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GUASCOR MARINE DIESEL ENGINES AND SYSTEMS

1. POWER DEFINITION

Dresser-Rand's Guascor diesel engines ratings stated in this document are based in ISO3046-1:2002(E), ISO3046-3:2006(E), ISO15550:2002(E). These ratings have been measured including all engine driven mechanical pumps.

Abbreviations ICFN / IFN

I = ISO Standard (3046)

C = Continuous

F = Fuel stop power

N = Net power

Our Guascor diesel engines are designed following the reference conditions. On vessels approved and/or surveyed by IACS members, "standard design conditions" are to be observed.

Standard reference conditions ISO 15550:2002

- Total barometric pressure: 100 kPa / 1000 mbar
- Air temperature: 25°C (77°F) / 298 K
- Relative humidity: 30%
- Charge air coolant (raw): 25°C (77°F) / 298 K
- Charge air coolant (treated): 29°C (84°F) / 302 K

Standard design conditions ISO 3046-1:2002 & 3046-3:2006.

- Total barometric pressure: 100 kPa / 1000 mbar
- Air temperature: 45°C (113°F) / 318 K
- Relative humidity: 60%
- Charge air coolant (raw): 32°C (89°F) / 305 K
- Charge air coolant (treated): 36°C (96°F) / 309 K

2. RATING DEFINITIONS

PROPULSION

A - Rating (unrestricted continuous duty)

Rated power intended for continuous use in applications requiring uninterrupted service with high load factors; this is an ISO standard (continuous) fuel stop power (ICFN)

Typical load factors:	80-100% of rated power
Full load operation time:	100% of time or 24/24h
Operation time:	5,000 - 8,000 h/year
Operation type:	Displacement hull vessels for unrestricted use at full speed and load
Typical applications:	Fishing trawlers, bottom trawlers, freighters, tankers, tow & push boats, long distance ferries, dredgers, cabin cruiser, research vessels

B - Rating (variable continuous duty)

Rated power intended for use in variable load applications, medium-high load factors; this is an ISO 3046 fuel stop power (IFN).

Typical load factors:	40-80% of rated power
Full load operation time:	80% of time or 10/12h
Operation time:	3,000 - 5,000 h/year
Hull type:	Semi-planning or semi-displacement hulls for restricted use at full load
Typical applications:	Mid-water trawlers, fishing long liners, purse seiners, harbour tow & push boats, passenger cruiser, tugboats, short distance ferries

C - Rating (intermittent duty)

Power intended for use in variable load applications with moderate load factors. This is an ISO 3046 fuel stop power (IFN)

Typical load factors:	20-80% of rated power
Full load operation time:	50% of time or 6/12h
Operation time:	1,500-3,000 h/year
Hull type:	Semi-planning or planning hulls, fast commercial and passenger vessels for restricted use with moderate load factors and high demands on vessel's speed
Typical applications:	Passenger boats, high-speed fishing boats, crew and service boats, moto-pumps, pilot boats

DIESEL ELECTRIC PROPULSION

COP (continuous power)

Rated power (ISO8528) intended for continuous use in applications requiring uninterrupted service with high load factors for an unlimited number of hours per year; 10% overload available in a period of time of 1/12 operation hours and maximum 25 h/year.

Typical load factors:	<80% of rated power
Full load operation time:	100% of time or 24/24h
Overload:	110% overload available 1/12h and max. 25 h/year
Operation time:	5,000 - 8,000 h/year
Typical applications:	Ferries, research vessels, passenger cruiser, tugboats, offshore vessels, freighters and tankers

AUXILIARY AND GENERATOR SET

COP (continuous power)

Engines with this rating (ISO 8528) are available for supplying utility power at a constant 100% load for an unlimited number of hours per year. A 10% overload capability for a period of time of 1/12 operation hours and maximum 25 h/year is additionally allowed to that specified on ISO 8528.

Typical load factors:	80-100% of rated power
Full load operation time:	100% of time or 24/24h
Overload:	110% overload available 1/12h and max. 25 h/year
Operation time:	5,000 - 8,000 h/year

3. FUEL CONSUMPTION

The fuel consumption values published in this document have been calculated according to ISO8178 standard test cycles (ISO8178 E3 Propulsion, E2 Electric propulsion and D2 auxiliary applications). These values must be considered as indicative guidance but not considered absolute values. Fuel consumption may vary as it can be influenced by external factors such as ship application, different environmental conditions, particular propeller design, hull form, etc.

ISO 8178 test cycles and weighting factors

E3 Test Cycle: Main propulsion and auxiliary engines adapted to propeller demand

Mode Number	1	2	3	4	5
% Speed	100	91	80	63	-
% Power	100	75	50	25	-
Weight Factor	0.2	0.5	0.15	0.15	-

E2 Test Cycle: Main propulsion engines at a constant speed

Mode Number	1	2	3	4	5
% Speed	100	100	100	100	-
% Power	100	75	50	25	-
Weight Factor	0.20	0.50	0.15	0.15	-

D2 Test Cycle: Auxiliary engines at a constant speed

Mode Number	1	2	3	4	5
% Speed	100	100	100	100	100
% Power	100	75	50	25	10
Weight Factor	0.05	0.25	0.30	0.30	0.10

Fuel consumption rates are based on ISO3046-1 with a tolerance of +5% and is based on diesel gasoil B with LHV 42700 kJ/kg (18358 Btu/lb) when used at 29°C (85°F) and weighing 836 g/liter (6977 lb/US gal)

Extensions of this information should be compared with the specifications indicated in the mentioned standards.

All technical information and data within this document is subject to modification without prior notice.

4. EMISSION CERTIFICATIONS

IMO (International Maritime Organization)

On January 1, 2000, annex VI of MARPOL 73/78 went into effect for all marine diesel engines above 130kW/177HP installed on vessels whose keel is laid after January 1st and which do not operate exclusively in national waters. Current revision (Tier II) entered into force from January 1, 2011.

- IMO apply to sea going vessels
- IMO apply on engines rated above 130 kW / 177 mHP
- Emergency on-board engines are exempt to accomplish IMO regulations

CCNR (Central Commission for the Navigation on the Rhine)

Effective January 1, 2003, the CCNR regulates exhaust emissions limits for all marine diesel engines above 37kW/50HP installed on inland waterway-going vessels running through the Rhine or its tributary rivers. Members of the CCNR include: Belgium, Netherlands, Germany, France, Luxembourg, and Switzerland. Current revision (CCNR II) entered into force effective January 1, 2007.

- CCNR rules apply to inland waterway-going vessels
- Applies on engines rated above 37 kW / 50 mHP
- Equivalent to EU directive for non-road mobile machinery 97/68/EC, as amended by directive 2004/26/EC, mutual recognition agreement effective July 1, 2007

Abbreviations

This document contents the following abbreviations which will appear on subsequent pages to identify the emission regulation compliance of each engine type and/or rating.

- **N.C.** Not compliant or not applicable
- **N.A.** Not applicable
- **IMO1** IMO Tier I compliant (see IMO2) EIAPP certificates available for engine replacement only for all diesel engines placed on a vessel before December 31, 2010
- **IMO2** IMO Tier II compliant; EIAPP certificates available since January 1, 2011
- **CCNR2** CCNR Stage II compliant
- **DEP** Diesel electric propulsion
- **COP** Continuous power
- **mHP** Metric horsepower (DIN)
- **kW** Kilowatt
- **KVA** Kilovolt amper

5. MARINE CLASSIFICATION SOCIETIES

Dresser-Rand's Guascor marine engines, gen-sets and gear boxes are designed and built according to the rules of major marine classification societies worldwide. Approvals from major marine classification societies worldwide include:

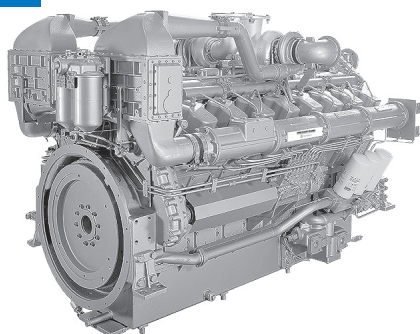
- **ABS** American Bureau of Shipping
- **BV** Bureau Veritas
- **GL** Germanischer Lloyd
- **LR** Lloyds Register
- **RINA** Registro Italiano Navale

Some marine products or ratings may differ depending upon class society.

For more information on emission or marine classification society certifications, please contact your local Dresser-Rand office for Guascor marine engines, gen-sets and gear boxes.

All information published in this booklet may be modified without prior notice.

F/SF480 SERIES PROPULSION



MAIN DATA

Cycle (ISO 8178)	E3 (propulsion)
Disposition	V 16
Displacement	47.9 liter
Cycle	4-stroke diesel
Combustion system	Direct injection
Aspiration	Turbocharged and aftercooled
Bore and stroke	152 x 165 mm (5.9 x 6.5 in)
Rotation (from flywheel)	Counterclockwise

Propulsion ratings

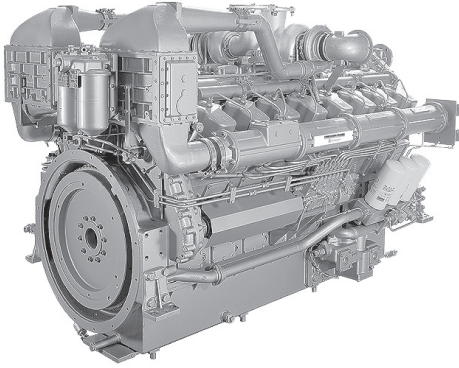
Rating	kW	mHP	RPM	Series	Fuel consumption (ISO 8178)		Emissions
					L/h	Gal/h	
A	934	1,270	1,800	F	156.1	41.3	IMO2
A	1,103	1,500	1,600	SF	184.6	48.8	IMO2
A	1,155	1,571	1,800	SF	207.2	54.8	IMO2/CCNR2
A	1,177	1,600	1,800	SF	196.1	51.9	IMO2
A	1,221	1,660	1,800	SF	203.5	53.8	IMO2
B	993	1,350	1,800	F	165.7	43.8	IMO2
B	1,268	1,724	1,800	SF	211.8	56.0	IMO2
C	1,029	1,400	1,800	F	171.6	45.4	IMO2
C	1,324	1,800	1,800	SF	221.9	58.7	IMO2

DIMENSIONS & WEIGHT

Length (mm / in)	3,300	130
Width (mm / in)	1,400	55
Height (mm / in)	1,740	69
Dry weight (kg / lb)	6,000	13,228

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.

F/SF 480 AUXILIARY



MAIN DATA

Cycle (ISO 8178)	D2 (auxiliary)
Disposition	V 16
Displacement	47,9 liter
Cycle	4-stroke diesel
Combustion system	Direct injection
Aspiration	Turbocharged and aftercooled
Bore and stroke	152 x 165 mm (5.9 x 6.5 in)
Rotation (from flywheel)	Counterclockwise

Auxiliary ratings

Rating	kW	mHP	RPM	Series	Fuel consumption (ISO 8178)		Emissions
					L/h	Gal/h	
A	846	1,151	1,500	F	101.2	26.8	IMO2/CCNR2
A	1,020	1,388	1,500	SF	119.7	31.7	IMO2/CCNR2
A	1,050	1,428	1,500	SF	123.1	32.6	IMO2
A	934	1,270	1,800	F	122.2	32.3	IMO2/CCNR2
A	1,154	1,570	1,800	SF	144.8	38.3	IMO2/CCNR2
A	1,177	1,601	1,800	SF	147.0	38.9	IMO2

DIMENSIONS & WEIGHT

Length (mm / in)	3,300	130
Width (mm / in)	1,400	55
Height (mm / in)	1,740	69
Dry weight (kg / lb)	6,000	13,228

Dimensions and weight may vary depending upon engine configuration.
Data subject to further modifications without prior notice.