Vehicle Type / Type : **PC24**

Manufacturer : **VOLVO TRUCK CORPORATION**

TEST REPORT

according to

UNECE-R105.06, **Supplement 1**

Uniform provisions concerning the approval of vehicles intended for the carriage of dangerous goods with regard to their specific constructional features

Approval Status

UNECE-Type-approval : **E1*105R06/00*0062*15**

Structure of the Test Report

0. General information

0.1.	Make (Trade name of manufacturer)	: VOLVO
0.2.	Type	: PC24
0.2.1.	Commercial description	: FH/FM
0.3.	Vehicle category	: N3, N3G
0.3.1.	Classification(s) according to the dangerous goods which the vehicle is intended to transport Vehicle designation	: EX/II, EX/III, AT, FL (Variant ADRC-FL) EX/II, EX/III, AT (Variant ADRC-BAS) AT (Variant ADRC-AT) FL, AT (Variant ADRC-FL + EFC-G)
0.3.2.	Location of the ECE-approval mark	: Behind the front inspection lid or on the inside of one of the doors
0.4.	Name and address of the manufacturer	: VOLVO TRUCK CORPORATION HERKULESGATAN 72 40508 GÖTEBORG SWEDEN
0.4.1.	Name and address of the manufacturer's representative	: N/A
0.5.	Information document no. Date of issue Date of last change	: E1*105R06/00*0062***16** : 2011-07-14 : **2019-07-04**

1. Tested vehicle(s) / object(s)

1.1.	Description	
	Vehicle	: Representative selection
	Commercial description	: FH, FM
	Identification number(s)	: YV2RG20A4CA709106 YV2AG30D9BA696848 YV2AG30C5BA696708 YV2XTY0C9HA807014 YV2RTY0C8EA758733
	Condition of vehicle(s) / object(s)	: Used, pretested
1.2.	Worst case selection	: The determination of "worst case scenario" was done according to internal procedures of the Technical Service (QMA 1.301.005, section 6.2.2.2.).

1.3.	Remarks	:	All variants and versions of the vehicle type as stated in the information folder are covered by the tested vehicle(s) and tested object(s) respectively. The vehicles are equipped to comply with the specific provisions defined in ADR 2019, Part 9, Chapter 9.2 (Requirements concerning the construction of vehicles) relating to the vehicle designations as stated in point 0.3.1. of this test report.

2. Test record

2.1.	Test and measurement equipment	:	The test and measurement equipment used were in compliance with the requirements.
2.1.1.	Specifications for the test site	:	Requirements fulfilled
2.2.	Requirements and tests for the type-approval of vehicles intended for the carriage of dangerous goods with regard to their specific constructional features ( ) Numbering according to the Regulation [ ] Numbering according to ADR Part 9, Chapter 9.2		
	Remarks concerning extension	:	**See List of modifications / Information document. The previously achieved test results still remain valid.**
(5.1.1.) [9.2.2]	Electrical equipment		
(5.1.1.1.) [9.2.2.1.]	General provisions	:	The whole electrical installation meets the relevant provisions of ADR (Ref. table 9.2.1.)
(5.1.1.2.) [9.2.2.2]	Wiring [EX/III, AT, FL]		
(5.1.1.2.1.) [9.2.2.2.1.]	Cables	:	No cable in an electrical circuit carries a current in excess of that for which the cable is designed. The cables are suitable for the conditions in the area of the vehicle, such as temperature range and fluid compatibility conditions as given in ISO 16750-4:2010 and ISO 16750-5:2010. The cables are in conformity with standard ISO 6722-1:2011 including its Corr. 01:2012 or ISO 6722-2:2013. All conductors are large enough and adequately insulated and protected against overheating. All required circuits are protected by fuses respectively. Unprotected circuits are as short as possible. Cables are securely fastened and are adequately routed and protected against mechanical and thermal stress.
(5.1.1.2.2.) [9.2.2.2.2]	Additional protection	:	All wiring located behind the cab is protected against impact, abrasion and chafing during normal vehicle operation, with the exception of the ABS-sensors. All wiring is protected in corrugated conduit or in polyurethane sheath or with inner metal protection.

(5.1.1.3.) [9.2.2.3.]	Size of conductors / Fuses and circuit breakers [EX/II, EX/III, AT, FL]	: All conductors are large enough and adequately insulated. All circuits are protected by fuses (melting, resettable or software controlled) or circuit breakers, except for - battery to cold start and stopping systems of the engine - battery to alternator and to starter motor - alternator to fuse box Unprotected circuits are as short as possible.
(5.1.1.4.) [9.2.2.4]	Batteries [EX/II, EX/III, AT, FL]	: The battery (batteries) is (are) located and isolated in a vented box. The battery poles ("plus side") are protected with plastic covers.
(5.1.1.5.) [9.2.2.5.]	Lighting [EX/II, EX/III, AT, FL]	: There are no lamp bulbs with screw caps.
(5.1.1.6.) [9.2.2.6.]	Electrical connections [EX/II, EX/III, AT, FL]	: The electrical connections meet protection degree IP54 at least. They are designed to prevent accidental disconnection and they are in line with the applicable standards.
(5.1.1.7.) [9.2.2.7.]	Voltage [EX/II, EX/III]	: The nominal voltage of the electrical system does not exceed 25 V AC. The only part with a higher voltage is the optional engine heater, it needs an external electric supply for running, there for it is not working in a dangerous surrounding. The vehicle type is not equipped with Xenon lights.
(5.1.1.8.) [9.2.2.8]	Battery master switch [EX/III, FL]	
(5.1.1.8.1.) [9.2.2.8.1.]	Switch	: The battery master switch is located inside of an aluminium casing marked with the explosion protection sign, which is located in the battery box at the side of the chassis or optionally at the side of the chassis exterior of the battery box in case this box is mounted at the chassis rear end. An extra battery box can be added, which includes starter batteries connected to the starter motor. To break this additional circuit a slave relay is connected to the battery master switch. If the relay is not energized, it disconnects the circuit.
(5.1.1.8.2.) [9.2.2.8.2.]	Control device	: The control is a distinctively marked switch in the cab. There is one control or optional two controls at the vehicle exterior. All switches are secured against inadvertent operation.
(5.1.1.8.3.) [9.2.2.8.3]	Time delay of switch	: The battery master switch breaks the circuits within 10 seconds.
(5.1.1.8.4.) [9.2.2.8.4]	Protection degree of the switch	: The requirements are met; the case of the switch has a protection degree of IP 65 or better. All master switch units are EX approved.

(5.1.1.8.5.) [9.2.2.8.5]	Protection degree of the cable connections	: The requirements are met; cable connections on the switch have a minimum protection degree of IP 54. The connections contained in the housing or in the battery box are sufficiently insulated and protected against short circuits.
(5.1.1.9.) [9.2.2.9]	Permanently energized circuits [EX/III, FL]	
(5.1.1.9.1.) [9.2.2.9.1]	Suitability of energized parts in hazardous areas [FL]	: The safety barrier (separate fuse) for the tachograph (standard and digital tachograph) circuit is suitable for use in hazardous area and meets the requirements.
(5.1.1.9.2.) [9.2.2.9.2]	Protection of by-pass connections [EX/III]	: By-pass connections are adequately protected against overheating by a seperate fuse according to EN 50015, 50016, 50017, 50018, 50019, 50020, 50021 or 50028.
(5.1.2.) [9.2.3]	Braking equipment [EX/II, EX/III, AT, FL]	: Braking systems are in accordance with regulation UNECE-R 13.11. The endurance braking systems performance is in line with the relevant requirements of the directive and of the regulation (Annex 5, test type IIA).
(5.1.3.) [9.2.4]	Prevention of fire risks	
(5.1.3.1.) [9.2.4.1]	General provisions	: See following details
(5.1.3.2.) [9.2.4.3]	Fuel tanks and cylinders [EX/II, EX/III, FL]	

(a) The fuel tanks (sort of fuel diesel oil / liquified natural gas) are protected and located at the right and/or left side of the frame between the axles. In case of a leakage of the fuel tank fuel will drain to the ground without contacting hot parts of the vehicle or the load.
Note:
The tank for 'AdBlue' is positioned in the same protective way.

(b) The fuel tanks are approved by UNECE-R34.
The LNG system is approved by UNECE-R110.

(c) Pipes of the fuel system are not fixed on the shell containing load.

(5.1.3.3.) [9.2.4.4]	Engine [EX/II, EX/III, FL]	: The engines (only compression-ignition engines) are placed forward in front of the vehicle to avoid any danger to the load by heat. EX/II and EX/III vehicles are only driven by engines of compressed – ignition using only liquid fuel with a flashpoint above 55 °C. The LNG system is approved according to UNECE-R110.

(5.1.3.4.) [9.2.4.5]	Exhaust system [EX/II, EX/III, FL]	:	Tubes and pipes located behind the cab rear end are covered by covers depending on cabin length and routing of the tubes and pipes. The mufflers are thermically insulated so that there is no danger to the load through heat or ignition. Distance of the exhaust system to the fuel tank meets the requirement. Note: There is a restriction for rigid trucks with short cab and left exhaust pipes.
(5.1.3.5.) [9.2.4.6]	Vehicle endurance braking [EX/II, EX/III, AT, FL]	:	The exhaust brake, the Volvo Compression Brake, the Volvo Engine Brake and the compact retarder, have an operation temperature of less than 200°C or are situated uncritically so that a thermal shield is not required.
(5.1.3.6.) [9.2.4.7]	Combustion heaters [EX/II, EX/III, AT, FL]		
(5.1.3.6.1.) [9.2.4.7.1]	Compliance with Regulation No. 122	:	The (optional) installed combustion heaters (diesel only) meet the requirements of UNECE-R122.00.
[9.2.4.7.2]	Combustion heaters and their exhaust gas routing [EX/II, EX/III, AT, FL]	:	The combustion heaters, their exhaust system and in special the exhaust gas routing are designed, located, protected or covered so that they do not cause any risk of unacceptable heating or ignition to the load. The exhaust outlet is situated at the rear of the cab or underneath the cab.
[9.2.4.7.3]	Methods for putting the heater out of operation [FL]	:	The provisions regarding the operation stop are met. The combustion heaters are put out of operation according to the following requirements: - main switch in the driver's cabin - stopping of the engine - start of the feed pump
[9.2.4.7.4]	Afterrunning of the heater [FL]	:	Afterrunning of the fan of the system is less than 40 seconds. The heaters used are designed to withstand this reduced afterrunning cycle for the time of their normal use.
[9.2.4.7.5]	Method for switching the heater on [EX/II, EX/III, AT, FL]	:	The combustion heaters can only be switched on manually, there are no programming devices.
[9.2.4.7.6]	Fuel type [EX/II, EX/III]	:	There are no heaters with gaseous fuels installed.
(5.1.4) [9.2.5]	Speed limitation device [EX/II, EX/III, AT, FL]	:	The speed limiters are in line with regulation UNECE-R 89.00. The limitation speed is set in a way so that the vehicle cannot exceed 90 km/h.
(5.1.5) [9.2.6]	Coupling devices for trailers [EX/II, EX/III]	:	Coupling devices comply with regulation UNECE-R 55.01.

(5.1.6) [9.2.7]	Prevention of other risks caused by fuels [AT, FL]	: The LNG system contains an integrated gas module as well as a gas conditioning module to maintain controlled temperature, pressure and flow at any operating point.
2.3.	Additional information	
	Test date	: 06.06.2011 – 20.10.2011, 13.06.2012 – 27.06.2012, 08.05.2013, 13.11.2013, 25.03.2015, 09.07.2015, 21.01.2016, 15.04.2016, 30.09.2016, 15.12.2016, 28.03.2017, 19.06.2017, 12.09.2017, 16.02.2018, 12.12.2018, 29.04.2019, **10.07.2019**
	Test site	: Volvo Technical Center, Göteborg / Sweden Hallered proving ground / Sweden TÜV Rheinland, Cologne
2.4.	Remark	: The results of the test refer exclusively to the object(s) mentioned under point 1. of this report.

3. Appendices

Appendix 0 : List of modifications

4. Statement of conformity

The information document mentioned in section 0.5. and the type described in that comply with the requirements mentioned on page 1.
With regard to the required level of performance to be achieved, the tested samples were representative for the type to be approved (see section 1.2).
The tests were carried out in accordance with the relevant requirements of EN ISO/IEC 17020:2012.

Köln, **10.07.2019**

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Expert Technical Service