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ISO Tolerances

■ Shaft diameters

Dimensions in  $\mu\text{m}$  ( $1 \mu\text{m} = 0.001\text{mm}$ )

mm		e7	f6	f7	f8	g5	g6	h3	h4	h5	h6	h7	h8	h9	j6	js4	js5	js6	k5	k6	m5	m6	n5	n6	
Over	To																								
0	3	-14 -24	-6 -12	-6 -16	-6 -20	-2 -6	-2 -8	0 -2	0 -3	0 -4	0 -6	0 -10	0 -14	0 -25	+4 -2	$\pm 1.5$	$\pm 2$	$\pm 3$	+4 0	+6 0	+6 +2	+8 +2	+8 +4	+10 +4	
3	6	-20 -32	-10 -18	-10 -22	-10 -28	-4 -9	-4 -12	0 -2.5	-4 -4	0 -5	0 -8	0 -12	0 -18	0 -30	+6 -2	$\pm 2$	$\pm 2.5$	$\pm 4$	+6 +1	+9 +1	+9 +4	+12 +4	+13 +8	+16 +8	
6	10	-25 -40	-13 -22	-13 -28	-13 -35	-5 -11	-5 -14	0 -2.5	0 -4	0 -6	0 -9	0 -15	0 -22	0 -36	+7 -2	$\pm 2$	$\pm 3$	$\pm 4.5$	+7 +1	+10 +1	+12 +6	+15 +6	+16 +10	+19 +10	
10	18	-32 -50	-16 -27	-16 -34	-16 -43	-6 -14	-6 -17	0 -3	0 -5	0 -8	0 -11	0 -18	0 -27	0 -43	+8 -3	$\pm 2.5$	$\pm 4$	$\pm 5.5$	+9 +1	+12 +1	+15 +7	+18 +7	+20 +12	+23 +12	
18	30	-40 -61	-20 -33	-20 -41	-20 -53	-7 -16	-7 -20	0 -4	0 -6	0 -9	0 -13	0 -21	0 -33	0 -52	+9 -4	$\pm 3$	$\pm 4.5$	$\pm 6.5$	+11 +2	+15 +1	+17 +8	+21 +8	+24 +15	+28 +15	
30	50	-50 -75	-25 -41	-25 -50	-25 -64	-9 -20	-9 -25	0 -4	0 -7	0 -11	0 -16	0 -25	0 -39	0 -62	+11 -8	$\pm 3.5$	$\pm 5.5$	$\pm 8$	+13 +2	+18 +2	+20 +9	+25 +9	+28 +17	+33 +17	
50	80	-60 -90	-30 -49	-30 -60	-30 -76	-10 -23	-10 -29	0 -5	0 -8	0 -13	0 -19	0 -30	0 -46	0 -74	+12 -7	$\pm 4$	$\pm 6.5$	$\pm 9.5$	+15 +2	+21 +2	+24 +11	+30 +11	+33 +20	+39 +20	
80	120	-72 -107	-36 -58	-36 -71	-36 -90	-12 -27	-12 -34	-6 -10	-6 -10	0 -15	0 -22	0 -35	0 -54	0 -87	+13 -9	$\pm 5$	$\pm 7.5$	$\pm 11$	+18 +3	+25 +3	+28 +13	+35 +13	+38 +23	+45 +23	

■ Bore diameters

Dimensions in  $\mu\text{m}$  ( $1 \mu\text{m} = 0.001\text{mm}$ )

Mm		E8	F7	F8	G7	H5	H6	H7	H8	H9	H10	J7	JS4	JS5	K5	K6	K7	M5	M6	M7	N5	P6	P7	R6	
Over	To																								
0	3	+28 +14	+16 +5	+20 +6	+12 +2	+4 0	+6 0	+10 0	+14 0	+25 0	+40 0	+4 -5	$\pm 1.5$	+2 -2	0 -4	0 -6	0 -10	-2 -6	-2 -8	-2 -12	-4 -8	-6 -12	-6 -16	-10 -16	
3	6	+38 +20	+22 +10	+28 +10	+16 +4	+5 0	+8 0	+12 0	+18 0	+30 0	+48 0	+6 -6	$\pm 2$	+2.5 -2.5	0 -5	+2 -6	+3 -9	-3 -8	-1 -9	0 -12	-7 -12	-9 -17	-8 -20	-12 -20	
6	10	+47 +25	+28 +13	+35 +13	+20 +5	+6 0	+9 0	+15 0	+22 0	+36 0	+58 0	+8 -7	$\pm 2.5$	+3 -3	+1 -5	+2 -7	+5 -10	-4 -10	-3 -12	0 -15	-8 -14	-12 -21	-9 -24	-16 -25	
10	18	+59 +32	+34 +16	+43 +16	+24 +6	+8 0	+11 0	+18 0	+27 0	+43 0	+70 0	+10 -8	$\pm 3$	+4 -4	+2 -6	+2 -9	+6 -12	-4 -12	-4 -15	0 -18	-9 -17	-15 -26	-11 -29	-20 -31	
18	30	+73 +40	+41 +20	+53 +20	+28 +7	+9 0	+13 0	+21 0	+33 0	+52 0	+84 0	+12 -9	$\pm 3.5$	+4.5 -4.5	+1 -8	+2 -11	+6 -15	-5 -14	-4 -17	0 -21	-12 -21	-18 -31	-14 -35	-24 -37	
30	50	+89 +50	+50 +25	+64 +25	+34 +9	+11 0	+16 0	+25 0	+39 0	+62 0	+100 0	+14 -11	$\pm 4$	+5.5 -5.5	+2 -9	+3 -13	+7 -18	-5 -16	-4 -20	0 -25	-13 -24	-21 -37	-17 -42	-29 -45	
50	80	+106 +60	+60 +30	+76 +30	+40 +10	+13 0	+19 0	+30 0	+46 0	+74 0	+120 0	+18 -12	$\pm 5$	+6.5 -6.5	+3 -10	+4 -15	+9 -21	-6 -19	-5 -24	0 -30	-15 -28	-26 -45	-21 -51	-35 -66	
80	120	+126 +72	+71 +36	+90 +36	+47 +12	+15 0	+22 0	+35 0	+54 0	+87 0	+140 0	+22 -13		+7.5 -7.5	+2 -13	+4 -18	+10 -25	-8 -23	-6 -28	0 -35	-18 -33	-30 -52	-24 -59	-44 -66	

**■ Hardness Conversion Table**

Rockwell Hardness			Vickers Hardness (HV)	Brinell Hardness (HB)		Shore Hardness (HS)
A Scale Load: 588.4N (HRA)	B Scale Load: 980.7N (HRB)	C Scale Load: 1471N (HRC)		Standard Ball	Tungsten Carbide Ball	
85.6	-	68	940	-	-	97
85.0	-	67	900	-	-	95
84.5	-	66	865	-	-	92
83.9	-	65	832	-	739	91
83.4	-	64	800	-	722	88
82.8	-	63	772	-	705	87
82.3	-	62	746	-	688	85
81.8	-	61	720	-	670	83
81.2	-	60	697	-	654	81
80.7	-	59	674	-	634	80
80.1	-	58	653	-	615	78
79.6	-	57	633	-	595	76
79.0	-	56	613	-	577	75
78.5	-	55	595	-	560	74
78.0	-	54	577	-	543	72
77.4	-	53	560	-	525	71
76.8	-	52	544	500	512	69
76.3	-	51	528	487	496	68
75.9	-	50	513	475	481	67
75.2	-	49	498	464	469	66
74.7	-	48	484	451	455	64
74.1	-	47	471	442	443	63
73.6	-	46	458	432	432	62
73.1	-	45	446	421	421	60
72.5	-	44	434	409	409	58
72.0	-	43	423	400	400	57
71.5	-	42	412	390	390	56
70.9	-	41	402	381	381	55
70.4	-	40	392	371	371	54
69.9	-	39	382	362	362	52
69.4	-	38	372	353	353	51
68.9	-	37	363	344	344	50
68.4	(109.0)	36	354	336	336	49
67.9	(108.5)	35	345	327	327	48
67.4	(108.0)	34	336	319	319	47
66.8	(107.5)	33	327	311	311	46
66.3	(107.0)	32	318	301	301	44
65.8	(106.0)	31	310	294	294	43
65.3	(105.5)	30	302	286	286	42
64.7	(104.5)	29	294	279	279	41
64.3	(104.0)	28	286	271	271	41
63.8	(103.0)	27	279	264	264	40
63.3	(102.5)	26	272	258	258	38
62.8	(101.5)	25	266	253	253	38
62.4	(101.0)	24	260	247	247	37
62.0	100.0	23	254	243	243	36
61.5	99.0	22	248	237	237	35
61.0	98.5	21	243	231	231	35
60.5	97.8	20	238	226	226	34
-	96.7	(18)	230	219	219	33
-	95.5	(16)	222	212	212	32
-	93.9	(14)	213	203	203	31
-	92.3	(12)	204	194	194	29
-	90.7	(10)	196	187	187	28
-	89.5	(8)	188	179	179	27
-	87.1	(6)	180	171	171	26
-	85.5	(4)	173	165	165	25
-	83.5	(2)	166	158	158	24
-	81.7	(0)	160	152	152	24

**■ Material speed tool steel & Alloy tool steel**

JIS	ISO	AISI ASTM	BS	DIN VDEh	
SKH51	HS 6-5-2	M2	BM 2	S 6-5-2	1.3343
SKH55	HS 6-5-2-5	—	BM35	S 6-5-2-5	1.3243
SKS 3	—	—	—	—	1.2419
SKD11	—	D2	BD2	—	1.2379
SKD61	40CrMoV5	H13	BH13	X40CrMoV51	1.2344

**■ High-carbon chrome bearing steel**

JIS	ISO	AISI SAE	BS	DIN	
SUJ 2	B1or 100Cr6	52100	—	100Cr6	1.2067/1.3505

**■ Carbon steel for machine structural use & Chrome molybdenum steel**

JIS	ISO 683/1,10,11 <sup>s</sup>	AISI SAE	B S 970 Part1,3 BS EN 10083-1,2	DIN	
S45C	C45 C45E4 C45M2	1045 1046	C45 C45E C45R	C45 C45E C45R	1.0503 1.1191 1.1193
S50C	C50 C50E4 C50M2	1049	080M50 C50 C50E C50R	C50 C50E C50R	1.1213
S55C	C55 C55E4 C55M2	1055	070M55 C55 C55E C55R	C55 C55E C55R	1.0535/1.1203
SCM430	—	4131	—	—	1.7218
SCM435	34CrMo4 34CrMoS4	4137	34CrMo4 34CrMoS4	34CrMo4 34CrMoS4	1.7220
SCM440	42CrMo4 42CrMoS4	4140 4142	708M40 709M40 42CrMo4 42CrMoS4	42CrMo4 42CrMoS4	1.7225

**■ Stainless Steel**

JIS	ISO TR 15510 L.No	AISI	BS	DIN	
SUS 303	13	303	303S21	X10CrNiS18 9	1.4305
SUS 304	6	304	304S31	X5CrNi18 10	1.4301
SUS 430	41	430	430S17	X6Cr17	1.4016

**■ Aluminum and aluminum alloy extender**

JIS H4000:88	I S O 6361:90 I S O 209:89	ASTM B209M:95	BS EN485-2:95 BS EN573-3:95	DIN EN485-2:95 DIN EN573-3:94
A5052P	AlMg2.5	5052	EN AW-5052	EN AW-5052
A6061P	—	6061	EN AW-6061	EN AW-6061
A7075P	AlZn5.5MgCu	7075	EN AW-7075	EN AW-7075

Remarks: AISI (USA), ASTM (USA), BS (UK), DIN (Germany), ISO (International Standard), JIS (Japan)

**■ Metric & Inch Dimension Conversion Table**

mm	Inch	
	(Fraction)	(Decimal)
0	0	0.000
3.175	1/8	0.125
6.350	1/4	0.250
9.525	3/8	0.375
12.700	1/2	0.500
15.875	5/8	0.625
19.050	3/4	0.750
22.225	7/8	0.875
25.400	1	1.000
28.575	1-1/8	1.125
31.750	1-1/4	1.250
34.925	1-3/8	1.375
38.100	1-1/2	1.500
41.275	1-5/8	1.625
44.450	1-3/4	1.750
47.625	1-7/8	1.875
50.800	2	2.000
53.975	2-1/8	2.125
57.150	2-1/4	2.250
60.325	2-3/8	2.375
63.500	2-1/2	2.500
66.675	2-5/8	2.625
69.850	2-3/4	2.750
73.025	2-7/8	2.875
76.200	3	3.000
79.375	3-1/8	3.125
82.550	3-1/4	3.250
85.725	3-3/8	3.375
88.900	3-1/2	3.500
92.075	3-5/8	3.625
95.250	3-3/4	3.750
98.425	3-7/8	3.875
101.600	4	4.000
104.775	4-1/8	4.125
107.950	4-1/4	4.250
111.125	4-3/8	4.375
114.300	4-1/2	4.500
117.475	4-5/8	4.625
120.650	4-3/4	4.750
123.825	4-7/8	4.875

mm	Inch	
	(Fraction)	(Decimal)
127.000	5	5.000
130.175	5-1/8	5.125
133.350	5-1/4	5.250
136.525	5-3/8	5.375
139.700	5-1/2	5.500
142.875	5-5/8	5.625
146.050	5-3/4	5.750
149.225	5-7/8	5.875
152.400	6	6.000
155.575	6-1/8	6.125
158.750	6-1/4	6.250
161.925	6-3/8	6.375
165.100	6-1/2	6.500
168.275	6-5/8	6.625
171.450	6-3/4	6.750
174.625	6-7/8	6.875
177.800	7	7.000
180.975	7-1/8	7.125
184.150	7-1/4	7.250
187.325	7-3/8	7.375
190.500	7-1/2	7.500
193.675	7-5/8	7.625
196.850	7-3/4	7.750
200.025	7-7/8	7.875
203.200	8	8.000
206.375	8-1/8	8.125
209.550	8-1/4	8.250
212.725	8-3/8	8.375
215.900	8-1/2	8.500
219.075	8-5/8	8.625
222.250	8-3/4	8.750
225.425	8-7/8	8.875
228.600	9	9.000
231.775	9-1/8	9.125
234.950	9-1/4	9.250
238.125	9-3/8	9.375
241.300	9-1/2	9.500
244.475	9-5/8	9.625
247.650	9-3/4	9.750
250.825	9-7/8	9.875

mm	Inch	
	(Fraction)	(Decimal)
254.000	10	10.000
257.175	10-1/8	10.125
260.350	10-1/4	10.250
263.525	10-3/8	10.375
266.700	10-1/2	10.500
269.875	10-5/8	10.625
273.050	10-3/4	10.750
276.225	10-7/8	10.875
279.400	11	11.000
282.575	11-1/8	11.125
285.750	11-1/4	11.250
288.925	11-3/8	11.375
292.100	11-1/2	11.500
295.275	11-5/8	11.625
298.450	11-3/4	11.750
301.625	11-7/8	11.875
304.800	12	12.000
307.975	12-1/8	12.125
311.150	12-1/4	12.250
314.325	12-3/8	12.375
317.500	12-1/2	12.500
320.675	12-5/8	12.625
323.850	12-3/4	12.750
327.025	12-7/8	12.875
330.200	13	13.000
333.375	13-1/8	13.125
336.550	13-1/4	13.250
339.725	13-3/8	13.375
342.900	13-1/2	13.500
346.075	13-5/8	13.625
349.250	13-3/4	13.750
352.425	13-7/8	13.875
355.600	14	14.000
381.000	15	15.000
406.400	16	16.000
431.800	17	17.000
457.200	18	18.000
482.600	19	19.000
508.000	20	20.000
533.400	21	21.000