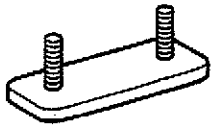


STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

6200F-01

	Mark	Class		Mark	Class
Hexagon head bolt	 Bolt head No. 4— 5— 6— 7— 8— 9— 10— 11—	4T	Hexagon flange bolt	 4 Protruding lines	9T
		5T	w/ washer hexagon bolt		
		6T	Hexagon flange bolt	 5 Protruding lines	10T
		7T	w/ washer hexagon bolt		
Hexagon head bolt	 Bolt head No. 8— 9— 10— 11—	8T	Hexagon flange bolt	 6 Protruding lines	11T
		9T	w/ washer hexagon bolt		
		10T	Hexagon flange bolt	 6 Protruding lines	11T
		11T	w/ washer hexagon bolt		
Hexagon flange bolt w/ washer hexagon bolt	 No mark	4T	Hexagon flange bolt w/ washer hexagon bolt	 No mark	4T
Hexagon head bolt	 2 Protruding lines	5T	Stud bolt	 No mark	4T
Hexagon flange bolt w/ washer hexagon bolt	 2 Protruding lines	6T	Stud bolt	 Grooved	6T
Hexagon head bolt	 3 Protruding lines	7T	Welded bolt		4T
Hexagon head bolt	 4 Protruding lines	8T			

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SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter mm	Pitch mm	Specified torque					
			Hexagon head bolt			Hexagon flange bolt		
			N-m	kgf-cm	ft-lbf	N-m	kgf-cm	ft-lbf
4T	6	1	5	55	48 in.-lbf	6	60	52 in.-lbf
	8	1.25	12.5	130	9	14	145	10
	10	1.25	26	260	19	29	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	74	760	55	84	850	61
	16	1.5	115	1,150	83	—	—	—
5T	6	1	6.5	65	56 in.-lbf	7.5	75	65 in.-lbf
	8	1.25	15.5	160	12	17.5	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1,050	76
	16	1.5	140	1,400	101	—	—	—
6T	6	1	8	80	69 in.-lbf	9	90	78 in.-lbf
	8	1.25	19	195	14	21	210	15
	10	1.25	39	400	29	44	440	32
	12	1.25	71	730	53	80	810	59
	14	1.5	110	1,100	80	125	1,250	90
	16	1.5	170	1,750	127	—	—	—
7T	6	1	10.5	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	105	1,050	76
	14	1.5	145	1,500	108	165	1,700	123
	16	1.5	230	2,300	166	—	—	—
8T	8	1.25	29	300	22	33	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	110	1,100	80	120	1,250	90
9T	8	1.25	34	340	25	37	380	27
	10	1.25	70	710	51	78	790	57
	12	1.25	125	1,300	94	140	1,450	105
10T	8	1.25	38	390	28	42	430	31
	10	1.25	78	800	58	88	890	64
	12	1.25	140	1,450	105	155	1,600	116
11T	8	1.25	42	430	31	47	480	35
	10	1.25	87	890	64	97	990	72
	12	1.25	155	1,600	116	175	1,800	130

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SERVICE DATA

Oil Pump

Body clearance	STD	0.07 – 0.15 mm (0.0028 – 0.0059 in.)
	Maximum	0.3 mm (0.012 in.)
Tip clearance	STD	0.11 – 0.14 mm (0.0043 – 0.0055 in.)
	Maximum	0.3 mm (0.012 in.)
Side clearance	STD	0.02 – 0.04 mm (0.0008 – 0.0016 in.)
	Maximum	0.1 mm (0.004 in.)
Pump body bushing inside diameter	Maximum	38.19 mm (1.5035 in.)
Stator shaft inside diameter	(Front side) Maximum	21.58 mm (0.8496 in.)
	(Rear side) Maximum	27.08 mm (1.0661 in.)

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3rd Coast Brake

Piston rod stroke	2.0 – 3.0 mm (0.079 – 0.118 in.)
Piston rod length	77.65 mm (3.057)
	78.40 mm (3.087)
	79.15 mm (3.116)
	79.90 mm (3.146)
	80.65 mm (3.175)

O/D Direct Clutch

Piston stroke		0.85 – 1.10 mm (0.033 – 0.043 in.)
Clutch return spring free length	STD	15.8 mm (0.622 in.)
Clutch drum bushing inside diameter	Maximum	27.11 mm (1.067 in.)
O/D planetary gear bushing	Maximum	11.27 mm (0.444 in.)
Planetary pinion gear thrust clearance	STD	0.02 – 0.60 mm (0.008 – 0.024 in.)
	Maximum	1.00 mm (0.039 in.)
Flange thickness	No.21	3.1 mm (0.122 in.)
	No.20	3.2 mm (0.128 in.)
	No.19	3.3 mm (0.130 in.)
	No.18	3.4 mm (0.134 in.)
	No.17	3.5 mm (0.138 in.)
	No.16	3.6 mm (0.142 in.)
	No.22	3.7 mm (0.146 in.)
	No.23	3.8 mm (0.151 in.)

O/D Brake

Piston return spring free length	STD	17.82 mm (0.702 in.)
Piston stroke	1UZ-FE:	1.40 – 1.70 mm (0.055 – 0.067 in.)
	2JZ-GE:	1.32 – 1.62 mm (0.052 – 0.064 in.)
Flange thickness	No.77	3.3 mm (0.130 in.)
	No.78	3.5 mm (0.138 in.)
	No.79	3.6 mm (0.142 in.)
	No.80	3.7 mm (0.146 in.)
	No.81	3.8 mm (0.150 in.)
	No.82	3.9 mm (0.154 in.)
	No.83	4.0 mm (0.157 in.)

Direct Clutch

Piston stroke	1UZ-FE:	0.50 – 0.80 mm (0.020 – 0.032 in.)
	2JZ-GE:	0.40 – 0.70 mm (0.016 – 0.028 in.)
Clutch piston return spring free length	STD	23.25 mm (0.915 in.)
Clutch drum bushing inside diameter	Maximum	53.97 mm (2.1248 in.)
Flange thickness	No.33	3.3 mm (0.130 in.)
	No.34	3.4 mm (0.134 in.)
	No.35	3.5 mm (0.138 in.)
	No.36	3.6 mm (0.142 in.)
	No.37	3.7 mm (0.146 in.)
	No.38	3.8 mm (0.150 in.)
	No.39	3.9 mm (0.154 in.)
	No.40	4.0 mm (0.157 in.)
	No.41	4.1 mm (0.161 in.)

Forward Clutch

Piston stroke	1UZ-FE:	0.70 – 1.00 mm (0.028 – 0.039 in.)
	2JZ-GE:	0.60 – 0.90 mm (0.024 – 0.035 in.)
Clutch drum bushing inside diameter	Maximum	20.08 mm (0.790 in.)
Flange thickness	No.61	3.0 mm (0.118 in.)
	No.60	3.2 mm (0.126 in.)
	No.45	3.4 mm (0.134 in.)
	No.62	3.6 mm (0.142 in.)
	No.44	3.8 mm (0.150 in.)
	No.42	4.0 mm (0.157 in.)

Multiple Disc Brake

Piston stroke	1UZ-FE:	0.70 – 1.00 mm (0.028 – 0.039 in.)
	2JZ-GE:	0.56 – 0.86 mm (0.022 – 0.034 in.)
Piston return spring free length	STD	36.8 mm (1.449 in.)
Flange thickness	No.36	3.6 mm (0.142 in.)
	No.37	3.7 mm (0.146 in.)
	No.38	3.8 mm (0.150 in.)
	No.39	3.9 mm (0.154 in.)
	No.40	4.0 mm (0.157 in.)
	No.41	4.1 mm (0.161 in.)

Front Planetary Gear

Planetary pinion gear thrust clearance	STD	0.2 – 0.6 mm (0.008 – 0.024 in.)
	Maximum	1.0 mm (0.0394 in.)

Front & Center Planetary Sun Gear

Sun gear bushing inside diameter	Maximum	24.79 mm (0.976 in.)
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Center Planetary Gear

Planetary gear bushing inside diameter	Maximum	41.31 mm (1.626 in.)
Planetary pinion gear thrust clearance	STD	0.2 – 0.6 mm (0.008 – 0.024 in.)
	Maximum	1.0 mm (0.039 in.)

2nd Brake

Flange thickness	No.21	2.1 mm (0.083 in.)
	No.23	2.3 mm (0.091 in.)
	No.25	2.5 mm (0.098 in.)
	No.27	2.7 mm (0.106 in.)
	No.29	2.9 mm (0.114 in.)
	No.31	3.1 mm (0.118 in.)

Rear Planetary Gear

Planetary pinion gear thrust clearance	STD	0.2 – 0.6 mm (0.008 – 0.024 in.)
	Maximum	1.0 mm (0.0394 in.)
Rear planetary ring gear inside bushing	Maximum	38.56 mm (1.518 in.)

1st & Reverse Brake

Pack clearance	1UZ-FE:	0.6 – 0.9 mm (0.024 – 0.035 in.)
	2JZ-GE:	0.5 – 0.8 mm (0.021 – 0.031 in.)
Piston return spring free length	STD	20.0 mm (0.787 in.)
Plate thickness	No.01	1.8 mm (0.071 in.)
	No.02	1.9 mm (0.075 in.)
	No.03	2.0 mm (0.079 in.)
	No.04	2.1 mm (0.083 in.)
	No.05	2.2 mm (0.087 in.)
	No.06	2.3 mm (0.090 in.)
	No.07	2.4 mm (0.094 in.)
	No.08	2.5 mm (0.098 in.)
	No.09	2.6 mm (0.102 in.)
	No.10	2.7 mm (0.106 in.)
	No.11	2.8 mm (0.110 in.)
	No.12	2.9 mm (0.114 in.)
	No.13	3.0 mm (0.118 in.)

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Output Shaft

Output shaft thrust play		1.63 – 2.89 mm (0.064 – 0.114 in.)
Output shaft inside bushing	Maximum	20.08 mm (0.791 in.)

Valve Body Spring

Spring		Free length/Outer diameter mm (in.)	Total No. of coils & (Color)
Upper valve body			
Lock-up relay valve		23.42 (0.922) / 5.86 (0.231)	12.25 (Red)
C-0 exhaust valve		24.25 (0.955) / 8.70 (0.343)	7.58 (Orange)
4-5 shift valve		25.50 (1.004) / 9.73 (0.383)	7.75 (Red)
Coast brake control valve		26.92 (1.060) / 8.70 (0.343)	10.53 (Green)
Secondary regulator valve		34.48 (1.357) / 9.22 (0.363)	13.5 (Red)
C-1 orifice control valve		37.13 (1.461) / 11.14 (0.439)	11.25 (White)
C-1 orifice control valve		21.50 (0.846) / 7.76 (0.306)	11.5 (None)
C-1 accumulator		78.16 (3.077) / 17.50 (0.689)	15.9 (Yellow)
Solenoid modulator valve		35.99 (1.417) / 8.30 (0.327)	13.8 (Light blue)
2-3 shift valve		25.5 (1.004) / 9.73 (0.383)	7.75 (Red)
B-3 control valve	1UZ-FE:	30.75 (1.211) / 8.70 (0.343)	9.9 (White)
	2JZ-GE:	26.05 (1.026) / 7.20 (0.283)	11.83 (Yellow)
B-3 control valve	1UZ-FE:	24.29 (0.956) / 7.70 (0.303)	8.13 (Blue)
	2JZ-GE:	19.79 (0.779) / 7.70 (0.303)	8.51 (Pink)
Lower valve No.1 body			
3-4 shift valve		25.50 (1.004) / 9.73 (0.383)	7.75 (Red)
1-2 shift valve		25.50 (1.004) / 9.73 (0.383)	7.75 (Red)
B-2 release control valve		24.25 (0.955) / 8.70 (0.343)	7.58 (Orange)
Primary regulator valve		39.78 (1.566) / 18.88 (0.743)	6.65 (Light green)
Lock-up control valve		20.87 (0.822) / 5.55 (0.219)	11.15 (Yellow)
Cut back valve		22.60 (0.890) / 8.13 (0.320)	8.0 (None)
C-0 control relay valve		20.30 (0.799) / 6.10 (0.240)	12.75 (None)
Accumulator control valve		27.47 (1.081) / 8.85 (0.348)	11.59 (Light green)
Solenoid relay valve		32.11 (1.264) / 8.80 (0.346)	8.6 (Beige)
Lower valve No.2 valve			
Reverse control valve		25.58 (1.007) / 8.64 (0.340)	8.75 (None)

Valve Body Key

Key	Hight mm (in.)	Width mm (in.)	Thickness mm (in.)
Upper valve body			
Lock-up relay valve	—	—	—
C-0 exhaust valve	8.5 (0.335)	5.0 (0.197)	3.2 (0.126)
4-5 shift valve	10.0 (0.394)	5.0 (0.197)	3.2 (0.126)
Coast brake control valve	15.0 (0.591)	ø 5.0 (0.197)	ø 5.0 (0.197)
Secondary regulator valve	10.0 (0.394)	5.0 (0.197)	3.2 (0.126)
C-1 orifice control valve	8.5 (0.335)	5.0 (0.197)	3.2 (0.126)
C-1 accumulator	36.5 (1.437)	—	3.2 (0.126)
Solenoid modulator valve	21.0 (0.827)	—	3.2 (0.126)
Check valve	10.0 (0.394)	5.0 (0.197)	3.2 (0.126)
2-3 shift valve	8.0 (0.315)	8.0 (0.315)	3.2 (0.126)
B-3 control valve	16.5 (0.650)	6.0 (0.236)	3.2 (0.126)
Lower valve No. 1 body			
3-4 shift valve	8.0 (0.315)	8.0 (0.315)	3.2 (0.126)
1-2 shift valve	8.0 (0.315)	8.0 (0.315)	3.2 (0.126)
B-2 release control valve	21.0 (0.827)	—	3.2 (0.126)
Primary regulator valve	—	—	3.2 (0.126)
Lock-up control valve	19.0 (0.748)	5.0 (0.197)	3.2 (0.126)
Cut back valve	21.0 (0.827)	—	3.2 (0.126)
C-0 control relay valve	8.5 (0.335)	5.0 (0.197)	3.2 (0.126)
Accumulator control valve	29.0 (1.142)	5.0 (0.197)	3.2 (0.126)
Solenoid relay valve	8.0 (0.315)	8.0 (0.315)	3.2 (0.126)
Lower valve No.2 body			
Reverse control valve	8.5 (0.335)	5.0 (0.197)	3.2 (0.126)

Accumulator spring

Spring	Free length/Outer diameter mm (in.)	Color
B ₂	80.91 (3.185) / 19.97 (0.786)	Pink & White
C ₂ 1UZ-FE:	Inside Outside	None
	35.80 (1.409) / 14.00 (0.551) 89.41 (3.520) / 19.70 (0.776)	
C ₂ 2JZ-GE:	Inside Outside	White
	35.80 (1.409) / 14.00 (0.551) 81.86 (3.223) / 19.70 (0.776)	
B ₀	69.4 (2.732) / 16.25 (0.640)	White
C ₀	65.6 (2.583) / 20.59 (0.811)	None

TORQUE SPECIFICATION

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Part tightened		N·m	kgf·cm	ft·lbf
Transmission housing x Transmission case	14 mm	34	345	25
	17 mm	57	580	42
Extension housing x Transmission case		34	345	25
Breather pipe x Transmission housing		5.4	55	48 in.·lbf
Packing lock pawl bracket x Transmission case		7.4	75	65 in.·lbf
O/D support x Transmission case		25	260	19
Oil pump x Transmission case		21	215	16
Oil pump body x Stator shaft		10	100	7
Valve body x Transmission case		10	100	7
Upper valve body x Lower No.1 valve body		6.4	65	56 in.·lbf
Lower valve No.1 body x Lower valve No.2 body		6.4	65	56 in.·lbf
Detent spring x Lower valve No.1 body		9.8	100	7
Oil strainer x Valve body		9.8	100	7
Oil pan x Transmission case		7.4	75	65 in.·lbf
Drain plug		20	205	15
Vehicle speed sensor x Transmission case		5.4	55	48 in.·lbf
O/D direct clutch vehicle speed sensor x Transmission case		5.4	55	48 in.·lbf
Transmission wiring stopper plate x Transmission case		5.4	55	48 in.·lbf
Shift solenoid valve No.1, No.3 x Lower valve No.1 body		6.4	65	56 in.·lbf
Shift solenoid valve No.2, No.4 x Lower valve No.2 body		9.8	100	7
No.1 Lock Plate x Lower valve No.1 body		6.4	65	56 in.·lbf
No.2 Lock Plate x lower valve No.2 body		9.8	100	7
Transmission output flange		126	1,280	92
Union x Transmission case		29	300	22
Elbow x Transmission case		29	300	22
Park/Neutral position switch	Bolt	13	130	9
	Nut	6.9	70	61 in.·lbf
Control shaft lever		16	160	12