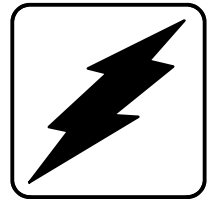


Warranty Flat Rates/ Failure Codes

Industrial 20–2000 kW Generator Sets
including Industrial Rental,
Transfer Switches, and Switchgear



KOHLER[®]
POWER SYSTEMS

ISO 9001
KOHLER
GENERATORS
INTERNATIONALLY REGISTERED

TP-5178 12/00b

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This manual provides flat rates and failure codes for 20-2000 kW generator sets including engines, accessories, transfer switches, and switchgear. A flat rate is the maximum time allowed for making warranty repairs. The manufacturer assigns a flat rate number to each flat rate. The manufacturer sets flat rates using facilities and equipment which any service shop should have available. You must write the flat rate number on the warranty claim form (K-1500) in the space marked *Flat Rate No.* See Figure 1-1.

If you make a repair which is not listed in the flat rates, please do the following:

- Enter a description of the work done in the *Description of Work Performed* area on the warranty claim form.
- Give the appropriate failure code.
- Enter the actual time in the space marked *Miscellaneous Labor Hours* on the claim form.

If you exceed an allowable flat rate time because of unforeseen circumstances, enter the actual time and the flat rate number with an explanation of the causes in the *Description of Work Performed* area. Do not put

extra time under *Miscellaneous Labor Hours*. If you need additional space for explanation, continue on the back of the form or on a separate sheet. These claims will be reviewed individually and are subject to approval by the Warranty Department.

Note: Refer to TP-5180, Warranty Policies and Procedures, Industrial 20-2000 kW Generator Sets including Industrial Rental, Transfer Switches, and Switchgear, for applicable warranty policies and procedures.

In addition to the flat rate number, use a failure code. Find the appropriate code in the following list. Enter this code on the warranty claim form (K-1500) in the space marked *Failure Code*. This failure code applies to the primary failed part and assists us in determining the mode of failure.

Note: Each flat rate time includes troubleshooting, test, and cleanup time.

Note: For 5-22 kW residential/commercial generator sets and transfer switches, refer to the following:

TP-6045 Warranty Flat Rates/Failure Codes
TP-6046 Warranty Policies and Procedures

Failure Codes

Electrical

EA	Electrically Out of Adjustment
EB	Circuit Board
EC	Connection Defect
EH	High Voltage
EL	Low Voltage
EO	Open
ES	Shorted
EU	Unstable Voltage

Mechanical

BD	Binding
BT	Bent
CD	Casting Defect
CK	Cracked
FT	Freight Damage
LP	Loose Parts
MA	Assembled Improperly
MB	Mechanically Broken
MD	Mechanical Defect
ML	Leaking
MN	Noisy
MO	Out of Adjustment
MV	Vibration
OC	Oil Consumption
PL	Plugged
ST	Sticking
SZ	Seized
TW	Twisted

Paint

PA	Adhesion
PC	Corrosion (Oxidation, Rust)
PE	Peeling Paint
PO	Overspray
PR	Runs, Sags

Packaging

PM	Material
PS	Shipping Damage

Parts

CP	Parts Claim
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Miscellaneous

CP	Parts Claim
FT	Freight
IN	Intermittent
IP	Incorrect Parts Supplied
IS	Incorrect Shipment
MP	Missing Parts
OC	Oil Consumption
SB	Service/Parts Bulletin
FM	Foreign Material

Engine/Alternator Cross-Reference

Use the following chart to determine the engine manufacturer for specific kW models.

Engine Cross-Reference Chart	
Model	Engine
Diesel engines* 20-200 kW	John Deere, Detroit Diesel Series 40, Deutz, Perkins
200-2000 kW	Detroit Diesel
Gas engines 20-100 kW	Ford, General Motors
125-275 kW	Detroit Diesel, Cummins
* Include an "O" in the model number (Example: 20ROZJ).	

Use the following chart to determine the alternator manufacturer for specific kW models.

Alternator Cross-Reference Chart	
Model	Alternator
Industrial	
20-300 kW	Kohler
300-2000 kW	Marathon

Section 1 Generator Set Accessory Flat Rates

1.1 Battery Chargers

Flat Rate Description	Flat Rate Number	Flat Rate Hours	Comments
Float/Equalize Battery Charger, 12/24 Volts DC, 10 Amp*			
AC or output cables	2553	1.00	
Ammeter or voltmeter	2243	1.25	
Charger R & R	2255	1.50	For replacement of wall-mounted units
Circuit board	2247	1.50	Main or alarm, includes calibration
Circuit board connector	2251	1.00	
Fuse holder	2245	1.00	Each, AC or DC
Lamps/bulbs	2244	1.00	
Power resistor	2249	1.50	
Replace wiring	2254	1.25	
SCR module	2246	1.50	
Terminal strip	2252	1.25	Each
Transformer	2250	1.75	
Trickle-Type Battery Charger			
AC or DC cord	2265	1.00	
Ammeter	2256	1.25	
Charger R & R	2381	1.25	
Circuit breaker	2259	1.00	
Diodes/resistors	2261	1.50	
Fuse holder	2258	1.00	
Lamp/holder	2257	1.00	
Replace wiring	2266	1.00	
Rheostat	2262	1.50	
Switch	2263	1.25	
Terminal strip	2264	1.00	
Transformer	2260	1.75	
* The float/equalize battery charger 12 volts DC, 6 amp/24 volts DC, 3 amp is not serviceable. NOTE: R & R means remove and replace.			

1.2 Fuel Tanks

Flat Rate Description	Flat Rate Number	Flat Rate Hours	Comments
Day Tanks*			
Control board	1929	1.50	
Control relay or wiring	1931	1.25	
Float switch	1930	1.25	
Motor or pump	1928	1.50	
Subbase Fuel and Day Tanks*			
Control relay or wiring	1926	1.25	
Float switch	1925	1.25	
Gauge sender	1927	1.25	
Motor or pump	1924	1.50	
* Supply the day tank serial number when filing the warranty. NOTE: See Engine Fuel System for subbase tank R & R.			

Section 2 Transfer Switch Flat Rates

2.1 Circuit Breaker/Contactor Models

Flat Rate Description	Flat Rate Number	Flat Rate Hours					
		30-104 Amps	105-225 Amps	226-400 Amps	401-600 Amps	601-1000 Amps	1001-2000 Amps
Circuit Breaker/Contactor							
Auxiliary switch	1807	1.25	—	—	—	—	—
Brake assembly	1800	—	1.25	1.25	1.25	1.25	1.25
Cam	1801	—	1.25	1.25	1.25	1.25	1.25
Circuit breaker, 2-pole	1794	2.50	2.75	3.25	3.50	4.00	8.50
Circuit breaker, 3-pole	1795	2.50	3.00	3.50	3.75	4.50	8.50
Circuit breaker, 4-pole	1796	2.50	3.25	3.75	4.25	4.75	8.50
Gear motor	1799	1.75	1.75	1.75	1.75	1.75	1.75
Load bus bar	1810	1.00	1.50	1.50	1.50	1.50	1.50
Mechanical interlocks	1808	1.50	1.50	1.50	1.50	1.50	1.50
Motor arm	1805	1.20	—	—	—	—	—
Neutral bar	1809	1.00	1.25	1.25	1.25	1.50	1.50
Nonautomatic 2- and 3-pole	1797	2.50	—	—	—	—	—
Normal limit switch	1806	1.25	—	—	—	—	—
Nylon freewheel, gear, or roller (center, spur, or idler gear)	1802	—	1.50	1.50	1.50	1.50	1.50
Nylon wheel	1804	1.10	—	—	—	—	—
Operating arm	1803	1.25	—	—	—	—	—
Transfer mechanism	1798	1.50	1.25	1.50	1.50	1.50	2.00
Controller							
Battery charger	1819	1.80	1.80	1.80	1.80	1.80	1.80
Circuit card	1814	1.50	1.50	1.50	1.50	1.50	1.50
Cranking limiter	1818	2.25	2.25	2.25	2.25	2.25	2.25
Current transformer	1822	1.30	1.30	1.30	1.30	1.30	1.30
Meters (volt, amp, or hour)	1821	1.50	1.50	1.50	1.50	1.50	1.50
Pilot lamps	1817	0.75	0.75	0.75	0.75	0.75	0.75
Plant exerciser	1820	1.80	1.80	1.80	1.80	1.80	1.80
Relays	1815	1.50	1.50	1.75	1.75	1.75	1.75
Selector switch	1816	2.00	2.00	2.00	2.00	2.00	2.00
Transformer	1811	1.75	1.75	1.75	1.75	1.75	1.75
Wiring harness plug socket	1812	1.50	1.50	1.50	1.50	1.50	1.50
Logic package, 6- and 9-card	1813	1.75	1.75	1.75	1.75	1.75	1.75

2.2 M340 Logic

Flat Rate Description	Flat Rate Number	Flat Rate Hours			Comments
		30-150 Amps	151-800 Amps	801-4000 Amps	
Accessories					
All hardware options	1898	2.00	2.00	2.00	
Bypass Isolation					
Bypass isolation handle	1921	1.00	1.00	1.00	
Bypass switch	1919	3.00	4.00	5.00	
Transfer switch fingers	1920	1.25	1.25	1.50	
Controller					
Microprocessor assembly R & R	1897	6.00	6.00	6.00	Includes setup/adjustments
Power supply circuit board R & R	1910	2.00	2.00	2.00	
NOTE: R & R means remove and replace.					

2.3 R340/S340 Logic

Flat Rate Description	Flat Rate Number	Flat Rate Hours			Comments
		30-150 Amps	151-800 Amps	801-4000 Amps	
Accessories					
Accessory card	1783	1.50	1.50	1.50	Voltmeter or ammeter, each
Accessory card cage	1784	1.75	1.75	1.75	
Accessory relay or socket	1789	1.25	1.25	1.25	
Battery charger	1785	1.80	1.80	1.80	
In-phase monitor/sync check relay/load shed	1788	2.00	2.00	2.00	
Meter	1790	1.50	1.50	1.50	
Optional circuit board	1792	1.50	1.50	1.50	
Pilot lamp(s)	1791	0.75	0.75	0.75	
Plant exerciser	1786	1.80	1.80	1.80	
Selector switch	1787	2.00	2.00	2.00	
Bypass Isolation					
Bypass isolation handle	1918	1.00	1.00	1.00	
Bypass switch	1916	3.00	4.00	5.00	
Transfer switch fingers	1917	1.25	1.25	1.50	
Controller					
Control relays	1914	1.50	1.50	1.50	
Daughter logic board	1912	1.75	1.75	1.75	
Main logic board	1911	3.00	3.00	3.00	
Main wire harness	1913	5.00	5.00	5.00	
Transformer or assembly	1915	1.50	1.50	1.50	

2.4 30-4000 Amp Contactors

Flat Rate Description	Flat Rate Number	Flat Rate Hours			Comments	
		30-150 Amps	151-800 Amps	801-4000 Amps		
ATS Contactor						
Auxiliary, miniature contacts R & R	1780	1.00	1.50	1.50	Adjustment	
Coil clearing contact, adjust	1779	1.00	1.50	1.50		
Contact assembly	1772	2.00	3.50	6.00		
Contact coil	1774	1.50	1.50	2.00		
Contact wire harness	1773	2.00	4.00	2.00		
Moveable main/arcng contacts	1781	—	1.50	2.00		
Rectifier	1777	1.00	1.00	1.00		
Resistor	1778	—	1.00	1.00		
Stationary main/arcng contact	1782	—	1.75	2.00		
Terminal bracket and lug	1775	—	1.50	1.50		
Terminal lug	1776	—	1.40	1.40		Lug only, each
NOTE: R & R means remove and replace.						

Section 3 Engine Flat Rates

3.1 Detroit Diesel* 125-200 kW

Flat Rate Description	Flat Rate Number	Flat Rate Hours	Comments
Air Intake and Exhaust			
Air cleaner assembly, replace	3367	0.80	Standard
Air cleaner assembly, replace	3369	1.00	Heavy duty
Air cleaner element	1564	0.30	
Exhaust silencer R & R	1566	4.00	
Flexible exhaust connector	1565	1.50	
Cooling			
Block heater assembly R & R	1576	1.25	Tank assembly or element only
Block heater cord or thermostat	1578	1.25	
Block heater R & R	1575	2.00	Complete kit
Coolant hose	1573	0.80	
Fan blade, replace	1574	1.25	
Radiator assembly, replace	1572	3.25	
Radiator, repair	3456	2.00	
Engine Electrical			
Engine wiring harness	1562	2.00	
Magnetic pickup	1561	2.00	
Shutdown/gauge sender/switch	1559	1.50	
Engine Mounting			
Skid base R & R	1570	4.50	
Vibration isolators	1571	1.75	Each pair
Fuel			
Auxiliary fuel pump	1583	1.50	
Flexible fuel lines	1582	1.00	
Subbase fuel tank†	1584	6.00	
Starter			
Starter relay	1738	0.80	
* The Warranty Department requires that repairs made on Detroit Diesel engines be performed by an authorized Detroit Diesel service center. † Contact factory prior to performing any warranty work. NOTE: R & R means remove and replace.			

3.2 Detroit Diesel* 135-400 kW (Series 50/60 Gas, Series 60 Diesel)

Flat Rate Description	Flat Rate Number	Flat Rate Hours		Comments
		135-275 kW Gas	230-400 kW Diesel	
Air Intake and Exhaust				
Air inlet manifold R & R	4888	—	0.20	
Air inlet piping R & R	4889	—	—	
Air-to-air piping R & R	4890	—	—	
Charge air cooler R & R	4891	0.20	0.20	
Turbocharger	4892	—	—	
Exhaust manifold R & R	4893	0.30	0.30	
Exhaust manifold outlet connection R & R	4894	0.20	0.20	Each
Cooling System				
Belt tensioner and bracket R & R	4895	0.50	0.50	
Pressure check cooling system	4896	0.50	0.50	
Radiator assembly, replace	5162	3.25	3.25	
Radiator, repair	5163	2.00	2.00	
Thermostat R & R	4897	0.10	0.10	
Thermostat housing seals R & R	4898	0.50	0.50	
Water pump R & R	4899	0.10	0.10	Front mounted
Crankshaft, Mains, and Flywheel				
Bull gear R & R	4900	0.40	0.40	
Belt set R & R	4901	0.30	0.30	
Crankshaft oil seal front R & R	4902	0.20	0.20	
Crankshaft oil seal rear R & R	4903	0.30	0.30	
Crankshaft pulley R & R	4904	0.20	0.20	
Flywheel R & R	4905	0.70	0.70	
Flywheel housing R & R	4906	0.20	0.20	
Gear case cover R & R	4907	0.90	0.90	
Vibration damper R & R	5239	0.10	0.10	
Cylinder Head and Valves				
Breather pad R & R	4908	0.10	0.10	
Rocker cover R & R	4909	0.10	0.10	Each
Valve and injector arm assembly R & R	4910	—	0.30	
Valve and injector mechanism R & R	4911	—	0.80	
Valve springs and/or seals R & R	4912	—	—	Head installed
Engine Electrical				
Alternator bracket R & R	4913	0.40	0.40	
Starter motor and drive assembly R & R	4914	0.20	0.20	
Starter solenoid R & R	4915	0.20	0.20	Starter removed
* The Warranty Department requires that repairs made on Detroit Diesel engines be performed by an authorized Detroit Diesel service center. NOTE: R & R means remove and replace.				

Detroit Diesel* 135-400 kW (Series 50/60 Gas, Series 60 Diesel), continued

Flat Rate Description	Flat Rate Number	Flat Rate Hours		Comments
		135-275 kW Gas	230-400 kW Diesel	
Fuel System				
Compression test	4916	—	0.70	Three cylinders
DDEC connector R & R	4917	0.10	0.10	Each, includes R & R turbocharger boost, oil pressure, oil temperature, coolant level, air temperature, or water temperature (DDEC III) sensors.
DDEC II or DDEC III, reprogram	4918	0.50	0.50	Per module
Electronic control module R & R	4919	1.00	1.00	
Fuel filter assembly R & R	4920	—	0.30	Primary
Fuel filter assembly R & R	4921	—	0.30	Secondary
Fuel lines R & R	4922	0.20	0.20	
Fuel pump and/or coupling R & R	4923	—	0.10	
Fuel pump drive assembly R & R	4924	—	0.10	
Injector R & R	4925	—	2.50	One
Injector (overhead removed)	4926	—	0.10	Each additional
SRS or TRS assembly R & R	4927	0.10	0.10	
Subbase fuel tank R & R	5255	6.00	6.00	
Lubricating System				
Dipstick tube and adapter	5241	0.10	0.10	
Oil cooler elements R & R	5242	0.20	0.20	
Oil cooler pressure test	5243	0.60	0.60	
Oil filter adapter R & R	5244	0.20	0.20	
Oil filter elements R & R	5245	0.20	0.20	
Oil pan and gasket R & R	5246	0.20	0.20	
<p>* The Warranty Department requires that repairs made on Detroit Diesel engines be performed by an authorized Detroit Diesel service center. NOTE: R & R means remove and replace.</p>				

3.3 Detroit Diesel* 200-2000 kW (Single Bearing, Series 71, 92, and 149)

Flat Rate Description	Flat Rate Number	Flat Rate Hours			Comments
		200-400 kW	450-800kW	801-2000kW	
Air Intake and Exhaust					
Air cleaner element	1564	0.75	0.75	0.75	Each
Exhaust silencer	1566	1.50	2.00	2.50	Each
Flexible exhaust connector	1565	1.50	1.50	1.50	Each
Cooling					
Block heater	1575	2.00	2.50	3.00	Complete block heater kit
Block heater circulating pump	1577	—	—	1.50	
Block heater control box	3363	1.50	1.50	2.00	Complete box or circuit board
Block heater element or tank	1576	2.00	3.00	4.00	Tank assembly or element only
Block heater relay/cord	1579	1.50	1.50	1.50	
Block heater thermostat	1578	1.50	2.00	2.50	
Coolant hoses	1573	1.50	2.00	2.50	Includes drain and refill of radiator
Cooling fan	1574	3.50	4.50	6.00	Includes fan guard(s) R & R
Fan belt	1581	1.50	2.00	2.50	Includes guards R & R, tension adjustment
Fan guard	1580	1.50	2.50	3.50	
Radiator R & R†	1572	6.50	8.00	10.00	Unit-mounted radiator
Engine Electrical					
Air damper microswitch	2354	1.50	1.50	1.50	
Engine wiring harness	1562	2.50	3.00	3.50	
Senders/shutdown switches	1559	1.50	1.50	1.50	
Speed pickup	1561	2.00	2.00	2.00	Controller crank disconnect
Engine Mounting					
Skid base	1570	—	—	—	Call factory
Vibration isolators	1571	1.00	2.00	2.50	Skid to pad spring isolators (each)
Fuel					
Auxiliary fuel pump	1583	1.50	1.50	1.50	
Flexible fuel lines	1582	1.50	2.00	2.00	
Fuel filter	1586	0.20	0.20	0.20	
Fuel gauge sender	1585	1.50	1.50	1.50	For base tank
Skid base tank†	1584	6.00	9.00	12.00	
Governor					
Governor controller	3382	1.50	1.50	1.50	
Lubrication					
Flush lube oil system	3594	—	4.80	4.80	
Oil filter element R & R	3595	—	0.70	0.70	
Oil pump R & R	3593	—	14.50	14.50	Includes radiator
Starter					
Starter relay (solenoid)	1738	1.50	1.50	1.50	
<p>* The Warranty Department requires that repairs made on Detroit Diesel engines be performed by an authorized Detroit Diesel service center. † Contact factory prior to performing any warranty work. NOTE: R & R means remove and replace.</p>					

3.4 Detroit Diesel* 1250-2000 kW (Series 4000 Diesel)

Flat Rate Description	Flat Rate Number	Flat Rate Hours				Comments
		1250 kW	1500 kW	1750 kW	2000 kW	
Air Intake and Exhaust						
Air inlet manifold R & R	4928	0.30	0.30	0.30	0.30	Each section
Air inlet manifold R & R	4929	—	—	1.40	1.40	One side complete
Air inlet manifolds R & R	4930	—	—	2.30	2.30	All
Charge air cooler assembly R & R	4931	1.90	1.90	1.90	1.90	Each
Charge air cooler mounting R & R	4932	2.50	2.50	2.50	2.50	
Charge air cooler piping seals R & R	4933	1.00	1.00	1.00	1.00	All, each bank
Charge air cooler top cover and seal R & R	4934	0.90	0.90	0.90	0.90	
Charge air piping to turbocharger R & R	4935	—	—	1.30	1.30	Each bank
Coolant piping, charge air cooler R & R	4936	—	—	1.10	1.10	Supply and return
Turbocharger R & R	4937	1.30	1.30	1.30	1.30	One
Turbocharger R & R	4938	2.60	2.60	2.60	2.60	Set of two
Turbocharger oil drain line R & R	4939	0.50	0.50	0.50	0.50	One
Turbocharger oil drain line R & R	4940	—	—	0.90	0.90	All
Turbocharger oil supply line R & R	4941	0.40	0.40	—	—	One
Turbocharger oil supply line R & R	4942	—	—	0.50	0.50	All
Exhaust crossover tube R & R	4943	—	—	0.30	0.30	One
Exhaust crossover tube R & R	4944	—	—	1.80	1.80	All
Exhaust manifold R & R	4945	0.60	0.60	0.60	0.60	One
Exhaust manifold R & R	4946	—	—	3.80	3.80	All
Exhaust manifold outlet connection R & R	4947	0.10	0.10	0.10	0.10	All, between turbochargers
Cooling System						
Belt tensioner and bracket, adjust R & R	4966	1.00	1.00	1.00	1.00	
Distribution housing R & R	4967	6.20	6.20	6.20	6.20	Upper
Manifold, water outlet R & R	4968	—	—	0.10	0.10	One section
Manifold, water outlet R & R	4969	0.30	0.30	0.30	0.30	One side
Pressure check cooling system	4970	1.00	1.00	1.00	1.00	
Radiator, replace	5164	10.00	10.00	10.00	10.00	
Thermostat, high temperature R & R	4971	1.50	1.50	1.50	1.50	
Thermostat, low temperature R & R	4972	0.80	0.80	0.80	0.80	
Thermostat housing, high temperature R & R	4973	1.50	1.50	1.50	1.50	
Thermostat housing, low temperature R & R	4974	0.60	0.60	0.60	0.60	
Water pump, high temperature R & R	4975	1.00	1.00	1.00	1.00	
Water pump, low temperature R & R	4976	0.80	0.80	0.80	0.80	
* The Warranty Department requires that repairs made on Detroit Diesel engines be performed by an authorized Detroit Diesel service center. NOTE: R & R means remove and replace.						

Detroit Diesel* 1250-2000 kW (Series 4000 Diesel), continued

Flat Rate Description	Flat Rate Number	Flat Rate Hours				Comments
		1250 kW	1500 kW	1750 kW	2000 kW	
Crankshaft, Mains, and Flywheel						
Belt set R & R	4948	2.50	2.50	2.50	2.50	
Dust shields, install	4949	0.60	0.60	0.60	0.60	Two
Crankshaft oil seal front R & R	4950	1.40	1.40	1.40	1.40	
Crankshaft oil seal rear R & R	4951	0.90	0.90	0.90	0.90	Generator removed
Crankshaft pulley R & R	4952	0.90	0.90	0.90	0.90	
Flywheel R & R	4953	0.90	0.90	0.90	0.90	Generator removed
Flywheel housing R & R	4954	3.80	3.80	3.80	3.80	
Flywheel housing inspection covers R & R	4955	0.10	0.10	0.10	0.10	
Vibration damper	4956	1.30	1.30	1.30	1.30	
Vibration damper guard	4957	0.40	0.40	0.40	0.40	
Cylinder Block, Liners, Pistons, and Rods						
Swing arm assembly R & R	4964	0.30	0.30	0.30	0.30	One
Swing arm assembly R & R	4965	1.50	1.50	2.60	2.60	All
Cylinder Head and Valves						
Push rods R & R	4958	0.10	0.10	0.10	0.10	Intake and exhaust
Rocker arm and bridge R & R	4959	0.30	0.30	0.30	0.30	One cylinder
Rocker arm and bridge R & R	4960	1.90	1.90	2.00	2.00	All
Rocker cover R & R	4961	0.30	0.30	0.30	0.30	Each
Rocker cover R & R	4962	0.40	0.40	0.60	0.60	All
SRS pulse wheel R & R	4963	5.30	5.30	5.30	5.30	
Engine Electrical						
Alternator R & R	4977	1.30	1.30	1.30	1.30	
Alternator/accessory drive R & R	4978	1.00	1.00	1.00	1.00	B bank
Starter R & R	5165	1.00	1.00	1.00	1.00	Each
Fuel System						
Control solenoid, high pressure pump R & R	4979	1.00	1.00	1.00	1.00	
Coupling R & R	4980	0.60	0.60	0.60	0.60	
DDEC sensor harness R & R	4981	1.10	1.10	—	—	One
Electronic control module	4982	1.40	1.40	1.40	1.40	Two
Electronic control module cold plate R & R	4983	0.50	0.50	0.50	0.50	One, front
Electronic control module cold plate R & R	4984	1.30	1.30	1.30	1.30	Both
Fuel filter assembly R & R	4985	0.60	0.60	0.60	0.60	Primary
Fuel filter elements R & R	4986	0.10	0.10	0.10	0.10	Secondary
Fuel flow limiter valve R & R	4987	0.30	0.30	0.30	0.30	One
Fuel junction block assembly R & R	4988	0.80	0.80	0.80	0.80	
Fuel lines, high pressure pump R & R	4989	0.80	0.80	0.80	0.80	
Fuel lines, low pressure transfer pump R & R	4990	0.80	0.80	0.80	0.80	
Fuel line to injector, high pressure R & R	4991	0.30	0.30	0.30	0.30	One
Fuel line to injector, high pressure R & R	4992	1.60	1.60	2.10	2.10	All
Fuel line, return R & R	4993	0.30	0.30	0.30	0.30	One, cylinder head to return rail

* The Warranty Department requires that repairs made on Detroit Diesel engines be performed by an authorized Detroit Diesel service center.
NOTE: R & R means remove and replace.

Detroit Diesel* 1250-2000 kW (Series 4000 Diesel), continued

Flat Rate Description	Flat Rate Number	Flat Rate Hours				Comments
		1250 kW	1500 kW	1750 kW	2000 kW	
Fuel System, continued						
Fuel pump and/or coupling, low pressure transfer R & R	4994	0.60	0.60	0.60	0.60	
Fuel pump assembly, high pressure R & R	4995	1.40	1.40	1.40	1.40	
Fuel pump injection pressure sensor, high pressure R & R	4996	0.10	0.10	0.10	0.10	
Fuel rail, high pressure R & R	4997	0.10	0.10	0.10	0.10	Set of two
Fuel rail, return R & R	4998	—	—	1.00	1.00	
Injector assembly R & R	4999	0.80	0.80	0.80	0.80	One
Injector assembly R & R	5000	3.30	3.30	4.30	4.30	All
Injector harness R & R	5001	0.90	0.90	—	—	One
Prime fuel system	5002	0.10	0.10	0.10	0.10	Complete
Relief valve, high pressure fuel rail R & R	5003	0.80	0.80	0.80	0.80	
SRS sensor R & R	5004	0.10	0.10	0.10	0.10	
TRS sensor R & R	5005	0.10	0.10	0.10	0.10	Flywheel removed
Temperature or pressure sensor R & R	5006	0.50	0.50	0.50	0.50	Any one
Subbase fuel tank R & R	5257	12.00	12.00	12.00	12.00	
Lubricating System						
Dipstick tube and adapter R & R	5007	0.10	0.10	0.10	0.10	
Breather assembly R & R	5008	0.80	0.80	0.80	0.80	Two
Centrifugal filter assembly R & R	5009	0.30	0.30	0.30	0.30	
Crankcase to breather tube R & R	5010	0.10	0.10	0.10	0.10	One
Element, oil cooler pressure test	5011	0.50	0.50	0.50	0.50	One
Oil cooler housing and/or cores R & R	5012	1.90	1.90	1.90	1.90	Set of three
Oil distribution manifold and seal R & R	5013	—	—	0.90	0.90	
Oil filter adapter housing R & R	5014	1.30	1.30	1.30	1.30	
Oil filter bypass valve and spring R & R	5015	0.10	0.10	0.10	0.10	
Oil filter elements R & R	5016	0.60	0.60	0.60	0.60	Set of four
Oil pan and seal R & R	5017	3.10	3.10	4.10	4.10	
* The Warranty Department requires that repairs made on Detroit Diesel engines be performed by an authorized Detroit Diesel service center. NOTE: R & R means remove and replace.						

3.5 Deutz 20-170 kW

Flat Rate Description	Flat Rate Number	Flat Rate Hours						Comments
		20 kW	30 kW	40 kW	50-60 kW	70-100 kW	115-170 kW	
Air Intake and Exhaust								
Charge air line R & R	4696	0.60	0.60	0.60	0.80	0.40	0.60	Each
Exhaust manifold R & R	4698	0.15	0.20	0.50	0.50	0.75	0.80	
Exhaust manifold, check flange side	4699	0.15	0.20	0.20	0.20	0.20	0.30	
Fuel return line seals R & R	4702	—	—	0.05	0.20	0.20	0.20	
Intake manifold R & R	4697	1.00	1.00	1.00	—	—	—	
Oil supply line seals R & R	4703	—	—	0.10	0.10	0.10	0.30	
Turbocharger R & R	4700	—	—	1.50	1.50	1.50	1.50	
Turbocharger, repair	4701	—	—	1.50	1.50	1.50	1.50	
Camshaft and Timing Gear								
Front cover gasket R & R	4650	1.35	1.35	1.35	1.35	1.35	1.45	
Time gear case cover R & R	4709	—	—	—	1.50	1.50	1.50	
Toothed belt R & R	4658	0.65	0.65	0.65	—	—	—	
Cooling								
Coolant compensating R & R	4722	—	—	—	0.30	0.30	0.30	
Coolant line to thermostat R & R	4720	—	—	—	0.10	0.10	0.10	
Coolant pump R & R	4718	—	—	—	0.90	0.90	0.90	
Line to exchanger crankcase R & R	4721	—	—	—	0.20	0.20	0.20	
Thermostat housing R & R	4719	—	—	—	0.25	0.25	0.25	
Crankshaft, Mains, and Flywheel								
Cover gasket, rear, R & R	4651	0.30	0.30	0.30	—	—	—	
Crankshaft flywheel seal R & R	4649	0.25	0.25	0.25	0.65	0.65	0.65	
Crankshaft front seal R & R	4648	0.95	0.95	0.95	0.70	0.70	0.70	
Flywheel R & R	4655	0.15	0.15	0.15	0.35	0.35	0.35	
V-belt pulley R & R	4654	0.15	0.15	0.15	0.40	0.40	0.40	
Vibration damper R & R	4717	—	—	—	0.40	0.40	0.40	
Cylinder Head and Valves								
Cylinder head or gasket R & R	4656	0.90	1.10	1.40	2.90	2.90	3.75	One Each additional All One Each additional All One cylinder Each additional All cylinders
Rocker arm bracket, push rods R & R	4662	0.20	0.25	0.25	0.35	0.35	0.45	
Rocker arm bracket, push rods R & R	4663	0.10	0.10	0.10	0.15	0.15	0.15	
Rocker arm bracket, push rods, R & R	4664	0.40	0.55	0.55	0.80	0.80	1.20	
Rocker arm bracket w/rocker arms, repair	4665	0.10	0.10	0.10	0.10	0.10	0.10	
Rocker arm bracket w/rocker arms, repair	4666	0.05	0.05	0.05	0.05	0.05	0.05	
Rocker arm bracket w/rocker arms, repair	4667	0.25	0.25	0.25	0.25	0.25	0.35	
Rocker cover gasket R & R	4657	0.15	0.20	0.20	0.20	0.20	0.30	
Valve clearance, adjust	4661	0.15	0.20	0.20	0.25	0.25	0.35	
Valve clearance, adjust	4710	0.05	0.05	0.05	0.05	0.05	0.05	
Valve clearance, adjust	4711	0.25	0.35	0.35	0.40	0.40	0.60	
NOTE: R & R means remove and replace.								

Deutz 20-170 kW, continued

Flat Rate Description	Flat Rate Number	Flat Rate Hours						Comments
		20 kW	30 kW	40 kW	50-60 kW	70-100 kW	115-170 kW	
Engine Electrical								
Alternator V-belt R & R	4704	0.10	0.10	0.10	0.10	0.10	0.10	
Alternator w/reg cutout R & R	4706	0.25	0.25	0.25	0.25	0.25	0.25	
Oil pressure sensor R & R	4707	0.05	0.05	0.05	0.10	0.10	0.10	
Shutdown solenoid R & R	4708	0.10	0.10	0.10	0.10	0.10	0.10	
Coolant temp. sensor R & R	4725	—	—	—	0.05	0.05	0.05	
Heater plug, 1-pin type R & R	4726	—	—	—	0.45	0.45	0.55	One
Heater plug, 1-pin type R & R	4727	—	—	—	0.25	0.25	0.25	Each additional
Heater plug, 1-pin type R & R	4728	—	—	—	1.20	1.20	1.80	All
Fuel								
Back leakage pipe R & R	4690	0.05	0.05	0.05	0.25	0.25	0.35	One
Back leakage pipe R & R	4691	0.05	0.05	0.05	0.05	0.05	0.05	Each additional
Back leakage pipe R & R	4692	0.15	0.20	0.20	0.40	0.40	0.60	All
Ejection pressure, set	4678	0.15	0.15	0.15	0.15	0.15	0.15	One
Ejection pressure, set	4679	0.10	0.10	0.10	0.10	0.10	0.10	Each additional
Ejection pressure, set	4680	0.35	0.45	0.45	0.45	0.45	0.65	All
Eject and spray pattern, test	4672	0.10	0.10	0.10	0.10	0.10	0.10	One
Eject and spray pattern, test	4673	0.05	0.05	0.05	0.05	0.05	0.05	Each additional
Eject and spray pattern, test	4674	0.20	0.25	0.25	0.25	0.25	0.35	All
Exchangeable fuel filter R & R	4681	0.05	0.05	0.05	0.10	0.10	0.10	
Fuel delivery, single injector R & R	4713	—	—	—	0.55	0.55	0.60	
Fuel hose line from fuel pump to fuel filter	4695	0.05	0.05	0.05	0.10	0.10	0.10	
Fuel pump R & R	4682	0.20	0.20	0.20	0.25	0.25	0.25	
Fuel pump fuel line R & R	4693	0.05	0.05	0.05	0.10	0.10	0.10	
Injection pump R & R	4669	0.25	0.30	0.30	0.50	0.50	0.55	One
Injection pump R & R	4670	0.20	0.20	0.20	0.20	0.20	0.20	Each additional
Injection pump R & R	4671	0.65	0.85	0.85	1.10	1.10	1.55	All
Injection pump fuel line R & R	4694	0.20	0.25	0.25	0.25	0.25	0.35	
Injector R & R	4675	0.15	0.20	0.20	0.35	0.35	0.45	One
Injector R & R	4676	0.15	0.15	0.15	0.10	0.10	0.10	Each additional
Injector R & R	4677	0.45	0.60	0.60	0.65	0.65	0.95	All
Injection line, clean	4687	0.10	0.10	0.10	0.10	0.10	0.10	One
Injection line, clean	4688	0.20	0.25	0.25	0.05	0.05	0.05	Each additional
Injection line, clean	4689	0.20	0.25	0.25	0.25	0.25	0.35	All
Injection lines, test	4683	0.15	0.20	0.20	0.30	0.30	0.40	
Injection line R & R	4684	0.10	0.10	0.10	0.25	0.25	0.35	One
Injection line R & R	4685	0.10	0.10	0.10	0.05	0.05	0.05	Each additional
Injection line R & R	4686	0.30	0.40	0.40	0.40	0.40	0.60	All
TDC cylinder	4714	—	—	—	0.55	0.55	0.60	One, includes R & R
TDC cylinder	4715	—	—	—	0.10	0.10	0.10	Each additional
TDC cylinder	4716	—	—	—	0.55	0.55	0.60	All
NOTE: R & R means remove and replace.								

Deutz 20-170 kW, continued

Flat Rate Description	Flat Rate Number	Flat Rate Hours						Comments
		20 kW	30 kW	40 kW	50-60 kW	70-100 kW	115-170 kW	
Lubrication								
Drain plug R & R	4653	0.10	0.10	0.10	0.10	0.10	0.10	
Lube oil filter R & R	4668	0.05	0.05	0.05	0.05	0.05	0.05	
Oil heat exchanger, leak check	4712	—	—	—	0.15	0.15	0.15	
Oil pan R & R	4652	0.20	0.25	0.25	0.60	0.70	0.70	
Starter								
Starter motor R & R	4723	0.15	0.15	0.15	0.30	0.30	0.30	
Starter pinion R & R	4724	0.25	0.25	0.25	0.25	0.25	0.25	
NOTE: R & R means remove and replace.								

3.6 Ford 20-100 kW

Flat Rate Description	Flat Rate Number	Flat Rate Hours			Comments
		20-30 kW	31-45 kW	50-100 kW	
Air Intake and Exhaust					
Air cleaner assembly	1547	0.40	0.60	1.00	Standard
Air cleaner assembly	1546	1.00	1.00	1.20	Heavy duty
Air cleaner element	1542	0.10	0.10	0.10	
Exhaust manifold, dry	1544	0.75	0.75	0.75	Each
Exhaust manifold, wet	1545	1.25	1.25	1.00	Each
Exhaust silencer	1549	1.25	1.25	1.50	
Exhaust stack pipe	1550	0.25	0.25	0.50	
Flexible exhaust connector	1548	1.25	1.25	1.50	
Intake manifold	1543	0.75	0.75	0.75	
Turbocharger R & R	2423	2.25	2.25	2.25	
Camshaft and Timing Gear					
Camshaft gear and chain	1515	—	3.40	4.50	
Camshaft R & R	1514	3.00	4.80	5.60	
Cooling					
Block heater element or tank	1737	1.25	1.25	1.25	Complete kit or block heater assembly
Block heater R & R	1524	1.75	1.75	1.75	
Coolant hoses	1519	0.80	0.80	0.80	Each
Cooling fan	1521	1.50	1.50	1.50	
Heater cord or thermostat	1525	1.25	1.25	1.25	
Radiator	1522	2.50	2.50	2.75	
Radiator, repair	3385	1.50	1.50	1.50	
Thermostat/housing	1518	1.00	1.00	1.00	
V-belt	1523	0.50	0.50	0.50	
Water pump, coolant	1520	1.75	2.00	2.00	
Crankshaft, Mains, and Flywheel					
Balancer R & R	1512	—	—	—	
Crankshaft and main bearings	1508	3.80	4.60	4.40	
Crankshaft damper	1511	0.90	0.60	0.80	
Crankshaft flywheel seal	1510	2.70	0.50	2.50	
Crankshaft front cover seal	1509	3.00	2.00	2.30	
Flywheel R & R	1513	0.30	0.30	0.30	
Cylinder Block, Liners, and Pistons, Rods					
Pistons and/or rings	1538	7.00	7.50	11.50	All
Cylinder Head and Valves					
Cylinder head or gasket R & R	1536	3.70	3.10	6.10	Each head
Cylinder head retorque	1537	1.00	1.30	1.00	
Valve cover gasket or breather	1535	0.20	0.20	0.20	Each head
Valve, grind or replace	1532	1.80	2.70	1.80	
Valve push rod	1533	—	0.50	0.40	All
Valve spring or stem seal R & R	1534	1.80	2.00	2.50	All
Valve tappet, adjust	1531	0.50	1.20	—	
NOTE: R & R means remove and replace.					

Ford 20-100 kW, continued

Flat Rate Description	Flat Rate Number	Flat Rate Hours			Comments
		20-30 kW	31-45 kW	50-100 kW	
Engine Electrical					
Battery charging alternator	1551	1.30	1.50	1.50	
Engine wiring harness	1958	1.50	1.50	1.50	
Gauge senders/shutdown switch	1957	1.50	1.50	1.50	
Engine Mounting					
Engine R & R	1558	3.00	3.50	4.00	
Skid Base	1557	3.00	3.50	4.00	
Vibration isolators	1556	1.50	1.50	1.75	Per pair
Fuel System					
Carburetor, adjust	1499	0.30	0.30	0.30	
Carburetor fuel shutdown solenoid	1502	0.90	0.90	0.90	Gasoline
Carburetor R & R	1500	1.10	1.10	1.10	Includes adjustment
Carburetor, rebuild	1002	1.75	1.75	2.00	
Electric choke R & R	1501	0.90	0.90	0.90	Includes choke adjustment
Flexible fuel line R & R	1506	0.50	0.50	0.50	Gas or gasoline
Fuel filter, gasoline	1507	0.50	0.50	0.50	
Fuel pump R & R	1503	1.25	1.25	1.25	
Gas fuel regulator/vaporizer R & R	1504	1.50	1.50	1.50	Test and adjustment
Gas solenoid valve	1505	1.00	1.00	1.00	
Governor					
Governor actuator	1528	1.25	1.25	1.50	
Governor, adjust	1526	0.50	0.50	0.50	Mechanical governor
Governor controller	1529	1.50	1.50	1.50	Includes adjustment
Governor R & R	1527	1.50	1.50	1.50	Mechanical governor; includes adjustment
Magnetic pickup	1530	1.50	1.50	1.50	
Ignition					
Crankshaft position sensor	1498	—	—	—	Distributorless ignition system
Ignition coil R & R	1495	1.40	1.40	1.40	DIS or distributor type
Ignition module	1496	1.50	1.50	1.50	Electronic ignition
Ignition timing	1497	0.40	0.40	0.40	Distributor type ignition
Spark plug wires	1494	0.25	0.40	0.50	Replace
Spark plugs, replace and cap	1493	0.25	0.30	0.40	
Lubrication					
Oil filter R & R	3362	0.25	0.25	0.25	
Oil pan or gasket	1517	1.60	1.90	1.70	
Oil pump, replace	1516	1.90	2.00	0.30	
Rebuild					
Major overhaul	1540	8.00	8.00	10.00	Includes valve service
Minor overhaul	1541	7.00	7.00	8.00	Excludes valve service
Short block R & R	1539	4.00	5.00	6.00	
Starter					
Starter drive R & R	1553	0.90	0.90	0.90	
Starter motor R & R	1552	1.40	1.40	1.40	Testing
Starter, rebuild	1554	1.90	1.90	1.90	Includes R & R, testing
Starter relay	1555	1.25	1.25	1.25	
NOTE: R & R means remove and replace.					

3.7 General Motors 30-100 kW

Flat Rate Description	Flat Rate Number	Flat Rate Hours	Comments
Air Intake and Exhaust			
Manifold/intake gasket R & R	4789	1.80	
Camshaft and Timing Gear			
Camshaft timing gear R & R	4813	3.00	
Crankshaft gear	4814	0.20	Excludes camshaft
Camshaft	4815	6.00	
Crankshaft, Mains, and Flywheel			
Bearing, crankshaft main	4819	3.40	Includes oil pan
Bearing, main	4820	0.70	One
Bearings, main	4821	2.80	All
Chain, timing, replace	4811	3.00	
Cover/gasket timing	4810	1.80	Includes balancer R & R
Crankshaft	4825	5.00	
Crankshaft gear	4812	0.20	Excludes timing
Expansion plug	4835	0.30	
Flywheel	4834	0.70	
Flywheel housing	4841	0.30	
Seal, main rear	4818	3.00	Includes oil pan
Seal, timing cover oil	4809	0.70	Includes balancer R & R
Cooling			
Block heater	5150	1.75	
Block heater element	5152	1.25	
Coolant hoses	5149	0.80	
Heater cord or thermostat	5151	1.25	
Radiator	5148	1.50	
Water pump/gasket	4840	0.70	
Cylinder Block, Liner, Pistons, and Rods			
Bearing, connecting rod	4822	3.00	One, includes oil pan
Bearing, connecting rod	4823	0.40	Each additional
Bearing, connecting rod	4824	2.80	All
Connecting rod or rings	4826	8.00	One
Connecting rod or rings	4827	10.00	Both
Connecting rings	4828	0.40	Each piston
Connecting rings	4829	2.60	All pistons
Connecting rod	4830	0.30	Each
Connecting rod	4831	2.00	All
Piston rod	4832	0.40	One
Piston rod	4833	3.00	All
NOTE: R & R means remove and replace.			

General Motors 30-100 kW, continued

Flat Rate Description	Flat Rate Number	Flat Rate Hours	Comments
Cylinder Head and Valves			
Balancer, harmonic	4808	0.50	
Cylinder head gasket	4795	5.00	One
Cylinder head gasket	4796	8.00	Both
Cylinder head	4797	6.00	One
Cylinder head	4798	9.50	Both
Lifter valve	4807	2.50	Includes R & R rocker
Push rod	4805	0.50	One, includes R & R rocker
Push rod	4806	0.90	Both, includes R & R rocker
Rocker arm	4790	0.40	Each
Rocker arms	4791	1.30	All
Rocker arm cover/gasket	4792	0.50	
Rocker arm balance stud valve	4793	0.50	One
Rocker arm balance stud valve	4794	0.30	Each additional
Valve, recondition	4801	2.00	One side
Valve, recondition	4802	3.50	Both
Ream/fit guides oversize	4803	0.20	
Valve, replace	4799	5.00	One
Valve, replace	4800	8.20	Both
Valve seals	4804	1.80	Includes R & R rocker
Engine Electrical			
Battery charging alternator	5157	1.50	
Engine wiring harness	5159	1.50	
Gauge senders/shutdown switch	5158	1.50	
Engine Mounting			
Engine, complete	4839	4.00	Complete
Engine, partial	4837	8.20	Partial
Engine; additional to recondition all valves/guides	4838	3.50	Additional
Skid base	5161	3.00	
Vibromounts	5160	1.50	
Lubrication			
Engine oil pump	4817	2.20	Includes oil
Oil pan and gasket	4816	2.00	Includes filter
Oil plug	4836	0.30	
Starter			
Starter drive R & R	5154	0.90	
Starter motor	5153	1.40	
Starter rebuild	5155	1.80	
Starter relay	5156	1.25	
NOTE: R & R means remove and replace.			

3.8 John Deere* 20–200 kW

Flat Rate Description	Flat Rate Number	Flat Rate Hours			Comments
		20–60 kW	70–100 kW	101–200 kW	
Air Intake and Exhaust					
Air cleaner assembly, replace	1059	0.30	0.70	0.80	Standard
Air cleaner assembly, replace	1060	0.50	0.90	1.00	Heavy duty
Air cleaner element, replace	1058	0.20	0.30	0.30	
Air cleaner R & R	1024	1.00	1.00	1.00	
Exhaust elbow	1659	0.50	0.50	0.50	
Exhaust elbow coupling, replace	1055	0.60	0.60	0.60	
Exhaust elbow, replace	1054	0.60	0.60	0.60	
Exhaust manifold gasket, replace	1051	0.60	0.80	1.40	Transfer exhaust
Exhaust manifold, replace	1052	0.80	1.00	1.40	Elbow and turbocharger
Exhaust manifold w/turbo, replace	1053	1.80	2.00	2.20	
Exhaust silencer R & R	1658	1.25	1.50	2.00	
Flexible exhaust connector	1061	1.25	1.50	1.50	
Intake elbow and gasket, replace	1057	0.60	0.60	0.60	
Intake manifold/gasket, replace	1056	1.00	1.00	1.00	
Turbocharger/gasket, replace	1048	0.80	0.80	0.40	
Turbocharger, recondition	1049	1.80	1.80	1.80	Includes R & R
Turbocharger, recondition	1050	1.00	1.00	0.80	When already removed
Camshaft and Timing Gear					
Camshaft and cam followers	1078	6.50	7.00	3.60	R & R fuel pump, crankshaft pulley, and timing gear cover; R & R cylinder head; retorque head bolts and adjust valves
Camshaft, replace	1077	4.40	5.00	3.30	R & R front crankshaft pulley, front cover, fuel pump, bracket, valve cover, and rocker arm assembly, replace camshaft and/or gear
Rocker arm assembly, recondition	1080	1.20	1.40	0.60	Includes R & R
Rocker arm cover and/or gasket	1079	0.60	0.60	0.40	
Timing gear cover and/or gasket	1081	2.20	2.40	2.20	
Cooling					
Block heater assembly R & R	1657	1.25	1.25	1.25	Tank assembly or element only
Block heater cord or thermostat	1656	1.25	1.25	1.25	
Block heater R & R	1655	1.75	1.75	2.00	Complete kit
Coolant hose	1105	0.80	0.80	0.80	
Fan belts, replace	1095	0.60	0.60	0.60	
Fan blade, replace	1096	0.60	0.60	0.60	
Fan pulley, replace	1097	0.60	0.60	0.60	
Idler pulley, recondition	1098	0.60	0.60	—	Includes R & R; replace ball bearings, sleeve, and/or pulley
Radiator assembly, replace	1104	2.50	2.75	3.25	
Radiator, repair	3383	2.00	2.00	2.00	
Thermostats, covers, gaskets	1102	0.60	0.60	0.60	
Thermostat housing, replace	1103	0.60	0.60	0.60	
Water pump/gasket, replace	1099	1.00	1.00	1.50	Adjust fan belt
Water pump, recondition	1100	2.00	2.00	2.50	Includes R & R
Water pump, recondition	1101	1.00	1.00	1.00	When already removed
* John Deere requires that the distributor/dealer have a factory-trained technician. NOTE: R & R means remove and replace.					

John Deere* 20-200 kW, continued

Flat Rate Description	Flat Rate Number	Flat Rate Hours			Comments
		20-60 kW	70-100 kW	101-200 kW	
Crankshaft, Mains, and Flywheel					
Crankshaft front oil seal	1069	2.20	2.40	2.90	
Crankshaft idler gear/bushings	1071	2.60	2.60	—	R & R timing gear cover and oil pan
Crankshaft pulley R & R	1073	0.60	0.60	0.60	
Crankshaft rear oil seal	1068	0.80	0.80	1.20	R & R flywheel and flywheel housing
Crankshaft, replace	1067	6.50	7.00	7.50	Replace rod and main bearings, check and/or recondition oil pump, and make all adjustments
Flywheel housing, replace	1076	0.80	0.80	0.70	R & R flywheel, replace rear crankshaft seal
Flywheel, replace	1074	0.60	0.60	0.70	
Flywheel ring gear, replace	1075	1.00	1.00	1.00	R & R flywheel
Idler gear/bushings	1072	0.40	0.60	—	Each additional
Main bearings, replace	1070	2.80	3.60	4.00	R & R oil pan and oil pump
Cylinder Block, Liners, Pistons, and Rods					
Cylinder block, replace	1117	17.00	19.00	20.00	Deglaze cylinder liners and replace piston rings, all seals, main bearings, and rod bearings; transfer and/or replace all parts and assemblies and make all adjustments
Cylinder liner package	1118	6.5	7.00	8.00	R & R head and oil pump, replace piston rings, check and/or replace rod bearings, retorque head bolts, adjust valves
Cylinder liner packings	1119	1.00	1.00	1.00	Each additional
Cylinder liner, replace	1120	6.50	7.00	8.00	R & R head and oil pump, replace piston rings, check and/or replace rod bearings, retorque head bolts, adjust valves
Cylinder liner, replace	1121	1.00	1.00	1.00	Each additional
Pistons, liners, rods, replace	1132	7.50	9.50	11.90	R & R head and oil pump, replace rod bearings, retorque head bolts, adjust valves
Pistons, liners, valves, crankshaft, camshaft, valves, recondition	1136	18.00	21.50	23.50	Replace rod and main bearings, retorque head bolts, adjust valves
Pistons, liners, valves, recondition	1134	11.50	13.50	14.60	R & R head and oil pump, check and/or replace main bearings and rod bearings, reset valves, retorque head bolts, adjust valves
Piston, replace	1122	6.00	7.00	8.80	R & R head and oil pump, replace piston rings, replace cylinder packings, R & R and deglaze liners, check and/or replace piston pin, bushings, and rod bearings
Piston, replace	1123	1.00	1.00	1.00	Each additional
Piston rings, replace	1124	6.50	7.00	8.00	R & R head and oil pump, check and/or replace piston pin, rod bushings, and bearings; R & R and deglaze liners, replace cylinder liner packings
Piston rings, replace	1125	1.00	1.00	1.00	Each additional
Piston, rings, valves, recondition	1133	13.50	17.50	14.60	R & R head and oil pump, remove liner ridges and deglaze, check and/or replace rod bearings and main bearings, reset valves, retorque head bolts, and adjust valves
* John Deere requires that the distributor/dealer have a factory-trained technician. NOTE: R & R means remove and replace.					

John Deere* 20-200 kW, continued

Flat Rate Description	Flat Rate Number	Flat Rate Hours			Comments
		20-60 kW	70-100 kW	101-200 kW	
Cylinder Block, Liners, Pistons, and Rods, continued					
Piston, rods, liners, valves, recondition	1135	11.00	13.50	15.50	R & R head and oil pump, replace rod bearings, check and/or replace main bearings, retorque head bolts, reset and adjust valves
Piston, rods, replace	1131	8.00	10.00	11.90	R & R head, oil pump and liners, remove liner ridges and deglaze, replace piston rings, connect rod bearings, retorque head bolts, adjust valves
Rod bearings, replace	1126	1.40	1.60	1.60	R & R oil pump
Rod bearings, replace	1127	0.20	0.20	0.20	Each additional
Rod, main bearings, replace	1130	3.40	4.80	5.30	
Rod/piston pin, replace	1128	6.50	8.50	9.00	R & R head and oil pump, R & R piston and rings, remove liner ridges, deglaze liners, check and/or replace rod bearings
Rod/piston pin, replace	1129	1.00	1.00	1.00	Each additional
Short block assembly, install	1116	8.00	9.00	10.00	Transfer all parts and assemblies and make all adjustments
Cylinder Head and Valves					
Cylinder head, component exchange	1112	3.20	3.80	6.20	R & R air cleaner and bracket as one assembly, exhaust manifold with turbocharger and valve cover, adjust valves and retorque head bolts, transfer parts
Cylinder head gasket, replace	1111	2.80	3.80	4.80	R & R air cleaner and bracket as one assembly, exhaust manifold with turbocharger and valve cover, adjust valves, retorque head bolts
Valves, guides, recondition	1114	6.50	8.00	8.80	All; includes R & R, cylinder head R & R, reset valves, knurl guides
Valves, recondition	1113	6.00	7.00	7.60	R & R cylinder head, reset all valves
Valves, replace	1115	6.50	8.00	9.90	All; R & R cylinder head, reseal valves, inserts
Engine Electrical					
Battery charging alternator	1739	1.20	1.20	1.20	
Engine wiring harness	1740	1.50	1.50	2.00	
Fuel rack shutdown solenoid	1742	—	—	1.50	External mounted
Shutdown/gauge sender/switch	1741	1.50	1.50	1.50	
Engine Mounting					
Skid base	1066	3.50	4.00	4.50	
Vibration isolators	1065	1.50	1.75	1.75	Each pair
* John Deere requires that the distributor/dealer have a factory-trained technician. NOTE: R & R means remove and replace.					

John Deere* 20-200 kW, continued

Flat Rate Description	Flat Rate Number	Flat Rate Hours			Comments
		20-60 kW	70-100 kW	101-200 kW	
Fuel					
Flexible fuel lines	1922	1.00	1.00	1.00	
Fuel filter body, recondition	1000	0.60	0.60	0.60	
Fuel filter bracket, replace	1004	0.60	0.60	0.60	
Fuel filter element(s), replace	1001	0.60	0.60	0.60	
Fuel hose or tube, replace	1005	0.60	0.60	0.60	Transfer pump to fuel filter
Fuel shutoff solenoid	1013	0.60	0.60	—	Includes R & R
Fuel transfer pump, replace	1003	0.60	0.60	0.60	
Hose or tube, replace	1006	0.60	0.60	0.60	Fuel filter to fuel injection pump
Injector line, replace	1020	0.60	0.60	0.60	One
Injector line, replace	1021	0.20	0.20	0.20	Each additional
Injector pump, adjust	3997	1.00	1.00	1.00	
Injection pump drive shaft	1011	1.20	1.20	1.60	R & R injector pump, adjust engine timing and speed
Injection pump, recondition	1008	6.00	6.00	6.00	R & R, adjust engine timing and speed
Injection pump, recondition	1009	4.60	4.60	4.60	When already removed
Injection pump, replace	1007	1.40	1.40	1.00	Adjust engine timing and speed
Nozzles, recondition	1016	1.00	1.00	0.70	One, includes R & R
Nozzles, recondition	1017	1.00	1.00	0.70	Each additional
Leak off line, replace	1012	0.60	0.60	0.20	
Nozzle, replace	1014	0.60	0.60	0.30	One
Nozzle, replace	1015	0.20	0.20	0.30	Each additional
Subbase fuel tank	1923	4.00	5.00	6.00	
Timing gear cover, drive gear R&R	1010	2.60	2.80	3.80	
Governor					
Engine speed, adjust	1107	0.60	0.60	0.50	
Governor actuator, replace	1108	1.50	1.50	1.50	Electronic governor
Governor controller, replace	1109	1.50	1.50	1.50	Electronic governor
Governor housing cover, replace	1106	0.60	0.60	0.60	With shutoff
Governor magnetic pickup, replace	1110	1.50	1.50	1.50	Electronic governor
* John Deere requires that the distributor/dealer have a factory-trained technician. NOTE: R & R means remove and replace.					

John Deere* 20-200 kW, continued

Flat Rate Description	Flat Rate Number	Flat Rate Hours			Comments
		20-60 kW	70-100 kW	101-200 kW	
Lubrication					
Engine oil cooler, replace	1091	0.60	0.60	0.60	Drain and refill engine coolant
Oil cooler, recondition	1092	1.20	1.20	1.20	Check and/or replace bypass valve and/or spring, includes R & R
Oil cooler, recondition	1093	0.60	0.60	0.60	When already removed
Oil dipstick and/or tube, replace	1082	0.60	0.60	0.60	
Oil filter elements, replace	1084	0.60	0.60	0.60	
Oil filter housing, replace	1085	0.80	0.80	0.50	
Oil filter inlet and/or gasket, replace	1083	0.60	0.60	0.60	
Oil pan and/or gasket, replace	1086	1.00	1.20	1.20	
Oil pump, replace	1087	1.40	1.60	1.60	
Oil pump, R & R and recondition	1088	1.80	2.00	2.40	
Oil pump, recondition	1089	0.60	0.60	1.40	When already removed
Oil regulator valve, recondition	1094	0.80	0.80	0.80	Includes R & R and includes R & R oil cooler
Vent hose or tube	1090	0.60	0.60	0.60	
Rebuild					
Engine, replace	1022	3.80	6.50	7.50	
Short engine, install	1023	5.20	8.60	9.60	
Starting					
Starter drive assembly, replace	1046	1.60	1.60	1.60	
Starter, recondition	1041	2.40	2.40	2.40	Includes armature, brushes, clutch, and R & R
Starter relay	1047	1.25	1.25	1.25	
Starter, replace	1037	0.60	0.60	0.60	
Starter solenoid, replace	1038	0.60	0.60	0.60	Includes R & R
* John Deere requires that the distributor/dealer have a factory-trained technician. NOTE: R & R means remove and replace.					

3.9 Perkins* 20-100 kW

Flat Rate Description	Flat Rate Number	Flat Rate Hours		Comments
		20-60 kW	70-100 kW	
Air Intake and Exhaust				
Air cleaner assembly, replace	2390	0.30	0.70	Standard
Air cleaner assembly, replace	2391	0.50	0.90	Heavy duty
Air cleaner element	2392	0.20	0.30	
Exhaust elbow or rain cap	2387	0.50	0.50	
Exhaust silencer R & R	2388	1.25	1.50	
Flexible exhaust connector	2389	1.25	1.50	
Cooling				
Block heater assembly R & R	2406	1.25	1.25	Tank assembly or element only
Block heater cord or thermostat	2405	1.25	1.25	
Block heater R & R	2404	1.75	1.75	Complete kit
Coolant hose	2403	0.80	0.80	
Fan blade, replace	2394	1.25	1.25	
Radiator assembly, replace	2402	2.50	2.75	
Radiator, repair	3457	2.00	2.00	
Engine Electrical				
Engine wiring harness	2407	1.50	1.50	
Shutdown/gauge sender/switch	2408	1.50	1.50	
Engine Mounting				
Skid base R & R	2416	3.50	4.00	
Vibration isolators	2417	1.50	1.75	Each pair
Fuel				
Auxiliary fuel pump	2410	1.50	1.50	
Flexible fuel lines	2409	1.00	1.00	
Subbase fuel tank	2411	4.00	5.00	
Governor				
Governor actuator, replace	2412	1.50	1.50	Electronic governor
Governor controller, replace	2413	1.50	1.50	Electronic governor
Governor magnetic, replace pickup	2414	1.50	1.50	Electronic governor
Starter				
Starter relay	2415	0.80	0.80	
* The Warranty Department requires that repairs made on Perkins engines be performed by an authorized Perkins service center. NOTE: R & R means remove and replace.				

Section 4 Generator Flat Rates

4.1 20-300 kW

Flat Rate Description	Flat Rate Number	Flat Rate Hours			Comments
		20-60 kW	61-150 kW	151-300 kW	
Accessories					
Generator strip heater	2350	1.50	1.50	1.50	
Rodent guard	2351	0.50	0.50	0.50	
Weather housing front rear/panel	1895	1.00	1.00	3.00	
Weather housing latch	1893	0.75	0.75	0.75	
Weather housing roof	1894	4.00	5.00	12.00	
AC Generator					
Alarm horn components	1624	1.25	1.25	1.25	i.e., Relay, switch, circuit board
Circuit breaker	1610	1.75	2.50	3.00	Line or safeguard
Current transformer	1619	1.75	1.75	1.75	One
Current transformer	1620	0.30	0.30	0.30	Each additional
End bearing	1608	2.50	2.50	3.50	
End bracket	1609	2.00	2.00	2.50	
Exciter field	1613	3.00	3.00	3.50	Permanent magnet or wound field exciter
Generator adapter	1611	10.50	12.50	14.50	Includes rotor/stator
Generator fan	1617	10.50	12.50	14.50	Includes rotor/stator
Heat sink assembly	1616	3.50	3.00	3.00	Includes photo board
Junction box	1618	1.00	1.00	1.25	
LED board	1621	1.75	1.75	1.75	Stationary
Photo transistor board	1622	3.50	3.00	3.00	Includes heat sink assembly
Rotor and assembly	1606	10.00	10.00	14.00	Includes stator
Rotor rectifier module	1612	3.00	—	—	
Speed sensor	1614	1.25	1.25	1.25	For crank disconnect
Speed sensor actuator cup	1615	2.00	2.00	2.00	
Stator	1607	8.00	8.00	12.00	
Voltage regulator	1623	2.00	2.00	2.00	

20-300 kW, continued

Flat Rate Description	Flat Rate Number	Flat Rate Hours			Comments
		20-60 kW	61-150 kW	151-300 kW	
Controller					
AC interlock board	1599	1.00	1.00	1.00	
Control relays	1598	1.25	1.25	1.25	
Controller, digital	3238	6.00	6.00	6.00	
Controller R & R	1587	1.00	1.00	1.00	
Controller terminal strip	1601	0.50	0.50	0.50	
Cycle crank board	1602	1.25	1.25	1.25	Includes R & R, calibration
Dry contact kit	2382	1.50	1.50	1.50	
Fuse holder or DC circuit breaker	1595	1.25	1.25	1.25	
Fuses	2420	0.50	0.50	0.50	Includes troubleshooting
Gauges/meters	1596	1.25	1.25	1.25	
Hourmeter	1593	1.25	1.25	1.25	
Main control board	1597	1.50	1.50	1.50	
Meter scale/fault lamps	1592	0.50	0.50	0.50	
Overvoltage board	1600	1.00	1.00	1.00	
Panel lights	1589	0.50	0.50	0.50	
Remote annunciator	2383	1.50	1.50	1.50	Assembly or circuit board
Ribbon cable	2419	0.80	0.80	0.80	Between main logic board and LED panel
Selector switch (volt/amp)	1591	1.75	1.75	1.75	
Start/indicator panel	1588	1.50	1.50	1.50	LED indicator board 5-16 light
Switches	1590	1.25	1.25	1.25	Emergency stop, start/stop, etc.
Tachometer	1603	1.00	1.00	1.00	
Transformer	1605	1.75	1.75	1.75	Battery charging or control
Voltage adjust rheostat	1594	1.00	1.00	1.00	
Wattmeter/transducer	1604	1.50	1.50	1.50	
NOTE: R & R means remove and replace.					

4.2 301-2000 kW

Flat Rate Description	Flat Rate Number	Flat Rate Hours			Comments
		301-600 kW	601-800 kW	801-2000 kW	
AC Generator					
Bus bar holder	3365	1.25	—	—	
Current transformer	1633	2.00	2.00	2.00	
End bracket	1629	8.00	9.00	10.00	
Exciter armature	1627	6.00	6.00	6.00	
Exciter stator	1626	6.00	6.00	6.00	Exciter field
Junction box	1630	6.00	7.00	8.00	
Line circuit breaker	1632	3.50	3.50	4.00	
Rectifier/diodes	1634	2.50	2.50	2.50	
Rotor bearing	1628	8.00	9.00	10.00	
Rotor/stator	1625	12.00	18.00	22.00	
Safeguard breaker	1631	1.50	1.50	1.50	
Surge suppressor	1635	2.50	2.50	2.50	
Voltage regulator	1636	2.00	2.00	2.00	Includes adjustments
Voltage regulator accessories	1637	2.00	2.00	2.00	Paralleling module, etc.
Controller					
AC interlock board	1650	1.00	1.00	1.00	
Control relays	1649	1.25	1.25	1.25	
Controller, digital	3239	4.00	4.00	4.00	
Controller R & R	1638	1.00	1.00	1.00	
Controller switches	1641	1.25	1.25	1.25	Emergency stop, start/stop, etc.
Controller terminal strip	1652	0.50	0.50	0.50	
Dry contact kit	2382	1.50	1.50	1.50	
Fuse holder or DC circuit breaker	1646	1.25	1.25	1.25	
Fuse R & R	2420	0.50	0.50	0.50	Includes troubleshooting
Gauges/meters	1647	1.25	1.25	1.25	
Hourmeter	1644	1.25	1.25	1.25	
Main control board	1648	1.50	1.50	1.50	
Meter scale/fault lamps	1643	0.50	0.50	0.50	
Overvoltage board	1651	1.00	1.00	1.00	
Panel lights	1640	0.50	0.50	0.50	
Remote annunciator	2383	1.50	1.50	1.50	Assembly or circuit board
Selector switch (volt/amp)	1642	1.75	1.75	1.75	
Start/indicator panel	1639	1.50	1.50	1.50	LED indicator board
Tachometer	1653	1.25	1.25	1.25	Includes R & R, calibration
Voltage adjust rheostat	1645	1.00	1.00	1.00	
Wattmeter/transducer	1654	1.50	1.50	1.50	
NOTE: R & R means remove and replace.					

Notes

Section 5 Switchgear Flat Rates

5.1 Low-Voltage Switchgear, 600 Volts or Less

Flat Rate Description	Flat Rate Number	Flat Rate Hours	Comments
Control circuit breakers/fuses	1943	1.75	
Control modules	1939	2.50	
Current transformer	1938	3.00	
Indicator lamps	1934	0.50	
Meters/gauges	1933	1.50	
Panel switches/pushbutton	1935	1.50	
Potential transformer	1937	1.50	
Power circuit breakers	1944	—	Call factory
Relay or relay socket	1940	1.50	
Selector switch	1936	2.00	
Voltage adjust rheostat	1942	1.50	
Voltage regulator	1941	1.25	

5.2 Medium-Voltage Switchgear, 601-5000 Volts

Flat Rate Description	Flat Rate Number	Flat Rate Hours	Comments
Control circuit breakers/fuses	1955	1.75	
Control modules	1951	2.50	
Current transformer	1950	4.00	
Indicator lamps	1946	0.50	
Meters/gauges	1945	1.50	
Panel switches/pushbutton	1947	1.50	
Potential transformer	1949	2.00	
Power circuit breakers	1956	—	Call factory
Relay or relay socket	1952	1.50	
Selector switch	1948	2.00	
Voltage adjust rheostat	1954	1.50	
Voltage regulator	1953	1.50	

Notes

Section 6 Industrial Rental Trailer Flat Rates

Flat Rate Description	Flat Rate Number	Flat Rate Hours			Comments
		20-60 kW	61-150 kW	151-300 kW	
Trailer*					
Axle R & R	3235	3.00	3.00	3.00	
Brake actuator R & R	3230	1.50	1.50	1.50	
Fuel filler cap R & R	3234	0.25	0.25	0.25	
Fuel gauge R & R	3232	0.50	0.50	0.50	
Fuel level switch R & R	3233	0.75	0.75	0.75	
Fuel tank housing R & R	3236	7.00	7.00	7.00	
Fuel tank trailer R & R	3237	6.00	6.00	6.00	
Jackstand R & R	3231	0.25	0.25	0.25	
Tire R & R	3229	1.00	1.00	1.00	
* Use the appropriate other sections for all other industrial rental generator set flat rates. NOTE: R & R means remove and replace.					

Notes

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