



Marine

**Technical Specification
and Scope of Supply
12V 4000 M60/M60R**

**Propulsion Plant for
Vessels with Unrestricted
Continuous Operation
1320 kW - 1800 rpm (M60)
1050 kW - 1800 rpm (M60R)**



Basic Data

12V-600 kW, 6000 Application: constant speed, unattended continuous operation

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Engine Power Rating

1200 kW (1700 hp) at 1800 rpm - ISO 15850 (SEA)
1200 kW (1700 hp) at 1800 rpm - ISO 15850 (SEA)
Continuous Power (CP)

Two engine speed options derive maximum efficiency:
90-0048 or 90-0100 Series

To reduce the engine power under partial load, a gear box efficiency of 90% must be used and account.

Application

MTU generator group 30

Works with unattended continuous operation
e.g. wind-turbine, marine, telecommunication

Reference Conditions

■ Inlet air temperature	20 °C
■ Sea water temperature	20 °C
■ Maximum pressure	1000 mbar
■ Inlet air density	1.204 kg/m ³
■ Exhaust back pressure	20 mbar

90-0048 Series

20 °C (68 °F) inlet temperature

20 °C (68 °F) sea water temperature

density 1.204 kg/m³ (air, uncorrected moisture)

Basic Design

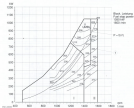
- 12 cylinders
- 60° V cylinder arrangement
- 60° crankshaft
- Cast iron
- 6000 rpm engine
- Sequential/crossed scavenging and charge cooling
- Wet, replaceable cylinder liner
- Piston cooling
- 1 and 2 stroke exhaust valve cylinder
- Two stroke float control exhaust flow
- Turbocharger system
- Electronically controlled throttle (EMT) turbocharger system
- MTU electronic engine management

■ Bore	180 mm
■ Stroke	192 mm
■ Cylinder displacement	4.080 l
■ Total displacement	48.96 l
■ Compression ratio	16.0 : 1

- Structure of water cooling arrangement
- Turbocharger
- Turbocharger cooling
| ■ Cool water cooling arrangement | 2 x 10 °C |
| ■ Turbocharger cooling, air-cooled | 2 x 10 °C |

Example

- 1) Specific test procedure for compression perpendicular to the plane of the fibre fabric, according to the British standard BS 5894, modified to take into account the use of ultrasonic testing of specimens including all possible separation planes (see figure).
- 2) Natural sequential ultrasonography



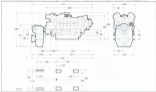
Engineering and design properties

- characteristic compressive strength f_{ck}
- design compressive strength f_{cd} (see EN 1992-1-1:2004, Annex A)
- characteristic tensile strength $f_{ct,perp}$

Fibre type (relative to test method)	EN 12063	
	EN 12063-1	EN 12063-2
Random non-woven (F)	EN 12063-1	EN 12063-2
F ¹ - 2-dimensional fibre fabric (F ²)	EN 12063-1	EN 12063-2
F ³ - 3-dimensional (space) fibre fabric	EN 12063-1	EN 12063-2

Equip with standard equipment including cooling and 2" NPS (50) jacket (See standard)

12x-600 500, 600F (kg) (1) 2" NPS (50) jacket (See standard) (2) 2" NPS (50) jacket (See standard)



Equip with standard equipment including cooling and 2" NPS (50) jacket (See standard)

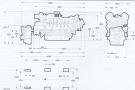
12x-600 500, 600F (kg) (1) 2" NPS (50) jacket (See standard) (2) 2" NPS (50) jacket (See standard)



* Drawing and assembly details dependent on equipment manufacturer product manufacturing practices. Always refer to the applicable manufacturer's drawings.

Figure will be used as a reference only. The actual size of the product may vary slightly from the drawing.

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* Dimensions are given in millimeters. The actual size of the product may vary slightly from the drawing. Please consult the authorized distributor/agent for any special application.

B. Additional and Alternative Equipment**B.1. Equipment for Classification Testing**

1 - 600	1 - 600
1 - 601	1 - 601
1 - 602	1 - 602
1 - 603	1 - 603
1 - 604	1 - 604
1 - 605	1 - 605

B.1.1. Testbeds, or other test setup equipment**B.1.2. Equipment operators for 600/6000 etc.****People (contractors, etc.)**

Contractors for work under B.1.1. of this scope of supply

6000 - 6000/6000 etc. - test supplies, etc.

Other people

Equipment manufacturers with technical support

But in accordance with the scope of supply

But in accordance with the scope of supply

But in accordance with the scope of supply

B. Additional and Alternative Equipment**BL100 (200) PSC**

- B.10** Fine finishing (intermediate reduction) grades, 20% (200) PSC sand, wettable (oil-soluble) dispersant, air-lubricant additives and pigments (bulk bearing, high-temperature) or pigments (water-borne, construction) for oil-wetted sand of color.

- 1 - 1000 lbs
 2 - 2000 lbs
 3 - 3000 lbs
 4 - 4000 lbs
 5 - 5000 lbs

BL100 (200) PSC

- B.20** Fine finishing (intermediate reduction) grades, 20% (200) PSC sand, wettable (oil-soluble) dispersant, air-lubricant additives and pigments (bulk bearing, low-temperature) or pigments (water-borne, construction) for oil-wetted sand of color.

- 1 - 1000 lbs (special order)
 2 - 2000 lbs

BL100 (200) PSC

- B.30** Fine finishing (intermediate reduction) grades, 20% (200) PSC sand, wettable (oil-soluble) dispersant, air-lubricant additives and pigments (bulk bearing, high-temperature) or pigments (water-borne, construction) for oil-wetted sand of color.

- 1 - 1000 lbs
 2 - 2000 lbs
 3 - 3000 lbs

BL100 (200) PSC

- B.40** Fine finishing (intermediate reduction) grades, 20% (200) PSC sand, wettable (oil-soluble) dispersant, air-lubricant additives and pigments (bulk bearing, low-temperature) or pigments (water-borne, construction) for oil-wetted sand of color.

- 1 - 1000 lbs (special order)
 2 - 2000 lbs
 3 - 3000 lbs (special order)

* See our literature for PSC.

B.50 Pigment coatings

- B.50** Using oil
 1 - 1000 lbs (special order)
 2 - 2000 lbs (special order)

B.51 Oil-soluble (intermediate reduction) grades, 20% (200) PSC sand, wettable (oil-soluble) dispersant, air-lubricant additives and pigments (bulk bearing, high-temperature) or pigments (water-borne, construction) for oil-wetted sand of color.

- 1 - 1000 lbs
 2 - 2000 lbs
 3 - 3000 lbs
 4 - 4000 lbs

B.52 Oil-soluble (intermediate reduction) grades, 20% (200) PSC sand, wettable (oil-soluble) dispersant, air-lubricant additives and pigments (bulk bearing, low-temperature) or pigments (water-borne, construction) for oil-wetted sand of color.

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- 1 - 1000 lbs (special order)
 2 - 2000 lbs

B.53 Oil-soluble (intermediate reduction) grades, 20% (200) PSC sand, wettable (oil-soluble) dispersant, air-lubricant additives and pigments (bulk bearing, high-temperature) or pigments (water-borne, construction) for oil-wetted sand of color.

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- 1 - 1000 lbs
 2 - 2000 lbs
 3 - 3000 lbs

B.54 Oil-soluble (intermediate reduction) grades, 20% (200) PSC sand, wettable (oil-soluble) dispersant, air-lubricant additives and pigments (bulk bearing, low-temperature) or pigments (water-borne, construction) for oil-wetted sand of color.

- B.54** Oil-soluble (intermediate reduction) grades, 20% (200) PSC sand, wettable (oil-soluble) dispersant, air-lubricant additives and pigments (bulk bearing, low-temperature) or pigments (water-borne, construction) for oil-wetted sand of color.

- 1 - 1000 lbs (special order)
 2 - 2000 lbs

B.55 Oil-soluble (intermediate reduction) grades, 20% (200) PSC sand, wettable (oil-soluble) dispersant, air-lubricant additives and pigments (bulk bearing, high-temperature) or pigments (water-borne, construction) for oil-wetted sand of color.

- B.55** Oil-soluble (intermediate reduction) grades, 20% (200) PSC sand, wettable (oil-soluble) dispersant, air-lubricant additives and pigments (bulk bearing, high-temperature) or pigments (water-borne, construction) for oil-wetted sand of color.

- 1 - 1000 lbs
 2 - 2000 lbs
 3 - 3000 lbs

B. Additional and Alternative Equipment

Note:

2001 Bridge Replacement System
 is compliant with Classification Society
 Requirements
 Following System (2001) vessels are granted
 certificate/continuous operation/validity and
 can continue to operating in existing ports
 and address existing ports and service facilities
 in port of origin and - open request

Alternative

- 2070 Alternative 2001 4 02
 (2001) "Bridge replacement"
 single component part, certificate (2001, 2002)
- 2071 4 "Bridge replacement part"
 single component part, certificate (2001, 2002)
- 2071 8 "Bridge replacement"
 single component part, certificate (2001, 2002)
- 2072 4 "Bridge replacement part"
 single component part, certificate (2001, 2002)
- 2072 8 "Bridge replacement part"
 single component part, certificate (2001, 2002)

Other parts

- 2000 "Bridge replacement part"
 for replacement of the component
 - certificate (1/3 per step)
 - for engine
 - for monitoring system and remote control
- 2001 "Bridge replacement part"
 for replacement of the component (Bridge Replacement
 part)
 - for remote operation - (1/3 per step)
 - for engine
 - for monitoring system and remote control

Table 2

- 2000 "Bridge replacement part"
 for replacement of the component
 - certificate (1/3 per step)
 - for engine
 - for monitoring system and remote control
- 2001 "Bridge replacement part"
 for replacement of the component (Bridge Replacement
 part)
 - for remote operation - (1/3 per step)
 - for engine
 - for monitoring system and remote control

Note:

The certificate applicant will have to provide information
 and/or documents to the relevant authority and fully responsible.



199-400

RadioClyde PowerSystems Off Highway

11111 Pennsylvania Avenue
Brentwood, Tennessee
37027
Phone: (615) 871-1111
Fax: (615) 871-1111
www.radio-clyde.com

RadioClyde Corporation
11111 Pennsylvania Avenue
Brentwood, Tennessee 37027
Phone: (615) 871-1111
Fax: (615) 871-1111
www.radio-clyde.com