

HDDF retrofit regulation

HDDF - GFV – Rome, March 13th - 14th 2013



New UNECE regulation

The provision of HDDF retrofit systems type approval should be defined in a new UNECE regulation.

Draft new Regulation on uniform provisions concerning the approval of specific LPG (liquefied petroleum gases) or NG (compressed natural gas/bio-methane/liquified natural gas) dual fuel retrofit systems to be installed in heavy duty vehicles, agricultural and forestry tractors and non-road mobile machinery equipped with Compression Ignition engines.

Scope

This Regulation applies to

- a) specific LPG retrofit systems for use of LPG (liquefied petroleum gases)
- b) specific NG retrofit systems for use of CNG (compressed natural gas or biomethane) or LNG (liquefied natural gas)

in the propulsion system of dual fuel heavy duty engines.

Scope

This Regulation applies to dual fuel retrofit systems intended to be fitted on vehicles of categories M2, N2, N3 and N1 with engines type approved according to R49.

Euro III and older engines are excluded.

This Regulation applies also to dual fuel retrofit systems intended to be fitted on C.I. engines having a net power higher than 18 kW but not more than 560 kW installed in non-road mobile machinery (variable, fixed speed or installed on category T vehicles).

Definitions 1/2

“Specific LPG (NG) Heavy Duty Dual Fuel (HDDF) retrofit system of an approved type” means a system which consists of several components as classified and approved according to Regulation No. 67/01 (No. 110), Part I and the specific instruction manual. This system is intended to be installed in heavy duty engine applications permitting the operation in LPG (NG) dual fuel mode. For definitions of the components of LPG retrofit systems refer to Regulation No. 67/01 (No 110).

“Dual fuel retrofit system type” means the dual fuel type as defined in par 2. of annex 11 of regulation 49 05 series of amendments or par. 2. of annex 15 of regulation 49 06 series of amendments, as applicable, resulting from the operation of the Heavy Duty Dual Fuel (HDDF) retrofit system installed on the parent engine.

“Dual-fuel engine” means an engine that, after the installation of a Heavy Duty Dual Fuel (HDDF) retrofit system, can simultaneously operate with diesel fuel and a gaseous fuel, both fuels being metered separately, where the consumed amount of one of the fuels relative to the other one may vary depending on the operation.

Definitions 2/2

“Original engine” means an engine before the installation of the HDDF retrofit system.

“The engine family” is a set of engines sharing relevant characteristics regarding the installation and the operation of the retrofit system. The family definition is based on the original engine characteristics.

“The parent engine” means an engine that is selected to act as the engine, on which the requirements of this Regulation are going to be demonstrated, and to which the members of a family refer.

“Application range” means the set of engines on which the type approved HDDF LPG and NG retrofit system can be installed.

General requirements

The manufacturer shall declare the dual fuel type of the retrofit system, which results from the installation of the retrofit system on the parent engine.

Only dual fuel types 1B, 2B and 3B are allowed.

The HDDF retrofit system shall be tested on the parent engine.

The engine family

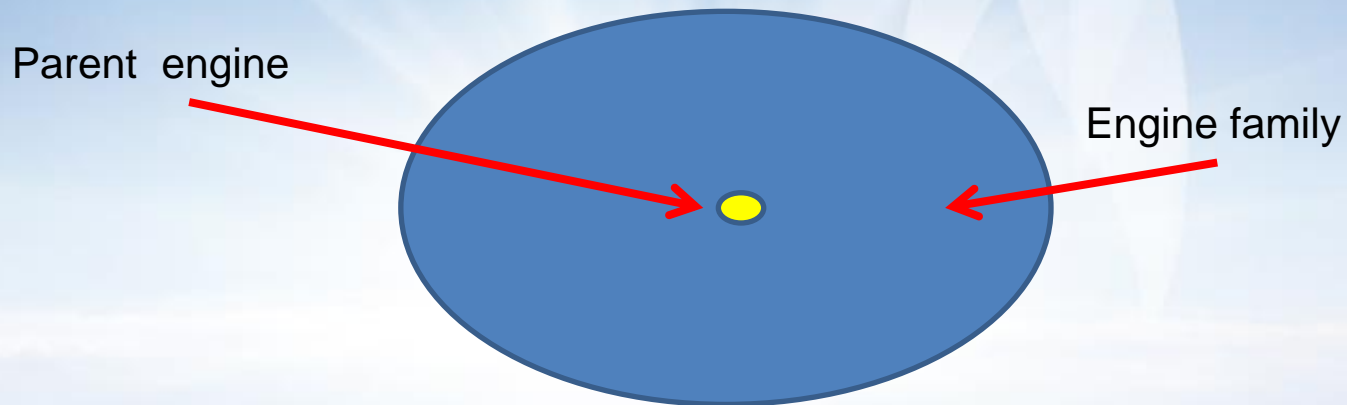
An engine belongs to the same engine family if shares the following characteristics with the parent engine before the installation of the HDDF retrofit system:

- (a) The same engine manufacturer
- (b) The same fuel supply type
- (c) The same combustion cycle and cooling medium
- (d) The same engine baseline emission stage
- (e) An approved power output between 0.7 and 1.15 the parent engine
- (f) The same pollution control system

The application range

The application range describes the range of engines or engine systems to which the HDDF retrofit system may be applied. The applicant shall provide detailed information about the application range to the Type Approval Authority.

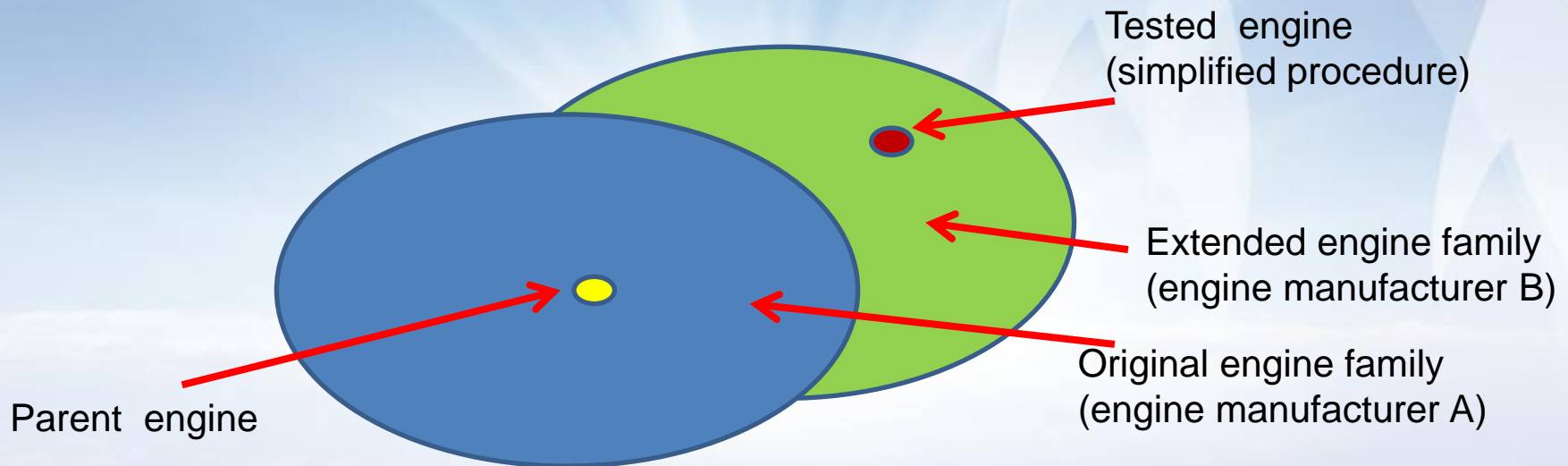
The application range is originally limited to the engine family.



Extensions of the application range 1/2

The application range may be extended to engines which differ from the parent engine as for one of the criteria features of the engine family.

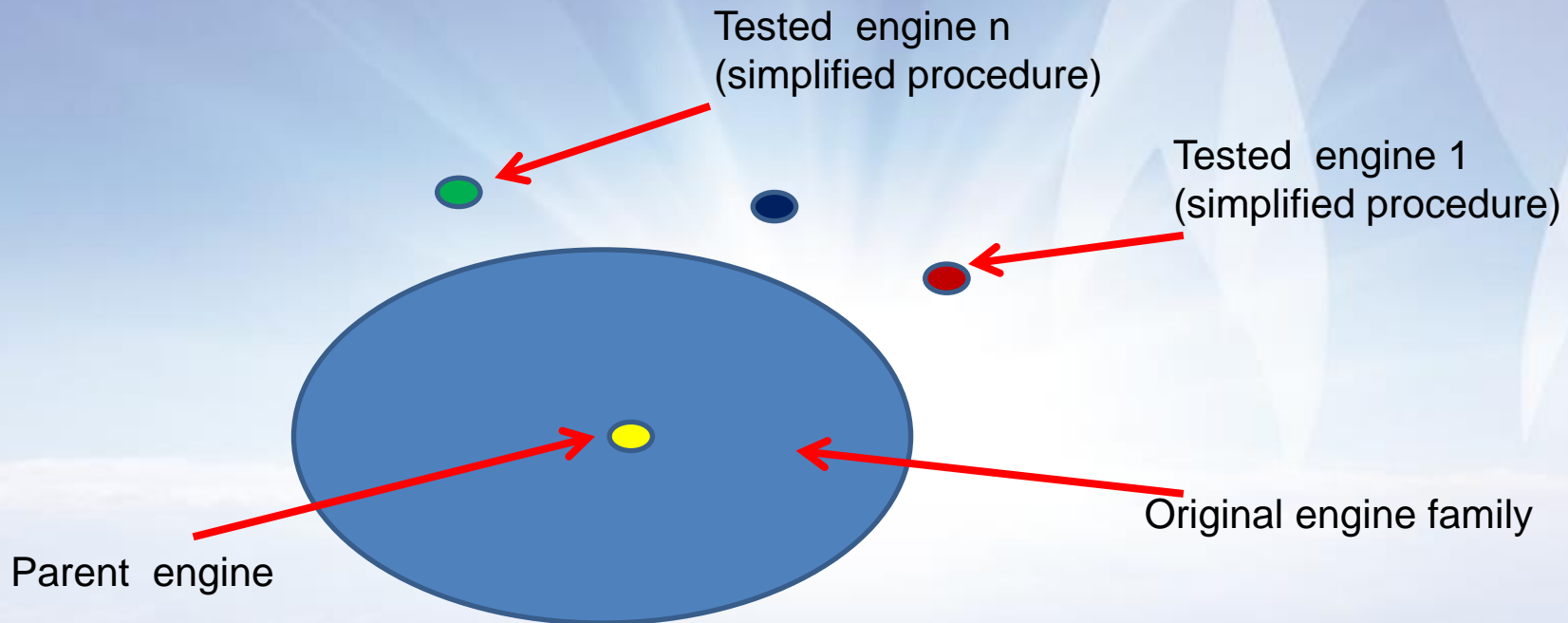
A representative engine shall be submitted to the simplified test procedure (PEMS).



Extensions of the application range 2/2

The application range may be extended to an engine differing from more than one criteria features of the engine family.

This engine shall be submitted to the simplified test procedure (PEMS).



R49 Exhaust emission requirements

The HDDF retrofit system shall be tested to meet the emission limits for the stage to which the parent engine was approved according to Regulation No. 49 or No. 96 as applicable.

The emission test shall be executed on the parent engine with the following configurations:

- a) diesel mode without the HDDF retrofit system installed
- b) diesel mode with the HDDF retrofit system installed
- c) dual fuel mode

R49 Exhaust emission requirements

For Euro IV, Euro V and EEV parent engines the exhaust emission test consists in the following cycles:

- a) ESC
- b) ETC
- c) ELR

For Euro VI and later parent engines the exhaust emission test consists in the following cycles:

- a) WHSC
- b) WHTC

Durability requirements

The parent engine and the HDDF retrofit system shall be submitted to the durability test specified in par. 8.5 after completion of step (a) and (b) and before step (c) of par. 8.2.1. As an alternative of the durability test, the manufacturer can use during step (c) the assigned deterioration factors listed in table 2 of par. 3.6 of annex 7 of regulation n. 49 06 series of amendments.

R49 OBD Requirements

The HDDF retrofit system, installed on the parent engine, shall comply with the OBD requirements and tests of Regulation No. 49, series of amendments corresponding to the original engine type approval, on both diesel and dual fuel modes.

Specific OBD requirements and tests are defined for gas-scope HDDF retrofit system OBD.

Instruction manuals

The system manufacturer must provide the following instruction manuals:

- a) Installation manual, which has the purpose to guide the installer through the correct procedures which shall be observed while assembling the HDDF retrofit systems.
- b) End-user manual, which has the purpose to inform the end-user about the characteristics and safety features of the installed HDDF retrofit systems.

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Thank You

