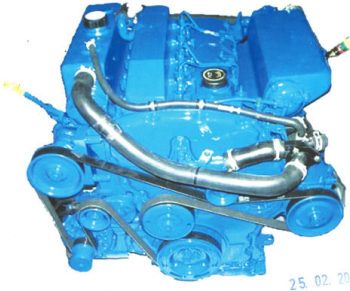
Factsheet: MARMARINE

PUMA 95 - 125 - 145 HP



25. 02. 2006

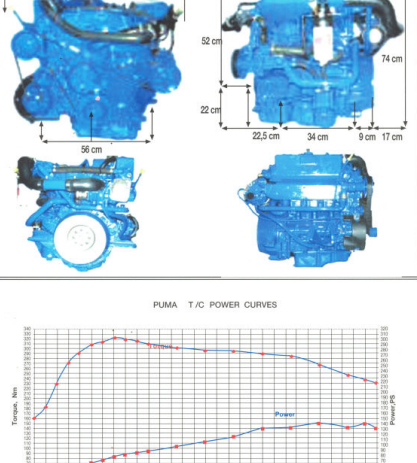
This super twin intercooled Puma marine disesel promises you 95 / 125 / 145 / bhp at 3500 rpm-a high torgue, hing performance Marmarine product with those well known Marmarine benefits of more power for less fuel , quiet low rewing power, ease of installation and that rugged
Ford reliability

FORD OTOSAN

The Technical Facst

Full Specification

- TYPE
  4 cylinders in Line 4cycle overnead 16 valve diesel engine.
  Turbo charged with twin intercooler.
- BORE/STOKE
  89.9 X 94.6 mm
- GROSS POWER
  Super 95 / 125 /145 - bhp at 3000 rpm.
- DISPLACEMENT
  Cm3 : 2.4
- COMPREESSION RATIO
  19 :1
- FUEL
  ASTM D975 Class 2 D or BS28669 Class A1.
- OIL FILTER
  Spin-on type oil filters; Full Flow oil and by-pass oil filter
- FUEL SYSTEM
  Bosch fuel injection system, with Mechanical
  Governor and flexible braided fuel supply line.
- ELECTRICAL SYSTEM
  12 volt negative ground with shop
- STARTING MOTOR
  12 volt also available at
- ALTERNATOR
  110 amp with voltage regulatór.
- RAW WATER COOLING SYSTEM
  A cupro-nickel heat exchanger with zinc anti-corrosion pencil.
- RAW WATER PUMP
  Gear driven high flow rubber impeller type.
- FRESH WATER COOLING SYSTEM
  Pressurized fresh water circuit for engine, exhaust manifold and turbocharger.
- FRESH WATER CAPACITY
  10.0 Litres.
- ENGINE MOUNTINGS
  4 in-line, adjustable high grade anti-vibration mounts on universal mounting feet.
  recommended Installation Angles for N/S installation 3° to 6° rear end down, 0°C sideways
- DRY WEIGHT LESS TRANSMISSION
  225 kg
- EXHAUST OUTLET
  60 mm exhaust elbow.
- TRANSMISSIONS
  Twin Disc MG-5005/A
- FINISH
  Marmarine blue with chrome rocker box, and filler caps.
- APPROVAL STANDARDS
  Pending.



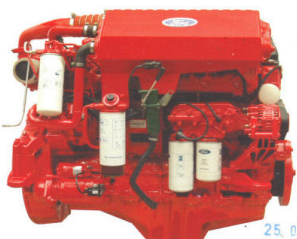
PUMA T/C POWER CURVES

Factsheet:

MARMARINE

ECOTORQ EDC7

SP250/360/380

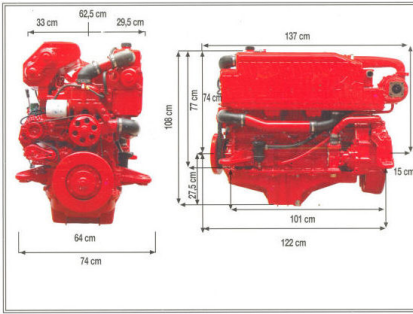


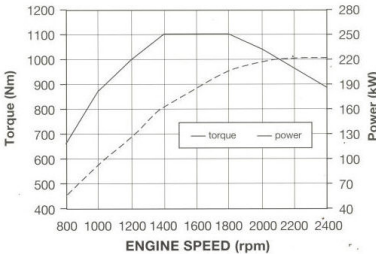
25. 02. 2006

This super twin intercooled EDC7 marine diesel promises you 250 / 360 / 380 bhp at 2400 rpm - a high torgue, hing performance Marmarine product with those well known Marmarine benefits of more power for less fuel, quiet low rewing power, ease of installation and that rugged Ford reliability

The Technical Facst

- **Full Specification**
- TYPE
  6 cylinders in Line 4 cycle overhead 24 valve diesel engine.
  Turbo charged with twin intercooler.
- BORE/STROKE
  112 X 124 mm
- GROSS POWER
  Super 250 / 360 / 380 - bhp at 2400 rpm.
- DISPLACEMENT
  Cm3 : 7330
- COMPREESSION RATIO
  17.4 :1
- FUEL
  ASTM D975 Class 2 D or BS28669 Class A1.
- OIL FILTER
  Spin-on type oil filters; Full flow oil and by-pass oil filter
- FUEL SYSTEM
  Bosch CR fuel injection system, with electronic
  Gov ernor and flexible braided fuel supply line.
- ELECTRICAL SYSTEM
  24 volt negative ground with shop
- STARTING MOTOR
  24 volt also available at
- ALTERNATOR
  60 amp with voltage regulator.
- RAW WATER COOLING SYSTEM
  A cupro-nickel heat exchanger with zinc anti-corrosion pencil.
- RAW WATER PUMP
  Gear driven high flow rubber impeller type.
- FRESH WATER COOLING SYSTEM
  Pressurized fresh water circuit for engine, exhaust manifold and turbochanger.
- FRESH WATER CAPACITY
  30.0 Litres.
- ENGINE MOUNTINGS
  4 in-line, adjustable high grade anti-vibration mounts on universal mounting feet.
- MAXIMUM INSTALLATION ANGLE
  20°rear down, 15 side
- DRY WEIGHT LESS TRANSMISSION
  950 kg
- EXHAUST OUTLET
  6in 152mm exhaust elbow.
- TRANSMISSIONS
  Twin Disc MG-5061/ZF
- FINISH
  Marmarine blue with chrome rocker box, and filler caps.
- APPROVAL STANDARDS
  Pending.


62,5 cm
33 cm
29,5 cm
64 cm
74 cm
137 cm
108 cm
77 cm
74 cm
27,5 cm
15 cm
101 cm
122 cm


Torque (Nm)
1200
1100
1000
900
800
700
600
500
400
Power (kW)
280
250
220
190
160
130
100
70
40
— torque
— power
800 1000 1200 1400 1600 1800 2000 2200 2400
ENGINE SPEED (rpm)

OTOSAN-FORD
ARCHIVES

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6.2ltna-6.0lttc-6.0lttci Industrial Diesel Engines	02
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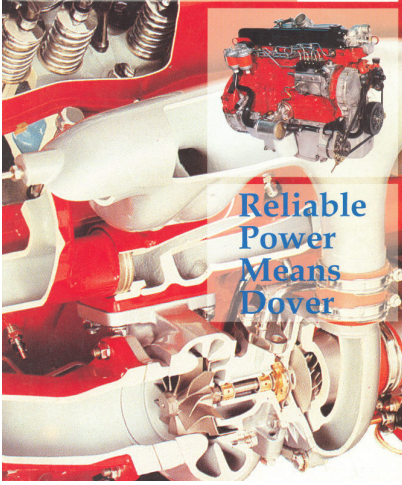
New FSD 425 4-Cylinder High-Speed Diesel Engine	21

INDUSTRIAL DIESEL ENGINES

6.2lt NA 6.0lt TC 6.0lt TCI

Ford

OTOSAN

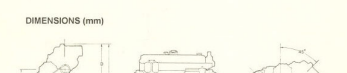


Reliable Power Means Dover

TECHNICAL SPECIFICATIONS

Engine type		6.2L 6.2lt Naturally aspirated	6.0L TC 6.0lt Turbocharged	6.0L TCI 6.0lt Turbocharged& intercooled
No.of cylinders		6	6	6
Engine power	kW(rpm)	94(2600)	109(2400)	131.5(2400)
Displacement	cc	6220	5950	5950
Induction system		Naturally aspirated	Turbo-charged	Turbo-charged
Cylinder bore	mm	107.2	104.8	104.8
Piston Stroke	mm	114.9	114.9	114.9
Compression ratio	(:1)	15.9	15.5	16.5
BMEP	bar	8.76	10.7	14.1
Peak fire pressure	bar	86.2	110.3	125
Weight inc flywheel	kg	475	498	500
Flywheel weight	kg	39.5	39.5	39.5

DIMENSIONS (mm)



1- Shallow pan

2 - Inclined pan

	6.2L	6.0L TC & 6.0L TCI
A.....	870	870
B.....	623	701
C.....	1020	1020
D.....	570	570
E.....	585	585
F.....	268	268

POWER RATINGS

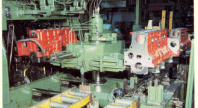
Engine type		6.2L	6.0L TC	6.0L TCI
POWER	kW	94	109	131.5
DIN 70020	rpm	2600	2400	2400
BS AU 141	kW	98	114	136
	rpm	2600	2400	2400
TORQUE	Nm	385	480	650
DIN 70020	rpm	1500	1700	1400
BS AU 141	Nm	391	491	665
	rpm	1500	1700	1400

SPECIFIC FUEL CONSUMPTION(gr/kW.h)

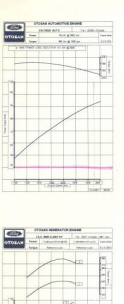
Engine Speed (rpm)	Model	Load			
		1/4	1/2	3/4	Full (Auto)
1500	6.2L	274	230	214	223(220)
	6.0L TC	275	225	220	215(218)
	6.0L TCI				(204)
	6.0L TC G				217
1800	6.2L	275	227	215	225(219)
	6.0L TC	280	229	216	210(213)
	6.0L TCI				(203)
	6.0L TC G				221
2000	6.2L	289	232	216	225(221)
	6.0L TC	292	235	220	210(215)
	6.0L TCI				(204)
	6.0L TC G				
2200	6.2L	300	241	223	227(221)
	6.0L TC	312	248	226	217(221)
	6.0L TCI				(208)
	6.0L TCI G				208
2400	6.0L TC	334	263	228	225(228)
	6.0L TCI				(217)
	6.0L TCI G				217
2600	6.2L	352	268	241	240(237)

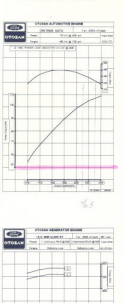
LUBRICATING SYSTEM

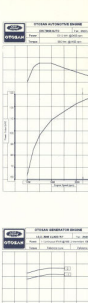
Engine type	6.2L	6.0L TC	6.0L TCI
Oil pan type	Vertical (Shallow Sump) Inclined (Automotive Sump)		
Oil pan material	Cast Aluminium		
Oil capacities Shallow lt Inclined lt	19 15		
Oil pump type	High capacity crankshaft driven birotor		
Max. oil pressure	6 bar		
Oil filter type /capacity	Vertical spin on canister / 2lt		
Max. oil temperature °C	116		
Oil specification	Ford SM2C-1017-A (SAE 15W/40)		
Max. Angles of inclination	Inclined	Shaker	
Front down	18°	15°	
Rear down	18°	15°	
Side ways	22.5°	22.5°	

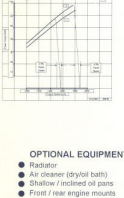


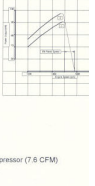
POWER CURVES











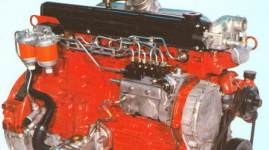
OPTIONAL EQUIPMENT

- Radiator
- Air cleaner (dry/oil bath)
- Shallow / inclined oil pans
- Front / rear engine mounts
- Automotive & class AI governing injection pump
- Thermostarters
- Cooling fans (crankshaft or water pump mounted)
- Exhaust pipe
- Instrument panel
- Truck transmissions
- Water cooled air compressor (7.8 CFM)
- Power steering pump
- Starter motor
- Alternator
- PTO
- 13"/14" Single plate clutch & actuation mechanisr
- SAE adaptors
- Oil drain pump
- Heavy flywheel

Otosan ENDÜSTRİYEL DİZEL MOTORLARI

Ford

2725-2726T



FORD 2720 sıralamasındaki endüstriyel motorlar, dizel motor teknolojisinde ileriye atılmış bir adımdır.
Bu sıralamada, su anda biri doğal emişli, diğeri Turbo olmak üzere iki adet motorumuz vardır. Motorların başlıca özellikleri ise:

- Silindir iç yüzeylerine özel honlama ile (plato honlama) dayanıklılık ve yağ tutucu özellik kazandırılmıştır. Turbo modellerde ise silindir gömlekleki kromdandır.
- Geliştirilmiş yanma, yakıt soğutma sistemleri motorun, çalışma sıcaklığına çabuk ulaşmasını sağlar. Bövlece yakıttan maksimum seviyede faydalanılır.
- Blok ve silindir kapağı takviyeli, esnemez dökümdür. Titreşim, gürültü ve mekanik gerilimler en az düzeydedir.
- Supap sistemi yüksek dirençli malzemeden üretilmiştir. Kamlar mekanik olarak sertleştirilmiştir. Supap itme çubukları 9 mm. çapındadır. Külbütör parmakları geniş ve değişebilir yataklıdır.
- Yakıt pompası düz, pistonlu tiptir.
- Yağ pompası, krank milinden güç alır. Yüksek debilidir (dakikada 90 litre).
- Yüksek debili yağ pompası ve büyük çaplı yağ galerileri ile etkili bir yağlama sağlanır. Yağlama sistemi soğutculudur.
- Ana yataklar üzerindeki, yüksek basınçlı yağ püskürtücüler pistonları alttan soğutur.
- Su pompası dayanıklı ve yüksek kapasitelidir.
- Düşük gürültü düzeyi operatöre verimliliği artırıcı bir ortam sağlar.

Ayrıca;

- Uzman satış personelimizin gerektiğinde Mühendislik hizmeti (hesap, montaji vereceğini ve periodik bakım anlaşmaları ile bu hizmetlerimizin devam edeceğini unutmayınız.

MOTOR TEKNİK ÖZELLİKLERİ

Motor tipi		2725 6.2 litre	2726T 6.0 litre
Silindir sayısı		6	6
Motor gücü	HP SAEid/dl	142.3 (2600)	166.7 (2400)
Silindir hacmi	cc	6220	5950
Hava emiş tipi		Normal	Turbo şarjlı
Silindir çapı	mm	107.2	104.8
Piston kursu	mm	114.9	114.9
Kompresyon oranı		15.9:1	15.5:1
Ortalama etkili basınç	bar	8.76	10.7
Maksimum ateşleme basıncı	bar	86.2	110.3
Ağırlık volan dahil	kg	440	489
Volan ağırlığı	kg	39.5	39.5

BOYUTLAR (mm)

1. Dik karterli

2. Eğik karterli

A	870	870
B	623	701
C	1020	1020
D	570	570
E	585	585
F	268	268

GÜÇ DEĞERLERİ

Değerler tam vüktekl sürekli güç eğrilerinden, BS 5514, DIN 6271 BS AU 141'e göre alınmıştır. Ayrıca SAE J1349 ve BS 649 bu verilerin sonuna ilave edilmiştir.

Motor tipi		2725	2726T
GÜÇ BS 5514 DIN 6271	kW d/d	90.0 2600	107.5 2400
BS AU 141	kW d/d	101.8 2600	118.0 2400
BS 649	kW d/d	86.1 2500	101.7 2400
SAE J1349	kW d/d	86.4 2500	101.7 2400
TORK BS 5514 DIN 6271	Nm d/d	380 1600	457 1700
BS AU 141	Nm d/d	417 1600	498 1700
BS 649	Nm d/d	353 1600	425 1700
SAE J1349	Nm d/d	354 1600	425 1700

ÖZGÜL YAKIT SARFİYATI (gr/kw saat)

Motor tipi	2725				2726T		
	Yük	%50	%75	%100	%50	%75	%100
Motor id/dı	1500	230	214	223	225	220	215
Motor id/dı	1800	227	215	225	229	216	210
Motor id/dı	2000	232	216	225	235	220	210
Motor id/dı	2200	241	225	227	248	226	217
Motor id/dı	2500	259	237	235	263	228	225
Motor id/dı	2600	268	241	240	—	—	—

SOĞUTMA SİSTEMİ

Motor tipi		2725	2726T
Su pompası tipi		Tek kavşlı kasnak	
Radyatör pervanesi oranı (Su pompasına bağlanmış)		1.67:1	
Su pompası akışı		Değişken	
Motor devri	d/d	2600	2400
Su pompası debisi	dıt	1.67:1/159.0	1.88:1/178.0
Soğutma suyu kapasitesi	lt	9.95	9.95
En elverişli motor çalışma sıcaklığı		95° C	95° C
Konulacak antifriz oranı		%50'lik karışım	

YAĞLAMA

Motor tipi		2725	2726T
Karter tipi		Dik (ortadan kuyulu) Eğik (otomotiv tipi)	
Malzemesi		Alüminyum döküm	
Yağ kapasiteleri Dik (ortadan kuyulu) Eğik (otomotiv tipi)	lt	 19.0 15.0	
Yağ pompası tipi		Çift rotorlu yüksek kapasiteli	
Maksimum yağ basıncı		6 bar	
Yağ filtresi tipi / kapasitesi		Dikey döndürmeli/1.0 litre	
Maksimum yağ sıcaklığı		116° C	116° C
Yağ spesifikasyonu		Ford SM2C-1017-A(SAE 15W/40)	
Motor çalışma açıları • Ön tarafı aşağıda • Arka tarafı aşağıda • Yana eğim		Eğik (önden kuyulu) 18° 18° 22.5°	Dik 15° 15° 22.5°

YAKIT SİSTEMİ

Enjektör pompası tipi	Düz kendinden pistonlu
Enjektörler	Direkt, 4 delikli
Yakıt filtreleri ideğişebilir elemanlı	Çift filtreli
Yakıt pompası tipi	Pistonlu, yıldız
Yakıt tipi Çalışma yardımı:	Dizel(-10° C'de) fazla yakıt düzeneği 2726T modelinde ön ısıtıcılı (Thermostart)

ELEKTRİK SİSTEMİ

Devresi	:	Negatif toprakli
Voltaj	:	12V
Alternatör	:	Makot12V 45 A
Marş motoru	:	12V 3.5 kW
Akü	:	(— 10° C'ye kadar) 120 A.Sa (— 20° C'ye kadar) 2x120 A.Sa

GÜÇ EĞRİLERİ

SEÇİME BAĞLI PARÇALAR

- Radyatör
- Hava filtresi (kuru/yağ banyolu)
- Dik karter
- Eğik karter
- Ön ve arka motor kulakları
- 1500 veya 3000 d/d."A" tipi enjektör pompası
- Ön ısıtıcı
- Gösterge tablosu
- Baskı/balata
- P.T.O
- Ağır volan
- SAE volan mahfazası
- Yağ boşaltma pompası
- Marş motoru
- Alternatör

KULLANIM YERLERİ

- Ticari taşıt araçları
- İş makinaları
- Jeneratörler
- Deniz tekneleri

Otosan
Otomobil Sanayii A.Ş.
Ankara Asfalt 4. km.
Ulus/ngiyer Mevkii
81302 Kadıköy - İstanbul
Posta Kutusu: 102 Kadıköy
Telefon : 339 44 40 (7 hat)
Telgraf : OTOSANAYI
Teleks : 29 470 otsa tr.
Fax : 339 06 61

Türkiye Genel Distribütörü
Nasoto
Pazarlama Anonim Şirketi
Çayırbaşı Sok. İstiniye-İstanbul
Tel: 176 45 80 (4 hat)
Teleks: 26832 naso tr

Otosan A.Ş. mamul teknik özelliklerini değiştirebilme hakkını saklı tutar.

Koç

Otosan

Ford

DENİZ MOTORLARI

Super 135, 185, 225, 275

Super 135

135 HP, 2600 d/d'da
Çift devre soğutmalı,
doğal havalandırmalı, 6
silindirli, direkt
püskürtmeli, deniz motoru

Yaklaşık boyutları (mm):
Uzunluk: 1041, Genişlik: 661,
Yükseklik: 870

Super 185

185 HP, 2500 d/d) da
Çift devre soğutmalı.
6 silindirli, direkt
püskürtmeli. Turbo dizel
deniz motoru. Teknecilik
ve ticari kullanımlar için
yapılabilecek tercih.

Yaklaşık boyutları (mm):
Uzunluk: 1320, Genişlik: 711,
Yükseklik: 889

Super 225

225 HP, 2450 d/d'da
Çift devre soğutmalı, 6
silindirli, direkt
püskürtmeli, deniz tipi
Turbo dizel motoru. Hızlı
ve ekonomik teknecilik için.

Yaklaşık boyutları (mm):
Uzunluk: 1320, Genişlik: 737,
Yükseklik: 889

Super 275

275 HP, 2500 d/d'da
Çift devre Soğutmalı
(intercooler'ü), 6 silindirli,
direkt püskürtmeli, deniz tipi
Turbo dizel motoru.

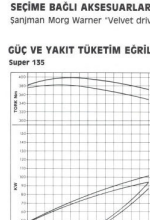
Yaklaşık boyutları (mm):
Uzunluk: 1320, Genişlik: 762,
Yüksekliik: 889

SEÇİME BAĞLI AKSESUARLAR

Şanjman Morg Warner "Velvet drive"- Newage PRM, Twin disc.

GÜÇ VE YAKIT TÜKETİM EĞRİLERİ

Super 135



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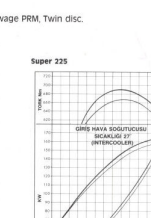

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Nasoto
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Tel: 176 45 80 (4 hat)
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Otosan A.Ş. mamul teknik özelliklerini değiştirebilme hakkını saklı tutar.

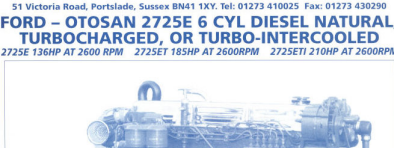
Koç

Lancing Marine

51 Victoria Road, Portslade, Sussex BN41 1XY. Tel: 01273 410025 Fax: 01273 430290

FORD – OTOSAN 2725E 6 CYL DIESEL NATURAL, TURBOCHARGED, OR TURBO-INTERCOOLED

2725E 136HP AT 2600 RPM 2725ET 185HP AT 2600RPM 2725ETI 210HP AT 2600RPM



DESIGN FEATURES

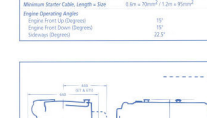
Engine:–	Well Proven, Robust, Six Cylinder Marine Diesel Engine – Suitable for Shaft, Sterndrive or Jet Installations.
Fuel System:–	Direct Injection, In-Line Fuel Injection Pump, Self Air Purge Tapping on Delivery Valve Block, Automatic Excess Fuel and Fuel Lift Pump.
Reliability:–	Maximum Reliability Combined with Low Fuel Comsumption.
Servicability:–	Piston Jet Cooling for Extended Life, Long Filter & Oil Changes, Easy Servicing and Low Cost Maintenance

Engine Specifications may vary as improvements are intraduced.

FORD OTOSAN 2725E DIESEL 6 CYL

Engine Model	2725E	2725ET	2725ETI
Power Maximum H.P.	136	185	210
RPM Maximum	2600	2600	2600
Torque Maximum Nm	385	525	650
Cubic Capacity Litres	6.22		
Bore mm	107		
Stroke mm	115		
Aspiration	Natural	Turbocharged	Turbo Intercooled
Engine Rotation	Anti Clock Wise Viewed from Rear		
Compression Ratio	16.5:1		
Electrics 12v Earth Return Alt. Amps	45		
Optional 12v Insulated Alt. Amps	78, or 140, Dual Output		
Optional 24v Insulated Alt. Amps	48		
Minimum Battery Size	1 X 176 AH 12 Volt		
Minimum Starter Cable, Length + Size	8.6m + 70mm² / 1.2m + 95mm²		
Engine Operating Angles			
Engine Front Up (Degrees)	15°		
Engine Front Down (Degrees)	15°		
Sideways (Degrees)	22.5°		

Engine Model	2725E	2725ET	2725ETI
Max Fuel Consumption l/hour	28	39	
Fuel Feed Diameter mm (mm)	5/16" (8)	5/16" (8)	5/16" (8)
Fuel Return Diameter mm (mm)	5/16" (8)	5/16" (8)	5/16" (8)
Exhaust Diameter mm (mm)	3" (100)	3" (100)	4" (100)
Water Intake Diameter mm	22	28	28
Coolant Capacity ltr	18	18	18
Oil Capacity ltr	19	19	19
Weight Engine Kg	467	476	486
Guide to Stengnear			
Max. Prop. Dia. For Gear Ratio 1.5:1 ins	19"	21"	
Min. Shaft Dia. St St. ins (mm)	1 1/2" (40)	1 3/4" (45)	
Speed Range For This Ratio (Knots)	13-25	15-25	
Max. Prop. Dia. For Gear Ratio 2.1 ins	24"	26"	
Min. Shaft Dia. St St. ins (mm)	1 3/4" (45)	2" (50)	
Speed Range For This Ratio (Knots)	9-20	11-20	
Max. Prop. Dia. For Gear Ratio 3.1 ins	32"	34"	
Min. Shaft Dia. St St. ins (mm)	2" (50)	2 1/4" (60)	
Speed Range For This Ratio (Knots)	6-12	6-12	



All Dimensions in mm. Accuracy + - 5%

STANDARD SPECIFICATIONS

Cooling System:- Gear Driven Sea Water Pump, Heat Exchanger, Water Cooled Exhaust Manifold & Outlet, (Optional Keel Cooling with Dry Exhaust Outlet).

Fuel System:- Direct Injection, Cav Minimec In-Line Fuel Pump, Fuel Lift Pump with Hand Primer Twin Bowl, Fuel Filter, Cold Start.

Engine Mounts:- Four Point Heavy Duty Adjustable Flexible Mounts.

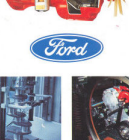
Lubrication:- Engine and Gear Box Oil Cooler, Oil Filter.

Electrical:- Electric Stop, Start/Run Switch, Warning Lights, 4m Wiring Loom Connected to Engine.

Miscellaneous:- Control Cable Connections, Lifting Rings, Gearbox Attachments, Aluminium Sump, Full Power Dynomometer Test on 185 HP and 210 HP Engines.

Optional Items:- Calorifier Connections, Sump Pump Kit, 4m Wiring Loom Extension, Chromed Rocker Cover, Audible Alarm Kit, Heavy Flywheel, Load Splitter Relay, Auxiliary Fuel Filters, Continuous Bilge Pump, PTO, Gearbox, Controls, Flexible Armoured Fuel Hoses, Engine Workshop Manual.
Instrumentation: Tachometer, Temperature, Oil Pressure, Voltmeter, Boost Pressure, Gearbox Oil Pressure, Rudder Angle, Hours.

See the Lancing Marine Boat Builders Guide for Complete Installation Kit.
Lancing Marine Reserve the Right to Alter Specifications Without Prior Notice



Otosan İnönü Truck Assembly & Engine Plant

Dealer

The information in this publication based on representative products Otosan reserves the right to change the specifications at any time. Where possible, notice of changes will be given in advance. Information on new products but before it is supplied, will be incorporated herein. For latest details always consult your Otosan Dealer

OTOSAN

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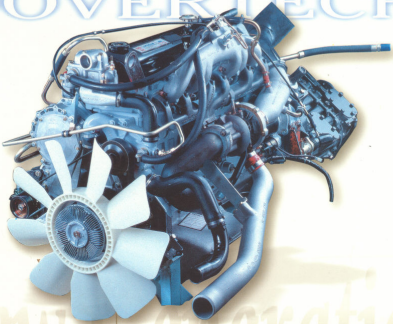
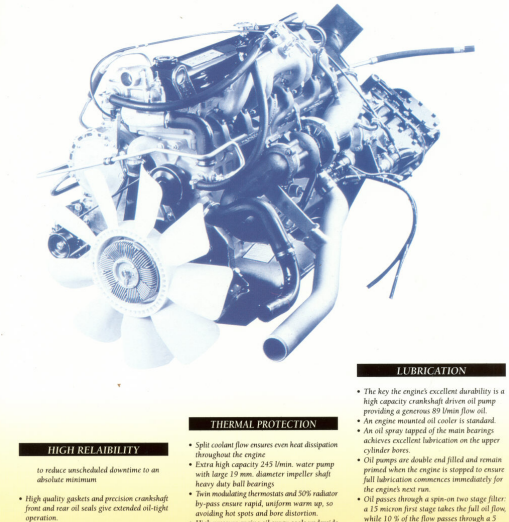
Koç

2000 DOVERTECH



New Generation

high reliability, premium durability, outstanding fuel economy...



HIGH RELAIBILITY

to reduce unscheduled downtime to an absolute minimum

- *High quality gaskets and precision crankshaft front and rear oil seals give extended oil-tight operation.*
- *Rubber olive low-pressure fuel line connections eliminate leaks and prevent air ingress to ensure uninterrupted engine operation.*
- *The self-purge fuel system reduces the need for air-bleeding-contributing to prompt starting*
- *Precision-machined pulleys combined with premium quality, high ride raw edge drive provides secure reliable and long life drive to the fan and ancillary equipment.*
- *The fuel injection pump incorporates "peg timing"which has the advantage that during adjustment the pump body remains static avoiding any stressing of the fuel lines.*
- *Inner reinforcements between cylinder and bores help for minimum oil consumption.*
- *The auto tensioner for poly V belt provide long belt and bearing life.*
- *80 tapered conrods have very high cylinder pressure endurance.*

THERMAL PROTECTION

- *Split coolant flow ensures even heat dissipation throughout the engine*
- *Extra high capacity 245 l/min. water pump with large 19 mm. diameter impeller shaft heavy duty ball bearings*
- *Twin modulating thermostats and 50% radiator by-pass ensure rapid, uniform warm up, so avoiding hot spots and bore distortion.*
- *High pressure engine oil spray cools underside of piston crowns.*
- *Carefully designed cylinder block and heat coolant passages ensure an optimum thermal environment, giving extended injector, valve and valve seat life.*
- *Water conditioner reduces scale and rust formation.*

COLD START CAPABILITY

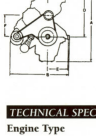
Ford diesel will start readily down to -5° using no aid other than the excess fuel facility on the fuel injection pump. Below this temperature starting aids and additional battery power will be required. Upon request technical assistance can be provided.

LUBRICATION

- *The key the engine's excellent durability is a high capacity crankshaft driven oil pump providing a generous 89 l/min flow oil.*
- *An engine mounted oil cooler is standard.*
- *An oil spray tapped of the main bearings achieves excellent lubrication on the upper cylinder bores.*
- *Oil pumps are double end filled and remain primed when the engine is stopped to ensure full lubrication commences immediately for the engine's next run.*
- *Oil passes through a spin-on two stage filter: a 15 micron first stage takes the full oil flow, while 10 % of the flow passes through a 5 micron second stage, so keeping the oil scrupulously clean and protecting the bearings.*
- *Centrifugal oil cleaner with 3 micron capacity increases oil change interval.*

ENGINE START-UP CAPABILITY

An important feature of an engine for most generator set applications is its ability to accept operating load immediately after start-up from cold. Ford diesel engines perform very well in this area with naturally aspirated engines achieving 90% of continuous load 3 to 6 seconds and turbocharged engines achieving the same in 10 to 15 seconds.



DIMENSIONS

	6.2L	6.0L TC &TCI	INCLINED PAN
A	870	870	840
B	623	701	940
C	1020	1020	1103
D	570	570	520
E	585	585	490
F	268	268	

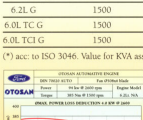
TECHNICAL SPECIFICATIONS

Engine Type		2725 6.2L N/A	2726TC 6.0L turbo	2728TCI 6.0L Turbo-intercooled	2728TCI 6.0L Turbo-intercooled
Number of cylinders		6	6	6	6
Engine Power	kW(rpm)	94(2600)	109(2400)	131.5(2400)	155(2400)
Engine Torque	Nm(rpm)	385(1500)	481(1700)	670(1500)	740(1500)
Displacement	cc	6220	5950	5950	5950
Cylinder bore	mm	107.2	104.8	104.8	104.8
Piston stroke	mm	114.9	114.9	114.9	114.9
Compression Ratio		15.9	15.5	17.4	17.4
Intake System		Naturally Aspirated	Turbo	Turbo	Turbo
BMPE	bar	8.76	10.7	14.1	14.1
Peak fire pressure	bar	86.2	110.3	125	125
Weight including flywheel	kg	475	498	500	500
Flywheel weight	kg	39.5	39.5	39.5	39.5
Vehicle Emission Level		ECE R.49.01	ECE R.49.01	ECE R.49.01	ECE R.49.01

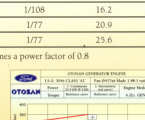
GENERATOR ENGINE

Engine Type	Engine Speed (rpm)	Cyclic irregularity	Fuel consumption (l/hr)	Continous Power (*) kW(KVA) [Kwe]	Intermittent Power (*) kW(KVA) [Kwe]
6.2L G	1500	1/108	16.2	54(59.6)[47.7]	58.3(65.6)[52.5]
6.0L TC G	1500	1/77	20.9	92.7(104.3)[83.4]	101.3(114)[91.2]
6.0L TCI G	1500	1/77	25.6	121.7(137.2)[109.8]	133(150)[120]

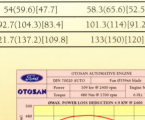
(*) acc: to ISO 3046. Value for KVA assumes a power factor of 0.8



2725 6.2 NA



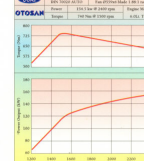
2725 6.2 NA Gen



2726 6.0 TC

FUEL CONSUMPTION (gr/kw hrs)

Engine Type (rpm)	Model	Load 1/4	1/2	3/4	Full(Auto)
1500	2725 / 6.2L	274	230	214	223(220)
	2726T / 6.0L	275	225	220	215(218)
	2728T1/185 PS/6.0L				(204)
	2728T1/210 PS/6.0L				217
1800	2725 / 6.2L	275	227	215	225(219)
	2726T / 6.0L	280	229	216	210(213)
	2728T1/185 PS/6.0L				(203)
	2728T1/210 PS/6.0L				221
2000	2725 / 6.2L	289	232	216	225(221)
	2726T / 6.0L	292	235	220	210(215)
	2728T1/185 PS/6.0L				(204)
	2728T1/210 PS/6.0L				
2200	2725 / 6.2L	300	241	223	227(221)
	2726T / 6.0L	312	248	226	217(221)
	2728T1/185 PS/6.0L				(208)
	2728T1/210 PS/6.0L				208
2400	2725 / 6.2L				
	2726T / 6.0L	334	263	228	225(228)
	2728T1/185 PS/6.0L				(217)
	2728T1/210 PS/6.0L				217

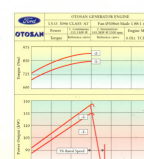


2728 6.0 TC1/210

POWER RATINGS

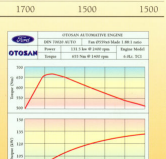
2.8 TC RATINGS 2000

Engine Type		6.2L N/A	6.0L TC	6.0L TC1/185	6.0L TC1/210
POWER	kW	94	109	131.5	150
DIN 70020	rpm	2600	2400	2400	2400
BS AU 141	kW	98	114	136	154
	rpm	2600	2400	2400	2400
TORQUE	Nm	385	480	650	723
DIN 70020	rpm	1500	1700	1500	1500
BS AU 141	Nm	391	491	665	740
	rpm	1500	1700	1500	1500

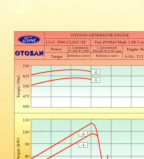


2728 6.0 TC2/210 Gen

2726 6.0 TC Gen



2726 6.0 TC1/185



2728 6.0 TC3/185 Gen

PREMIUM DURABILITY

to extend operating life and reduce depreciation costs.

- *Parent bores (on naturally aspirated engines) are diamond honed to provide minute oil-retaining grooves and then plateau honed to give a good bearing surface which inhibits glazing and piston scuff. Turbo charged engines are fitted with thick Chromard liners. This liner with unique plateau honing inhibits bore polishing and ring sticking.*
- *Plasma Molybdenum top compression ring, taper faced F14 second compressing ring and nitrided steel oil control ring together with cast iron top ring insert minimise wear. Pistons with tapered pin boss are diamond-turned to provide a fine oil-retaining surface finish which further improves long term resistance to wear. On naturally aspirated engines, an expansion-controlling insert gives a closer piston-to-bore fit so avoiding piston slap and consequent wear. Re entrant combustion bowl and optimised profile provides low fuel consumption and low emissions in TCI engines.*
- *Stiff block and cylinder head castings reduce vibration and mechanical stress.*
- *Long valve train life is achieved by using bronze-bushed rocker arms with large diameter push rods and large tappets with precision-machined bores to ensure smooth self-rotation. The Dover range also features stellite exhaust valves, valve seat insert, chrome - flashed valve stems, positive stem seals, free-release valve rotators and straight cut fine mesh steel timing gears.*
- *Other features which give the Dover engine long life durability are nodular iron exhaust manifold, high quality fuel filter, centrifugal oil filter and high quality CF4 oil providing very low wear.*

OUTSTANDING FUEL ECONOMY

The Ford Dovertech range has been developed to optimise fuel-to-power conversion.

- *Improved combustion efficiency is achieved by the free-flow design of the inlet ports and manifold which coupled with large diameter inlet valves give optimum air flow into the cylinders.*
- *Helical-flow induction ports create a high degree of swirl in the combustion chamber, giving excellent fuel/air mixing. The piston bowl is designed to maximise the benefits of the swirl-induced air flow. As a result the combustion process is more rapid, enabling the injection timing to be delayed. With combustion occurring when the rising piston is closer to top dead center there is less counter-producting force.*
- *Induction ports are specially tuned for low swirl for high end performance in TCI.*
- *Rapid warm-up and maintenance of the optimum engine temperature for maximum fuel efficiency are achieved by twin-stage thermostats and a full-flow radiator by-pass on 6-cylinder industrial models.*
- *17 mm VCO injectors provide low smoke and exhaust emissions.*

COOLING SYSTEM

Engine Type		2725 6.2L N/A	2726TC 6.0L	2728TCI 6.0L/185	2728TCI 6.0L/210
Water pump type		Poly V belt centrifugal split type			
Drive ratio		1.88			
Engine speed	rpm	2400			
Flow rate	lt/min	178			
Coolant water capacity	lt	9.95			
Optimum operating temp.		99°C			
Antifreeze		LLC (Long life coolant)			
Thermostat		Twin type (77°C 82°C)			

LUBRICATING SYSTEM

Engine Type	2725 6.2L N/A	2726TC 6.0L	2728TCI 6.0L/185	2728TCI 6.0L/210
Oil pan type	vertical (shallow sump)			
	inclined (automotive sump)			
Oil pan material	cast aluminium			
Oil capacities				
Shallow lt	19			
Inclined lt	15			
Oil pump type	high capacity crankshaft driven birotor			
Max. oil pressure@idle	2.1bar			
Max. oil pressure@rated speed	6 bar			
Oil filter type / capacity	vertical spin on canister/2 lt. +centrifugal oil cleaner			
Max. oil temperature	116°C			
Oil specification	API CF4			
Max. angles of inclination	inclined	shallow		
Front down	18°	15°		
Rear down	18°	15°		
Side ways	22.5°	22.5°		

FUEL SYSTEM

Engine Type	2725 6.2L N/A	2726TC 6.0L	2728TCI 6.0L/185	2728TCI 6.0L/210
Injection pump type	in line piston with mechanical governor			
Injectors	4 holes mini SAC	6 holes VCO		
Fuel filters	twin bowl (replacement element)			
Fuel lift pump	high pressure plunger with hand primer			
Fuel type	diesel			
Starting aids	single termostat device for starts down to -10°C			
	Plus excess fuel device in fuel injection pump			

ELECTRICAL SYSTEM

Engine Type	
System wiring	insulated earth return
Voltage	12V/24V
Alternator	Mako 12V 55A / 24V 30A
Starter motor	Mako 12V 3.5kW / 24V 4.5 kW
Battery	(down to -10°C) 120 A.hr
	(down to -20°C) 2 x 120 A.hr

Otosan - İnönü

Otosan - Kartal Parts Distribution Center

OPTIONAL EQUIPMENT

13"/14" single plate clutch & actuation mechanism
Air filter (dry/oil bath)
Alternator (12V or 24V)
Automotive & Class A1 governing injection pump
Cooling fan (fixed or viscous drive-crankshaft or water pump mounted)
Exhaust system
Front/rear engine mounts
Heavy flywheel for Gen-Set & Marine application, flywheel housing
Instrument panel
Intercooler
Oil drain pump
Power steering pump
Power Take Off (PTO)
Radiator
SAE adaptors
Shallow/inclined oil pans
Starter motor (12V or 24V)
Thermostarter
Truck transmissions
Water cooled air compressor (7.6 CFM)

APPLICATIONS

Air compressor
Automotiv
Combine harvester
Fork lift
Genset
Marine
Pumping equipment
Gas

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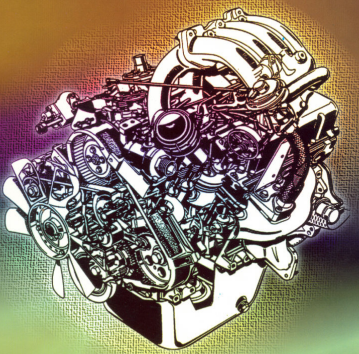
NEW NEW NEW NEW

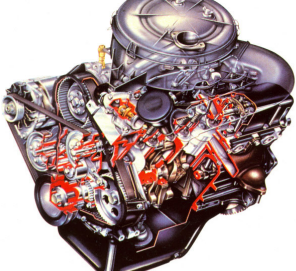
FSD 425



4- CYLINDER, HIGH-SPEED
DIRECT INJECTION DIESEL ENGINE

The Source for Power... Worldwide

Ford



NEW FSD 425, 4 - CYLINDER, HIGH - SPEED, DIRECT INJECTION DIESEL ENGINE

The Ford FSD 425 represents a major industry breakthrough in diesel engine design. After 5 years' development and an investment of $160 million, Ford have succeeded in combining the advantages of a small, high speed, naturally aspirated diesel with the added, and significant, benefits of direct fuel injection tehnology.
The 4-cylinder, in-line, 2,5 litre unit combines advanced structural design integrity to increase durability and minimise noise with scientifically optimised air motion and precise fuel management to set new standards of thermal efficiency and fuel economy. Ford engineers incorporated many premium features to ensure maximum reliability and low cost of maintenance.
The FSD 425 diesel engine is particularly suited to high-speed automative and light industrial applications, as well as for conversion for marine installation. Specialist support is provided by Ford's network of Power Products Sales and Service outlets, with additional back-up through out Europe and worldwide from Ford's extensive vehicle dealer organisation.

PRODUCT FEATURES AND CUSTOMER BENEFITS

Customer Benefits

Ford engineers drew on more than 18 years' experience in the design and manufacture of small high-speed diesels in the development of the new FSD 425 power unit. Its principle feature is the successful application of direct fuel injection technology to a small, high-speed diesel.
This, together with the use of computer-aided design techniques to achieve maximum structural rigidity, and the incorporation of a number of premium product features, means that the FSD 425 offers original equipment manufacturers and end users the benefits of:

**High performance, high-speed operation.*
**Low-running costs, and reduced service and maintenance schedules.*
**Low noise and vibration levels, for reduced operator fatigue and improved environmental comfort.*
**Dependable reliability, for maximum equipment utilisation.*
**Outstanding durability, for minimum downtime and maximum equipment life.*
**An engine which meets EEC legislation regarding noise, smoke and exhaust emissions.*

Direct Versus Indirect Fuel Injection

The key design requirement to achieve high-speed direct injection was to provide air at the desired rate with a high degree of 'swirl'. This promotes the rapid air movement necessary to distribute the injected fuel within the combustion chamber to give clean and efficient combustion. The pattern of the swirl is critical to the achievement of the best balance of power, fuel economy, and smoke levels. Getting the helical shape of the intake port right was therefore a fundamental element in the technological breakthrough behind the FSD 425:

** sophisticated computer aided design techniques were used to research and develop a completely new inlet manifold*
** valve sizes, seat angles and port shapes were optimised to provide most efficient air flow.*

The second key requirement was to inject the necessary charge of fuel into the combustion chamber within the split-second timing demanded by the high-speed direct injection engine. The Ford FSD 425 therefore incorporates new generation high-pressure rotary fuel injection pumps. These pumps provide:

** peak line pressures up to 100% over IDI systems*
** automatic excess fuel and cold start advance*
** hydraulic torque control to regulate maximum fuel delivery through the speed range*
** thermostatically controlled fast idle device to prevent stall on warm-up or at light loads*
** automatic fuel shut-off*

To give greater accuracy of injection timing and improved consistency in performance, the pumps are tamperproof and are pre-set in manufacture for fuel setting, injection timing and maximum speed setting. To ensure an even distribution of fuel in the combustion chamber, a new five-hole pencil slim injector replaces the single spray type used with indirect injection. To achieve rapid delivery of fuel, nozzle opening pressures are 70 to 80 % higher.

Engine Noise

The direct injection diesel engine produces fuel economy benefits of around 15% but tends to generate more noise than its indirect injection counterpart directly as a result of the combustion processes and higher speeds which contribute so much to its superior performance. A considerable amount of development work has therefore been conducted by Ford to offset these inherently increased noise levels:

- *Sophisticated computer Finite Element Analysis techniques were employed to produce a stiffer block with added side panel ribbing and a thickened oil pan to reduce structural vibration. With careful attention to mass distribution this design has been achieved without increased weight penalty.*
- *The FSD 425 crankshaft incorporates a torsional vibration damper pulley. In addition, a specially designed and patented neoprene rubber plug has been fitted into the front of the damper. The development of the damper and plug alone has reduced noise by up to 3.5dB (A) at the front of the engine.*
- *Other noise reduction features are the use of expansion-controlled pistons, which ensure a close fit even when cold, thus minimising piston slap, and sound -deadening steel for the rocker cover.*

SPECIFIC FUEL CONSUMPTION (gr / kWh)

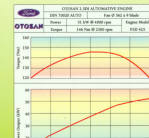
Engine Speed (rpm)	FSD425	FSD425HP	FSD425T
1500	226	221	237
2000	227	221	221
2500	231	222	222
3000	237	228	228
3500	246	237	241
4000	265	257	254

COOLING SYSTEM

WATER PUMP	FSD425	FSD425HP	FSD425T
Type	Centrifugal impeller		
Drive	Single poly vee 4 - groove belt		
Drive Ratio (:1)	1.27	1.27	1.52
Thermostat type	wax - capsule		
Thermostat operating temperatures (start / fully open)	88 ° / 102 °C		

FLOW RATES (System with typical radiator an heater in circuit) Lt. / min.

Engine Speed	FSD425	FSD425HP	FSD425T
2000	68	68	88
2500	80	80	103
3000	92	92	118
3500	104	104	133
4000	116	116	149
Maximum System Pressure	0.5 bar		
Antifreeze to Ford Specification	WSS - M97B44 - D		
Mixture Ratio	% 50 OAT; %50 water		



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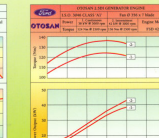

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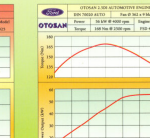

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ELECTRICAL SYSTEM

System voltage	12V
System polarity	Negative Earth
Alternator	
Automotive Engines	12V 55 A with exhauster
Industrial / Marine Engines	12V 55 A without exhauster
Starter Motor	2.5 kW pre - engaged with earth return
Batteries	
Down to - 10°C	1 x 520A / 120 RC
Down to - 15°C	1 x 680A / 135RC
Down to - 20°C	2 x 520A / 120RC

Durability, Reliability and Serviceability

In the development of the FSD 425, Ford engineers have drawn on their vast experience to incorporate a wide range of features promoting longer engine life, greater reliability and reduced maintenance.

* *Induction hardening of crankshaft journals with fillet rolling to increase strength and improve bearing surfaces.*
* *Induction hardened valve seats in the cylinder head to improve reliability and durability, Multigroove valve collets to promote valve rotation and to ensure even thermal loading.*
* *Piston durability improved by using a cast iron top ring insert*
* *Re-entrant type combustion bowls for minimum emissions.*
* *Cylinder head bolts torqued to yield to provide uniform and consistent clamping loads, improving gasket sealing and avoiding the need to retorque in service.*
* *Optimum engine sealing against leaks, including PTFE rotary seals on crank and camshafts.*
* *All gaskets used in the FSD 425 are now manufactured from asbestos-free material.*
* *Additional entity available for Exhaust Gas Recirculation (EGR) to conform with 97EEC Light Duty Truck legislation.*
* *Chilled iron camshaft with wide cam faces and optimised profiles, plus large diameter tappets and bushed rocker arms for longer life and extended service intervals.*
* *Spin-on oil filter and new, clip-on fuel filter design to improve serviceability.*
* *Peg timing feature added to the flywheel to improve fuel injection timing accuracy in service.*

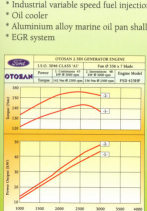
INSTALLATION DATA

Operating Angles

Maximum installed angles apd for continuous operation	- 17.5 ° sideways, exhaust manifold up from normal -5.0 ° sideways, exhaust manifold down from normal -15.0 ° front and rear down
For intermittent operation	-20.5 ° sideways, exhaust manifold up from normal -10.0 ° sideways, exhaust manifold down from normal -20.0 ° front and rear down

OPTIONAL EQUIPMENT

* Injection pump with two - speed governor for automotive and marine applications
* Industrial variable speed fuel injection pump with general purpose governing
* Oil cooler
* Aluminium alloy marine oil pan shallow
* EGR system
* Exhauster
* Marine starter motor
* Cooling fans
* Mounting brackets
* Air cleaners
* MT75 manual 5 - speed tranmission



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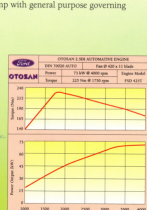

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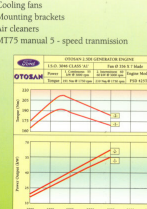

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TECHNICAL SPECIFICATIONS

Engine Type	FSD425	FSD425HP	FSD425T
Number of cylinders	4	4	4
Displacement (lt.)	2,496	2,496	2,496
Induction System	Naturally aspirated	Naturally aspirated	Turbocharged
Cylinder Bore (mm)	93,7	93,7	93,7
Piston Stroke (mm)	90,5	90,5	90,5
Compression Ratio (:1)	20,6	20,6	18,3
BMEP (maximum)	7,35	8,45	11,37
Length (mm)	667	667	667
Width (mm)	675	671	690
Height (mm)	834	930	776
Weight with flywheel (kg)	226	233	236
Flywheel weight (kg)	14,6	14,6	14,6

LUBRICATING SYSTEM

OIL PAN material :	FSD425	FSD425HP	FSD425T
Automotive		Pressed steel centre or rear well	
Industrial / Marine		Alloy shallow	
OIL capacities (Lt.)			
Initial Fill	7,0	7,0	7,1*
Service Fill	6,2	6,2	6,3*
*: Includes mandatory oil cooler			
OIL pressures (bar)			
Maximum Pressure		4,5	
Nominal pressure at idle speed		1,0	
OIL Cooler	-	-	Standart equipment (0.1 Lt. Capacity)
OIL Filter & capacity		Horizontal spin -on cartridge / 0.4 Lt.	
OIL temperature (max.)		125°C	
OIL Ford specification		WSE - M2C906 - A/B	
OIL viscosity		SAE 15W / 40	
OIL specification		Service fill to ACEA B2 / B3 & API CF4 / CG4	

FUEL SYSTEM

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Fuel Injection System	FSD425	FSD425HP	FSD425T
Usage		Automotive / Industrial	
Type		Bosch VE Distributor	
Governor		2 - speed mechanical	
Max. engine speed (rpm)		4000	
Max. governor speed (rpm)		4400	
Features:		Rotary, incorporating automatic excess fuel, solenoid stop controls and self air purge. Temperature controlled fast idle and temperature controlled start advance.	
Injectors		Stanadyne 5 holes pencil type	
Fuel Lift Pump			
Make		S.U.A. Automotive	
Type		Mechanically operated diaphragm	
Fuel Delivery		66 Lt. / h @ 4000 rpm	
Delivery pressure		30 kPa @ 4000 rpm	
Fuel Type		Diesel fuel to EN 590 : 1993 (Sulphur content max. % 0.2)	
Fuel Filters		Single bowl with 5C port head. Integral water in fuel sensor	
Operating Temperature		35 °C measured at the injection pump inlet connection.	
Cold Start Options			
-10°C		Excess fuel	
-20°C		Excess fuel plus a Single Fast Flame Start Plug	

POWER RATINGS

Max. Power Standart 88/195/EEC	FSD425	FSD425HP	FSD425T
Automotive / MarineDIN 70020	51 kW @ 4000 rpm	56 kW @ 4000 rpm	73 kW @ 4000 rpm
Standart BS5514 / DIN 6271			
Industrial (Continuous)	38 kW @ 3000 rpm	43 kW @ 3000 rpm	55 kW @ 3000 rpm
Industrial (Intermittent)	42 kW @ 3000 rpm	48 kW @ 3000 rpm	60 kW @ 3000 rpm
Max. Torque **Standart 88/195/EEC**			
Automotive / Marine	146 Nm @ 2500 rpm	168 Nm @ 2500 rpm	225 Nm @ 1750 rpm
Standart BS5514 / DIN 6271			
Industrial (Continuous)	124 Nm @ 2500 rpm	142 Nm @ 2500 rpm	191 Nm @ 1750 rpm
Industrial (Intermittent)	136 Nm @ 2500 rpm	156 Nm @ 2500 rpm	210 Nm @ 1750 rpm

2.5 DI GENERATOR ENGINE

Engine Type	Engine Speed (rpm)	Fuel Consumption (Lt. / hr)	Continuous Power kW (KVA) [Kwe]	Intermittent Power kW (KVA) [Kwe]
FSD 425	3000	10.9	38(42)[34.2]	42(47.2)[37.8]
FSD 425HP	3000	11.8	43(48)[38.7]	48(54)[43.2]
FSD 425T	3000	15.1	55(62)[49.5]	60(67.5)[54]

Engine Type	Engine Speed (rpm)	Fuel Consumption (Lt. / hr)	Continuous Power kW (KVA) [Kwe]	Intermittent Power kW (KVA) [Kwe]
FSD 425T	1500	12.1	44.4 (50) [40]	48.9 (55)[44]

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