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PROPOSAL FOR NEW DRAFT REGULATION WITH REGARD THE TYPE APPROVAL
OF A HEATING SYSTEM AND OF A VEHICLE WITH REGARD TO ITS
HEATING SYSTEM

Transmitted by the Working Party on General Safety Provisions (GRSG)

Note: The text reproduced below was adopted by GRSG at its eighty-fifth session, and is transmitted for consideration to WP.29 and to AC.1. It is based on documents TRANS/WP.29/GRSG/2002/11 and Add.1, as amended by TRANS/WP.29/GRSG/63, para. 38, and TRANS/WP.29/GRSG/64, annex 6.

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PROPOSAL FOR A NEW DRAFT REGULATION:

UNIFORM TECHNICAL PRESCRIPTIONS CONCERNING THE
APPROVAL OF VEHICLES OF CATEGORIES M, N AND O
WITH REGARD TO THEIR HEATING SYSTEMS

1. SCOPE

- 1.1. This regulation applies to all vehicles in categories M, N and O ^{1/} in which a heating system is fitted.

Type approvals are granted according to:

- 1.2. Part I – Approval of a vehicle type with regard to its heating system.
1.3. Part II – Approval of a heating system with regard to its operational safety.

2. DEFINITIONS: General

For the purposes of this Regulation:

- 2.1. "Vehicle" means a vehicle of category M, N or O in which a heating system is fitted.
- 2.2. "Manufacturer" means the person or body who is responsible to the approval authority for all aspects of the type approval process and for ensuring conformity of production. It is not essential that the person or body is directly involved in all stages of the construction of the vehicle or component which is the subject of the approval process.
- 2.3. "Interior" means the enclosed parts of a vehicle used for the accommodation of the vehicle occupants and/or the load.
- 2.4. "Heating system for the passenger compartment" means any type of device designed to increase the temperature of the passenger compartment.
- 2.5. "Heating system for the load area" means any type of device designed to increase the temperature of the load area.
- 2.6. "Load area" means the interior part of the vehicle used to accommodate the non-passenger load.

^{1/} As defined in Annex 7 to the Consolidated Resolution on the Construction of Vehicles (R.E.3) (Document TRANS/WP.29/78/Rev.1/Amend.2).

2.7. "Passenger compartment" means the interior part of the vehicle used to accommodate the driver and any passengers.

2.8. "Gaseous fuel" includes fuels that are gaseous at normal temperature and pressure (288,2 K and 101,33 kPa), such as liquefied petroleum gas (LPG) and compressed natural gas (CNG).

2.9. "Overheating" means the condition that exists when the air inlet for the heating air to the combustion heater is completely blocked.

3. APPLICATION FOR APPROVAL

3.1. APPLICATION FOR APPROVAL OF A TYPE OF VEHICLE WITH REGARD TO ITS HEATING SYSTEM

3.1.1. The application for approval of a vehicle type with regard to its heating system shall be submitted by the manufacturer of the vehicle or by his duly accredited representative.

3.1.2. It shall be accompanied by the undermentioned documents in triplicate and by the following particulars:

3.1.2.1. a detailed description of the vehicle type with respect to its structure, dimensions, configuration and constituent materials;

3.1.2.2. drawings of the heating system and its general arrangement

3.1.3. A model for the information document is given in annex 1, part 1, appendix 1.

3.1.4. A vehicle representative of the type to be approved must be submitted to the technical service responsible for conducting the type-approval tests.

3.1.5. If the vehicle to be approved is equipped with a heater with an ECE type approval, the type approval number and the maker's type designations of this type of heater shall be enclosed in the application for the vehicle type approval.

3.1.6. If the vehicle to be approved is equipped with a heater without ECE type approval, one sample representative of the type to be approved shall be submitted to the technical service.

3.2. APPLICATION FOR APPROVAL OF A TYPE OF HEATER

3.2.1. The application for approval of a type of heater as a component shall be submitted by the manufacturer of the heating system.

3.2.2. It shall be accompanied by the undermentioned documents in triplicate and by the following particulars:

- 3.2.2.1. a detailed description of the heating system type with respect to its structure, dimensions, configuration and constituent materials;
- 3.2.2.2. drawings of the heating system and its general arrangement
- 3.2.3. A model for the information document is given in annex 1 part 1, appendix 2.
- 3.2.4. One sample heater representative of the type to be approved shall be submitted to the technical service.
- 3.2.5. The sample shall be clearly and indelibly marked with the applicant's trade name or mark and the type designation.

4. APPROVAL

- 4.1. If the type submitted for approval to this Regulation meets the requirements of the relevant part(s) of this Regulation, approval of that type shall be granted.
- 4.2. An approval number shall be assigned to each type approved. Its first two digits (at present 00, corresponding to the Regulation in its original form) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign the same number to another type of vehicle or heating system as defined in this Regulation.
- 4.3. Notice of approval or of extension of approval of a type pursuant to this Regulation shall be communicated to the Contracting Parties to the Agreement applying this Regulation, by means of one of the forms conforming to the models in annex 1 part 2, as appropriate, to this Regulation.

- 4.4. There shall be affixed, conspicuously and in a readily accessible location specified on the approval form, to every vehicle conforming to a type approved under this Regulation and to every component supplied separately conforming to a type approved under this Regulation, a circle surrounding the letter "E" followed by the distinguishing number of the country which has granted type approval 1/
- 4.5. In the case of a component type-approval, the number of this Regulation, followed by the Letter "R", a dash and the approval number according to paragraph 4.2.
- 4.6. If a type conforms to a type approved under one or more other Regulations annexed to the Agreement, in the country which has granted approval under this Regulation, the symbol prescribed in paragraph 4.2. needs not be repeated; in such a case, the Regulation(s) under which approval has been granted in the country which has granted approval under this Regulation shall be placed in vertical columns to the right of the symbol prescribed in paragraph 4.2.
- 4.7. The approval mark shall be clearly legible and be indelible.
- 4.8. In the case of a vehicle, the approval mark shall be placed close to or on the vehicle data plate affixed by the manufacturer.
- 4.9. Annex 2 to this Regulation gives examples of arrangements of approval marks.
5. PART I: APPROVAL OF A VEHICLE TYPE WITH REGARD TO ITS HEATING SYSTEM

1/ 1 for Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for the Czech Republic, 9 for Spain, 10 for Yugoslavia, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg, 14 for Switzerland, 15 (vacant), 16 for Norway, 17 for Finland, 18 for Denmark, 19 for Romania, 20 for Poland, 21 for Portugal, 22 for the Russian Federation, 23 for Greece, 24 for Ireland, 25 for Croatia, 26 for Slovenia, 27 for Slovakia, 28 for Belarus, 29 for Estonia, 30 (vacant), 31 for Bosnia and Herzegovina, 32 for Latvia, 33 (vacant), 34 for Bulgaria, 35 (vacant), 36 for Lithuania, 37 for Turkey, 38 (vacant), 39 for Azerbaijan, 40 for The former Yugoslav Republic of Macedonia, 41 (vacant), 42 for the European Community (approvals are granted by its Member States using their respective ECE symbol), 43 for Japan, 44 (vacant), 45 for Australia, 46 for Ukraine, 47 for South Africa and 48 for New Zealand. Subsequent numbers shall be assigned to other countries in the chronological order in which they ratify or accede to the Agreement concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be fitted and/or be used on wheeled vehicles and the Conditions for Reciprocal Recognition of Approvals granted on the basis of these Prescriptions, and the numbers thus assigned shall be communicated by the Secretary-General of the United Nations to the Contracting Parties to the Agreement.

5.1. Definition

For the purpose of Part I of this Regulation,

5.1.1. "Vehicle type with regard to heating system" means vehicles which do not differ in essential respects such as the functioning principle(s) of the heating system.

5.2. Specifications

5.2.1. The passenger compartment of every vehicle shall be fitted with a heating system. If a heating system for the load area is provided in a vehicle, it shall comply with this Regulation.

5.2.2. The heating system of the vehicle to be type approved shall meet the technical requirements of Part II of this Regulation.

5.3. Vehicle Installation Requirements for Combustion Heaters

5.3.1. Scope

5.3.1.1. Subject to paragraph 5.3.1.2., combustion heaters shall be installed according to the requirements of paragraph 5.3.

5.3.1.2. Vehicles of category O having liquid fuel heaters are deemed to comply with the requirements of paragraph 5.3.

Positioning of combustion heater

5.3.2.1. Body sections and any other components in the vicinity of the heater must be protected from excessive heat and the possibility of fuel or oil contamination.

5.3.2.2. The combustion heater shall not constitute a risk of fire, even in the case of overheating. This requirement shall be deemed to be met if the installation ensures an adequate distance to all parts and suitable ventilation, by the use of fire resistant materials or by the use of heat shields.

5.3.2.3. In the case of M2 and M3 vehicles, the combustion heater must not be positioned in the passenger compartment. However, an installation in an effectively sealed envelope which also complies with the conditions in paragraph 5.3.2.2. may be used.

5.3.2.4. The label referred to in annex 7, paragraph 1.4., or a duplicate, must be positioned so that it can be easily read when the heater is installed in the vehicle.

5.3.2.5. Every reasonable precaution should be taken in positioning the heater to minimize the risk of injury and damage to personal property.

5.3.3. Fuel supply

5.3.3.1. The fuel filler must not be situated in the passenger compartment and must be provided with an effective cap to prevent fuel spillage.

5.3.3.2. In the case of liquid fuel heaters, where a supply separate from that of the vehicle is provided, the type of fuel and its filler point must be clearly labelled.

5.3.3.3. A notice, indicating that the heater must be shut down before refuelling, must be affixed to the fuelling point. In addition a suitable instruction must be included in the manufacturer's operating manual.

5.3.4. Exhaust system

5.3.4.1. The exhaust outlet must be located so as to prevent emissions from entering the vehicle through ventilators, heated air inlets or opening windows.

5.3.5. Combustion air inlet

5.3.5.1. The air for the combustion chamber of the heater must not be drawn from the passenger compartment of the vehicle.

5.3.5.2. The air inlet must be so positioned or guarded that blocking by rubbish or luggage is unlikely.

5.3.6. Heating air inlet

5.3.6.1. The heating air supply may be fresh or re-circulated air and must be drawn from a clean area not likely to be contaminated by exhaust fumes emitted either by the propulsion engine, the combustion heater or any other vehicle source.

5.3.6.2. The inlet duct must be protected by mesh or other suitable means.

5.3.7. Heating air outlet

5.3.7.1. Any ducting used to route the hot air through the vehicle must be so positioned or protected that no injury or damage could be caused if it were to be touched.

5.3.7.2. The air outlet must be so positioned or guarded that blocking by rubbish or luggage is unlikely.

5.3.8. Automatic control of the heating system

5.3.8.1. The heating system must be switched off automatically and the supply of fuel must be stopped within five seconds when the vehicle's engine stops running. If a manual device is already activated, the heating system can stay in operation.

6. PART II: APPROVAL OF A HEATING SYSTEM WITH REGARD TO ITS OPERATIONAL SAFETY

6.1. Definitions

For the purpose of Part II of this Regulation,

6.1.1. "Heating system" means any type of device which is designed to increase the temperature of the interior of a vehicle, including any load area.

6.1.2. "Combustion heater" means a device directly using liquid or gaseous fuel and not using the waste heat from the engine used for propulsion of the vehicle.

6.1.3. "Type of combustion heater" means devices which do not differ in essential respects such as:

- fuel type (e.g. liquid or gaseous),
- transfer medium (e.g. air or water),
- vehicle location (e.g. passenger compartment or load area).

6.1.4. "Waste-heat heating system" means any type of device using the waste heat from the engine used for propulsion of the vehicle to increase the temperature of the interior of the vehicle, this may include water, oil or air as the transfer medium.

6.2. Specifications: General

The requirements for heating systems are that:

- the heated air entering the passenger compartment shall be no more polluted than the air at the point of inlet to the vehicle,
- the driver and passengers, during road use, will not be able to come into contact with parts of the vehicle or heated air liable to cause burns,
- the exhaust emissions from combustion heaters are within acceptable limits.

The test procedures for the verification of each of these requirements are set out in annexes 3, 4 and 5.

6.2.1. The following table indicates which annexes apply to each type of heating system within each vehicle category:

<u>Heating system</u>	<i>Vehicle category</i>	ANNEX 4 Air quality	Annex 5 Temperature	Annex Exhaus	Annex 8 LPG safety
Engine waste heat - water	M				
	N				
	O				
Engine waste heat - air See Note 1	M	Yes	Yes		
	N	Yes	Yes		
	O				
Engine waste heat - oil	M	Yes	Yes		
	N	Yes	Yes		
	O				
Gaseous fuel heater - See Notes 2 and 3	M	Yes	Yes	Yes	Yes
	N	Yes	Yes	Yes	Yes
	O	Yes	Yes	Yes	Yes
Liquid fuel heater See Note 3	M	Yes	Yes	Yes	
	N	Yes	Yes	Yes	
	O	Yes	Yes	Yes	

Note 1: Heating systems which comply with the requirements of annex 3 are exempt from these test requirements.

Note 2: A new annex 8 "Safety requirements for LPG combustion heaters" will be added to this Regulation at a later stage.

Note 3: Combustion heaters located outside the passenger compartment, using water as a transfer medium, are deemed to comply with annexes 4 and 5.

6.3. Specifications: Combustion heaters

Additional requirements for combustion heaters are laid down in annex 7.

7. MODIFICATION AND EXTENSION OF APPROVAL OF A VEHICLE OR COMPONENT TYPE

7.1 Every modification of the type shall be notified to the administrative department which approved the type. That department may then either:

- 7.1.1. consider that the modifications made are unlikely to have an appreciable adverse effect and that, in any case, the vehicle or component still complies with the requirements; or
- 7.1.2. require a further test report from the technical service responsible for conducting the tests.
- 7.2. Confirmation or refusal of approval, specifying the modifications, shall be communicated by the procedure specified in paragraph 4.3. to the Contracting Parties to the Agreement which apply this Regulation.
- 7.3. The competent authority issuing the extension of approval shall assign a series number for such an extension and inform thereof the other Contracting Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in annex 1, part 2, appendix 1 or 2 as appropriate to this Regulation.

8. CONFORMITY OF PRODUCTION.

The conformity of production procedures shall comply with those set out in the Agreement, Appendix 2 (E/ECE/324-E/ECE/TRANS/505/Rev.2), with the following requirements:

- 8.1. Vehicles and components approved to this regulation shall be so manufactured as to conform to the type approved by meeting the requirements set forth in paragraphs 5 and 6 above.
- 8.2. The competent authority which has granted type-approval may at any time verify the conformity control methods applicable to each production facility. The normal frequency of these verifications shall be once per two years.

9. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

- 9.1. The approval granted in respect of a vehicle type pursuant to this Regulation may be withdrawn if the requirements laid down in paragraphs 5 and 6. above are not complied with.
- 9.2. If a Contracting Party to the Agreement applying this Regulation withdraws an approval it has previously granted, it shall forthwith notify the other Contracting Parties applying this Regulation, by means of a communication form conforming to the model in annex 1, part 2, appendix 1 or 2 to this Regulation.

10. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a type of vehicle or component under this Regulation, he shall so inform the authority which granted the approval. Upon receiving the relevant communication, that authority shall inform thereof the other Parties to the 1958 Agreement applying this regulation by means of a communication form conforming to the model in annex 1, Part 2, Appendix 1 or 2 to this Regulation.

11. NAMES AND ADDRESSES OF TECHNICAL SERVICES CONDUCTING APPROVAL TESTS, AND ADMINISTRATIVE DEPARTMENTS

The Contracting Parties to the Agreement which apply this Regulation shall communicate to the Secretariat of the United Nations the names and addresses of the technical services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, issued in other countries, are to be sent.

Annex 1Part 1Appendix 1

MODEL INFORMATION DOCUMENT

(for a vehicle type in accordance with paragraph 4.3. of the Regulation relating to the ECE Type Approval of a heating system and of a vehicle with regard to its heating system)

If the heating system or its component parts have electronic controls, information concerning their performance must be supplied

0. GENERAL

0.1. Make (trade name of manufacturer):

0.2. Type and general commercial description(s):

0.3. Means of identification of type, if marked on the vehicle:

0.4. Location of that marking:

0.5. Category of vehicle: 1/

0.6. Name and address of manufacturer:

0.7. Address(es) of assembly plant(s):

1. GENERAL CONSTRUCTION CHARACTERISTICS OF THE VEHICLE

1.1. Photographs and/or drawings of a representative vehicle:

2. POWER PLANT

2.1. Manufacturer's engine code:
(as marked on the engine, or other means of identification)2.2. Working principle: positive ignition/compression ignition, four stroke/two stroke 2/

2.3. Number and arrangement of cylinders:

2.4. Maximum net power:kW atmin⁻¹
(manufacturer's declared value)

- 2.5. Cooling system (liquid/air) 2/
- 2.6. Nominal setting of the engine temperature control mechanism:
- 2.7. Pressure charger: yes/no
 - 2.7.1. Type(s)
 - 2.7.2. Description of the system (e.g. maximum charge pressure: kPa, wastegate if applicable)
- 3. BODYWORK
 - 3.1. A brief description of the vehicle with regard to the heating system if the heating system uses the heat of the engine cooling fluid
 - 3.2. A brief description of the vehicle type with regard to the heating system if the cooling air or the exhaust gases of the engine are used as the heat source, including:
 - 3.3. Layout of the heating system showing its position in the vehicle:
 - 3.4. Layout drawing of the heat exchanger for heating systems using the exhaust gases for heating or of the parts where the heat exchange takes place (for heating systems using the engine cooling air for heating):
 - 3.4.1. Sectional drawing of the heat exchanger or the parts respectively where the heat exchange takes place, indicating the thickness of the wall, materials used and the characteristics of the surface:
 - 3.4.2. Specifications shall be given for further important components of the heating system, such as e.g. the heater fan, with regard to their method of construction and technical data
 - 3.5. Maximum electrical consumption:kW

1/ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), annex 7 (documents TRANS/WP.29/78/Rev.1/Amend.2)

2/ Strike out which does not apply.

Annex 1Part 1Appendix 2

MODEL INFORMATION DOCUMENT

(for a heating system type in accordance with paragraph 4.3. of the Regulation relating to the ECE Type approval of heating system with regard to its operational safety)

If the heating system or its component parts have electronic controls, information concerning their performance must be supplied

1. GENERAL

- 1.1. Make (trade name of manufacturer):
 - 1.2. Type and general commercial description(s):
 - 1.3. Name and address of manufacturer:
 - 1.4. In the case of components, location and method of affixing of the ECE approval mark:
.....
 - 1.5. Address(es) of assembly plant(s):
 2. COMBUSTION HEATER (IF ANY)
 - 2.1. Make (trade name of manufacturer):
 - 2.2. Type and general commercial description(s):
 - 2.3. Means of identification of type, if marked on the heating system:
 - 2.4. Location of that marking:
 - 2.5. Name and address of manufacturer:
 - 2.6. Address(es) of assembly plant(s):
 - 2.7. Test pressure (in the case of a combustion heater fuelled by liquefied petroleum gas or similar, the pressure applied at the gas inlet connector of the heater):
-

Annex 1

Part 2

Appendix 1

(Maximum format: A4 (210 mm x 297 mm))



COMMUNICATION

issued by: Name of administration:

.....
.....
.....

concerning 2/: APPROVAL GRANTED

APPROVAL EXTENDED

APPROVAL REFUSED

APPROVAL WITHDRAWN

PRODUCTION DEFINITELY DISCONTINUED

of a vehicle type pursuant to Regulation No. XXX

Approval No.

Extension No.

Reason for extension:

SECTION I

GENERAL

1.1. Make (trade name of manufacturer):

1.2. Type:

1.3. Means of identification of type, if marked on the vehicle/component/ separate technical unit 2/ b/:

1.3.1. Location of that marking:

1.4. Category of vehicle c/:

1.5. Name and address of manufacturer:
.....

1.6. Location of the ECE approval mark:

1.7. Address(es) of assembly plant(s):

SECTION II

1. Additional information (where applicable)
2. Technical service responsible for carrying out the tests:
3. Date of test report:
4. Number of test report:
5. Remarks (if any):
6. Place:
7. Date:
8. Signature:
9. The index to the information package lodged with the approval authority, which may be obtained on request, is attached.
10. The vehicle is approved according to the requirements of annex 9 (ADR):
YES/NO .

1/ Distinguishing number of the country which has granted/extended approval (see approval provisions in the Regulation)

2/ Strike out what does not apply (there are cases where nothing needs to be deleted, when more than one entry is applicable)

b/ If the means of identification of type contains characters not relevant to describe the vehicle, component or separate technical unit types covered in this information document, such characters shall be represented in the documentation by the symbol "?" (e.g. ABC??123??)

c/ As defined in annex 7 to the Consolidated Resolution on the Construction of Vehicles (R.E.3) (document TRANS/WP.29/78/Rev.1/Amend.2, as amended).

Annex 1

Part 2

Appendix 2

(Maximum format: A4 (210 mm x 297 mm))



COMMUNICATION

issued by: Name of administration:

.....
.....
.....

concerning 2/: APPROVAL GRANTED

APPROVAL EXTENDED

APPROVAL REFUSED

APPROVAL WITHDRAWN

PRODUCTION DEFINITELY DISCONTINUED

of a component type pursuant to Regulation No. XXX

Approval No.

Extension No.

Reason for extension:

SECTION I

GENERAL

1.1. Make (trade name of manufacturer):

1.2. Type:

1.3. Means of identification of type, if marked on the device b/: ...

1.3.1. Location of that marking:

1.4. Name and address of manufacturer:

1.5. Location of the ECE approval mark:

1.6. Address(es) of assembly plant(s):

.....

SECTION II

1. Additional information (where applicable)
2. Technical service responsible for carrying out the tests:
.....
3. Date of test report:
4. Number of test report:
5. Remarks (if any):
6. Place:
7. Date:
8. Signature:
9. The index to the information package lodged with the approval authority, which may be obtained on request, is attached.

1/ Distinguishing number of the country which has granted/extended/refused/ withdrawn approval (see approval provisions in the Regulation)

2/ Strike out what does not apply (there are cases where nothing needs to be deleted, when more than one entry is applicable)

b/ If the means of identification of type contains characters not relevant to describe the vehicle, component or separate technical unit types covered in this information document, such characters shall be represented in the documentation by the symbol "?" (e.g. ABC??123??)

Annex 2

ARRANGEMENTS OF APPROVAL MARKS

Model A

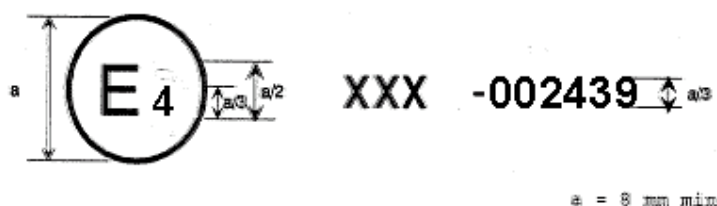
(See paragraph 4.5. of this Regulation)



The above approval mark affixed to a heating system shows that the component type concerned has, with regard to its constructional features, been approved in the Netherlands (E 4) pursuant to Regulation No. XXX under approval number 002439. The approval number indicates that the approval was granted according to the requirements of Regulation No. XXX in its original form.

Model B 1/

(See paragraph 4.4. of this Regulation)

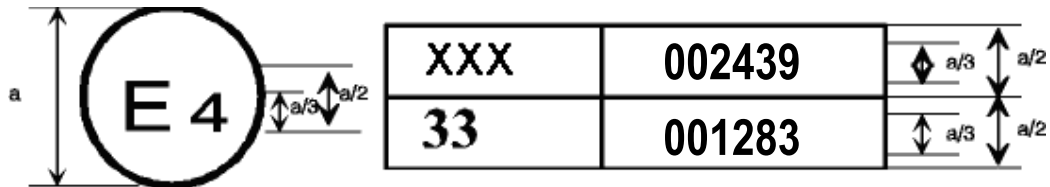


The above approval mark affixed to a vehicle shows that the vehicle type concerned has, with regard to its heating system(s), been approved in the Netherlands (E 4) for Class III, pursuant to Regulation No. XXX. The number 00 indicates that the approval was granted according to the requirements of Regulation No. XXX in its original form.

1/ See footnote to paragraph 4.5.

Model C

(See paragraph 4.6. of this Regulation)

 $a = 8 \text{ mm min.}$

The above approval mark affixed to a vehicle shows that the vehicle type concerned has been approved in the Netherlands (E 4) pursuant to Regulations Nos. XXX and 33.* The numbers 00 indicate that, at the dates when the respective approvals were given, both Regulations were in their original forms.

*/ This number is given merely as an example.

Annex 3

REQUIREMENTS FOR WASTE HEATING SYSTEMS – AIR

1. The requirements set out in paragraph 6.2. of this Regulation are considered satisfied in respect of heating systems which include a heat exchanger, the primary circuit of which is passed over by exhaust gases or polluted air, provided that the following conditions are satisfied:
 2. the walls of the primary circuit of the heat exchanger must be leak tight at any pressure up to and including 2 bar;
 3. the walls of the primary circuit of the heat exchanger must not include any detachable component;
 4. the wall of the heat exchanger where the exchange of heat takes place must be at least 2 mm thick if made of non-alloy steels;
 - 4.1. in cases where other materials are used (including composite or coated materials), the thickness of the wall must be such as to ensure that the heat exchanger has the same service life as in the case referred to in paragraph 4.;
 - 4.2. if the wall of the heat exchanger where the exchange of heat takes place is enamelled, the wall where such enamel has been applied must be at least 1 mm thick and this enamel must be durable, leak tight and not porous;
 5. the pipe conducting the exhaust gases must include a corrosion test zone at least 30 mm long, this zone being situated directly downstream of the heat exchanger, uncovered and easily accessible;
 - 5.1. the wall of this corrosion test zone must not be thicker than the pipes for the exhaust gases situated inside the heat exchanger and the materials and surface properties of this section must be comparable with those of these pipes;
 - 5.2. if the heat exchanger forms a single unit with the vehicle exhaust silencer, the external wall of the latter must be regarded as the zone complying with point 5.1 where any corrosion should occur.
6. In the case of waste heat heating systems using the cooling air of the engine for heating purposes, the conditions of paragraph 5.2. of this Regulation are considered satisfied without the use of a heat exchanger provided that the following conditions are satisfied:
 - 6.1. the cooling air which is used for heating purposes comes into contact only with surfaces of the engine which do not include any detachable part, and

6.2. the connections between the walls of this cooling air circuit and the surfaces used for the transfer of heat are gastight and oil-resistant.

These conditions are considered satisfied if, for example:

- a sheath around each sparking plug draws off any gas leaks outside the heating air circuit;
- the joint between the cylinder head and the exhaust manifold is situated outside the heating air circuit;
- there is double leak protection between the cylinder head and the cylinder and any leaks from the first joint are drawn off outside the heating air circuit, or

the leak protection between the cylinder head and the cylinder still holds when the cylinder head nuts are cold-tightened at one-third of the nominal torque prescribed by the manufacturer, or

- the area where the cylinder head is joined to the cylinder is situated outside the heating air circuit.

Annex 4

TEST PROCEDURE FOR AIR QUALITY

1. In the case of vehicle type-approval the following test shall be carried out:
 - 1.1. Operate the heater for one hour at maximum output in conditions of still air (wind speed ≤ 2 m/s), with all windows closed and, in the case of a combustion heater, the propulsion engine switched off. If, however, having selected the maximum output the heater switches off automatically in less than an hour, the measurements may be made before switch-off.
 - 1.2. The proportion of CO in the ambient air shall be measured by taking samples from:
 - 1.2.1. a point outside the vehicle as close as possible to the heating air inlet, and
 - 1.2.2. a point inside the vehicle less than 1 m from the heated air outlet.
 - 1.3. Readings shall be taken for a representative time of 10 minutes.
 - 1.4. The reading from position described in paragraph 1.2.2. shall be less than 20 ppm CO higher than from position described in paragraph 1.2.1.
 2. In the case of type-approval of heaters as components the following test shall be carried out after the tests of annexes 5, 6 and paragraph 1.3 of annex 7.
 - 2.1. The primary circuit of the heat exchanger shall be subjected to a leakage test to ensure that polluted air cannot enter the heated air intended for the passenger compartment.
 - 2.2. This requirement shall be considered to be fulfilled if, at a gauge pressure of 0,5 hPa, the leakage rate from the heat exchanger is less than or equal to 30 dm³/h.
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Annex 5

TEST PROCEDURE FOR TEMPERATURE

1. Operate the heater for one hour at maximum output in conditions of still air (wind speed ≤ 2 m/s), with all windows closed. If, however, having selected the maximum output the heater switches off automatically in less than an hour, the measurements may be made earlier. If the heated air is drawn from outside the vehicle the test shall be carried out at an ambient temperature of not less than 15 °C.
2. The surface temperature of any part of the heating system likely to come into contact with the driver of the vehicle during normal road use shall be measured with a contact thermometer. No such part or parts shall exceed a temperature of 70 °C for uncoated metal or 80 °C for other materials.
 - 2.1. In the case of part or parts of the heating system behind the driver's seat, and in the case of overheating, the temperature shall not exceed 110°C.
 - 2.2. In the case of vehicles of categories M1 and N, no part of the system likely to come into contact with seated passengers during normal road use of the vehicle, with the exception of the outlet grille, shall exceed a temperature of 110 °C.
 - 2.3. In the case of vehicles of categories M2 and M3, no part of the system likely to come into contact with passengers during normal road use of the vehicle shall exceed a temperature of 70 °C for uncoated metal or 80 °C for other materials.
3. In the case of exposed parts of the heating system outside the passenger compartment, and in the case of overheating, the temperature shall not exceed 110 °C.

The temperature of the heated air entering the passenger compartment shall not exceed 150 °C to be measured at the centre of the outlet.

Annex 6

TEST PROCEDURE FOR EXHAUST EMISSION OF COMBUSTION HEATERS

1. Operate heater for one hour at maximum output in conditions of still air (wind speed ≤ 2 m/s) and an ambient temperature of 20 ± 10 °C. If, however, having selected the maximum output the heater switches off automatically in less than an hour, the measurements may be made before switch-off.
2. The dry and undiluted exhaust emissions, measured using an appropriate meter, shall not exceed the values indicated in the following table:

Parameter	Heaters using gaseous fuels	Heaters using liquid fuel
CO	0.1 % vol.	0.1 % vol.
NO _x	200 ppm	200 ppm
HC	100 ppm	100 ppm
Bacharach reference unit	1	4

3. The test shall be repeated in conditions equivalent to a vehicle speed of 100 km/h. Under these conditions the CO value must not exceed 0.2 % vol. If the test has been carried out on the heater as a component, then it need not be repeated in the case of the vehicle type in which the heater is installed.

1/ Reference unit 'Bacharach' ASTM D 2156 is used.

Annex 7ADDITIONAL REQUIREMENTS FOR COMBUSTION HEATERS AND THEIR
INSTALLATION

1. Operating and maintenance instructions shall be supplied with every heater and, in the case of heaters intended for the after-market, installation instructions shall also be supplied.
 2. Safety equipment shall be installed (either as part of the combustion heater or as part of the vehicle) to control the operation of every combustion heater in an emergency. It shall be designed such that, if no flame is obtained at start-up or if the flame goes out during operation, the ignition and switching times for the supply of fuel are not exceeded by four minutes in the case of liquid fuel heaters or, in the case of gaseous fuel heaters, one minute if the flame supervision device is thermoelectric or 10 seconds if it is automatic.
 3. The combustion chamber and the heat exchanger of heaters using water as a transfer medium shall be capable of withstanding a pressure of twice the normal operating pressure or 2 bar (gauge), whichever is greater. The test pressure shall be noted in the information document.
 4. The heater must have a manufacturer's label showing the manufacturer's name, the model number and type together with its rated output in kilowatts. The fuel type must also be stated and, where relevant, the operating voltage and gas pressure.
 5. Delayed shut-off of combustion air blowers
 - 5.1. If a combustion air blower is fitted a delayed shut-off must be provided even in the event of overheating and in the event of interruption of the fuel supply.
 - 5.2. Other measures to prevent damage due to deflagration and exhaust corrosion can be applied if the manufacturer provides evidence to the satisfaction of the approval authority of their equivalent effect.
 6. Requirements for electrical supply
 - 6.1. All technical requirements affected by the voltage must be within the voltage range of ± 16 per cent of the rated figure. However, if under voltage and/or over voltage protection is provided, the requirements shall be met at rated voltage and in the immediate vicinity of the cut-off points.
 7. Warning light
 - 7.1. A clearly visible tell-tale in the operator's field of view shall inform when the combustion heater is switched on or off.
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Annex 8

SAFETY REQUIREMENTS FOR LPG COMBUSTION HEATERS

(See paragraph 6.2.1., note 2 of this Regulation)

Annex 9ADDITIONAL PROVISIONS APPLICABLE TO CERTAIN VEHICLES
AS SPECIFIED IN THE ADR**1.** Scope

This annex applies to certain vehicles for which the European Agreement concerning the International Carriage of Dangerous Goods (ADR) contains specific requirements concerning combustion heaters and their installation.

2. Definitions

For the purpose of this Annex, the vehicle designations EX/II, EX/III, AT, FL and OX are as defined in Chapter 9.1 of the ADR.

3. Technical Provisions

3.1. General (EX/II, EX/III, AT, FL and OT vehicles)

3.1.1.1/ The combustion heaters and their exhaust gas routing shall be designed, located, protected or covered so as to prevent any unacceptable risk of heating or ignition of the load. This requirement shall be considered as fulfilled if the fuel tank and the exhaust system of the appliance conform to the following provisions:

- Any fuel tanks for supplying the appliance shall meet the following requirements:
 - (a) In the event of any leakage, the fuel shall drain to the ground without coming into contact with hot parts of the vehicle or the load;
 - (b) Fuel tanks containing petrol shall be equipped with an effective flame trap at the filler opening or with a closure enabling the opening to be kept hermetically sealed.
- The exhaust system as well as the exhaust pipes shall be so directed or protected to avoid any danger to the load through heating or ignition. Parts of the exhaust system situated directly below the fuel tank (diesel) shall have a clearance of at least 100 mm or be protected by a thermal shield.

3.1.2. The combustion heater shall be switched on manually. Programming devices shall be prohibited.

3.2. EX/II and EX/III Vehicles

Combustion heaters using gaseous fuels are not permitted.

1/ Compliance with this paragraph shall be verified on the completed vehicle.

3.3. FL Vehicles

The combustion heaters shall be put out of operation by at least the following methods:

- (a) Intentional manual switching off from the driver's cab;
- (b) Stopping of the vehicle engine; in this case the heating device may be restarted manually by the driver;
- (c) Start up of a feed pump on the motor vehicle for the dangerous goods carried.

3.3.2. After running is permitted after the combustion heaters have been put out of operation. For the methods of paragraph 3.3.1 (b) and (c) the supply of combustion air shall be interrupted by suitable measures after an after-running cycle of not more than 40 seconds. Only heaters for which proof has been furnished that the heat exchanger is resistant to the reduced after-running cycle of 40 seconds for the time of their normal use shall be used.
