

Minor Update of the Mitsubishi GRENDiA Forklift Truck

- Compliant with 2007 Japanese Domestic Exhaust Gas Emission Regulations -



GENERAL MACHINERY &
SPECIAL VEHICLE HEADQUARTERS

MATERIAL HANDLING EQUIPMENT
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The Mitsubishi GRENDiA forklift truck was first marketed in June 2003. It includes many new technologies related to safety and the environment. These include features such as improved operator comfort (e.g., less vibration, reduced noise, and improved functionality in steering handle, control lever, pedal, etc.), early compliance with European and North American exhaust gas emission standards, and an interlock system that prevents loading, unloading, or movement in the absence of a seated operator. In September 2008, the vehicle was marketed in Japan, already compliant with the 2007 domestic exhaust gas emission regulations ahead of its competitors. This paper describes the new GRENDiA model.

1. Major modifications

1.1 Compliance with 2007 exhaust gas emission regulations

(1) Diesel engine model

We have improved performance to achieve environmental friendliness without compromising the basic performance of the highly acclaimed Mitsubishi diesel engine. The engine meets the 2007 exhaust gas regulations^{note}.

Figure 1 is an external view of the Mitsubishi diesel engine installed on the GRENDiA, which has a rated capacity of 2–3.5 tons.

Note: Emission Standard for Specific Special Vehicles (including off-road vehicles).

(2) Gasoline engine model

We have achieved excellent environmental performance in meeting the 2007 emission standard while maintaining high power and reliability through a further evolution of the high-performance gasoline engine, which was already an industry leader in the use of an electronically controlled fuel injection system and a three-way catalytic converter.

1.2 Rear axle reinforcement (improved endurance)

We reinforced specific parts of the rear axle (**Figure 2**) which was a key element in this initiative requiring utmost endurance and improved the vehicle's endurance, to extend the required maintenance interval for which market needs are increasing.

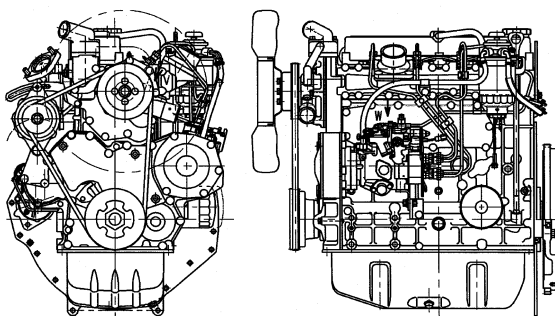


Figure 1 S4S diesel engine

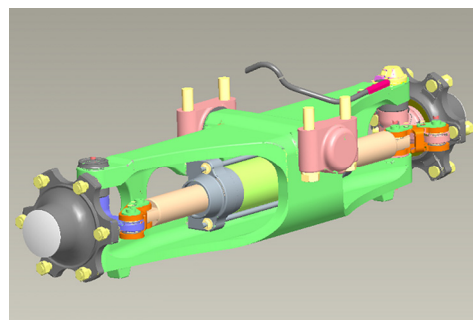


Figure 2 Rear axle

1.3 Integrated digital monitor

We have already expanded the use of electronic control systems to the engine itself to help meet the more stringent exhaust gas emission regulations. We have added an LCD digital monitor so the operator can monitor the vehicle's status and identify faults in case of malfunction.

Figure 3 shows the monitor on the new GRENDiA compared to that of the old model (shown in **Figure 4**).



Figure 3 New GRENDiA monitor panel



Figure 4 Older-model GRENDiA monitor panel

The digital monitor has the following major functions:

- (1) digital speedometer
- (2) clock
- (3) three types of hour meters (engine, key switch, and seat switch)
- (4) LED warning lights for error code indications and error code history (maximum of 32 events)
- (5) load weight display (available as an option only for the two-stage panorama mast)
- (6) operator recognition (available as an option only for power shift transmission)
- (7) service reminder (alarm for recommended maintenance, available as an option)
- (8) speed and load alarm (available as an option)
- (9) fuel gauge and water thermometer

2. Major specifications

The major specifications of the new GRENDiA are given in **Table 1**.

Table 1 Major specifications

		FGE15	FGE25Z	FD15	FD25
Rated capacity (kg)		1 500	2 500	1 500	2 500
Lifting speed (mm/s)	loaded	630	640	630	630
	unloaded	650	660	690	660
Traveling speed (km/h)	loaded	19	19	19	19
	unloaded	19.5	19.5	19.5	19.5
Engine type		K21E	K25E	S4Q2	S4S
Rated output (kW/rpm)		36.8/2 700	43.1/2 700	30/2 500	38.1/2 500