

TYPE APPROVAL CERTIFICATE

Certificate No:
TAM0000107**This is to certify:****That the Diesel Engine**with type designation(s)
6090SFM75, 6090AFM75, 6090SFM85, 6090AFM85

Issued to

**John Deere Power Systems
Waterloo IA, United States**

is found to comply with

DNV GL rules for classification:**Ships Pt.4 Ch.3 Sec.1 Reciprocating internal combustion engines,
High speed and light craft Pt.4 Ch.3 Rotating machinery - drivers****Application :**

propulsion, multi engine plant / auxiliary / emergency

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

This Certificate is valid until **29th September, 2024.**Issued at **Hamburg** on **30th September, 2019**DNV GL local station: **Houston Certification &
Inspection Services**for **DNV GL**Approval Engineer: **Jan Sell**

**Olaf Drews
Head of Section**

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Job Id: **262.1-007307-5**
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Product description

four stroke, in-line engine, non-reversible, trunk-piston, with supercharging, with charge air cooling, direct injection, injection operation electronically controlled (common rail), valve operation by cams, liquid fuel

Cylinder bore [mm] 118
Piston stroke [mm] 127
No. of cylinders 6
Charge air cooling 6090SFM: Air-to-seawater aftercooling,
6090AFM: Air-to-coolant aftercooling

Additional place of production

not applicable

Application/Limitation

The Type Approval is valid for the following ratings.
John Deere rating definitions and application guidelines shall be observed.

Engine model 6090SFM75:

Propulsion (JD rating group)	M1	M2	M3	M4	M5
Mean indicated pressure (bar):	17.5	19.2	20.8	23.3	24.5
Max. cylinder pressure (bar):	122	138	152	170	181
Rated cont. output (kW):	242	280	317	373	410
Corresponding to (RPM) :	2100	2200	2300	2400	2500

Auxiliary /Emergency	50 Hz	60 Hz
Mean indicated pressure (bar):	22.5	23.1
Max. cylinder pressure (bar):	111	139
Rated cont. output (kW):	222	278
Corresponding to (RPM) :	1500	1800

Engine model 6090AFM75:

Propulsion (JD rating group)	M1	M2	M3	M4
Mean indicated pressure (bar):	15.6	16.9	18.3	20.1
Max. cylinder pressure (bar):	104.5	118.5	138	154
Rated cont. output (kW):	213	242	280	317
Corresponding to (RPM) :	2100	2200	2300	2400

Auxiliary /Emergency	50 Hz	60 Hz
Mean indicated pressure (bar):	20.4	19.0
Max. cylinder pressure (bar):	123.4	111
Rated cont. output (kW):	195	222
Corresponding to (RPM) :	1500	1800

Engine model 6090SFM85:

Propulsion (JD rating group)	M1	M2	M3	M4	M5
Mean indicated pressure (bar):	17.5	19.2	20.8	23.4	24.6
Max. cylinder pressure (bar):	115.8	137.7	149.8	164.9	174.8
Rated cont. output (kW):	242	280	317	373	410
Corresponding to (RPM) :	2100	2200	2300	2400	2500

Auxiliary /Emergency	50 Hz	60 Hz
Mean indicated pressure (bar):	21.8	22.8

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Max. cylinder pressure (bar):	105.9	143.4
Rated cont. output (kW):	222	278
Corresponding to (RPM) :	1500	1800

Engine model 6090AFM85:

Propulsion (JD rating group)	M1	M2	M3	M4
Mean indicated pressure (bar):	15.7	16.9	18.4	20.1
Max. cylinder pressure (bar):	128.7	142.2	151.3	163.4
Rated cont. output (kW):	213	242	280	317
Corresponding to (RPM) :	2100	2200	2300	2400

Auxiliary /Emergency	50 Hz	60 Hz
Mean indicated pressure (bar):	19.3	18.6
Max. cylinder pressure (bar):	124.3	121.4
Rated cont. output (kW):	195	222
Corresponding to (RPM) :	1500	1800

Type Approval documentation

This renewal of Type Approval is based on previous certificate M-12580.

262.1-007307-1, 262.1-007307-2, 262.1-007307-3, 262.1-007307-4, 262.1-007307-5

Tests carried out

Documentation:

Test reports for JD6090 received with letters from John Deere dated 2009-08-18 and 2009-08-25.

Test report title Witness Test Report for the John Deere 6090SFM75

Date of test 2009-07-30 until 2009-08-03

Test engine:

Model 6090SFM75
Serial no. RG6090L042743
No. of cylinders 6
Power [kW/cyl.] 40.34
Speed [rpm] 2100

Marking of product

The product to be marked with manufacturer's name or trademark and type number identification.

Periodical assessment

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.

The objective of the Periodical Assessment is to verify that the conditions for the Type Approval are not altered since the Type Approval certificate was issued.

In case where the Type Approved product is manufactured at other companies, the Periodical Assessment shall verify that the Type Approval applicant has a quality control system for consistent production at their licensees/subcontractors. Furthermore Periodical Assessment shall be carried out randomly at these companies.

Other Conditions

1. High pressure fuel injection pipes shall be double walled and provided with leakage alarm (DNV GL Rules Ships Pt.4 Ch.3 Sec.1 [2.8.7]).
2. Surface heat protection shall be fitted where necessary, e.g. between cylinder head and exhaust manifold, in order to meet the requirement to max. 220 °C surface temperature (DNV GL Rules Ships Pt.4 Ch.3 Sec.1 [2.6.1]).
3. Engine safety, control and monitoring systems, including sensors and actuators, are not covered by

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this certificate. Documentation for engine safety, control (including speed governing), and monitoring systems shall be submitted for approval according to DNV GL Rules Ships Pt.4 Ch.9 Sec.1 Table 5 and/or as listed in relevant Type Approval certificates.

An independent overspeed protection device shall be installed (for engines with rated power of 220kW or over) (DNV GL Rules Ships Pt.4 Ch.3 Sec.1 [5.3.1]).

4. Correct oil sump shall be selected for the application (regarding inclinations, see DNV GL Rules Ships Pt.4 Ch.1 Sec.3 Table3).

5. Electric cables and installation of these are not covered by this Type Approval and shall be verified to comply with the requirements of DNV GL Rules Ships Pt.4 Ch.8.

6. Engines with seawater cooling:

a. Flexible hoses containing seawater shall be fitted with fire sleeves, covering the complete hose including the end fittings and/or hose clamps (refer to John Deere Engine Application Guidelines – Marine Cooling System AG-09_5 and Application Guideline – Marine Classification and Type Approval MAG02).

b. The fire sleeves shall be easy to remove and reinstall, to allow easy regular visual inspection of the flexible hoses and end fittings respectively hose clamps.

c. Hose clamps shall be entirely seawater resistant (all parts, including screws) and fitted as double clamps.

d. Seawater pump shall be of flexible impeller pump type.

e. An individual seawater shutoff valve shall be installed upstream of each engine.

If seawater system design does not prevent backflow of seawater in reverse direction into the engine, an individual shutoff valve shall also be installed downstream of each engine.

It shall be possible to operate the shutoff valves from outside the engine room.

f. A warning sign shall be provided for the shutoff valves (e.g. "Engine No. xxx seawater inlet/outlet. Keep open when engine running. Close in case of fire in engine room and when engine stopped and unsupervised." or similar).

7. Fuel oil filters for engines used for main propulsion shall be arranged in such a way that they can be cleaned without interrupting the supply of filtered fuel oil (DNV GL Rules Ships Pt.4 Ch.6 Sec.5 [4.7]).

END OF CERTIFICATE