	98	167	2.5	
	180	60	3	142	51.5	14 500	5 250	3 000	3 800	<b>2317S</b>	<b>2317SK</b>	98	167	2.5	
<b>90</b>	160	30	2	57.5	23.5	5 850	2 400	3 600	4 300	<b>1218S</b>	<b>1218SK</b>	99	151	2	
	160	40	2	70.5	28.7	7 200	2 930	3 600	4 300	<b>2218S</b>	<b>2218SK</b>	99	151	2	
	190	43	3	117	44.5	12 000	4 550	3 200	3 800	<b>1318S</b>	<b>1318SK</b>	103	177	2.5	
	190	64	3	154	57.5	15 700	5 850	2 800	3 600	<b>2318S</b>	<b>2318SK</b>	103	177	2.5	
<b>95</b>	170	32	2.1	64.0	27.1	6 550	2 770	3 400	4 000	<b>1219S</b>	<b>1219SK</b>	106	159	2	
	170	43	2.1	84.0	34.5	8 550	3 500	3 400	4 000	<b>2219S</b>	<b>2219SK</b>	106	159	2	
	200	45	3	129	51.0	13 200	5 200	3 000	3 600	<b>1319S</b>	<b>1319SK</b>	108	187	2.5	
	200	67	3	161	64.5	16 400	6 550	2 800	3 400	<b>2319S</b>	<b>2319SK</b>	108	187	2.5	
<b>100</b>	180	34	2.1	69.5	29.7	7 100	3 050	3 200	3 800	<b>1220S</b>	<b>1220SK</b>	111	169	2	
	180	46	2.1	94.5	38.5	9 650	3 900	3 200	3 800	<b>2220S</b>	<b>2220SK</b>	111	169	2	
	215	47	3	140	57.5	14 300	5 850	2 800	3 400	<b>1320S</b>	<b>1320SK</b>	113	202	2.5	
	215	73	3	187	79.0	19 100	8 050	2 400	3 200	<b>2320S</b>	<b>2320SK</b>	113	202	2.5	
<b>105</b>	190	36	2.1	75.0	32.5	7 650	3 300	3 000	3 600	<b>1221S</b>	—	116	179	2	
	190	50	2.1	109	45.0	11 100	4 550	3 000	3 600	<b>2221S</b>	—	116	179	2	
	225	49	3	154	64.5	15 700	6 600	2 600	3 200	<b>1321S</b>	—	118	212	2.5	
	225	77	3	200	87.0	20 400	8 850	2 400	3 000	<b>2321S</b>	—	118	212	2.5	
<b>110</b>	200	38	2.1	87.0	38.5	8 900	3 950	2 800	3 400	<b>1222S</b>	<b>1222SK</b>	121	189	2	
	200	53	2.1	122	51.5	12 500	5 250	2 800	3 400	<b>2222S</b>	<b>2222SK</b>	121	189	2	
	240	50	3	161	72.5	16 400	7 300	2 400	3 000	<b>1322S</b>	<b>1322SK</b>	123	227	2.5	
	240	80	3	211	94.5	21 600	9 650	2 200	2 800	<b>2322S</b> <sup>3)</sup>	<b>2322SK</b>	123	227	2.5	

1) Smallest allowable dimension for chamfer dimension *r*. 2) "K" indicates bearings have tapered bore with a taper ratio of 1: 12.

3) Machined cage is standard for 2322S (K).

**Equivalent bearing load  
dynamic**

$$P_r = X F_r + Y F_a$$

$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	$Y_1$	0.65	$Y_2$

**static**

$$P_{or} = F_r + Y_o F_a$$

For values of  $e$ ,  $Y_1$ ,  $Y_2$  and  $Y_o$  see the table below.

Constant $e$	Axial load factors			Mass kg (approx.)
	$Y_1$	$Y_2$	$Y_o$	
0.16	3.9	6.0	4.1	1.73
0.25	2.5	3.9	2.7	1.97
0.22	2.9	4.5	3.1	4.31
0.39	1.6	2.5	1.7	5.54
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0.17	3.7	5.7	3.8	2.09
0.25	2.5	3.9	2.6	2.48
0.21	2.9	4.6	3.1	5.13
0.37	1.7	2.6	1.8	6.56
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0.17	3.8	5.8	3.9	2.55
0.27	2.4	3.7	2.5	3.13
0.22	2.8	4.3	2.9	5.94
0.38	1.7	2.6	1.7	7.76
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0.17	3.7	5.8	3.9	3.21
0.27	2.4	3.7	2.5	3.87
0.23	2.8	4.3	2.9	6.84
0.38	1.7	2.6	1.8	9.01
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0.17	3.6	5.6	3.8	3.82
0.27	2.4	3.7	2.5	4.53
0.24	2.7	4.1	2.8	8.46
0.38	1.7	2.6	1.8	11.6
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0.18	3.6	5.5	3.7	4.52
0.28	2.3	3.5	2.4	5.64
0.23	2.7	4.2	2.9	10.0
0.38	1.7	2.6	1.7	14.4
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0.18	3.7	5.7	3.9	5.33
0.28	2.2	3.5	2.3	6.64
0.22	2.8	4.4	3.0	12.0
0.37	1.7	2.6	1.8	17.4

