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Section

1001

**GENERAL INFORMATION,
SPECIFICATIONS AND
SPECIAL TORQUES**

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



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SAE FASTENER TORQUE CHART




NOTE: Use these torques, unless special torques are specified. Values are for UNC and UNF thread fasteners, plated or unplated, as received from supplier. Fasteners can be dry or lubricated with normal engine oil. Values do not apply if graphite, moly-disulphide or other extreme pressure lubricant is used.

SAE Grade No.	2				5				8*			
Bolt head identification (See Note 1)					  				  			
Bolt Size	LB FT		Nm		LB FT		Nm		LB FT		Nm	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1/4	5	6	7	8	9	11	12	15	12	15	16	20
5/16	10	12	14	16	17	20.5	23	28	24	29	33	39
3/8	20	23	27	31	35	42	48	57	45	54	61	73
7/16	30	35	41	47	54	64	73	87	70	84	95	114
1/2	45	52	61	70	80	96	109	130	110	132	149	179
9/16	65	75	88	102	110	132	149	179	160	192	217	260
5/8	95	105	129	142	150	180	203	244	220	264	298	358
3/4	150	185	203	251	270	324	366	439	380	456	515	618
7/8	160	200	217	271	400	480	542	651	600	720	814	976
1	250	300	339	406	580	696	787	944	900	1080	1220	1464
1-1/8					800	880	1085	1193	1280	1440	1736	1953
1-1/4					1120	1240	1519	1681	1820	2000	2468	2712
1-3/8					1460	1680	1980	2278	2380	2720	3227	3688
1-1/2					1940	2200	2631	2983	3160	3560	4285	4827

NOTE 1: Bolt head identification marks as per grade. Manufacturing marks will vary. *Thick nuts must be used with Grade 8 bolts

METRIC FASTENER (ISO) TORQUE CHART

NOTE: Use these torques, unless special torques are specified. Values are for course thread fasteners, plated or unplated, as received from supplier. Fasteners can be dry or lubricated with normal engine oil. Values do not apply if graphite, moly-disulphide or other extreme pressure lubricant is used.

ISO Class No.	8.8				10.9				12.9			
Bolt head identification (See Note 1)												
Bolt Size	Nm		LB FT		Nm		LB FT		Nm		LB FT	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
M4	3	4	2	3	4	5	3	4	Because of the low ductility of these fasteners, the torque range is to be determined individually for each application. As a general rule, the torque ranges specified for grade 10.9 fasteners can be used satisfactorily on 12.9 fasteners. *M14 is not a preferred size			
M5	6.5	8	5	6	9.5	11	7	8				
M6	10.5	12	8	9	15	17.5	11	13				
M8	26	31	19	23	37	43	27	32				
M10	52	61	38	45	73	87	54	64				
M12	90	107	66	79	125	150	93	112				
*M14	144	172	106	127	200	245	149	179				
M16	217	271	160	200	310	380	230	280				
M20	434	515	320	380	610	730	450	540				
M24	675	815	500	600	1050	1275	780	940				
M30	1250	1500	920	1100	2000	2400	1470	1770				
M36	2175	2600	1600	1950	3500	4200	2580	3090				

NOTE 1: Bolt head identification marks as per grade. Manufacturing marks will vary

STANDARD TORQUE DATA FOR HYDRAULIC TUBES AND FITTINGS

TUBE NUTS FOR 37° FLARED FITTINGS								O-RING BOSS PLUGS, ADJUSTABLE FITTING LOCK NUTS, SWIVEL JIC - 37° SEATS			
SIZE	TUBING O.D.		THREAD SIZE	LB FT		Nm		LB FT		Nm	
	Inches	mm		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
4	1/4	6.4	7/16-20	9	12	12	16	6	10	8	14
5	5/16	7.9	1/2-20	12	15	16	20	10	15	14	20
6	3/8	9.5	9/16-18	21	24	29	33	15	20	20	27
8	1/2	12.7	3/4-18	35	40	47	54	25	30	34	41
10	5/8	15.9	7/8-14	53	58	72	79	35	40	47	54
12	3/4	19.1	1-1/16-12	77	82	104	111	60	70	81	95
14	7/8	22.2	1-3/16-12	90	100	122	136	70	80	95	109
16	1	25.4	1-5/16-12	110	120	149	163	80	90	108	122
20	1-1/4	31.8	1-5/8-12	140	150	190	204	95	115	129	156
24	1-1/2	38.1	1-7/8-12	160	175	217	237	120	140	163	190
32	2	50.8	2-1/2-12	225	240	305	325	250	300	339	407

Above torque figures are recommended for plain, cadmium or zinc plated fittings, dry or wet installations and swivel nuts either swaged or brazed. These torques are not recommended for tubes 1/2 inch (12.7 mm) O.D. and larger with wall thickness of 0.035 inch (0.889 mm) or less. The torque is specified for 0.035 inch (0.889 mm) wall tubes on each application individually.

CONVERSION FACTORS

U.S. Customary to SI (Metric) Units

SI (Metric) Units to U.S. Customary

	Multiply	By	To Obtain: Multiply	By	To Obtain
Area:	square foot (ft ²)	0.092 903	square meter (m ²)	10.763 91	square foot (ft ²)
	acre	0.404 686	hectar (ha)	2.471 05	acre
Force:	ounce force (ozf)	0.278 014	newton (N)	3.596 942	ounce force (ozf)
	pound force (lbf)	4.448 222	newton (N)	0.224 809	pound force (lbf)
Length:	inch (in)	25.4	millimetre (mm)	0.039 370	inch (in)
	foot (ft)	0.304 8	meter (m)	3.280 804	foot (ft)
	mile	1.609 344	kilometer (km)	0.621 371	mile
Mass:	pound (lb)	0.453 592	kilogram (kg)	2.204 622	pound (lb)
Mass/Area:	ton/acre	2241.702	kilogram per hectare (kg/ha)	0.000 446	ton/acre
Mass/Energy: (Fuel Consumption)	pound per brake horsepower- hour (lb/bhp-h)	608.277 4	gram per kilowatt hour (g/kwh)	0.001 644	pound per brake horsepower- hour (lb/bhp-h)
Mass/Volume: (Density)	pound per cubic yard (lb/yd ³) 0.593276	0.593 276	kilogram per cubic meter (kg/m ³)	1.685 555	pound per cubic yard (lb/yd ³)
Power:	horsepower - U.S. customary (hp - U.S. customary)	0.745 700	kilowatt (kw)	1.341 02	horsepower - U.S. customary (hp-U.S. customary)
Pressure:	pound per square inch (psi)	6.894 757	kilopascal (kPa)	0.145 038	pound per square inch (psi)
Temperature:	degrees Fahrenheit (°F)	TC = 5/9 (TF-32)	degree Celsius (°C)	TF = 1.8 TC + 32	degree Fahrenheit (°F)
Torque:	pound inch (lb in)	0.112 985	newton meter (Nm)	8.850 748	pound inch (lb in)
	pound foot (lb ft)	1.355 818	newton meter (Nm)	0.737 562	pound foot (lb ft)
Velocity (Speed):	miles per hour (mph)	1.609 344	kilometer per hour (km/h)	0.621 371	miles per hour (mph)
Volume:	cubic inch (in ³)	16.387 06	cubic centimeter (cm ³)	0.061 024	cubic inch (in ³)
	cubic foot (ft ³)	0.028 317	cubic meter (m ³)	35.314 66	cubic foot (ft ³)
	cubic yard (yd ³)	0.764 555	cubic meter (m ³)	1.307 950	cubic yard (yd ³)
	ounce-U.S. fluid (oz)	29.573 53	milliliter (ml)	0.033 814	ounce-U.S. fluid (oz)
	quart-U.S. liquid (qt)	0.946 353	liter (l)	1.056 688	quart-U.S. liquid (qt)
	quart-Imperial (qt)	1.136 523	liter (l)	0.879 877	quart-Imperial (qt)
	gallon-U.S. liquid (gal)	3.785 412	liter (l)	0.264 172	gallon-U.S. liquid (gal)
	gallon-Imperial (gal)	4.546 092	liter (l)	0.219 969	gallon-Imperial (gal)
Volume/Area:	bushel (U.S.) per acre	0.087 078	cubic meter per hectare (m ³ /ha)	11.484 000	bushel (U.S.) per acre
Volume/Time: (Flow)	gallon per minute (U.S.) (gpm U.S.)	3.785 412	liter per minute (l/m)	0.264 172	gallon per minute (U.S.) (gpm U.S.)
	gallon per minute (Imperial) (gpm Imp.)	4.546 092	liter per minute (l/m)	0.219 969	gallon per minute (Imperial) (gpm Imp.)
Horsepower:	U.S. customary hp	1.014	metric horsepower	0.986 3	U.S. customary hp
	net engine hp	0.815*	P.T.O. observed hp		
	net engine hp	0.70*	mox drawbar hp		

* Approximation based on observed tests

SPECIFICATIONS

Modular Solenoid Valve Resistance	7 to 10 ohms
Waterman Solenoid Valve Resistance	9.5 to 13.50 ohms
Seed Hopper Bottom Plate Clearance	1/16 inch
Corn and Beet Bottom Seed Plate Clearance.....	0.338 to 0.354 inch
Planter Unit Gauge Wheel Travel.....	3.2 to 3.4 inch
Seed Opener Disc Minimum OD	13-1/2 inch
Seed Shoe Bottom Minimum Width	
Front	7/8 Inch
Rear	1-1/8 Inch
Seed Opener Disc Gap	0 to 0.125 Inch
Furrow Firming Point Wear Limit	Replace if worn to less than 47/64 inch
Covering Disc.....	8 inch diameter
Opener Disc Maximum Warpage and Bearing Play	1/8 inch
Squeeze Pump Drive Chain Adjustment	1 inch deflection between sprockets
Planter Depth Zero Setting.....	1/32 inch
Relief Valve Pressure - In holding and sequence valves	2600 PSI
Pressure Switch - Normally Open - In LH Holding Valve	
Opening Pressure.....	2000 PSI
Closing Pressure	1900 to 2010 PSI
Flow Divider Relief Valve Pressure	525 to 575 PSI
Hillside operation Maximum, 4 and 6 Row Narrow Only	1100 PSI
Fertilizer Disc Maximum Warpage and Bearing Play	1/8 inch
Clearance Between Fertilizer Disc	0 to 3/32 Inch
Tool Bar to Ground Clearance (Except Horizontal Fold)	Approximately 20 inches

Cyclo Planters Only

Trailing Rigid Tool Bar Warpage	
Horizontal and Front Side	
4Row, 6Row and 8Row Narrow	1 inch
8Row Wide and 12Row	1-1/2 inch
Rear	0 inch
Seed Drum Drive Shaft Squareness to Firewall	3 and 9 o'clock measurements must be within 0.030 inch of each other.
	12 and 6 o'clock measurements must be within 0.060 inch of each other and within 0.090 of the 3 or 9 o'clock measurements.
Seed Drum to Manifold Clearance	0 to 0.060 inch
Seed Drum to Seed Leveling Bar Clearance (If Equipped)	3/8 to 1/2 inch
Seed Drum Alignment.....	2.62 inches from the centerline of the first set of seed drum holes to the firewall when the drum is pressurized to 10 to 12 ounces/in. ² .

Seed Drum Maximum Allowable Runout.....	0.20 inch
Blower Fan Hydraulic Motor Shaft Speed.....	3700 RPM minimum
Oil Cooler Back Pressure.....	60 to 100 PSI at 180°F at PTO speed
PTO Hydraulic Pumps	
Single Module Pumps (540 and 1000 RPM).....	8 gpm at 2000 PSI
Double Module Pumps (1000 RPM).....	17 to 19 gpm at 2000 PSI
Relief Valve Opening Pressure.....	2250 PSI

Cyclo Horizontal Fold Planters Only

Wing Frame Flex at Outer Row Unit	
12 Row Narrow.....	± 14.5 inch
16 Row Narrow.....	± 20 inch
Tool Bar to Ground Clearance.....	Aproximately 22 inches
Hobble Spring Length.....	9-1/2 inch
Steering Cylinder Anchor Bracket Position.....	90 degrees from toolbar
Wing Latch Spring Adjustment.....	1-13/16 inch from plug head to bolt head
Drive Wheel Spring Adjustment.....	1/4 inch from lock nut to end of spring rod
Marker Cylinder Spring Adjustment.....	1-9/16 inch from bolt head to lock nut
Wing Latch Limit Switch Adjustment.....	1/4 inch from headed pin to planter frame

SPECIAL TORQUES

	Decimal Value
Fertilizer Disc Mounting Nut.....	.80 to 90 lb ft
Wheel Hub Bearing Adjustment - Endwise Transport and Vertical Fold Drive/Carry Rolling Torque	12 lb in
Gauge Wheel Pivot Pins	150 to 160 lb ft
Opener Disk Mounting Bolts.....	150 to 160 lb ft
Blower Fan Rotor Shaft Bolt	28 to 31 lb ft
PTO Pump Drive Coupler Nut.....	53 to 60 lb ft
Flow Control Valve, Plug, Retainer and Cushion Relief	35 to 40 lb ft
Granular Chemical Control Gauge Retainer Screws	9 to 13 lb in
Hydraulic Alternating Marker Valve	
Hex Plug	72 to 144 lb in
Allen Plug.....	12 to 24 lb in
Spring Retainer.....	12 to 24 lb in
Chemical Meter Housing to Hopper Bolts	44 to 53 lb in
Hopper Air Gauge Screws.....	12 to 15 lb in
Wheel Lug Bolts	66 to 77 lb ft
Row Unit U-Bolts.....	80 to 90 lb ft
Row Unit Head Bracket U-Bolt Nuts	110 to 130 lb ft
Row Unit Parallel Linkage Lock Nuts	37 to 50 lb ft
Marker Attaching Bracket U-Bolt Nuts.....	110 to 130 lb ft
Relief Valve, Check Valve, Modular Solenoid Valve, Backflow Valve, Counterbalance Valve and Pressure Switch.....	35 to 40 lb ft
Waterman Solenoid Valve.....	20 lb ft
Plug.....	14 lb ft

Trailing Planters Only

Holding Valve and Sequence Valve to Flow Divider Mounting Bolts.....	19 to 20 lb ft
Flow Divider Tie Rod Nuts	60 lb ft
Electrical Module.....	35 to 40 lb ft
Carrying Wheel Bracket L-Bolts	180 to 210 lb ft
Wheel Bracket Tie Bolt.....	138 to 153 lb ft
Endwise Transport Bearing Block Bolts	570 to 630 lb ft

Mounted and Semi Mounted Planters Only

Decimal Value

Assist Wheel Cylinder Mounting Plate Bolts.....	290 to 320 lb ft
Assist Wheel U-Bolt Nuts.....	348 to 400 lb ft
Wheel Bracket U-Bolt Nuts.....	180 to 210 lb ft

Horizontal Fold Planters Only

Flow Divider Tie Bolt Nuts.....	75 lb ft
Solenoid Valve Nuts.....	5 to 6 lb ft
Wheel Brackets to Tool Bar	
L-Bolts	
Drive Wheels.....	180 to 210 lb ft
Outboard Wheels.....	300 to 330 lb ft
Wheel Bracket Tie Bolt Drive.....	140 to 155 lb ft
U-Bolts - Inboard Wheels (Center Section).....	420 to 470 lb ft
PTO Pump Drive Coupler Nut.....	53 to 60 lb ft
Lift and Steering Valve Mounting.....	20 to 25 lb ft

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