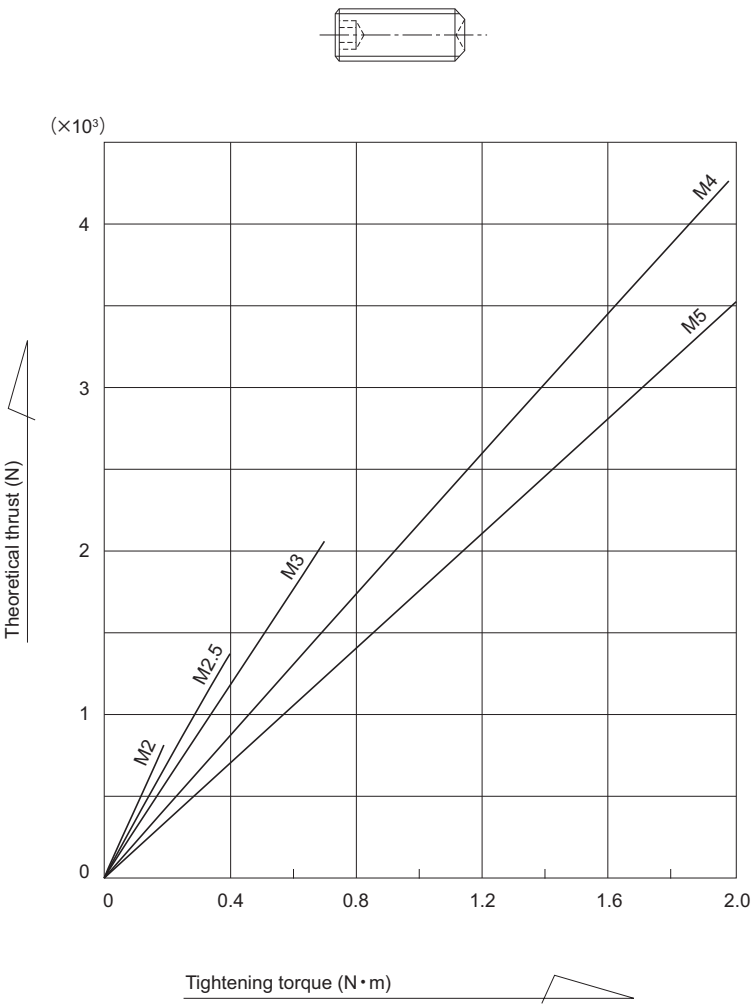
Appendix

THK General Catalog

Appendix Tables

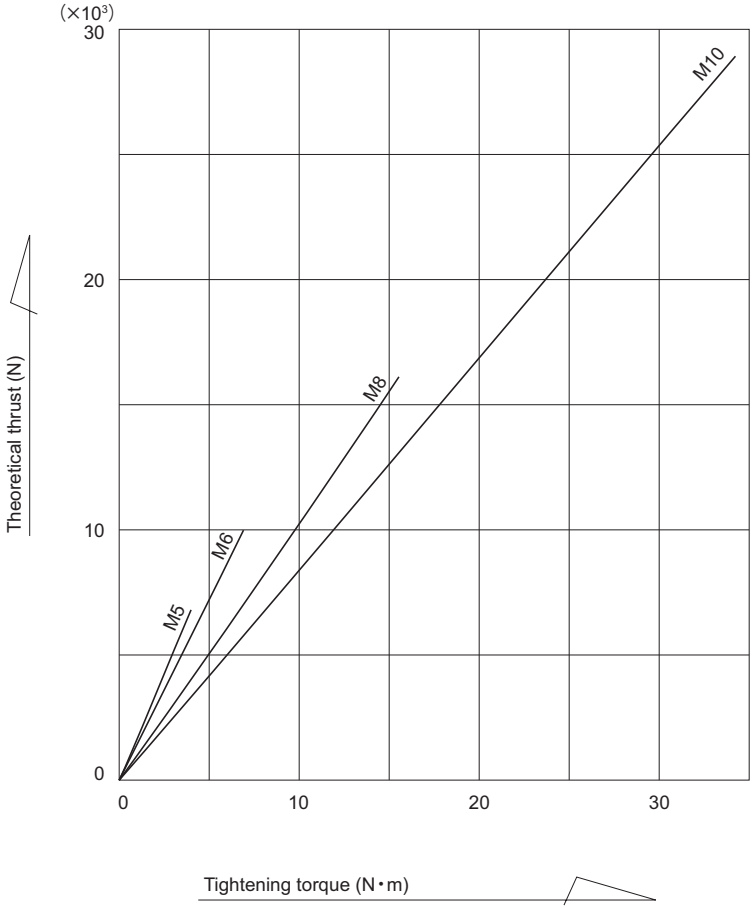
Tightening Torques and Theoretical Thrusts for Hexagonal Socket-head Setscrew

[M2 to M5, Cut-point]



Note) The theoretical thrust may vary depending on the lubrication and the conditions of the surfaces of the setscrew or the reference surface (μ = 0.13).

[M5 to M10, Cut-point]



Note) The theoretical thrust may vary depending on the lubrication and the conditions of the surfaces of the setscrew or the reference surface (μ = 0.13).

Dimensional Tolerances of the Shafts

Dimension classification (mm)		e	f		g		h						js		
Over	Or less	e6	f5	f6	g5	g6	h5	h6	h7	h8	h9	h10	js5	js6	js7
—	3	–14 –20	–6 –10	–6 –12	–2 –6	–2 –8	0 –4	0 –6	0 –10	0 –14	0 –25	0 –40	±2	±3	±5
3	6	–20 –28	–10 –15	–10 –18	–4 –9	–4 –12	0 –5	0 –8	0 –12	0 –18	0 –30	0 –48	±2.5	±4	±6
6	10	–25 –34	–13 –19	–13 –22	–5 –11	–5 –14	0 –6	0 –9	0 –15	0 –22	0 –36	0 –58	±3	±4.5	±7.5
10	14	–32 –43	–16 –24	–16 –27	–6 –14	–6 –17	0 –8	0 –11	0 –18	0 –27	0 –43	0 –70	±4	±5.5	±9
14	18														
18	24	–40 –53	–20 –29	–20 –33	–7 –16	–7 –20	0 –9	0 –13	0 –21	0 –33	0 –52	0 –84	±4.5	±6.5	±10.5
24	30														
30	40	–50 –66	–25 –36	–25 –41	–9 –20	–9 –25	0 –11	0 –16	0 –25	0 –39	0 –62	0 –100	±5.5	±8	±12.5
40	50														
50	65	–60 –79	–30 –43	–30 –49	–10 –23	–10 –29	0 –13	0 –19	0 –30	0 –46	0 –74	0 –120	±6.5	±9.5	±15
65	80														
80	100	–72 –94	–36 –51	–36 –58	–12 –27	–12 –34	0 –15	0 –22	0 –35	0 –54	0 –87	0 –140	±7.5	±11	±17.5
100	120														
120	140	–85 –110	–43 –61	–43 –68	–14 –32	–14 –39	0 –18	0 –25	0 –40	0 –63	0 –100	0 –160	±9	±12.5	±20
140	160														
160	180														
180	200	–100 –129	–50 –70	–50 –79	–15 –35	–15 –44	0 –20	0 –29	0 –46	0 –72	0 –115	0 –185	±10	±14.5	±23
200	225														
225	250														
250	280	–110 –142	–56 –79	–56 –88	–17 –40	–17 –49	0 –23	0 –32	0 –52	0 –81	0 –130	0 –210	±11.5	±16	±26
280	315														
315	355	–125 –161	–62 –87	–62 –98	–18 –43	–18 –54	0 –25	0 –36	0 –57	0 –89	0 –140	0 –230	±12.5	±18	±28.5
355	400														
400	450	–135 –175	–68 –95	–68 –108	–20 –47	–20 –60	0 –27	0 –40	0 –63	0 –97	0 –155	0 –250	±13.5	±20	±31.5
450	500														
500	560	–145 –189	–76 –106	–76 –120	–22 –52	–22 –66	0 –30	0 –44	0 –70	0 –110	0 –175	0 –280	±15	±22	±35
560	630														
630	710	–160 –210	–80 –115	–80 –130	–24 –59	–24 –74	0 –35	0 –50	0 –80	0 –125	0 –200	0 –320	±17.5	±25	±40
710	800														
800	900	–170 –226	–86 –126	–86 –142	–26 –66	–26 –82	0 –40	0 –56	0 –90	0 –140	0 –230	0 –360	±20	±28	±45
900	1000														
1000	1120	–195 –261	–98 –144	–98 –164	–28 –74	–28 –94	0 –46	0 –66	0 –105	0 –165	0 –260	0 –420	±23	±33	±52.5
1120	1250														
1250	1400	–220 –298	–110 –164	–110 –188	–30 –84	–30 –108	0 –54	0 –78	0 –125	0 –195	0 –310	0 –500	±27	±39	±62.5
1400	1600														

Unit: μm=0.001mm

	j		k			m		n		p		Dimension classification (mm)	
	j5	j6	k5	k6	k7	m5	m6	n5	n6	p5	p6	In excess of...	Or less
	±2	+4 –2	+4 0	+6 0	+10 0	+6 +2	+8 +2	+8 +4	+10 +4	+10 +6	+12 +6	—	3
	+3 –2	+6 –2	+6 +1	+9 +1	+13 +1	+9 +4	+12 +4	+13 +8	+16 +8	+17 +12	+20 +12	3	6
	+4 –2	+7 –2	+7 +1	+10 +1	+16 +1	+12 +6	+15 +6	+16 +10	+19 +10	+21 +15	+24 +15	6	10
	+5 –3	+8 –3	+9 +1	+12 +1	+19 +1	+15 +7	+18 +7	+20 +12	+23 +12	+26 +18	+29 +18	10	14
												14	18
	+5 –4	+9 –4	+11 +2	+15 +2	+23 +2	+17 +8	+21 +8	+24 +15	+28 +15	+31 +22	+35 +22	18	24
												24	30
	+6 –5	+11 –5	+13 +2	+18 +2	+27 +2	+20 +9	+25 +9	+28 +17	+33 +17	+37 +26	+42 +26	30	40
												40	50
	+6 –7	+12 –7	+15 +2	+21 +2	+32 +2	+24 +11	+30 +11	+33 +20	+39 +20	+45 +32	+51 +32	50	65
												65	80
	+6 –9	+13 –9	+18 +3	+25 +3	+38 +3	+28 +13	+35 +13	+38 +23	+45 +23	+52 +37	+59 +37	80	100
												100	120
	+7 –11	+14 –11	+21 +3	+28 +3	+43 +3	+33 +15	+40 +15	+45 +27	+52 +27	+61 +43	+68 +43	120	140
												140	160
												160	180
	+7 –13	+16 –13	+24 +4	+33 +4	+50 +4	+37 +17	+46 +17	+51 +31	+60 +31	+70 +50	+79 +50	180	200
												200	225
												225	250
	+7 –16	+16 –16	+27 +4	+36 +4	+56 +4	+43 +20	+52 +20	+57 +34	+66 +34	+79 +56	+88 +56	250	280
												280	315
	+7 –18	+18 –18	+29 +4	+40 +4	+61 +4	+46 +21	+57 +21	+62 +37	+73 +37	+87 +62	+98 +62	315	355
												355	400
	+7 –20	+20 –20	+32 +5	+45 +5	+68 +5	+50 +23	+63 +23	+67 +40	+80 +40	+95 +68	+108 +68	400	450
												450	500
	—	—	+30 0	+44 0	+70 0	+56 +26	+70 +26	+74 +44	+88 +44	+108 +78	+122 +78	500	560
												560	630
	—	—	+35 0	+50 0	+80 0	+65 +30	+80 +30	+85 +50	+100 +50	+123 +88	+138 +88	630	710
												710	800
	—	—	+40 0	+56 0	+90 0	+74 +34	+90 +34	+96 +56	+112 +56	+140 +100	+156 +100	800	900
												900	1000
	—	—	+46 0	+66 0	+105 0	+86 +40	+106 +40	+112 +66	+132 +66	+166 +120	+186 +120	1000	1120
												1120	1250
	—	—	+54 0	+78 0	+125 0	+102 +48	+126 +48	+132 +78	+156 +78	+194 +140	+218 +140	1250	1400
												1400	1600

Dimensional Tolerances of Housing Holes

Dimension classification (mm)		E		F			G		H					
In excess of...	Or less	E6	E7	F6	F7	F8	G6	G7	H5	H6	H7	H8	H9	H10
—	3	+20 +14	+24 +14	+12 +6	+16 +6	+20 +6	+8 +2	+12 +2	+4 0	+6 0	+10 0	+14 0	+25 0	+40 0
3	6	+28 +20	+32 +20	+18 +10	+22 +10	+28 +10	+12 +4	+16 +4	+5 0	+8 0	+12 0	+18 0	+30 0	+48 0
6	10	+34 +25	+40 +25	+22 +13	+28 +13	+35 +13	+14 +5	+20 +5	+6 0	+9 0	+15 0	+22 0	+36 0	+58 0
10	14	+43 +32	+50 +32	+27 +16	+34 +16	+48 +16	+17 +6	+24 +6	+8 0	+11 0	+18 0	+27 0	+43 0	+70 0
14	18													
18	24	+53 +40	+61 +40	+33 +20	+41 +20	+53 +20	+20 +7	+28 +7	+9 0	+13 0	+21 0	+33 0	+52 0	+84 0
24	30													
30	40	+66 +50	+75 +50	+41 +25	+50 +25	+64 +25	+25 +9	+34 +9	+11 0	+16 0	+25 0	+39 0	+62 0	+100 0
40	50													
50	65	+79 +60	+90 +60	+49 +30	+60 +30	+76 +30	+29 +10	+40 +10	+13 0	+19 0	+30 0	+46 0	+74 0	+120 0
65	80													
80	100	+94 +72	+107 +72	+58 +36	+71 +36	+90 +36	+34 +12	+47 +12	+15 0	+22 0	+35 0	+54 0	+87 0	+140 0
100	120													
120	140	+110 +85	+125 +85	+68 +43	+83 +43	+106 +43	+39 +14	+54 +14	+18 0	+25 0	+40 0	+63 0	+100 0	+160 0
140	160													
160	180													
180	200	+129 +100	+146 +100	+79 +50	+96 +50	+122 +50	+44 +15	+61 +15	+20 0	+29 0	+46 0	+72 0	+115 0	+185 0
200	225													
225	250													
250	280	+142 +110	+162 +110	+88 +56	+108 +56	+137 +56	+49 +17	+69 +17	+23 0	+32 0	+52 0	+81 0	+130 0	+210 0
280	315													
315	355	+161 +125	+182 +125	+98 +62	+119 +62	+151 +62	+54 +18	+75 +18	+25 0	+36 0	+57 0	+89 0	+140 0	+230 0
355	400													
400	450	+175 +135	+198 +135	+108 +68	+131 +68	+165 +68	+60 +20	+83 +20	+27 0	+40 0	+63 0	+97 0	+155 0	+250 0
450	500													
500	560	+189 +145	+215 +145	+120 +76	+146 +76	+186 +76	+66 +22	+92 +22	+30 0	+44 0	+70 0	+110 0	+175 0	+280 0
560	630													
630	710	+210 +160	+240 +160	+130 +80	+160 +80	+205 +80	+74 +24	+104 +24	+35 0	+50 0	+80 0	+125 0	+200 0	+320 0
710	800													
800	900	+226 +170	+260 +170	+142 +86	+176 +86	+226 +86	+82 +26	+116 +26	+40 0	+56 0	+90 0	+140 0	+230 0	+360 0
900	1000													
1000	1120	+261 +195	+300 +195	+164 +98	+203 +98	+263 +98	+94 +28	+133 +28	+46 0	+66 0	+105 0	+165 0	+260 0	+420 0
1120	1250													
1250	1400	+298 +220	+345 +220	+188 +110	+235 +110	+305 +110	+108 +30	+155 +30	+54 0	+78 0	+125 0	+195 0	+310 0	+500 0
1400	1600													

Unit: μm=0.001mm

	Js		J		K		M		N		P		Dimension classification (mm)	
	Js6	Js7	J6	J7	K6	K7	M6	M7	N6	N7	P6	P7	In excess of...	Or less
	±3	±5	+2 –4	+4 –6	0 –6	0 –10	–2 –8	–2 –12	–4 –10	–4 –14	–6 –12	–6 –16	—	3
	±4	±6	+5 –3	+6 –6	+2 –6	+3 –9	–1 –9	0 –12	–5 –13	–4 –16	–9 –17	–8 –20	3	6
	±4.5	±7.5	+5 –4	+8 –7	+2 –7	+5 –10	–3 –12	0 –15	–7 –16	–4 –19	–12 –21	–9 –24	6	10
	±5.5	±9	+6 –5	+10 –8	+2 –9	+6 –12	–4 –15	0 –18	–9 –20	–5 –23	–15 –26	–11 –29	10	14
													14	18
	±6.5	±10.5	+8 –5	+12 –9	+2 –11	+6 –15	–4 –17	0 –21	–11 –24	–7 –28	–18 –31	–14 –35	18	24
													24	30
	±8	±12.5	+10 –6	+14 –11	+3 –13	+7 –18	–4 –20	0 –25	–12 –28	–8 –33	–21 –37	–17 –42	30	40
													40	50
	±9.5	±15	+13 –6	+18 –12	+4 –15	+9 –21	–5 –24	0 –30	–14 –33	–9 –39	–26 –45	–21 –51	50	65
													65	80
	±11	±17.5	+16 –6	+22 –13	+4 –18	+10 –25	–6 –28	0 –35	–16 –38	–10 –45	–30 –52	–24 –59	80	100
													100	120
	±12.5	±20	+18 –7	+26 –14	+4 –21	+12 –28	–8 –33	0 –40	–20 –45	–12 –52	–36 –61	–28 –68	120	140
													140	160
													160	180
	±14.5	±23	+22 –7	+30 –16	+5 –24	+13 –33	–8 –37	0 –46	–22 –51	–14 –60	–41 –70	–33 –79	180	200
													200	225
													225	250
	±16	±26	+25 –7	+36 –16	+5 –27	+16 –36	–9 –41	0 –52	–25 –57	–14 –66	–47 –79	–36 –88	250	280
													280	315
	±18	±28.5	+29 –7	+39 –18	+7 –29	+17 –40	–10 –46	0 –57	–26 –62	–16 –73	–51 –87	–41 –98	315	355
													355	400
	±20	±31.5	+33 –7	+43 –20	+8 –32	+18 –45	–10 –50	0 –63	–27 –67	–17 –80	–55 –95	–45 –108	400	450
													450	500
	±22	±35	—	—	—	—	–26 –70	–26 –96	–44 –88	–44 –114	–78 –122	–78 –148	500	560
													560	630
	±25	±40	—	—	—	—	–30 –80	–30 –110	–50 –100	–50 –130	–88 –138	–88 –168	630	710
													710	800
	±28	±45	—	—	—	—	–34 –90	–34 –124	–56 –112	–56 –146	–100 –156	–100 –190	800	900
													900	1000
	±33	±52.5	—	—	—	—	–40 –106	–40 –145	–66 –132	–66 –171	–120 –186	–120 –225	1000	1120
													1120	1250
	±39	±62.5	—	—	—	—	–48 –126	–48 –173	–78 –156	–78 –203	–140 –218	–140 –265	1250	1400
													1400	1600

SI Unit Conversion Table

[Conversion to SI Units]

Amount	Name of unit	Symbol	Factor of conversion to SI	Name of SI unit	Symbol
Angle	Degree Minute Second	° ′ ″	$\pi/180$ $\pi/10800$ $\pi/648000$	Radian	rad
Length	Meter Angstrom X-ray unit Nautical mile	m Å xu n mile	1 10^{-10} $\approx 1.00208 \times 10^{-13}$ 1852	Meter	m
Area	Square meter Are Hectare	m^2 a ha	1 10^2 10^4	Square meter	m^2
Volume	Cubic meter Liter	m^3 ℓ (L)	1 10^{-3}	Cubic meter	m^3
Mass	Kilogram Ton Atomic-mass unit	kg t u	1 10^3 $\approx 1.66057 \times 10^{-27}$	Kilogram	kg
Time	Second Minute Hour Day	s min h d	1 60 3600 86400	Second	S
Speed	Meter per second Knot	m/s kn	1 1852/3600	Meter per second	m/s
Frequency	Cycle per second	s^{-1}	1	Hertz	Hz
Rotational speed	Revolution per minute	rpm	1	Per minute	min^{-1}
Angular velocity	Radian per minute	rad/s	1	Radian per minute	rad/s
Acceleration	Meter per second per second G	m/s^2 G	1 9.80665	Meter per second per second	m/s^2
Force	Weight kilogram Weight ton Dyne	kgf tf dyn	9.80665 9806.65 10^{-5}	Newton	N
Moment of force	Weight kilogram meter	kgf•m	9.80665	Newton meter	N-m
Stress and pressure	Weight kilogram per square meter Weight kilogram per square centimeter Weight kilogram per square millimeter	kgf/m^2 kgf/cm^2 kgf/mm^2	9.80665 9.80665×10^4 9.80665×10^6	Pascal	Pa
Pressure	Water column meter Mercury column meter Torr Atmosphere Bar	mH_2O mmHg Torr atm bar	9806.65 101325/760 101325/760 101325 10^5	Pascal	Pa
Energy	Erg IT calorie Weight kilogram meter Kilowatt hour Metric Horsepower hour Electron volt	erg cal_{IT} kgf-m kW•h PS•h eV	10^{-7} 4.1868 9.80665 3.600×10^6 $\approx 2.64779 \times 10^6$ $\approx 1.60219 \times 10^{-19}$	Joule	J
Power	Watt Metric Horsepower Kilogram force-meter	W PS kgf-m/s	1 ≈735.5 9.80665	Watt	W

Amount	Name of unit	Symbol	Factor of conversion to SI	Name of SI unit	Symbol
Viscosity	Poise Centipoise Kilogram force-second per square meter	P cP kgf-s/m^2	10^{-1} 10^{-3} 9.80665	Pascal second	Pa-s
Kinematic viscosity	Stokes Centistokes	St cSt	10^{-1} 10^{-6}	Square meter per second	m^2/s
Temperature	Degree	℃	+273.15	Kelvin	K
Radioactivity Dose Absorbed dose Equivalent dose	Curie Roentgen Rad Rem	Ci R rad rem	3.7×10^{10} 2.58×10^{-4} 10^{-2} 10^{-2}	Becquerel Coulomb per kilogram Gray Sievert	Bq C/kg Gy Sv
Magnetic flux	Maxwell	Mx	10^{-8}	Weber	Wb
Magnetic flux density	Gamma Gauss	γ Gs	10^{-9} 10^{-4}	Tesla	T
Magnetic-field intensity	Oersted	Oe	$10^3/4\pi$	Ampere per meter	A/m
Quantity of electricity Voltage potentialdifference Electrostatic capacity (Electric) resistance (Electric) conductance Inductance Current	Coulomb bolt Farad Ohm Siemens Henry Ampere	C V F Ω S H A	1 1 1 1 1 1 1	Coulomb bolt Farad Ohm Siemens Henry Ampere	C V F Ω S H A

[Comparative Table of SI, CGS System and Gravitational System Units]

Amount / Unit system	Length L	Mass M	Time T	Accelera-tion	Force	Stress	Pressure	Energy
SI	m	kg	s	m/s^2	N	Pa	Pa	J
CGS system	cm	g	s	Gal	dyn	dyn/cm^2	dyn/cm^2	erg
Gravitational system	m	$kgf\text{-}s^2/m$	s	m/s^2	kgf	kgf/m^2	kgf/m^2	kgf-cm

Amount / Unit system	Power	Tempera-ture	Viscosity	Kinematic viscosity	Magnetic flux	Magnetic flux density	Magnetic-field intensity
SI	W	K	Pa-s	m^2/s	Wb	T	A/m
CGS system	erg/s	℃	P	St	Mx	Gs	Oe
Gravitational system	kgf-m/s	℃	$kgf\text{-}s/m^2$	m^2/s	—	—	—

[Integer Multipliers of 10 of SI Units]

Number of digits multiplied to unit	Prefix		Number of digits multiplied to unit	Prefix	
	Name	Symbol		Name	Symbol
10^{18}	Exa	E	10^{-1}	Deci	d
10^{15}	Peta	P	10^{-2}	Centi	c
10^{12}	Tera	T	10^{-3}	Milli	m
10^{9}	Giga	G	10^{-6}	Micro	μ
10^{6}	Mega	M	10^{-9}	Nano	n
10^{3}	Kilo	k	10^{-12}	Pico	p
10^{2}	Hecto	h	10^{-15}	Femto	f
10	Deca	da	10^{-18}	Atto	a

[Hardness Conversion Table]

Rockwell	Vickers hardness	Brinell hardness HB		Rockwell hardness		Shore hardness
C-scale hardness HRC (load: 1471 N)	Hardness HV	Standard ball	Tungsten carbide ball	HRA A scale Load: 588.4N Brale indenter	HRB B scale Load: 980.7N Ball with diam of 1/16 in.	Hardness HS
68	940	—	—	85.6	—	97
67	900	—	—	85.0	—	95
66	865	—	—	84.5	—	92
65	832	—	739	83.9	—	91
64	800	—	722	83.4	—	88
63	772	—	705	82.8	—	87
62	746	—	688	82.3	—	85
61	720	—	670	81.8	—	83
60	697	—	654	81.2	—	81
59	674	—	634	80.7	—	80
58	653	—	615	80.1	—	78
57	633	—	595	79.6	—	76
56	613	—	577	79.0	—	75
55	595	—	560	78.5	—	74
54	577	—	543	78.0	—	72
53	560	—	525	77.4	—	71

Rockwell	Vickers hardness	Brinell hardness HB		Rockwell hardness		Shore hardness
C-scale hardness HRC (load: 1471 N)	Hardness HV	Standard ball	Tungsten carbide ball	HRA A scale Load: 588.4N Brale indenter	HRB B scale Load: 980.7N Ball with diam of 1/16 in.	Hardness HS
52	544	500	512	76.8	—	69
51	528	487	496	76.3	—	68
50	513	475	481	75.9	—	67
49	498	464	469	75.2	—	66
48	484	451	455	74.7	—	64
47	471	442	443	74.1	—	63
46	458	432	432	73.6	—	62
45	446	421	421	73.1	—	60
44	434	409	409	72.5	—	58
43	423	400	400	72.0	—	57
42	412	390	390	71.5	—	56
41	402	381	381	70.9	—	55
40	392	371	371	70.4	—	54
39	382	362	362	69.9	—	52
38	372	353	353	69.4	—	51
37	363	344	344	68.9	—	50
36	354	336	336	68.4	(109.0)	49
35	345	327	327	67.9	(108.5)	48
34	336	319	319	67.4	(108.0)	47
33	327	311	311	66.8	(107.5)	46
32	318	301	301	66.3	(107.0)	44
31	310	294	294	65.8	(106.0)	43
30	302	286	286	65.3	(105.5)	42
29	294	279	279	64.7	(104.5)	41
28	286	271	271	64.3	(104.0)	41
27	279	264	264	63.8	(103.0)	40
26	272	258	258	63.3	(102.5)	38
25	266	253	253	62.8	(101.5)	38
24	260	247	247	62.4	(101.0)	37
23	254	243	243	62.0	100.0	36
22	248	237	237	61.5	99.0	35
21	243	231	231	61.0	98.5	35
20	238	226	226	60.5	97.8	34
(18)	230	219	219	—	96.7	33
(16)	222	212	212	—	95.5	32
(14)	213	203	203	—	93.9	31
(12)	204	194	194	—	92.3	29
(10)	196	187	187	—	90.7	28
(8)	188	179	179	—	89.5	27
(6)	180	171	171	—	87.1	26
(4)	173	165	165	—	85.5	25
(2)	166	158	158	—	83.5	24
(0)	160	152	152	—	81.7	24