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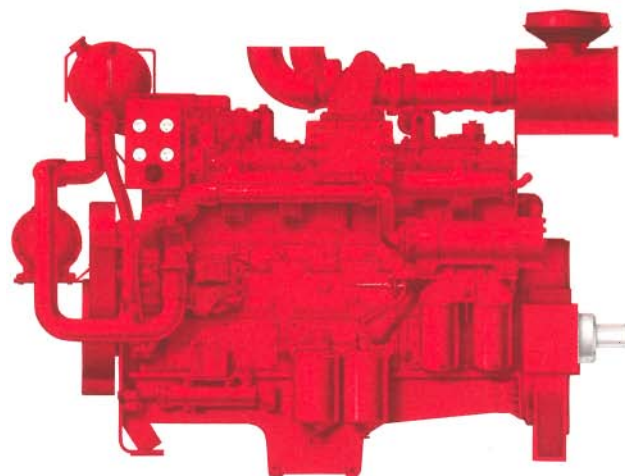


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# VT28-F FIRE PUMP ENGINE



## SPECIFICATIONS

**Four Stroke Cycle, Turbocharged,  
V12 Cylinder Diesel Engine.**

Bore and Stroke	140x152 mm	(5½x6 in.)
Displacement	28 L	(1710 cu. in.)
Oil System Cap.	75.7 L	(20 U.S. gals.)
Engine Coolant Cap.	113.6 L	(30 U.S. gals.)
Net Weight with Std. Accessories, Dry	3 039 kg	(6,700 lbs.)

## INSTALLATION CONSIDERATIONS

Maximum raw water pressure must not exceed 1 035 kPa (150 PSI). Minimum acceptable raw water flow at 21°C (70°F) raw water temperature and 38°C (100°F) ambient air temperature should be at least 227 L/min. (60 GPM) at the 2100 RPM listed rating.

Ventilation air required for engine combustion is 802 L/sec. (1700 CFM) at 2100 RPM rating. This is for engine air combustion only and does not take into consideration additional air required for normal room cooling.



This symbol on the nameplate means the product is Listed by Underwriters' Laboratories Inc.



This symbol on the nameplate means the product is approved by the Factory Research Corporation.



This symbol on the nameplate means the product is Listed by Underwriters' Laboratories of Canada.

## LISTED AGENCY RATINGS

442 H.P. @ 1460 R.P.M.

534 H.P. @ 1750 R.P.M.

559 H.P. @ 1900 R.P.M.

589 H.P. @ 2100 R.P.M.

All of the above ratings are listed by the following agencies:

Underwriters' Laboratories

Factory Mutual

Underwriters' Laboratories of Canada

The agency-approved horsepower ratings published are already derated for fire pump service. The ratings show horsepower available for driving the fire pump at standard SAE J1349 conditions of 7 521 mm (29.61 in.) Hg barometer and 25°C (77°F) inlet air temperature (approximate 91.4 m [300 ft.] above sea level). The only additional deration necessary is for higher ambient temperatures and elevations as follows: 3% for each 305 m (1000 ft.) above 91.4 m (300 ft.) and 1% for each 5.6°C (10°F) above 25°C (77°F) in accordance with National Fire Association Pamphlet No. 20.



## DESIGN FEATURES

**Bearings:** Replaceable, precision type, steel backed inserts.

Seven main bearings, 146 mm (5.75 in.) diameter. Connecting rod bearings 96 mm (3.75 in.) diameter.

**Camshaft:** Dual camshafts precisely control valve and injector timing. Lobes are induction hardened for long life. Fourteen replaceable precision type bushings 51 mm (2.0 in.) diameter.

**Camshaft Followers:** Induction hardened, roller type for long cam and follower life.

**Connecting Rods:** Drop forged, I-beam section 305 mm (12 in.) center to center length. Rifle drilled for pressure lubrication of piston pin. Rod is tapered on piston pin end to reduce unit pressures. Rods are removable through cylinders.

**Cooling System:** Self adjusting belt driven centrifugal water pump. Large volume water passages provide even flow of coolant around cylinder liners, valves, and injectors. Dual modulating by-pass thermostats regulate coolant temperature. Spin-on corrosion resistors check rust and corrosion, control acidity, and remove impurities.

**Crankshaft:** Fully counterweighted high tensile steel forging with induction hardened fillets and journals.

**Cylinder Block:** Alloy cast iron with removable wet liners.

Cross bolt support to main bearing cap provides extra strength and stability.

**Cylinder Heads:** Alloy cast iron. Each head serves three cylinders. Drilled fuel supply and return lines. Valve seats are replaceable corrosion resistant inserts. Valve guides and cross head guides are replaceable inserts.

**Cylinder Liners:** Replaceable wet liners dissipate heat faster than dry liners and are easily replaced without reboring the block.

**Fuel System:** Cummins exclusive low pressure PT™ system with wear compensating pump and integral dual flyweight governor. Camshaft actuated fuel injectors give accurate metering and timing. Fuel lines are internal drilled passages in cylinder heads. Spin-on fuel filter.

**Gear Train:** Timing gears and accessory drive gears are induction hardened helical gears driven from crankshaft and located at front of block.

**Lubrication:** Large capacity gear pump provides pressure lubrication to all bearings and oil supply for piston cooling. All pressure lines are internal drilled passages in block and heads. Oil cooler, full-flow filters, and by-pass filters maintain oil condition and maximize oil and engine life.

**Pistons:** Aluminum alloy, cam ground and barrel shaped to compensate for thermal expansion assures precise fit at operating temperatures. CeCorr™ grooved skirt finish provides superior lubrication. Oil cooled for rapid heat dissipation. Teflon pads on thrust faces minimize liner vibration and noise. Three compression and one oil ring.

**Piston Pins:** Full floating, tubular steel retained by snap rings. 51 mm (2.0 in.) diameter.

**Turbocharger:** Two top mounted Cummins exhaust gas driven turbochargers. Turbocharging provides more power, improved fuel economy, altitude compensation, and lower smoke and noise levels.

**Valves:** 48 mm (1.875 in.) diameter poppet type intake and exhaust valves. Wear resistant face on exhaust valves.

## STANDARD EQUIPMENT

**Air Cleaner:** Two, 381 mm (15 in.) diameter, dry type, mounted.

**Belt Guard and Damper Shield:** Protection from alternator, accessory drive, and water pump belts and vibration damper.

**Coolant Pump:** Belt driven, centrifugal type.

**Corrosion Resistor:** Fleetguard, mounted, checks rust and corrosion, controls acidity, and removes impurities from coolant.

**Electrical Equipment:** 24 volt negative ground system. 24 volt starting motor; 24 volt, 18 ampere alternator; voltage regulator; manually operable contactors; junction box with enclosed terminal strip.

**Engine Support:** Pedestal type, front and rear.

**Exhaust Manifold:** Two, water cooled.

**Exhaust Outlet:** 127 mm (5 in.) diameter, 90° elbow.

**Filters:** Fleetguard. Lubricating oil, full flow, replaceable paper element type, mounted. Fuel, twin high capacity replaceable paper element type (primary) and wire screen/magnetic (secondary).

**Flywheel:** Machined for stubshaft mounting.

**Flywheel Housing:** SAE No. 0.

**Governor:** Variable speed type.

**Heat Exchanger:** Tubular type, mounted, copper-nickel.

**Instrument Panel:** Mounted. Includes ammeter, hourmeter, water temperature gauge, lubricating oil temperature gauge, lubricating oil pressure gauge.

**Oil Pan:** Cast aluminum, center sump type, 68.1 litre (18 U.S. gallon) capacity.

**Oil Pressure Switch:** Provides signal to activate alarm (not included) for low oil pressure.

**Overspeed Switch:** Mounted. Overspeed shutdown with manual reset, stop crank contacts.

**Sight Glass:** Shows water level of engine at a glance; made of heavy duty plastic for shatter protection.

**Stubshaft:** Mounted on flywheel.

**Throttle Control:** Hydraulic, with no manual override.

**Vibration Damper:** Compressed rubber type.

**Water Jacket Heater:** Mounts on right side of engine; 230 volt, 4000 watt.

**Water Temperature Switch:** Provides signal to activate alarm (not included) for high water temperature.

## OPTIONAL EQUIPMENT

**Oil Heater:** Mounted in side of oil pan.

*Cummins has always been a pioneer in product improvement. Thus specifications may change without notice. Illustrations may include optional equipment. See specific proposal bill of material for actual equipment being furnished.*



**Cummins Engine Company, Inc.**  
**Columbus, IN 47202**  
**U.S.A.**

# CUMMINS ENGINE COMPANY, INC.

## Engine Data Sheet

**Fire Pump Engine Model:** VT-1710-F  
(for listed/approved ratings see tabulation)

**Date:** June, 1980

**Data Sheet:** DS-3555-A

### General Engine Data

Type:	4 Cycle; 40° Vee; 12 Cylinder
Aspiration:	Turbocharged
Bore — in. (mm)	5.5 (140)
Stroke — in. (mm)	6 (152)
Displacement — in. <sup>3</sup> (litre)	1710 (28)
Compression Ratio:	14.1
Valves per Cylinder: — Intake	2
— Exhaust	2
Engine Weight & Center of Gravity (With Standard Accessories)	
Reference Installation Diagram	213137
Dry Weight — lb. (kg)	6700 (3 039)
Wet Weight — lb. (kg)	6950 (3 152)
C.G. Distance From F.F.O.B. — in. (mm)	n.a.
C.G. Distance Above Crankshaft — in. (mm)	n.a.
Maximum Allowable Bending Moment @ Rear Face of Block — lb.-ft. (N•m)	1000 (1350)

### Air Induction System

Maximum Allowable Temperature Rise Between Ambient Air and Engine Air Inlet (Ambients 32°F [0°C] to 100°F [38°C]) — °F (°C)	30 (15)
Maximum Allowable Intake Restriction With a Dirty Air Filter Element — in. H <sub>2</sub> O (mm H <sub>2</sub> O)	25 (630)
Part Number of Standard Air Filter Element (Dry Type)	139264

### Lubrication System

Oil Pressure @ Rated Speeds — PSI (kPa)	50-90 (340-620)
Oil Flow @ Maximum Rated Speeds (Nominal) — U.S. GPM (litre/s)	60 (3.8)
Oil Pan Capacity (High — Low) U.S. gal. (litre)	18-16 (68.0-60.5)
Full Flow Lube Oil Filter Capacity — U.S. gal. (litre)	20 (75.5)
Part Number of Standard Oil Pan	181275
Part Number of Standard Oil Filter Element	LF-516

**Application Note:** When ambient temperatures will be lower than 70°F (21°C) an oil heater is required. The recommended heater wattage for this engine is 600 down to 40°F (4°C).

### Cooling System

Heat Exchanger Cooled (Shell & Tube Type)	
Part Number of Tube Bundle	185671
Raw Water Working Pressure Range at Heat Exchanger — PSI (kPa)	150 (1030) Maximum
Recommended Minimum Water Supply Pipe Size to Heat Exchanger (Reference Only) — in. (mm) dia.	2 (50)
Recommended Minimum Water Discharge Pipe Size From Heat Exchanger (Reference Only) — in. (mm) dia.	2.5 (65)
Coolant Water Capacity (Engine Side) — U.S. gal. (litre)	30 (113)
Standard Thermostat — Type	Modulating
— Range — °F (°C)	170-185 (77-85)
Minimum Raw Water Flow with Water Temperatures to 90°F (32°C) — U.S. GPM (litre/s)	65 (4.1)

**Note:** Minimum raw water requirement is based on water flow required to minimize tube fouling in the heat exchanger tube bundle.

A jacket water heater is mandatory on this engine. The recommended heater wattage is 4000 down to 40°F (4°C).

## Exhaust System

Maximum Allowable Back Pressure Imposed by Piping & Silencer — in. Hg (mm Hg) .....	3 (75)
Exhaust Pipe Size Normally Acceptable — in. (mm) dia. ....	8 (200) Single
	5 (125) Dual

## Fuel System

Supply Line Size — in. (mm) .....	0.625 (16) O.D. Tube
Drain Line Size — in. (mm) .....	0.625 (16) O.D. Tube
Maximum Fuel Line Length Between Supply Tank & Fuel Pump — ft. (m) .....	40 (12)
Maximum Fuel Height Above Crankshaft — in. (mm) .....	80 (2030)
Part Number of Standard Fuel Filter .....	BM-91119
Part Number of Standard Fuel Filter Element .....	FF-108
Maximum Allowable Restriction to Fuel Pump With Dirty Filter — in. Hg (mm Hg) .....	8 (200)
Maximum Allowable Return Line Restriction — in. Hg (mmHg) .....	4 (100)

## Electrical System

Battery Voltage .....	24	
Battery Cable Size (Maximum Cable Length Not to Exceed 10 ft. (3.0 m) AWG) ...	00	
Wiring for Automatic Starting (Negative Ground) .....	Standard	
Alternator (Standard) 24 Volt, Internally Regulated — Ampere .....		
Manually Operable Contactors .....	Standard	
Minimum Recommended Battery Capacity —	<u>Amp-hr.</u>	<u>°F CCA</u>
70°F (21°C) Minimum Temperature .....	200	900
32°F (0°C) Minimum Temperature .....	260	1290
Reference Wiring Diagram Number .....	212461	

## Performance Data

All data is based on the engine operating with fuel system, water pump, lubricating oil pump, air cleaner, and alternator; not included are compressor, fan, optional equipment and driven components. Data is based on operation at SAE standard J816b conditions of 500 feet (150 m) altitude (29.00 in. [736 mm] Hg dry barometer), 85°F (29°C) intake air temperature and 0.38 in. (9.6 mm) Hg water vapor pressure, using No. 2 diesel or a fuel corresponding to ASTM D2. All data is subject to change without notice.

Altitude Above Which Output Should be Limited — ft. (m) .....	500' (150m)
Correction Factor per 1000 ft. (300 m) above Altitude Limit .....	3%
Temperature Above Which Output Should be Limited — °F (°C) .....	85 (29)
Correction Factor per 10°F (11°C) Above Temperature Limit .....	1% (2%)

Listed/Approved Ratings BHP (kW)	Speed RPM	Ventilation Air Req'd. For Combustion CFM (litre/s)	Heat Rejection to Cooling Water BTU/min. (kW)	Heat Rejection to Ambient Air* BTU/min. (kW)	Exhaust Gas Flow CFM (litre/s)	Temp. °F (°C)	Fuel Consumption gal./hr. (litre/h)
UL LISTED RATINGS							
589 (439)	2100	1607 (760)	22,365 (391)	2832 (50.0)	3581 (1690)	770 (414)	32.8 (124)
559 (417)	1900	1418 (671)	20,580 (360)	2599 (45.5)	3161 (1492)	770 (414)	30.1 (114)
534 (398)	1750	1234 (584)	19,320 (338)	2435 (42.6)	2804 (1323)	795 (428)	28.2 (107)
442 (330)	1460	893 (422)	16,485 (288)	2012 (35.2)	2048 (967)	805 (433)	23.3 (88.2)
FM APPROVED RATINGS							
558 (415)	2100	1530 (722)	21,300 (374)	2100 (36.9)	3410 (1610)	765 (407)	32.8 (124)
528 (394)	1900	1350 (637)	19,600 (345)	2000 (35.2)	3010 (1420)	765 (407)	30.1 (114)
504 (376)	1750	1175 (555)	18,400 (324)	1800 (31.6)	2670 (1260)	790 (421)	28.2 (107)
417 (311)	1460	850 (401)	15,700 (276)	1500 (26.4)	1950 (920)	800 (427)	23.3 (88.2)

\*Does not include exhaust piping.

Fire Pump Engine Model: VT-1710-F  
Data Sheet No.: DS-3555-A  
Date: June, 1980  
Bulletin No.: 3383356