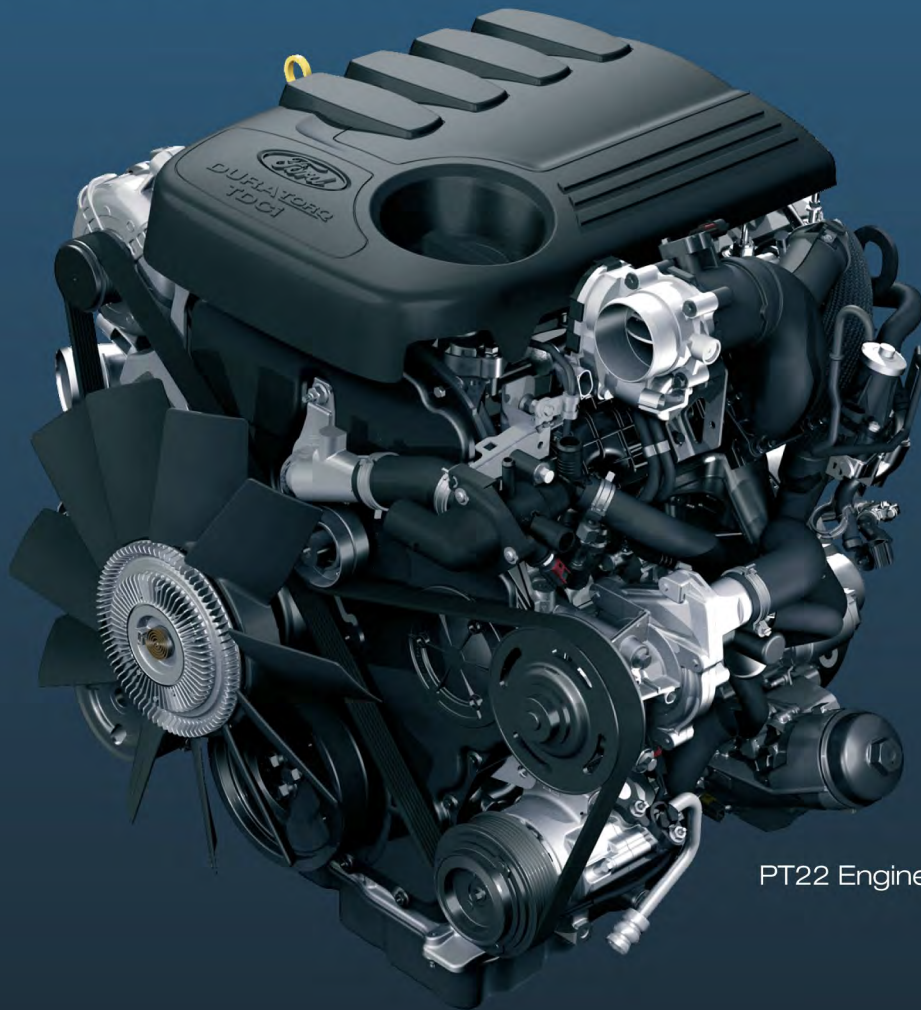


Ford Industrial Diesel PT22 and PT32

74-147kW 100-200PS crankshaft power acc ISO 15550



A new range of certified industrial engines developed from the Ford Duratorq TDCi diesel



PT22 Engine

- Compact I4 and I5 configuration
- Low weight
- Low noise
- Common rail fuel injection system
- Electronically controlled
- Emissions certified to European and EPA standards
- All engines use the same Electronic Controller
- Engines and Electronic Controllers CE marked and Certificate of Conformity included

Technical description

Engine Block and Cylinder Head

- Cast-iron block and aluminium head for strength, durability and lightness
- Ladder frame design for extremely stiff layout of the engine's connection with the oil pan and adaptor housing
- Aluminium cylinder head with 4 valves per cylinder
- Oil cooled pistons
- 5/6 main bearing crankshaft
- Six head bolts per cylinder for highly uniform clamping of the head gasket and reduced bore deflection
- Optimised compression ratio (15.5:1) for improved balance of power, torque and low emissions (2.2L variants)

Lubrication System

- Variable flow oil pump reduces fuel consumption by eliminating unnecessary pumping losses
- Replaceable oil filter element
- Oil cooler

Fuel System

- High pressure common rail system - up to 1800 bar

Air Inlet and Exhaust System

- Turbocharger with variable geometry
- Cooled EGR
- Charge air cooler

Cooling System

- Thermostatically controlled closed system
- Viscous fan or optional electronic fan and cooling components

Electrical System

- 12V electrical system

Engine Control System

- Latest generation electronic engine control system
- Analogue and digital outputs available
- Supports CAN protocols J1939 and MEA2000

Throttle Control

- Electronic throttle

Options

- Adaptor housings (details available early 2013)
- Engine monitor with multi-function digital display (J1939 displays diagnostic codes)
- Alternator
- Starter motor
- Power steering pump
- Front end accessory drive
- 390mm diameter (PT22) 420mm diameter (PT32) belt driven viscous fan
- 0.5 bar fuel delivery pump
- Fuel filter with water sensor
- Air filter

Engine data

Power ratings

Engine model	Displacement	Bore	Stroke	Compression ratio	Maximum power	Maximum torque
PT22 DRRB	2198 cc	86.0 mm	94.6 mm	15.5:1	74 kW (100 PS) at 3500 rpm	310 Nm at 1300 - 2100 rpm
PT22 CYRB	2198 cc	86.0 mm	94.6 mm	15.5:1	92 kW (125 PS) at 3500 rpm	350 Nm at 1450 - 2100 rpm
PT22 CVRB	2198 cc	86.0 mm	94.6 mm	15.5:1	114 kW (155 PS) at 3500 rpm	385 Nm at 1600 - 2300 rpm
PT22 USRB	2198 cc	86.0 mm	94.6 mm	15.5:1	100 kW (135 PS) at 3500 rpm	355 Nm at 1500 - 1800 rpm
PT32 SAFAR	3198 cc	89.9 mm	100.76 mm	17.5:1	129 kW (172 PS) at 3000 rpm	424 Nm at 1500 rpm
PT32 SAFARD (with DPF)	3198 cc	89.9 mm	100.76 mm	17.5:1	129 kW (172 PS) at 3500 rpm	474 Nm at 1800 rpm
PT32 SAFARM	3198 cc	89.9 mm	100.76 mm	17.5:1	147 kW (200 PS) at 3500 rpm	474 Nm at 1500 rpm

Operating angles

Maximum engine operating angle	Front end down	Rear end down	LH side	RH side
PT22	30 degrees	30 degrees	35 degrees	35 degrees
PT32	40 degrees	40 degrees	40 degrees	20 degrees

Flywheel data

Moments of inertia

PT22 DMF	0.3024 kgm ²	SMF	0.3430 kgm ²
PT32 DMF	0.3007 kgm ²	SMF	0.3430 kgm ²

Cooling system

The heater inlet and outlet pipes on the engine must be connected together when the engine is used in a non automotive application and a heater is not included. Ford engines must be run at all times with 45% OAT coolant which acts as both antifreeze and as a corrosion inhibitor.

Coolant pump type	Drive method	Drive ratio	Coolant	Thermostat type	Thermostat temp	Coolant flow rate	Temperature sensor
Centrifugal impeller	Grooved poly vee belt	1.22:1 (PT 22) 1.59:1 (PT 32)	45% OAT	Wax element	Starts to open 88 deg Fully open 90 deg	30-110 L/min (with fully open thermostat)	Located in thermostat housing

Fuel system

The fuel system is high pressure common rail direct injection with Piezo (PT 22) or solenoid (PT 32) injectors. It is strongly recommended that the fuel system components detailed under options are specified to ensure correct matching of components and provide maximum protection for the fuel system.

Fuel type	Fuel pump type	Fuel pressure
Low sulphur diesel	Electronic injection pump ECU controlled. 0.5 bar fuel delivery required to injection pump	1800 bar at fuel rail

Lubrication system

Oil pan type	Oil filter type	Engine oil capacity	Max oil temperature	Oil pump type	Recommended oils
Pressed steel	Full flow disposable filter (paper element)	7 L (PT 22) 12 L (PT 32)	140 degrees C	Gear - rotor	5W30 (WSS-M2C913A)

Inlet system

Recommended air cleaner type	Crankcase breathing system	Max inlet restriction	Air demand
Remote mounted K&N paper element RX 3800 (light duty) or Donaldson PSD090048 (heavy duty)	Fully closed	16.4 kPa at maximum power	PT22 400 cfm at maximum power PT32 474 cfm at maximum power

Exhaust system

Exhaust manifold type	Maximum exhaust back pressure	Maximum temperature at manifold
Single outlet	44.4 kPa	760 degrees C

Emissions

Engine model	EU stage IIIA*	EU stage IIIB*	EU HD stage VI	RCD	EU stage IV*	US EPA Tier 4
PT22 DRRB	●	●			Mid 2013	Mid 2013
PT22 CYRB	●	●			Mid 2013	Mid 2013
PT22 CVRB	●	●		●	Mid 2013	Mid 2013
PT22 USRB			●			
PT32 SAFAR	●					
PT32 SAFARD (with DPF)		●				
PT32 SAFARM				●		

*NRMM standards not automotive. EU stage IIIB, EU stage IV and EPA Tier 4 are all achieved using stand alone DPF systems supplied by HJS Emission Technology GmbH

Engine management system

The engine management system used on the Ford Duratorq industrial engines is designed specifically for engines used in non automotive applications. It is capable of matching engine performance without the need for an interface to other systems normally found in a vehicle application. It has been developed by Revolve Technologies and NIRA for the Ford emissions certified industrial and marine engines.

There are two variants for diesel engines, one for Piezo and one for solenoid injectors. Power variants are provided by software calibration. Diagnostic codes are broadcast via J1939 protocol, typical display images shown below.

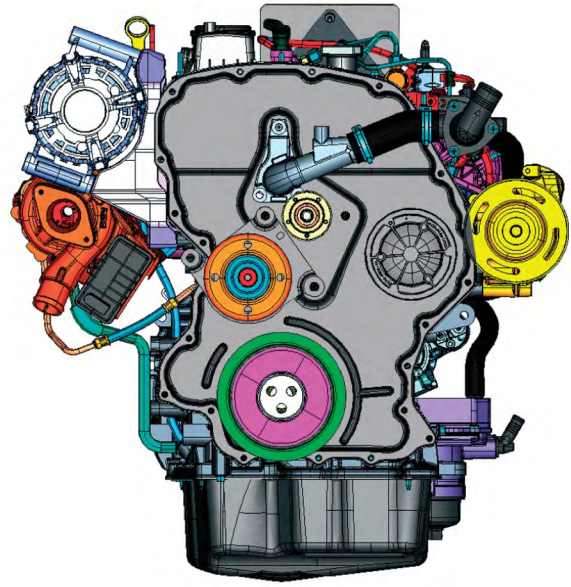
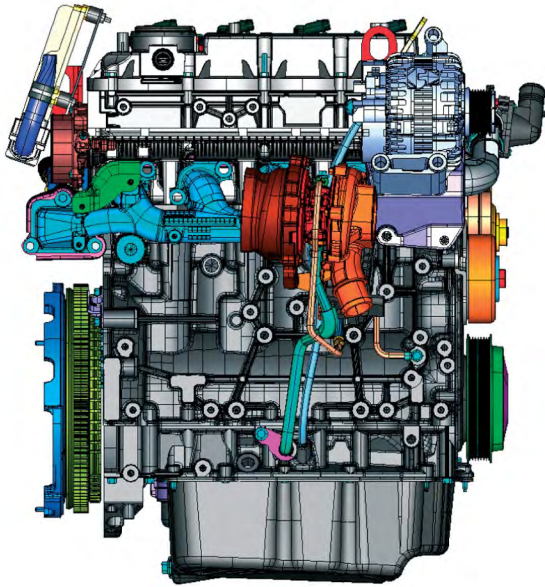


Engine heat balance data

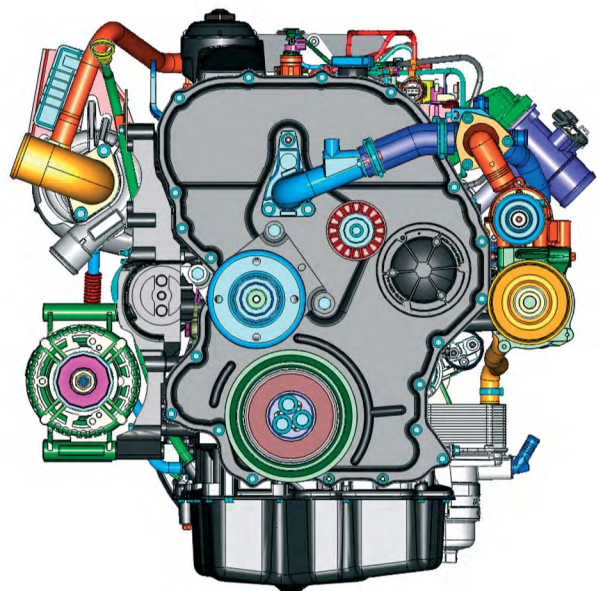
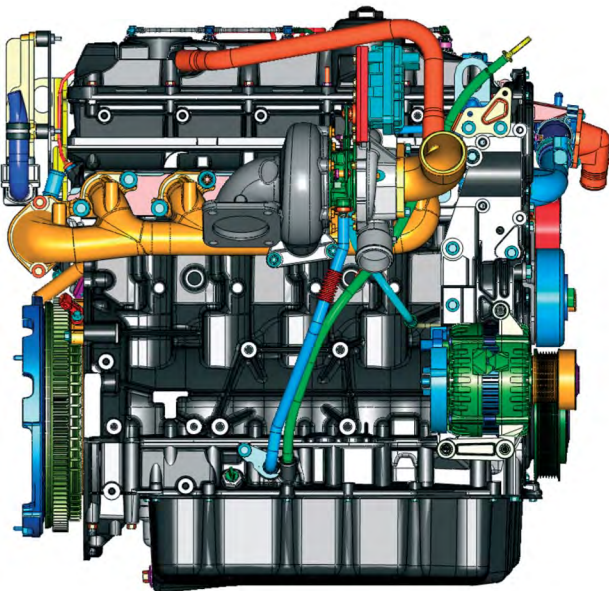
	Engine	3.2L I5 Puma				2.2L I4 Global Puma
		Application	IIIA NRMM	IIIB NRMM	1500rpm(50Hz) GenSet	1800rpm(60Hz) GenSet
	Configuration	Derated torque and power No DPF	Derated power With DPF	Full torque and power No DPF	Full torque and power No DPF	No DPF
	Max Power	128.3kW@3000RPM	128.9kW@3500RPM	69.2kW@1500RPM	89.2kW@1800RPM	114.0kW@3500RPM
	Max Torque	425.3Nm@1800RPM	470.7Nm@2100RPM	440.5Nm@1500RPM	473.2Nm@1800RPM	385.0Nm@1600RPM
Heat rejection to coolant (kW)	@Max Power	64	73	40	47	64
	@Max Torque	42	52	40	47	37
Coolant flow (lpm)	@Max Power	108	118	70	80	118
	@Max Torque	80	92	70	80	70
Max allowable top hose temperature (deg C)		110	110	110	110	110
Calculated heat rejection to charge air (kW)	@Max Power	19.7	20.5	5.6	9.6	16.7
	@Max Torque	4.8	8.5	5.6	9.6	4.4
Air mass flow rate from turbo (kg/s)	@Max Power	0.180	0.196	0.076	0.104	0.173
	@Max Torque	0.054	0.087	0.076	0.104	0.046
Turbo compressor air outlet temp @ 25 deg C ambient	@Max Power	158	153	123	141	145
	@Max Torque	138	146	123	141	145
Manifold inlet temp @ 25 deg C ambient		50	50	50	50	50
Allowable pressure drop across Charge air cooler system @ peak power (kPa)		-10	-10	-10	-10	-6

Installation drawings

PT 22 engine

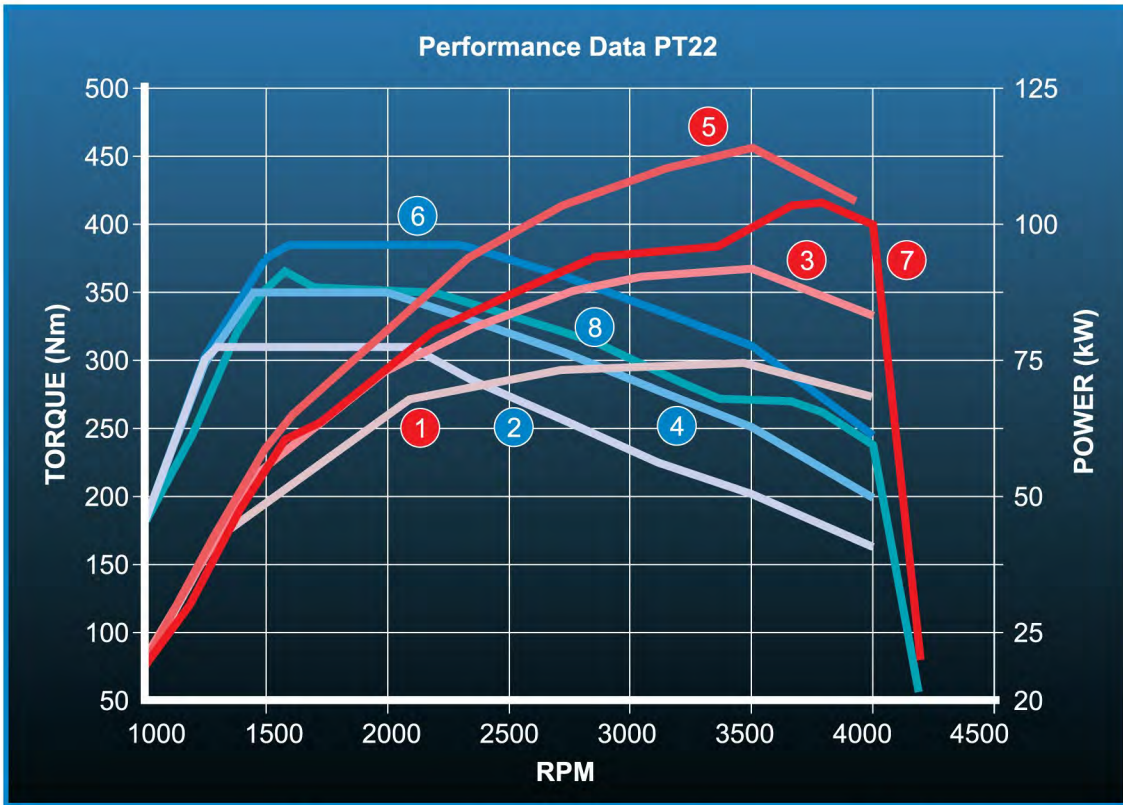


PT 32 engine

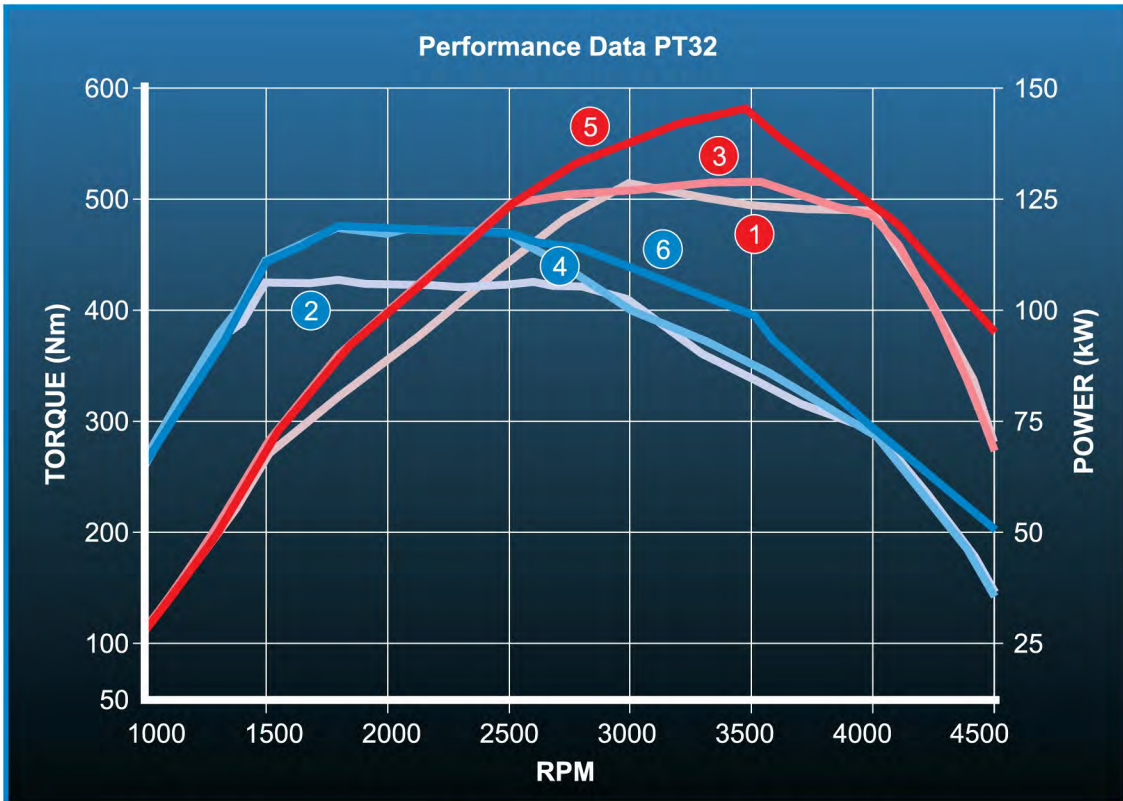


Dimensions	PT22	PT32
Length	699mm	769mm
Width	724mm	743mm
Height	734mm	741mm
Weight	190kg	241kg

Performance Data PT22/PT32

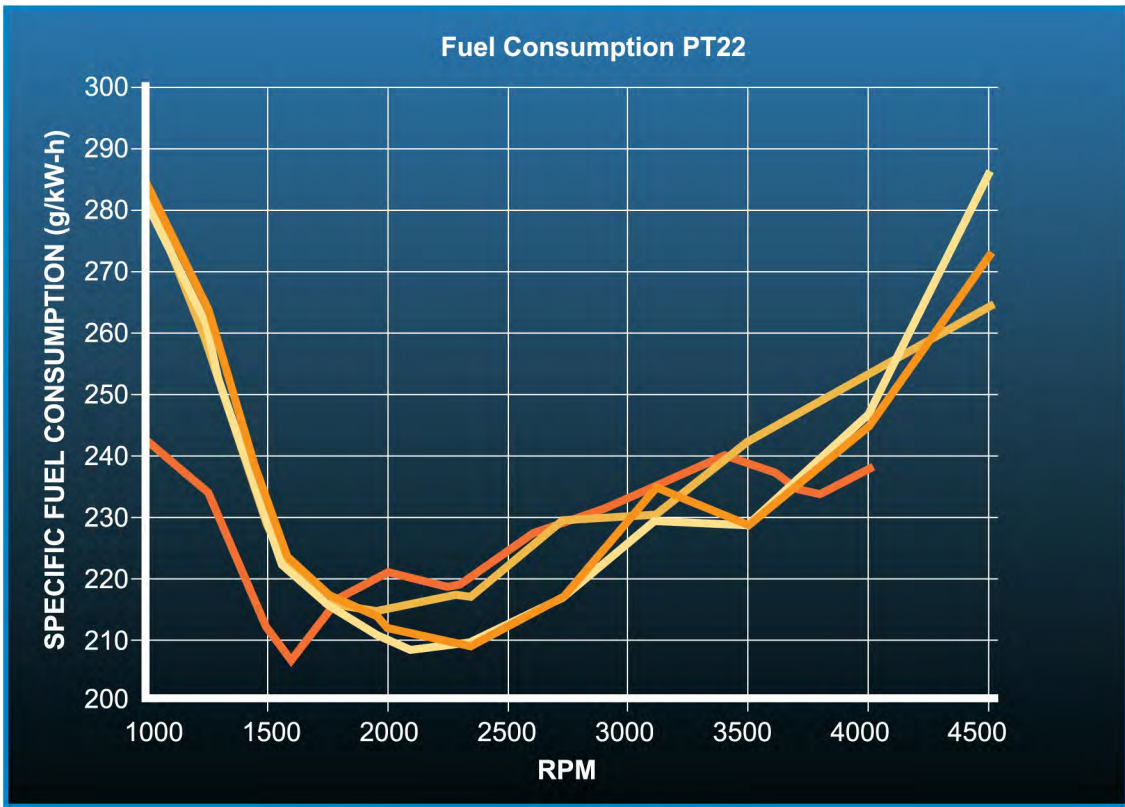


- ① DRRB Power curve ③ CYRB Power curve ⑤ CVRB Power curve ⑦ USRB Power curve
- ② DRRB Torque curve ④ CYRB Torque curve ⑥ CVRB Torque curve ⑧ USRB Torque curve

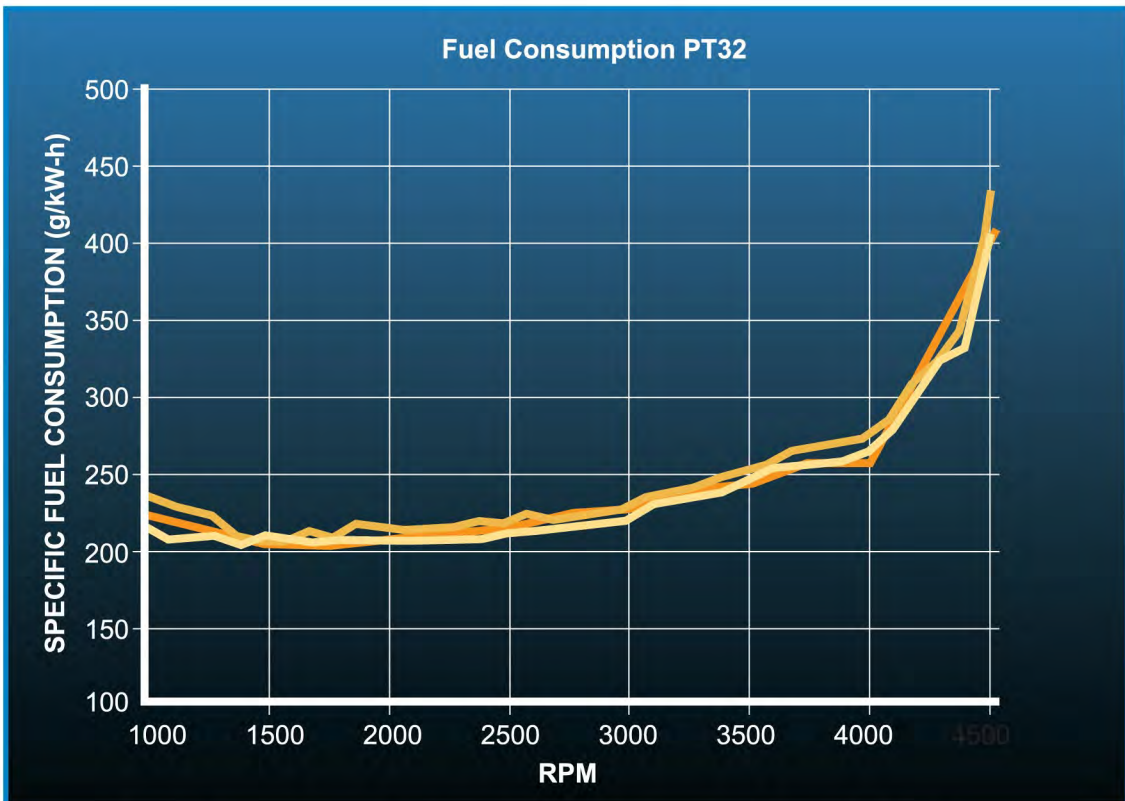


- ① SAFAR Power curve ③ SAFARD Power curve ⑤ SAFARM Power curve
- ② SAFAR Torque curve ④ SAFARD Torque curve ⑥ SAFARM Torque curve

Specific Fuel Consumption PT22/PT32



PT22 DRRB PT22 CVRB PT22 CYRB PT22 USRB



PT32 SAFAR PT32 SAFARD PT32 SAFARM

