

SPECIFICATIONS

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WISCONSIN

DEUTZ

PETTER

ELECTRIC

**TECHNICAL
DATA**

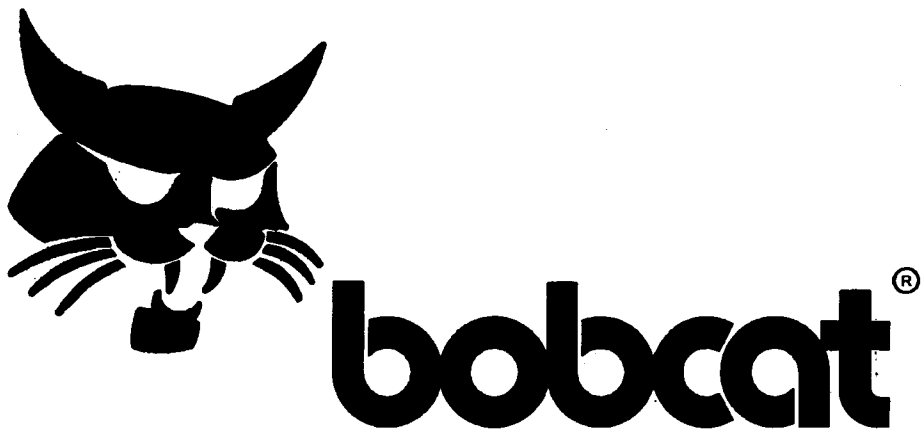
SPECIFICATION



ENGINE SPECIFICATIONS (WISCONSIN)

WISCONSIN

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8A TECHNICAL DATA

8A-1 ENGINE SPECIFICATIONS (Wisconsin)

All specifications are given in inches with metric parentheses.

Displacement	107.7 cu. in. (1,76 liters)
Bore	3.25 (82,55 liters)
Stroke	3.25 (82,55 liters)
Firing Order	1-3-4-2
Oil Capacity W/Filter	1 gal. (3,79 liters)
Maximum RPM (Full Load)	2800 RPM
Idle RPM	1000 RPM
Oil Pressure	4-5 PSI (27,6-34,5 kPa) (Normal)- 15 PSI (103,4 kPa) (Maximum)
Fuel Pump Pressure	2-3 PSI (13,8-20,7 kPa)

8A-1.1 Fuel Specifications

Always use clean fuel. Do not let the fuel tank become empty.

Type of Fuel Regular gasoline 85-90 octane

8A-1.2 Engine Oil

System:

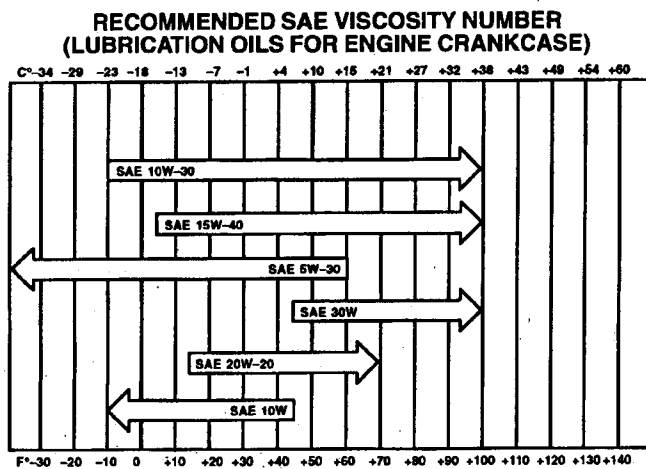
Check oil level after every 8 hours of operation (Check oil every 4 hours on new engine during the first 50 hours of operation).

Oil level must be maintained between the *add* and *full* marks on the dipstick.

Specifications:

Use a good quality detergent motor oil that meets the correct API service classification.

Use oil of proper SAE viscosity for expected temperature conditions at the time of starting, not for the highest temperature expected during the working day.



**TEMPERATURE RANGE ANTICIPATED BEFORE NEXT OIL CHANGE
(GASOLINE: USE API CLASSIFICATION SE)
(DIESEL: USE API CLASSIFICATION CD)**

Use summer recommendations in winter if machine is kept in warm building.

8A-1.3 Valve Mechanism

Valve Stem Clearance in Guide .....	.003 (0,076-0,127)
Maximum .....	.007 (0,178)
Valve Tappet Clearance:	
Intake .....	.008 (0,203)
Exhaust .....	.016 (0,406)

8A-1.4 Crankshaft

Crank Pin Diameter	1.875-1.876 (47,625-47,650)
Crank Pin Length	1.130-1.135 (28,702-28,829)
Crankshaft End Play (Cold) .....	.002-.004 (0,051-0,102)

8A-1.5 Idler Gear

Idler Gear to Shaft Collar Clearance0015-.0035 (0,0381-0,0889)
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8A-1.6 Connecting Rod

Connecting Rod to Crank Pin Clearance (Diameter)0012-.0033 (0,030-0,086)
Connecting Rod to Crank Pin Clearance (Side Clearance) .....	.009-.018 (0,229-0,457)
Connecting Rod Busing to Piston Pin Clearance ..	.0005-.0011 (0,013-0,028)

8A-1.7 Piston, Piston Pin, Piston Rings

Piston to Cylinder at Piston Skirt (Wide Skirt) .....	.0035-.0040 (0,089-0,102)
Piston Pin to Piston clearance .....	.0000-.0008 (0,000-0,020)
Piston Ring Gap .....	.010-.020 (0,254-0,508)
Piston Ring Side Clearance in Grooves:	
Top Ring .....	.002-.0035 (0,051-0,089)
2nd Ring .....	.001-.0025 (0,025-0,064)
3rd Ring .....	.001-.0025 (0,025-0,064)
Oil Ring .....	.0025-.004 (0,064-0,101)

8A-1.8 Ignition System

Breaker Point Gap .....	.018-.022 (0,458-0,559)
Spark Plug Gap .....	.030 (0,762)

8A-1.9 Distributor Advance Characteristics

VH4D The distributor has an automatic advance. The automatic advance is 11-1/2° in the distributor, equal to 23° on the crankshaft. The distributor is fully advanced at 1800 RPM engine speed or above.

VF4D The distributor has an automatic advance. The automatic advance is 13-1/2° in the distributor, equal to 27° on the crankshaft. The distributor is fully advanced at 1800 RPM engine speed or above.

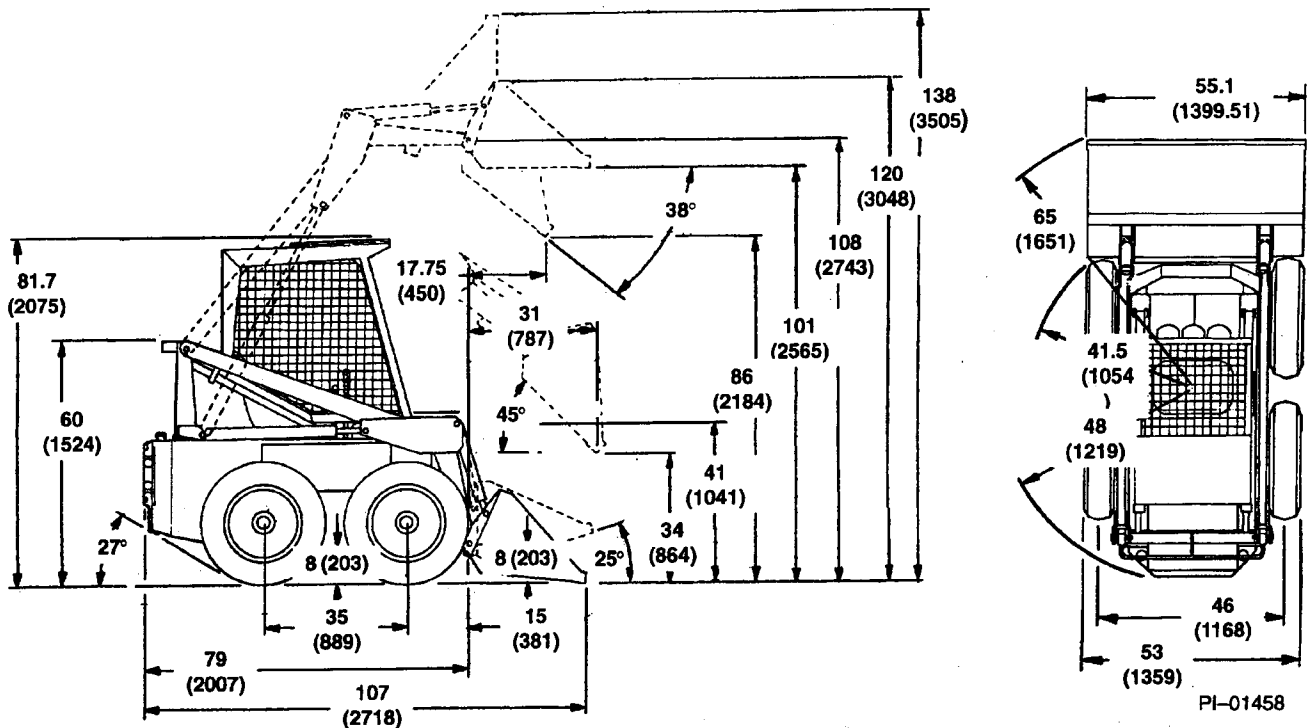
8A-1.10 Starter

the starter is the gear drive type and is 12 volt, negative ground.

8A-1.11 Engine Torque Specifications

Item	Ft.-Lbs.	Nm
Cylinder Head Bolts	22-24	30-33
Spark Plug	25-30	34-41
Manifold Nuts	18-23	24-31
Timing Gear Cover	14-18	19-24
Oil Pan Bolts	6-9	8-12
Connecting Rod Bolts	22-28	30-38
Cylinder Block	40-50	54-68
Main Bearing Plate Bolts	25-30	34-41
Flywheel Nut	40-60	54-81

600 LOADER (WISCONSIN GAS)



Dimensions are given for loader equipped with dirt bucket and may vary with other bucket types. All dimensions are shown in inches. Metric dimensions are given in millimeters enclosed by parentheses.

Where applicable, specifications conform to ICED & SAE standards and are subject to change without notice.

OPERATIONAL & PERFORMANCE

Operating Weight . . . (Gasoline)	3625 (1645 kg)	(LP Gas)	3695 (1677 kg)
Rated Operating Capacity	1000 lbs. (453,8 kg)		
Lift Capacity to Maximum Height	Gas 1700 lbs. (771,8 kg)		
		LP Gas	1700 lbs. (771,8 kg)
Tipping Load	Gas 1880 lbs. (853,3 kg)		
		LP Gas	1990 lbs. (903,4 kg)

Hydraulic Function Time:

Raise to Maximum Height	4.0 sec.
Lower from Maximum Height	2.5 sec.
Dumping Bucket	1.6 sec.
Rollback Bucket	1.6 sec.
Travel Speed	Infinitely variable to 5.7 MPH forward & reverse

Controls:

Vehicle	Forward, reverse & steering functions controlled by two hand levers
Travel Speed	Hand lever controlled, adjusted variable sheave.
Loader	Lift, tilt & auxiliary functions controlled by separate foot pedals.
Engine	Handle lever throttle, manual choke & key-type ignition-starter switch.

ENGINE

Make	Wisconsin
Model	VF4D
Fuel	Gasoline or LP Gas
Governed Flywheel Horsepower	25 (18,6 kw) @ 2400 RPM
Maximum Torque	57.5 ft.-lbs. (77,9 Nm) @ 1800 RPM
Number of Cylinders	4
Bore/Stroke	3.25x3.25 (82,5x82,5)
Displacement	107.7 cubic inches (1,8L)
Ignition	12 volt distributor
Cooling Medium	Air
Lubrication Filtration	Replacement element, full flow w/by-pass
Crankcase Ventilation	Internal breathing w/sealed carburetor
Air Cleaner	Replaceable dry cartridge type w/condition indicator

LOADER HYDRAULICS

Pump	Engine driven, gear type	
Minimum Pump Capacity	9.5 GPM (35,95L/M) @ 2400 RPM	
System Relief Setting	1700 PSI (11721 kPa)	
Filtration	Full flow on suction port of pump with by-pass, condition indication & 33 micron replaceable paper element	
Cylinders	Doubleacting w/ Teflon seals & wear rings	
Function	Lift	Tilt
Bore Diameter	2" (50,8 mm)	2" (50,8 mm)
Rod Diameter	1.25" (31,75 mm)	1" (25,4 mm)
Stroke	25" (635 mm)	16" (406,4 mm)
Valves	Open-center type with float detent on lift	

ELECTRICAL

Alternator	22 amp. enclosed belt driver.
Battery	70 amp.-hr. rating 12 volt
Starter	12 volt gear drive

DRIVE SYSTEM

Transmission	Variable sheave type
Clutches	4 (2 each side) single disc pressure lubricated
Primary Reductions	3.00:1
Secondary Reductions	5.00:1
Final Drive	#60H roller chain running in sealed oil bath (2.92:1 ratio)
Total Engine to Wheel Reduction	Variable from 37:1 to 100:1

CAPACITIES

Fuel	(Gasoline) 10 gal. (37,85 L) (LP Gas) 33 lbs. (14,98 kg)
Engine Lubricant Including Filter	4 qt. (3,8 L)
Hydraulic Reservoir & Final Drive Case	17 gal. (75,7 L)
Hydraulic System	20 gal. (75,7 L)

TIRES

Standard	Melroe special bar 7:00x15-6 ply steel cap nylon
Pressure	45-50 PSI (310,275-344,750 kPa)

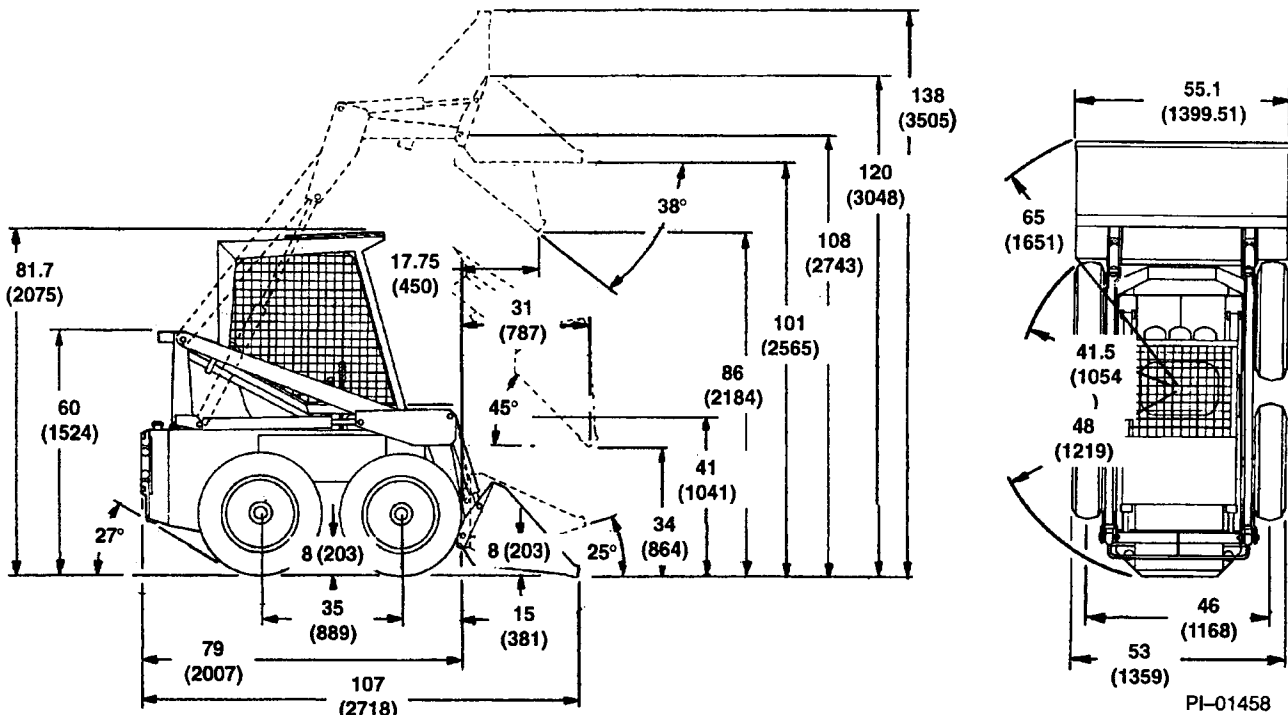
COUNTERWEIGHT

Standard Cast Grill	100 lbs. (45,4 kg)
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MACHINE WEIGHT (Less Bucket)

Shipping (Gasoline)	3170 lbs. (1439 kg)
Shipping (LP Gas)	3280 lbs. (1489 kg)

610 LOADER (WISCONSIN GAS)



Dimensions are given for loader equipped with dirt bucket and may vary with other bucket types. All dimensions are shown in inches. Metric dimensions are given in millimeters enclosed by parentheses.

Where applicable, specifications conform to IDEC & SAE standards and are subject to change without notice.

OPERATIONAL & PERFORMANCE

Operating Weight	4000 lbs. (1800 kg)
Rated Operating Capacity	1000 lbs. (453,6 kg)
Lift Capacity to Maximum Height	2190 lbs (990 kg)
Tipping Load	2100 lbs. (771,1 kg)
Hydraulic Function Time:	
Raise to Maximum Height	3.6 sec.
Lower from Maximum Height	2.2 sec.
Dumping Bucket	1.2 sec.
Rollback Bucket	1.2 sec.
Travel Speed	Infinitely variable to 6.6 MPH (10,6 kg/hr)forward & reverse

Controls:	
Vehicle	Forward, reverse & steering functions controlled by two hand levers
Travel Speed	Hand lever controlled, hydraulically adjusted variable sheave.
Loader	Lift, tilt & auxiliary functions controlled by separate foot pedals.
Engine	Handle lever throttle, manual choke & key-type ignition-starter switch.

ENGINE

Make	Wisconsin
Model	VF4D
Fuel	Gasoline or LP Gas
Governed Flywheel Horsepower	30 (22 kw) @ 2800 RPM
Maximum Torque	66.2 ft.-lbs. (90 Nm) @ 1800 RPM
Number of Cylinders	4
Bore/Stroke	3.25x3.25 in. (82,5x82,5 mm)
Displacement	107.7 cubic inches (1,8L)
Ignition	12 volt breaker
Cooling Medium	Air
Lubrication	Oil Spray
Lubrication Filtration	Replacement element, full flow w/by-pass
Crankcase Ventilation	Internal breathing w/sealed carburetor
Air Cleaner	Replaceable dry cartridge type w/condition indicator

LOADER HYDRAULICS

Pump	Engine driven, gear type
Minimum Pump Capacity	11 GPM (41,6 L/M) @ 2800 RPM
System Relief Setting	1700 PSI (11721 kPa)
Filtration	Full flow on suction side with by-pass, condition indication & 33 micron element
Cylinders	
Function	Doubleacting
Lift	
Tilt	
Bore Diameter	2" (50,8 mm)
Rod Diameter	1.25" (31,75 mm)
Stroke	25.90" (637,86 mm)
16.50" (419,10 mm)	
Valves	Open-center type with float detent on lift

ELECTRICAL

Alternator	Enclosed belt driven 22 amp.
Battery	12 volt 70 amp.-hr. rating
Starter	12 volt gear drive

DRIVE SYSTEM

Transmission	Variable sheave type
Clutches	4 (2 each side) single disc pressure lubricated
Primary Reductions	3.00:1 ratio
Secondary Reductions	5.00:1 ratio
Final Drive	#60H roller chain running in sealed oil bath
Total Engine to Wheel Reduction	Variable from 37:1 to 100:1 ratio

CAPACITIES

Fuel	(Gasoline) 11 gal (41,6 L) (LP Gas) 33 lbs. (15 kg)
Engine Lubricant Including Filter	4 qt. (3,8 L)
Hydraulic Reservoir & Final Drive Case	17 gal. (64,4 L)
Hydraulic System	20 gal. (75,7 L)

TIRES

Standard	7:00x15-6 ply steel cap nylon
Pressure	45-50 PSI (310,275-344,750 kPa)

COUNTERWEIGHT

Standard Cast Grill	100 lbs. (45,4 kg)
Ballast	320 lbs. (140 kg)

MACHINE WEIGHT (Less Attachments)

Shipping	Gasoline: 3575 lbs. (1621,6 kg)
	LP Gas: 3645 lbs. (1653,4 kg)

ENGINE SPECIFICATIONS (DEUTZ)

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8B-1 ENGINE SPECIFICATIONS (Deutz F2L 411)

All specifications are given in inches with metric parentheses.

Displacement	85.2 cu. in. (1,39 liters)
Bore	3.61 (91,95 L)
Stroke	4.13 (104,90 L)
Firing Order	2-1
Oil Capacity W/Filter	1 gal. 3,79 liters)

8B-1.2 Fuel System

Pressure of Fuel Lift Pump	4-5 PSI (27,5-34,5 kPa)
Make of Fuel Injection Pump	Bosch PFR2K70A414/2
Make of Fuel Injection Nozzle	DLA 152S533
Release Pressure of Injection Nozzle New-2560-2673 PSI (17649-18428 kPa)	
Used-2488-2602 PSI (17152-17938 kPa)	
Injection timing (Start of Injection)	25° B.T.D.C.
Distance from Injection Pump Mounting Flange to Camshaft Base Circle	
Including gasket and shims	3.248-3.256 (82,5-82,7 mm)

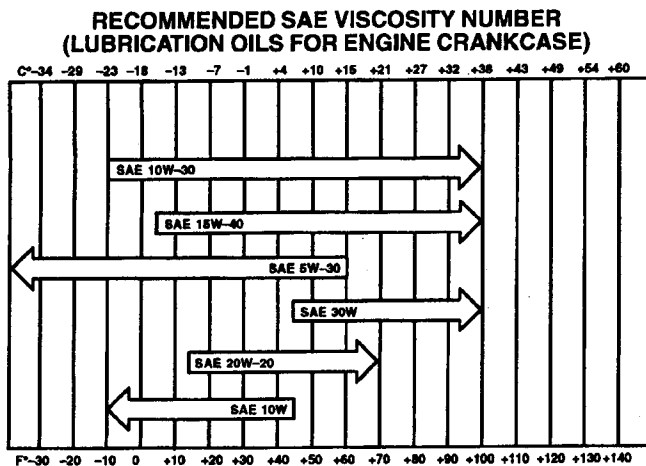
8B-1.2 Lubrication System

Oil Pressure	28.5 PSI (196,5 kPa) at 1500 RPM
End Clearance in Oil Pump Gear .....	.004 (.1 mm)

Check oil level after every 8 hours of operation. (Check oil every 4 hours on new engine during the first 50 hours of operation).

Oil level must be maintained between the *add* and *full* mark on the dipstick. Use a good quality detergent motor oil that meets the api service classification CC or CD.

Use oil of proper SAE viscosity for expected temperature conditions at the time of starting, not for the highest temperature expected during the working day.



**TEMPERATURE RANGE ANTICIPATED BEFORE NEXT OIL CHANGE
(GASOLINE: USE API CLASSIFICATION SE)
(DIESEL: USE API CLASSIFICATION CD)**

8B-1.3 Govern, Front Cover and Throttle

Distance from Governor Bearing Cup to Engine Block	3.37-3.38	(85,6-85,7)
End Play in Throttle Shaft	.008-.043	(0,2-1,1 mm)
Engine High Idle Speed	2674	RPM
Engine Low Idle Speed	950	RPM

8B-1.4 Cylinder Head and Valves

I.D. of Valve Guides	.315-.3155	(8,000-8,015 mm)
I.D. of Bore for Intake Valve Seat	1.378-1.379	(35,000-35,025)
I.D. of Bore for Exhaust Valve Seat	1.5354-1.5364	(39,000-39,025)
Valve Seat Width, Inlet	.040-.055	(1,0-1,4)
Valve Seat Width, Exhaust	.031-.033	(0,8-0,83)
Valve Seat Angle, Exhaust and Intake	44-1/2° ± 0° 10'	
Valve Stem Diameter, Intake	.3134-.314	(7,96-7,975)
Valve Stem Diameter, Exhaust	.3118-.3126	(7,92-7,94)
Maximum Distance Valves may be Recessed into Head	.020	(0,5 mm)
Maximum Distance Valves may Protrude from Head, Exhaust	.095	(2,42)
Valve Clearance, Cold	.006	(0,15 mm)
Minimum Free Length of Valve Springs	1.81	(46 mm)
Maximum Length of Head Bolts	9.114	(231,5)

8B-1.5 Cylinder, Piston and Connecting Rod

Cylinder Bore (Standard)	3.622-3.623	(92,000-92,022)
Maximum Wear Limit	.012	(0,3 mm)
Piston Diameter (Standard)	3.6197-3.620	(91,940-91,949)
Piston Diameter (1st oversize)	3.6394-3.6397	(92,440-92,449)
Piston Diameter (2nd oversize)	3.659-3.6594	(92,940-92,949)
Wrist Pin Bore	1.1812-1.1814	(30,002-30,007)
Wrist Pin Diameter	1.1809-1.1811	(29,996-30,00)
Piston Ring Side Clearance, Top Compression Ring		(0,088-0,112)
Piston Ring Side Clearance, 2nd & 3rd Compression Ring		(0,090-0,122)
Piston Ring Side Clearance, Oil Ring		.006 (0,15)
Ring End Gap, Compression	.014-.022	(0,35-0,55 mm)
Maximum Ring End Gap	.079	(2,0 mm)
Distance Between Piston & Head	.031-.039	(0,8-1,0)
Compression Pressure	355-575	PSI (2445-3960 kPa)

NOTE: The cylinders must be within 35 PSI (241 kPa) of each other.

I.D. of Hole in Connecting Rod for Wrist Pin Bushing	1.3386-1.3392	(34,000-34,016)
I.D. of Wrist Pin Bushing	1.1827-1.1841	(30,040-30,076)
I.D. of Hole in Connecting Rod for Crankshaft Bearing	2.2441-2.2448	(57,000-57,019)
Rod-to-Crankshaft Clearance	.002-.0044	(0,050-0,112)
Rod-to-Crankshaft (Maximum)	.012	(0,3)
Rod-to-Crankshaft Side Clearance	.006-.012	(0,170-0,271)

8B-1.6 Camshaft, Crankshaft, Bearings

Camshaft End Play	.006-.024	(0,15-0,60)
Maximum	.039	(1,0)
I.D. of Camshaft Bushing	1.8901-1.8923	(48,01-48,064)
Diameter of Crankpin, Standard	2.046-2.0468	(51,971-51,990)
Diameter of Crankpin, 1st Undersize	2.0264-2.0272	(51,471-51,490)
Diameter of Crankpin, 2nd Undersize	2.0067-1.0075	(50,971-50,990)
Diameter of Crankpin, 3rd Undersize	1.9870-1.9878	(50,471-50,490)
Width of Crankpin	1.3386-1.3401	(34,000-34,039)
Diameter of Crankshaft Main Journals		
Standard	2.4398-2.4406	(61,971-61,990)
Diameter of Crankshaft Main Journals		
1st Undersize	2.4201-2.4209	(61,471-61,490)
Diameter of Crankshaft Main Journals		
2nd Undersize	2.4004-2.4012	(60,971-60,990)
Diameter of Crankshaft Main Journals		
3rd Undersize	2.3807-2.3815	(60,471-60,490)
Crankshaft Center Journal, Standard	2.361-2.3618	(59,971-59,990)
Crankshaft Center Journal, 1st Undersize	2.3414-2.3421	(59,471-59,490)
Crankshaft Center Journal, 2nd Undersize	2.3217-2.3224	(58,971-58,990)
Crankshaft Center Journal, 3rd Undersize	2.302-2.3028	(58,471-58,490)
Maximum Out-of-Round Tolerance of Journals	.0027	(0,07)
End Play of Crankshaft	.008-.016	(0,2-0,4)
Hardness of Journals		Rc 53-60

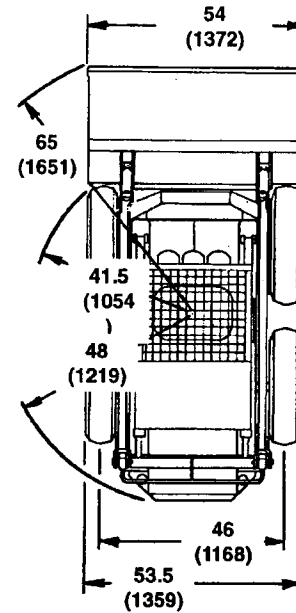
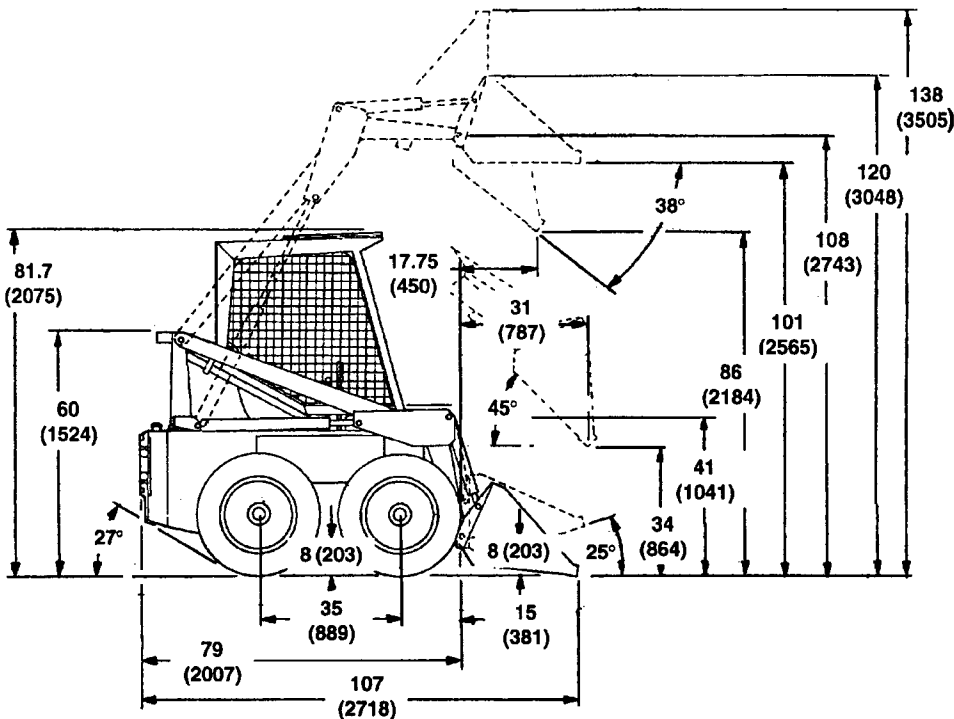
8B-1.7 Torque Specifications

ITEM	PRELOADING	TIGHTENING	TOTAL
Cylinder Head Bolts	21.5 ft.-lbs. (29 Nm)	30° 60° 60°	150°
Injector Hold-Down	21.5 ft.-lbs. (29 Nm)	60° 60° —	120°
Connecting Rod	21.5 ft.-lbs. (29 Nm)	30° 60° —	90°
Camshaft Bearing Flange	—	— — —	25 ft.-lbs. (34 Nm)
Bearing Support	21.5 ft.-lbs. (29 Nm)	30° 30° —	60°
Blower Mounting Bolts	—	— — —	25 ft.-lbs. (34 Nm)
V-Belt Pulley	21.5 ft.-lbs. (29 Nm)	90° — —	90°
Intake Manifold	—	— — —	11 ft.-lbs. (15 Nm)
Crankshaft Gear	21.5 ft.-lbs. (29 Nm)	30° 30° —	60°
Oil Suction Pipe	—	— — —	36 ft.-lbs. (49 Nm)
Flywheel	21.5 ft.-lbs. (29 Nm)	60° 30° —	90°
Rocker Arm Bolts	21.5 ft.-lbs. (29 Nm)	45° — —	45°
Balance Weight	21.5 ft.-lbs. (29 Nm)	30° 30° —	60°

8B-1.8 Special Tools (Also See Clark Tool Catalog P/N 6556519)

DEUTZ P/N	DESCRIPTION
100020	Compression checking tool
100030	Compression checking tool
101900	Angle of turn gauge for head bolts
101910	Angle of turn gauge for other bolts
110030	Tool for nozzle removal (use with 150800)
121100	Valve spring tool
122100	Valve service tools
122230	Valve service tools
122800	Valve service tools
122970	Valve service tools
123310	Valve service tools
123830	Valve service tools
124020	Valve service tools
130300	Piston ring tool
130510	Piston ring compressor
131000	Wrist pin mandrel
139000	Heater for piston
141000	Puller for end cover and gears
143620	Tool for installing camshaft bearings
150010	Tool for reconditioning cylinder face on crankcase
150800	Puller tool

600D LOADER (DEUTZ DIESEL)



PI-01458

Dimensions are given for loader equipped with dirt bucket and may vary with other bucket types. All dimensions are shown in inches. Metric dimensions are given in millimeters enclosed by parentheses.

Where applicable, specifications conform to ICED & SAE standards and are subject to change without notice.

OPERATIONAL & PERFORMANCE

Operating Weight	4235 (1921,0 kg)
Rated Operating Capacity	1000 lbs. (453,6 kg)
Lift Capacity to Maximum Height	1700 lbs. (771,1 kg)
Tipping Load	1830 lbs. (830,1 kg)
Hydraulic Function Time:	
Raise to Maximum Height	4.1 sec.
Lower from Maximum Height	2.6 sec.
Dumping Bucket	1.6 sec.
Rollback Bucket	1.6 sec.
Travel Speed	Infinitely variable to 4.4 MPH (7,1 km/hr) forward & reverse

Controls:	
Vehicle	Forward, reverse & steering functions controlled by two hand levers
Travel Speed	Hand lever controlled, hydraulically adjusted variable sheave.
Loader	Lift, tilt & auxiliary functions controlled by separate foot pedals.
Engine	Handle lever throttle, key-type starter switch & pushbutton preheater.

ENGINE

Make	Deutz
Model	F2L410
Fuel	No. 2 Diesel
Governed Flywheel Horsepower	24 (30,5 kw) @ 2700 RPM
Maximum Torque	47.4 ft.-lbs. (64,27 Nm) @ 2200 RPM
Number of Cylinders	2
Bore/Stroke	3.59x3.94 in. (91,186x100,076 mm)
Displacement	77.6 cubic inches (1,3L)
Cooling Medium	Air
Lubrication	Pressure
Lubrication Filtration	Replacement element, full flow w/by-pass
Crankcase Ventilation	Filtered Road Vent
Air Cleaner	Replaceable dry cartridge type w/condition indicator
Preheater	12 volt glow plug

LOADER HYDRAULICS

Pump	Engine driven, gear type	
Minimum Pump Capacity	8.7 GPM (33L/M) @ 2700 RPM	
System Relief Setting	1700 PSI (11721 kPa)	
Filtration	Full flow on suction side with by-pass, condition indicator & 33 micron replaceable element	
Cylinders	Doubleacting	
Function	Lift	Tilt
Bore Diameter	2.00" (50,80 mm)	2.00" (50,80 mm)
Rod Diameter	1.25" (31,75 mm)	1.00" (25,4 mm)
Stroke	25.90" (658,00 mm)	16.60" (422,00 mm)
Valves	Open-center type with float detent on lift	

ELECTRICAL

Alternator	Enclosed belt driver 22 amp.
Battery	12 volt 70 amp.-hr. rating
Starter	12 volt gear drive

DRIVE SYSTEM

Transmission	Variable sheave type
Clutches	4 (2 each side) single disc pressure lubricated
Primary Reductions	3.45:1 ratio
Secondary Reductions	5.00:1 ratio
Final Drive	#60H roller chain running in sealed oil bath
Total Engine to Wheel Reduction	Variable from 37:1 to 100:1 ratio

CAPACITIES

Fuel	10.5 gal (39,7 L)
Engine Lubricant Including Filter	4 qt. (3,8 L)
Hydraulic Reservoir & Final Drive Case	17 gal. (64,4 L)
Hydraulic System	20 gal. (75,7 L)

TIRES

Standard	7:00x15-6 ply nylon steel cap w/Metroe special bar tread
Pressure	45-50 PSI (310,275-344,750 kPa)

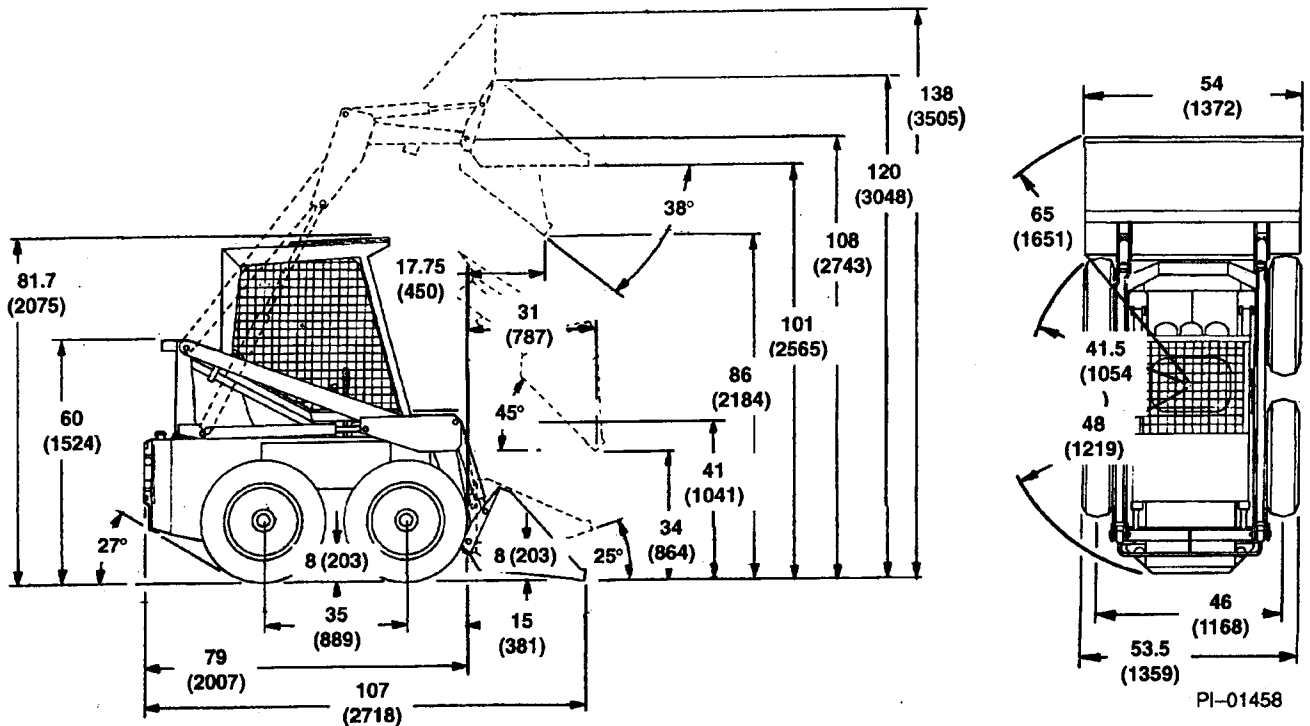
COUNTERWEIGHT

Standard Cast Grill	100 lbs. (45,4 kg)
Ballast (if Any)	320 lbs. (140 kg)

MACHINE WEIGHT (Less Bucket)

Shipping	3805 lbs. (1726,0 kg)
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611 LOADER (DEUTZ DIESEL)



Dimensions are given for loader equipped with dirt bucket and may vary with other bucket types. All dimensions are shown in inches. Metric dimensions are given in millimeters enclosed by parentheses.

Where applicable, specifications conform to ICED & SAE standards and are subject to change without notice.

OPERATIONAL & PERFORMANCE

Operating Weight	4200 (1900 kg)
Rated Operating Capacity	1000 lbs. (453,6 kg)
Lift Capacity to Maximum Height	1700 lbs. (771,8 kg)
Tipping Load	2100 lbs. (950 kg)
Hydraulic Function Time:	
Raise to Maximum Height	4.1 sec.
Lower from Maximum Height	2.6 sec.
Dumping Bucket	1.6 sec.
Rollback Bucket	1.6 sec.
Travel Speed	Infinitely variable to 6.4 MPH (10,3 km/hr) forward & reverse

Controls:

Vehicle	Forward, reverse & steering functions controlled by two hand levers
Travel Speed	Hand lever controlled, hydraulically adjusted variable sheave.
Loader	Lift, tilt & auxiliary functions controlled by separate foot pedals.
Engine	Handle lever throttle, key-type starter switch & pushbutton preheater.

ENGINE

Make	Deutz
Model	F2L411
Fuel	No. 2 Diesel
Governed Flywheel Horsepower	27.5 (20,5 kw) @ 2700 RPM
Maximum Torque	58 ft.-lbs. (79 Nm) @ 2000 RPM
Number of Cylinders	2
Bore/Stroke	3.62x4.13 in. (91,95x104,90 mm)
Displacement	85.2 cubic inches (1,396 L)
Cooling Medium	Air
Lubrication	Pressure
Lubrication Filtration	Replacement element, full flow w/by-pass
Crankcase Ventilation	Filtered Road Vent
Air Cleaner	Replaceable dry cartridge type w/condition indicator
Preheater	12 volt glow plug

LOADER HYDRAULICS

Pump	Engine driven, gear type	
Minimum Pump Capacity	8.7 GPM (32,1L) @ 2700 RPM	
System Relief Setting	1700 PSI (11721 kPa)	
Filtration	Full flow on suction side with by-pass, condition indicator & 33 micron replaceable paper element	
Cylinders	Doubleacting	
Function	Lift	Tilt
Bore Diameter	2.00" (50,80 mm)	2.00" (50,80 mm)
Rod Diameter	1.25" (31,75 mm)	1.00" (25,4 mm)
Stroke	25.90" (657,86 mm)	16.50" (419,10 mm)
Valves	Open-center type with float detent on lift	

ELECTRICAL

Alternator	Enclosed belt driver 22 amp.
Battery	12 volt 70 amp.-hr. rating
Starter	12 volt gear drive

DRIVE SYSTEM

Transmission	Variable sheave type
Clutches	4 (2 each side) single disc pressure lubricated
Primary Reductions	3.45:1 ratio
Secondary Reductions	5.00:1 ratio
Final Drive	#60H roller chain running in sealed oil bath
Total Engine to Wheel Reduction	Variable from 37:1 to 100:1 ratio

CAPACITIES

Fuel	7 gal (26 L)
Engine Lubricant Including Filter	4 qt. (3,8 L)
Hydraulic Reservoir & Final Drive Case	17 gal. (64,4 L)
Hydraulic System	20 gal. (75,7 L)

TIRES

Standard	7:00x15-6 ply nylon steel cap
Pressure	45-50 PSI (310,275-344,750 kPa)

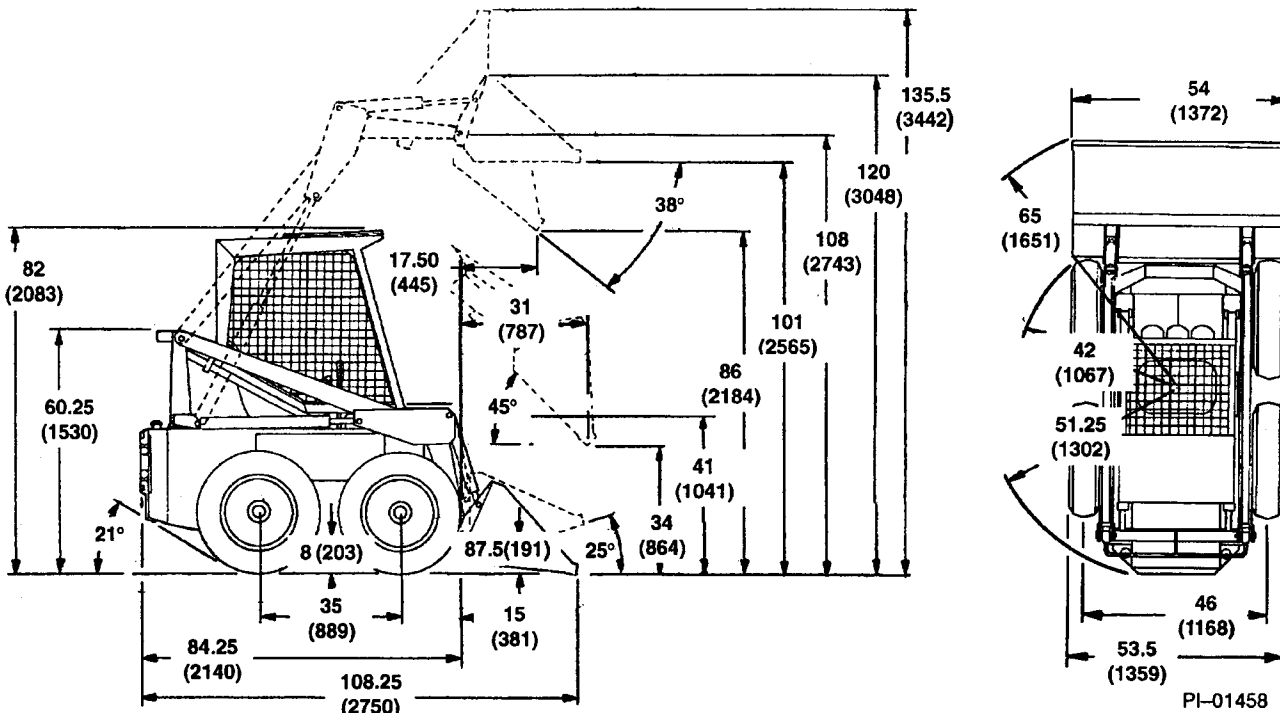
COUNTERWEIGHT

Standard Cast Grill	100 lbs. (45,4 kg)
Ballast (if Any)	320 lbs. (140 kg)

MACHINE WEIGHT (Less Bucket)

Shipping	3800 lbs. (1700 kg)
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611D LOADER (BUREAU OF MINES APPROVED)



Dimensions are given for loader equipped with dirt bucket and may vary with other bucket types. All dimensions are shown in inches. Metric dimensions are given in millimeters enclosed by parentheses.

Where applicable, specifications conform to ICED & SAE standards and are subject to change without notice.

OPERATIONAL & PERFORMANCE

Operating Weight	4326 (1962,0 kg)
Rated Operating Capacity	1000 lbs. (453,6 kg)
Lift Capacity to Maximum Height	2193 lbs. (994,7 kg)
Tipping Load	2560 lbs. (1161 kg)
Hydraulic Function Time:	
Raise to Maximum Height	3.6 sec.
Lower from Maximum Height	2.2 sec.
Dumping Bucket	1.2 sec.
Rollback Bucket	1.2 sec.
Travel Speed	Infinitely variable to 6.4 MPH (10 km/hr) forward & reverse

Controls:	
Vehicle	Forward, reverse & steering functions controlled by two hand levers
Travel Speed	Hand lever controlled, hydraulically adjusted variable sheave.
Loader	Lift, tilt & auxiliary functions controlled by separate foot pedals.
Engine	Handle lever throttle, key-type starter switch & pushbutton preheater.

ENGINE

Make	Deutz
Model	F2L411W
Fuel	No. 2 Diesel
Governed Flywheel Horsepower	22.5 (16,8 kw) @ 2700 RPM
Maximum Torque	53 ft.-lbs. (72 Nm) @ 2200 RPM
Number of Cylinders	2
Bore/Stroke	3.62x4.13 in. (91,9x104,90 mm)
Displacement	85.2 cubic inches (1,396 L)
Cooling Medium	Air
Lubrication	Pressure
Lubrication Filtration	Replacement element, full flow w/by-pass
Crankcase Ventilation	Filtered Road Vent
Air Cleaner	Replaceable dry cartridge type w/condition indicator
Preheater	12 volt glow plug

LOADER HYDRAULICS

Pump	Engine driven, gear type	
Minimum Pump Capacity	8.7 GPM (33,1 L/M @ 2700 RPM)	
System Relief Setting	1700 PSI (11721 kPa)	
Filtration	Full flow on suction side with by-pass, condition indicator & 33 micron replaceable paper element	
Cylinders	Doubleacting	
Function	Lift	Tilt
Bore Diameter	2.00" (50,80 mm)	2.00" (50,80 mm)
Rod Diameter	1.25" (31,75 mm)	1.00" (25,4 mm)
Stroke	25.90" (658,00 mm)	16.60" (421,64 mm)
Valves	Open-center type with float detent on lift	

ELECTRICAL

Alternator	Enclosed belt driver 22 amp.
Battery	12 volt 70 amp.-hr. rating
Starter	12 volt gear drive

DRIVE SYSTEM

Transmission	Variable sheave type
Clutches	4 (2 each side) single disc pressure lubricated
Primary Reductions	3.45:1 ratio
Secondary Reductions	5.00:1 ratio
Final Drive	#60H roller chain running in sealed oil bath
Total Engine to Wheel Reduction	Variable from 37:1 to 100:1 ratio

CAPACITIES

Fuel	8 gal (30 L)
Engine Lubricant Including Filter	4 qt. (3,8 L)
Hydraulic Reservoir & Final Drive Case	17 gal. (64,4 L)
Hydraulic System	20 gal. (75,7 L)

TIRES

Standard	10x16.5-6ply
Pressure	30-35 PSI (206,850-241,325 kPa)

COUNTERWEIGHT

Front Mounted	170 lbs. (77,1 kg)
Scrubber Muffler Filled	
Empty	

MACHINE WEIGHT (Less Attachments)

Shipping (W/Scrubber Muffler)	
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ENGINE SPECIFICATIONS (PETTER)

	Paragraph Number	Page Number
ENGINE SPECIFICATIONS	8C-1	8C-1
LOADER SPECIFICATIONS		8C-6

PETTER



8C-1 ENGINE SPECIFICATIONS (Petter)

All specifications are given in inches with metric parentheses.

Displacement	70 CID (1147 cc)
Bore	3.5 (88,9)
Stroke	3.625 (92,1)
Firing Order	1-2
Oil Capacity W/Filter	5-1/2 gal. (5,2 L)

8C-1.1 Fuel Specifications

Always use clean fuel. Do not let the fuel tank become empty.

Type of Fuel No. 2 Diesel Fuel

8C-1.2 Engine Oil

System:

Check oil level after every 8 hours of operation. (Check oil every 4 hours on new engine during the first 50 hours of operation).

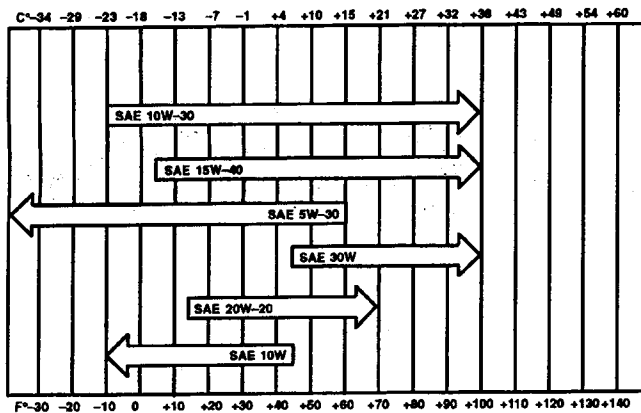
Oil level must be maintained between the *add* and *full* mark on the dipstick.

Specifications:

Use a good quality detergent motor oil that meets the correct API service classification SE.

Use oil of proper SAE viscosity for expected temperature conditions at the time of starting, not for the highest temperature expected during the working day.

RECOMMENDED SAE VISCOSITY NUMBER (LUBRICATION OILS FOR ENGINE CRANKCASE)



TEMPERATURE RANGE ANTICIPATED BEFORE NEXT OIL CHANGE
(GASOLINE: USE API CLASSIFICATION SE)
(DIESEL: USE API CLASSIFICATION CD)

Lubrication System

Oil Pressure 45 PSI (310,27 kPa)
Lubrication Filtration Replaceable element, full flow w/by-pass

8C-1.3 Cylinder Head

Valve Guide Bore Diameter 0.312-0.313 (7,924-7,950)
Valve Depth From Cylinder Head Face (New) 0.028-0.053 (0,711-1,346)

8C-1.4 Valve Mechanism

Valve Rocker Clearance (Cold) 0.004 (0,101)
Exhaust Valve Lift By Decompressor (Max.) 0.025 (0,635)
Bumping Clearance 0.032-0.037 (0,812-0,939)

8C-1.5 Camshaft

Camshaft End Float 0.003-0.015 (0,0762-0,381)
Intake Valve Opens 13.5° before TDC
Intake Valve Closes 38.5° after BDC
Exhaust Valve Opens 38.5° before BDC
Exhaust Valve Closes 13.5° after TDC

8C-1.6 Crankshaft

Crankshaft End Float (New) 0.0075-0.0185 (0,1905-0,4699)
Crankshaft End Float (Not To Exceed) 0.025 (0,635)
Crankshaft Out-Of-Round (Not to Exceed) 0.003 (0,0762)
Main Bearing Clearance (New) 0.0012-0.0028 (0,0304-0,07112)
Connecting Rod Bearing Clearance 0.0015-0.0030 (0,0381-0,0762)

Crankshaft Regrinding Diameters:

	Main Journal	Intermediate Journal	Crankpin
Standard	2.9995-2.990 (76,1863-76,1746)	2.7485-2.7480 (69,8119-69,7992)	2.1250-2.1245 (53,975-53,9623)
Undersize:			
0.010 (0,254)	2.9895-2.9890 (5,9333-75,9206)	2.7385-2.7380 (69,5579-69,5452)	2.1150-2.1145 (53,721-53,7083)
0.020 (0,508)	2.9795-2.9790 (75,6793-75,6666)	2.7285-2.7280 (69,3039-69,2912)	2.1050-2.1045 (53,467-53,4543)
0.030 (0,762)	2.9695-2.9690 (75,4253-75,4126)	2.7185-2.7180 (69,0499-69,0372)	2.0950-2.0945 (53,213-53,2003)
0.040 (1,016)	2.9595-2.9590 (75,1713-75,1586)	2.7085-2.7080 (68,7959-68,7832)	2.0850-2.0845 (52,959-52,9463)

8C-1.7 Connecting Rod

Connecting Rod Bearing Clearance 0.0025-0.0030 (0,0381-0,0762)
Connecting Rod Small Bushing Diameter
(Installed) 1.1253-1.1258 (28,5826-28,5953)

8C-1.8 Piston

Piston Ring Gap (New) 0.010-0.015 (0,254-0,381)
Piston Ring Gap (Not To Exceed) 0.040 (1,016)

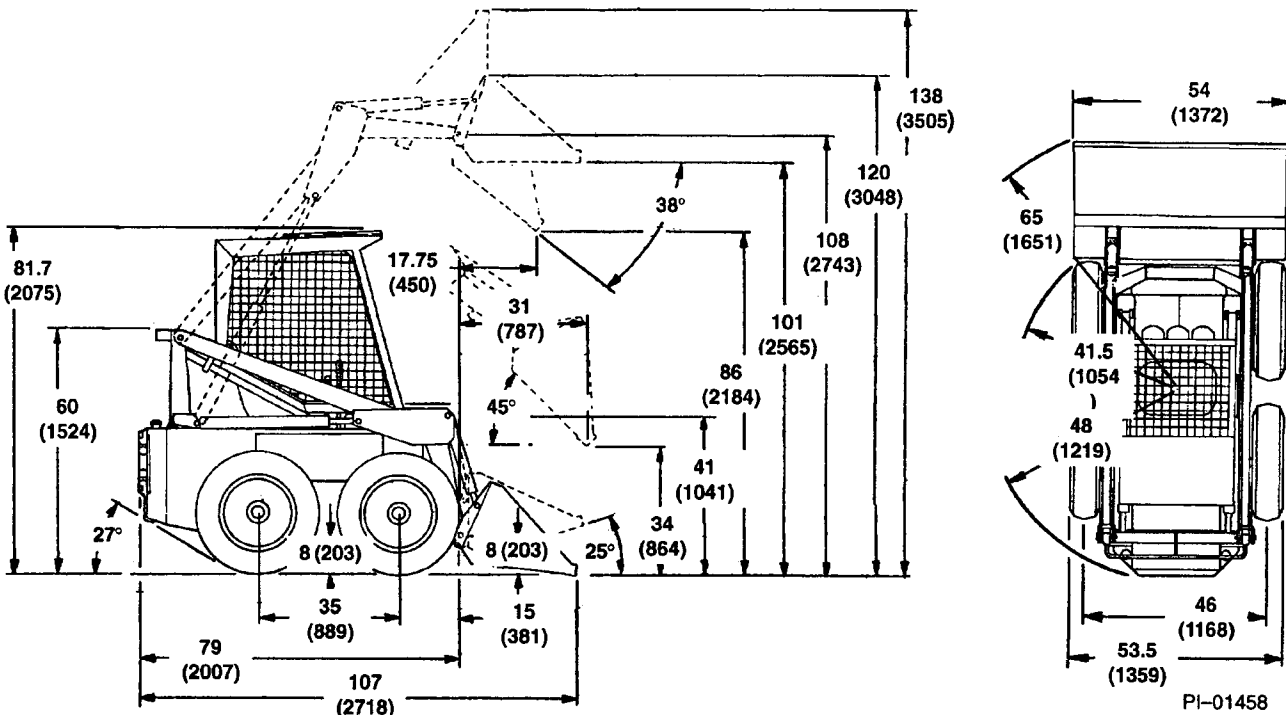
8C-1.9 Cylinder Block

Cylinder Bore Wear (Not To Exceed) 0.010-0.015 (0,254-0,381)
Cylinder Reboring Diameters:
Standard 3.500-3.501 (88,9-88,925)
Oversize:
0.20 (0,508) 3.5200-3.5210 (89,408-89,4334)
0.040 (1,016) 3.5400-3.5410 (89,916-89,9414)

8C-1.10 Torque Specifications

Connecting Rod Cap Bolts	40 ft.-lbs.	(54,233 Nm)
Cylinder Head Nuts	34 ft.-lbs.	(46,098 Nm)
Injector Mounting Stud Nuts	15 ft.-lbs.	(20,337 Nm)
Lubricating Oil Filter Bolt	10 ft.-lbs.	(13,558 Nm)
Fuel Filter Bolt	10 ft.-lbs.	(13,558 Nm)
Flywheel Bolt	35 ft.-lbs.	(47,454 Nm)
Crankshaft Gear Bolt	35 ft.-lbs.	(47,454 Nm)
Camshaft Gear Bolt	25 ft.-lbs.	(33,895 Nm)
Flywheel End Extension Shaft Bolt	25 ft.-lbs.	(33,895 Nm)
Camshaft Extension Shaft Bolt	35 ft.-lbs.	(47,454 Nm)
Rocker Support Nut	15 ft.-lbs.	(20,337 Nm)
Center Main Bearing Bolt	25 ft.-lbs.	(33,895 Nm)

600D LOADER (DEUTZ DIESEL)



Dimensions are given for loader equipped with dirt bucket and may vary with other bucket types. All dimensions are shown in inches. Metric dimensions are given in millimeters enclosed by parentheses.

Where applicable, specifications conform to ICED & SAE standards and are subject to change without notice.

OPERATIONAL & PERFORMANCE

Operating Weight	4255 (1930 kg)
Rated Operating Capacity	1000 lbs. (453,6 kg)
Lift Capacity to Maximum Height	1700 lbs. (771,8 kg)
Tipping Load	1830 lbs. (830,1 kg)
Hydraulic Function Time:	
Raise to Maximum Height	4.1 sec.
Lower from Maximum Height	2.7 sec.
Dumping Bucket	1.7 sec.
Rollback Bucket	1.7 sec.
Travel Speed	Infinitely variable to 5.7 MPH (9,2 km/hr) forward & reverse

Controls:

Vehicle	Forward, reverse & steering functions controlled by two hand levers
Travel Speed	Hand lever controlled, hydraulically adjusted variable sheave.
Loader	Lift, tilt & auxiliary functions controlled by separate foot pedals.
Engine	Handle lever throttle, key-type starter switch

ENGINE

Make	Petter
Model	BA2R
Fuel	No. 2 Diesel
Governed Flywheel Horsepower	25 (25,4 kw) @ 3000 RPM
Maximum Torque	43 ft.-lbs. (58,30 Nm) @ 2400 RPM
Number of Cylinders	2
Bore/Stroke	3.500x3.625 in. (88,9x92,075 mm)
Displacement	70 cubic inches (1,2L)
Cooling Medium	Air
Lubrication	Pressure
Lubrication Filtration	Replacement element, full flow w/by-pass
Crankcase Ventilation	Internal breathing
Air Cleaner	Replaceable dry cartridge type w/condition indicator

LOADER HYDRAULICS

Pump	Belt driven, gear type	
Minimum Pump Capacity	8.7 GPM (33,0 L/M @ 3000 RPM)	
System Relief Setting	1700 PSI (11721 kPa)	
Filtration	Full flow on suction side with by-pass, condition indicator & 33 micron replaceable paper element	
Cylinders	Doubleacting	
Function	Lift	Tilt
Bore Diameter	2.00" (50,80 mm)	2.00" (50,80 mm)
Rod Diameter	1.25" (31,75 mm)	1.00" (25,4 mm)
Stroke	25.90" (658,00 mm)	16.60" (422,00 mm)
Valves	Open-center type with float detent on lift	

ELECTRICAL

Alternator	Belt driven dustproof 22 amp.
Battery	12 volt 70 amp.-hr. rating
Starter	12 volt gear drive

DRIVE SYSTEM

Transmission	Variable sheave type
Clutches	4 (2 each side) single disc pressure lubricated
Primary Reductions	3.00:1 ratio
Secondary Reductions	5.00:1 ratio
Final Drive	#60H roller chain running in sealed oil bath
Total Engine to Wheel Reduction	Variable from 37:1 to 100:1 ratio

CAPACITIES

Fuel	11 gal (41,6 L)
Engine Lubricant Including Filter	10.5 pt. (5,0 L)
Hydraulic Reservoir & Final Drive Case	17 gal. (64,4 L)
Hydraulic System	20 gal. (75,7 L)

TIRES

Standard	7:00x15-6 ply nylon steel cap w/Melroe special bar tread
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COUNTERWEIGHT

Standard Cast Grill	100 lbs. (45,4 kg)
Ballast (If Any)	320 lbs. (140 kg)

MACHINE WEIGHT (Less Bucket)

Shipping	3835 lbs. (1739,6 kg)
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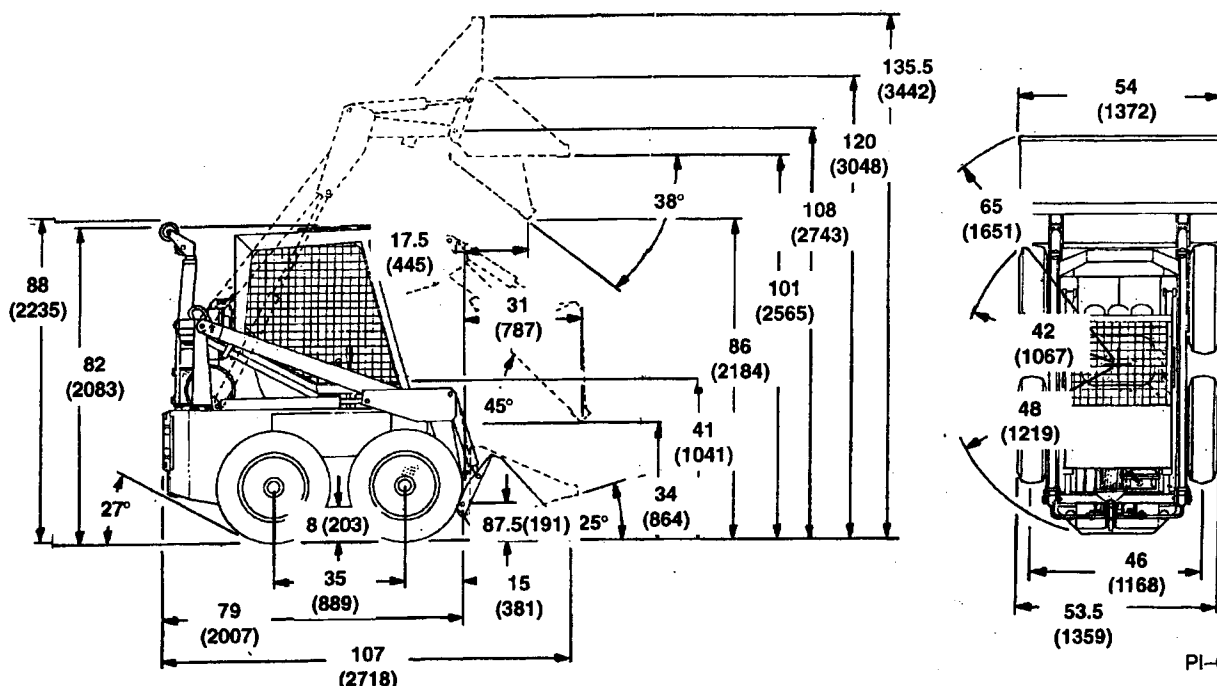
MOTOR SPECIFICATIONS, (ELECTRIC)

	Paragraph Number	Page Number
MOTOR SPECIFICATIONS	8D-1	8D-1
LOADER SPECIFICATIONS		8D-1

ELECTRIC



600E LOADER (RELIANCE ELECTRIC)



Dimensions are given for loader equipped with dirt bucket and may vary with other bucket types. All dimensions are shown in inches. Metric dimensions are given in millimeters enclosed by parentheses.

Where applicable, specifications conform to ICED & SAE standards and are subject to change without notice.

OPERATIONAL & PERFORMANCE

Operating Weight	3550 (1610 kg)
Rated Operating Capacity	1000 lbs. (453,6 kg)
Lift Capacity to Maximum Height	1700 lbs. (771,8 kg)
Tipping Load	1840 lbs. (835 kg)
Hydraulic Function Time:	
Raise to Maximum Height	5.25 sec.
Lower from Maximum Height	3.25 sec.
Dumping Bucket	1.75 sec.
Rollback Bucket	1.75 sec.
Travel Speed	Infinitely variable to 3.0 MPH (4,8 km/hr) forward & reverse

Controls:

Vehicle	Forward, reverse & steering functions controlled by two hand levers
Travel Speed	Hand lever controlled, hydraulically adjusted variable sheave.
Loader	Lift, tilt & auxiliary functions controlled by separate foot pedals.
Motor	Pushbutton start & stop switch

MOTOR (Motor Manufacturer's Rating)

Make	Reliance
Model	TEFC-XP
Frame	Explosion Proof Enclosure 254T
Rated Horsepower	15 (11 kw) continuous
Breakdown Torque	440 volt: @ 1760 RPM 380 volt: @ 1465 RPM 550 volt: @ 1760 RPM
Operating Voltage	440 3 phrase-60 cycle 380 3 phrase-50 cycle 550 3 phrase-60 cycle
Motor Classification Rating	Class 1-Group D; Class 2-Group E, F & G
Insulation	NEMA "A" Class "F"
Cooling Medium	Air
Cable Reel	Automatic retractable explosion proof
Cable & Size	50 ft. (15,2 m) 10 gauge wire

LOADER HYDRAULICS

Pump	Belt driven, gear type	
Minimum Pump Capacity	7.5 GPM (28 L/M) @ 1750 RPM	
System Relief Setting	1700 PSI (11721 kPa)	
Filtration	Full flow on suction side with by-pass, condition indicator & 33 micron replaceable paper element	
Cylinders	Doubleacting	
	Function	Lift
	Bore Diameter	2.00" (50,80 mm)
	Rod Diameter	1.25" (31,75 mm)
	Stroke	25.90" (635,00 mm)
		Tilt
		2.00" (50,8 mm)
		1.00" (25,4 mm)
		16.60" (406,4 mm)
Valves	Open-center type with float detent on lift	

POWER TRAIN

Transmission	Variable sheave type
Clutches	4 (2 each side) single disc pressure lubricated
Primary Reductions	3.00:1 ratio
Secondary Reductions	5.00:1 ratio
Final Drive	#60H roller chain running in sealed oil bath
Total Engine to Wheel Reduction	Variable from 36:1 to 100:1 ratio

CAPACITIES

Hydraulic Reservoir & Final Drive Case	17 gal. (64,4 L)
Hydraulic System	20 gal. (75,7 L)

TIRES

Standard	7:00x15-6 ply nylon steel cap w/bar lug tread
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COUNTERWEIGHT

Standard Cast Grill	100 lbs. (45 kg)
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MACHINE WEIGHT (Less Attachment)

Shipping	3515 lbs. (1594 kg)
Shipping (Less Reel & Cable)	2935 lbs. (1331 kg)



TECHNICAL DATA

	Paragraph Number	Page Number
DECIMAL & MILLIMETER EQUIVALENTS		8E-3
HYDRAULIC/HYDROSTATIC TRANSMISSION FLUID	8E-2	8E-1
LOADER TORQUE SPECIFICATIONS	8E-1	8E-1
SPECIAL TOOLS	8E-3	8E-1
STANDARD TORQUE SPECIFICATIONS FOR BOLTS		8E-2
U.S. TO METRIC CONVERSION		8E-3

**TECHNICAL
DATA**



8E-1 LOADER TORQUE SPECIFICATIONS

The following special torques must be used on the Bobcat.

Wheel Bolts	105-115 ft.-lbs. (102-119 Nm)
Hydraulic Fluid Filter Container Nut	12 ft.-lbs. (16,27 Nm)
Split Jackshaft Connector Screws	20 ft.-lbs. (27,116 Nm)
Clutch Sprocket Screws	16 ft.-lbs. (21,696 Nm)
Upper Jackshaft Locking Collar Set Screws	25 ft.-lbs. (33,895 Nm)
Gearcase Cover Mounting Nuts	30 ft.-lbs. (40,675 Nm)
Tapered Bore Drive Sheave to Crankshaft	35 ft.-lbs. (47,454 Nm)
Lower Jackshaft (Large) Sprocket to Cluster Sprocket	55 ft.-lbs. (74,57 Nm)
Axle Hub Mounting Nuts	65 ft.-lbs. (88,128 Nm)
Upper Jackshaft Bearing Mounting Nuts	70 ft.-lbs. (94,907 Nm)
Upright Brace Mounting Nuts	80 ft.-lbs. (108,465 Nm)
1/2;" Inside Clutch Chain Tightener Nuts	85 ft.-lbs. (115,245 Nm)
9/16" Inside Clutch chain Tightener Nuts	110 ft.-lbs. (149,140 Nm)
Wheel Mounting Screws	110 ft.-lbs. (149,140 Nm)
Lower Jackshaft Mounting Screws	110 ft.-lbs. (149,140 Nm)
Variable Speed Drive Sheave Retaining Nut	130 ft.-lbs. (172,256 Nm)
Upright Mounting Screws	150 ft.-lbs. (203,373 Nm)
Clutch Pin Holding Nuts	225 ft.-lbs. (305,059 Nm)
Axle Sprocket Nut	450 ft.-lbs. (610 Nm)

8E-2 Hydraulic Fluid

The hydraulic system capacity is 20 gals. (75,7 L). The loader hydraulic system reservoir must be filled only with fluid which will protect the components. For operation in temperatures from below freezing up to hot climate conditions, use 10W-30 or 10W-40 engine oil which meets API Classification SE as replacement fluid.

Where below zero temperatures are common, loaders must be kept in warm building. Extra warm-up time must be used each time the loader is started during very cold temperature conditions. Cold oil will not flow easily, and makes action of the hydraulic components slower.

8E-3 Special Tools

The special tools for the loader can be ordered from the Tool Catalog (P/N 6556519).

DECIMAL AND MILLIMETER EQUIVALENTS

FRACTIONS	DECIMALS	MM	FRACTIONS	DECIMALS	MM		
	1/64 —	0.015625 —	0.397		33/64 —	0.515625 —	13.097
	1/32 —	0.03125 —	0.794		17/32 —	0.53125 —	13.494
	3/64 —	0.046875 —	1.191		35/64 —	0.546875 —	13.891
1/16 —		0.0625 —	1.588	9/16 —		0.5625 —	14.288
	5/64 —	0.078125 —	1.984		37/64 —	0.578125 —	14.684
	3/32 —	0.09375 —	2.381		19/32 —	0.59375 —	15.081
	7/64 —	0.109375 —	2.778		39/64 —	0.609375 —	15.478
1/8 —		0.1250 —	3.175	5/8 —		0.6250 —	15.875
	9/64 —	0.140625 —	3.572		41/64 —	0.640625 —	16.272
	5/32 —	0.15625 —	3.969		21/32 —	0.65625 —	16.669
	11/64 —	0.171875 —	4.366		43/64 —	0.671875 —	17.066
3/16 —		0.1876 —	4.762	11/16 —		0.6875 —	17.462
	13/64 —	0.203125 —	5.159		45/64 —	0.703125 —	17.859
	7/32 —	0.21875 —	5.556		23/32 —	0.71875 —	18.256
	15/64 —	0.234375 —	5.953		47/64 —	0.734375 —	18.653
1/4 —		0.2500 —	6.350	3/4 —		0.7500 —	19.050
	17/64 —	0.265625 —	6.747		49/64 —	0.765625 —	19.447
	9/32 —	0.28125 —	7.144		25/32 —	0.78125 —	19.844
	19/64 —	0.296875 —	7.541		51/64 —	0.796875 —	20.241
5/16 —		0.3125 —	7.938	13/16 —		0.8125 —	20.638
	21/64 —	0.328125 —	8.334		53/64 —	0.828125 —	21.034
	11/32 —	0.34375 —	8.731		27/32 —	0.84375 —	21.431
	23/64 —	0.359375 —	9.128		55/64 —	0.859375 —	21.828
3/8 —		0.3750 —	9.525	7/8 —		0.8750 —	22.225
	25/64 —	0.390625 —	9.922		57/64 —	0.890625 —	22.622
	13/32 —	0.40625 —	10.319		29/32 —	0.90625 —	23.019
	27/64 —	0.421875 —	10.716		59/64 —	0.921875 —	23.416
7/16 —		0.4375 —	11.112	15/16 —		0.9375 —	23.812
	29/64 —	0.453125 —	11.509		61/64 —	0.953125 —	24.209
	15/32 —	0.46875 —	11.906		31/32 —	0.96875 —	24.606
	31/64 —	0.484375 —	12.303		63/64 —	0.984375 —	25.003
1/2 —		0.5000 —	12.700	1 —		1.000 —	25.400

1 mm = 0.03937"

0.001 = 0.0254 mm

U.S. TO METRIC CONVERSION

	TO CONVERT	INTO	MULTIPLY BY
LINEAR MEASUREMENT	Miles	Kilometers	1.609
	Yards	Meters	0.9144
	Feet	Meters	0.3048
	Feet	Centimeters	30.48
	Inches	Meters	0.0254
	Inches	Centimeters	2.54
	Inches	Millimeters	25.4
AREA	Square Miles	Square Kilometers	2.59
	Square Feet	Square Meters	0.0929
	Square Inches	Square Centimeters	6.452
	Acre	Hectare	0.4047
VOLUME	Cubic Yards	Cubic Meters	0.7646
	Cubic Feet	Cubic Meters	0.02832
	Cubic Inches	Cubic Centimeters	16.39
WEIGHT	Tons (Short)	Metric Tons	0.9078
	Pounds	Kilograms	0.4536
	Ounces (Avdp.)	Grams	28.3495
PRESSURE	Pounds/Sq. In.	Kilopascal	6.895
WORK	Foot-Pounds	Newton-Meter	1.356
LIQUID VOLUME	Quarts	Liters	0.9463
	Gallons	Liters	3.785
LIQUID FLOW	Gallons/Minute	Liters/Minute	3.785
TEMPERATURE	Fahrenheit	Celsius	1. Subtract 32°
			2. Multiply by 5/9

STANDARD TORQUE SPECIFICATIONS FOR BOLTS

The following table shows standard torque specifications for bolts with zinc phosphate coating. Bolts purchased from Clark that have zinc phosphate coating are specified by the letter *H* following the part number.

	THREAD SIZE	SAE GRADE 5	SAE GRADE 8
INCH. LBS. (Nm)	0.250	80-90 (9-10)	110-120 (13-14)
	0.3125	180-200 (21-23)	215-240 (24-27)
FOOT LBS. (Nm)	0.375	25-28 (34-38)	35-40 (48-54)
	0.4375	40-45 (54-61)	60-65 (82-88)
	0.500	65-70 (88-95)	90-100 (125-135)
	0.5625	90-100 (125-135)	125-140 (170-190)
	0.625	125-140 (170-190)	175-190 (240-260)
	0.750	220-245 (300-330)	300-330 (410-450)
	0.875	330-360 (450-490)	475-525 (645-710)
	1.000	475-525 (645-710)	725-800 (985-1085)
	1.125	650-720 (880-975)	1050-1175 (1425-1600)
	1.250	900-1000 (1200-1360)	1475-1625 (2000-2200)
	1.375	1200-1350 (1630-1830)	2000-2200 (2720-2980)
	1.500	1500-1650 (2040-2240)	2600-2850 (3530-3870)
	1.625	2000-2800 (2720-2980)	3450-3800 (4680-5150)
	1.750	2500-2750 (3390-3730)	4300-4800 (5830-6500)
	1.875	3150-3500 (4270-4750)	5500-6100 (7450-8300)
2.000	3800-4200 (5150-5700)	6500-7200 (8800-9800)	

