



**DIRECTIVE 2001/56/EC OF THE EUROPEAN PARLIAMENT
AND OF THE COUNCIL**

of 27 September 2001

**relating to heating systems for motor vehicles and their trailers,
amending Council Directive 70/156/EEC and repealing Council
Directive 78/548/EEC**

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE
EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and
in particular Article 95 thereof,

Having regard to the proposal from the Commission ⁽¹⁾,

Having regard to the opinion of the Economic and Social
Committee ⁽²⁾,

Acting in accordance with the procedure laid down in Article 251 of
the Treaty ⁽³⁾,

Whereas:

- (1) Council Directive 78/548/EEC of 12 June 1978 on the approximation of the laws of the Member States relating to heating systems for the passenger compartment of motor vehicles ⁽⁴⁾ was adopted as one of the separate directives of the EC type-approval procedure which has been established by Council Directive 70/156/EEC of 6 February 1970 on the approximation of the laws of the Member States relating to the type-approval of motor vehicles and their trailers ⁽⁵⁾. Consequently, the provisions laid down in Directive 70/156/EEC relating to vehicle systems, components and separate technical units apply to Directive 78/548/EEC.
- (2) In particular, under Article 3(4) and Article 4(3) of Directive 70/156/EEC each separate directive is to be accompanied by an information document incorporating the relevant items of Annex I to Directive 70/156/EEC and also a type-approval certificate based on Annex VI thereto in order that type-approval may be computerised.
- (3) In the light of technical progress, combustion heaters, usually fuelled by diesel, petrol or liquefied petroleum gas, are now fitted to many types of vehicle in order to provide heat for the passenger compartment (e.g. of buses), the load area (e.g. of trucks and trailers) or the sleeping compartment (e.g. of trucks and motor caravans) so that heat can be provided efficiently and without the noise and gaseous emissions associated with running the propulsion engine when the vehicle is parked. For reasons of safety, it is necessary to extend the scope to include requirements for combustion heaters, and for their installation. Such requirements should correspond to the highest standards consistent with current technology.
- (4) It is necessary to provide for type-approval for combustion heaters as components and for vehicles in which a combustion heater is installed.
- (5) It will be necessary to supplement this Directive with additional safety requirements for liquefied petroleum gas (LPG) combustion heaters by the addition of an Annex.

⁽¹⁾ OJ C 326, 24.10.1998, p. 4 and OJ C 116 E, 26.4.2000, p. 2.

⁽²⁾ OJ C 101, 12.4.1999, p. 15.

⁽³⁾ Opinion of the European Parliament of 13 April 1999 (OJ C 219, 30.7.1999, p. 58), Council Common Position of 17 November 2000 (OJ C 36, 2.2.2001, p. 1) and Decision of the European Parliament of 14 March 2001 (not yet published in the Official Journal). Council Decision of 26 June 2001.

⁽⁴⁾ OJ L 168, 26.6.1978, p. 40.

⁽⁵⁾ OJ L 42, 23.2.1970, p. 1. Directive as last amended by Directive 98/91/EC of the European Parliament and of the Council (OJ L 11, 16.1.1999, p. 25).

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- (6) The measures necessary for the implementation of this Directive should be adopted in accordance with Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission ⁽¹⁾.
- (7) For reasons of clarity it is advisable to repeal Directive 78/548/EEC and replace it by this Directive,

HAVE ADOPTED THIS DIRECTIVE:

Article 1

For the purposes of this Directive, 'vehicle' means any vehicle to which Directive 70/156/EEC applies.

Article 2

No Member State may refuse to grant EC type-approval or national type-approval of a type of vehicle or of a type of heating system on grounds relating to the heating system for the passenger compartment or load area if the system satisfies the requirements set out in the Annexes.

Article 3

No Member State may refuse or prohibit the sale, registration, entry into service or use of any vehicle or the sale, entry into service or use of any heating system on grounds relating to the heating system for the passenger compartment or load area if the system satisfies the requirements set out in the Annexes.

Article 4

1. With effect from 9 May 2003 Member States may not, on grounds relating to heating systems:

- refuse, in respect of a type of vehicle or heating system, to grant EC type-approval or national type-approval, or
- prohibit the sale, registration, or entry into service of vehicles, or the sale or entry into service of heating systems,

if the heating system complies with the requirements of this Directive.

2. With effect from 9 May 2004 Member States:

- shall no longer grant EC type-approval, and
- may refuse to grant national type-approval,

for a type of vehicle on grounds relating to heating systems, or for a type of combustion heater, if the requirements of this Directive are not fulfilled.

3. With effect from 9 May 2005 Member States:

- shall consider certificates of conformity which accompany new vehicles in accordance with the provisions of Directive 70/156/EEC to be no longer valid for the purposes of Article 7(1) of that Directive, and
- may refuse the sale, registration and entry into service of new vehicles,

on grounds relating to heating systems if the requirements of this Directive are not fulfilled.

This paragraph shall not apply to vehicle types equipped with a waste-heat heating system, using water as the transfer medium.

⁽¹⁾ OJ L 184, 17.7.1999, p. 23.

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4. With effect from 9 May 2005 the requirements of this Directive relating to combustion heaters as components shall apply for the purposes of Article 7(2) of Directive 70/156/EEC.

Article 5

No later than 9 November 2002 the Commission shall examine additional safety requirements with respect to liquefied petroleum gas (LPG) fuelled heating systems of motor vehicles, and, if appropriate, amend this Directive in accordance with the procedure referred to in Article 6(2).

Article 6

1. The Commission shall be assisted by the Committee for Adaptation to Technical Progress, set up by Article 13 of Directive 70/156/EEC, hereinafter referred to as 'the Committee'.

2. Where reference is made to this paragraph, Articles 5 and 7 of Decision 1999/468/EC shall apply, having regard to the provisions of Article 8 thereof.

The period laid down in Article 5(6) of Decision 1999/468/EC shall be set at three months.

3. The Committee shall adopt its rules of procedure.

Article 7

Directive 70/156/EEC is hereby amended as follows:

1. Item 36 in Part 1 of Annex IV shall be replaced by the following:

Subject	Directive	Official Journal reference	Applicability										
			M ₁	M ₂	M ₃	N ₁	N ₂	N ₃	O ₁	O ₂	O ₃	O ₄	
'36. Heating systems	2001/56/EC	L 292 of 9.11.2001	X	X	X	X	X	X	X	X	X	X	X

2. In Annex XI:

(a) Item 36 in Appendix 1 shall be replaced by the following:

Item	Subject	Directive	M ₁ ≤ 2 500 (1) kg	M ₁ > 2 500 (1) kg
'36	Heating systems	2001/56/EC	I	G + P'

(b) Item 36 in Appendix 2 shall be replaced by the following:

Item	Subject	Directive	Armoured vehicles of category M ₁
'36	Heating systems	2001/56/EC	X'

Article 8

Directive 78/548/EEC shall be repealed with effect from 9 May 2004. References made to Directive 78/548/EEC shall be construed as references to this Directive.

Article 9

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive before 9 May 2003, and shall forthwith inform the Commission thereof.

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When Member States adopt these measures, they shall contain a reference to this Directive or be accompanied by such reference on the occasion of their official publication. The methods of making such a reference shall be laid down by the Member States.

2. Member States shall communicate to the Commission the text of the main provisions of national law which they adopt in the field covered by this Directive.

Article 10

This Directive shall enter into force on the day of its publication in the *Official Journal of the European Communities*.

Article 11

This Directive is addressed to the Member States.

▼B**LIST OF ANNEXES**

Annex I:	Administrative provisions for EC type-approval
Appendix 1:	Information document — EC type-approval of a vehicle
Appendix 2:	EC type-approval certifi- cate (vehicle)
Appendix 3:	Information document — EC component type- approval
Appendix 4:	EC type-approval certifi- cate (component)
Appendix 5:	EC component type- approval mark
Annex II:	Scope, definitions and requirements
Annex III:	Requirements for waste heating system — air
Annex IV:	Test procedure for air quality
Annex V:	Test procedure for temperature
Annex VI:	Test procedure for exhaust emissions
Annex VII:	Requirements for combustion heaters and their installation
Annex VIII:	Safety requirements for LPG combustion heaters



ANNEX I

ADMINISTRATIVE PROVISIONS FOR EC TYPE-APPROVAL

1. APPLICATION FOR EC TYPE-APPROVAL OF A VEHICLE TYPE
 - 1.1. The application for EC type-approval pursuant to Article 3(4) of Directive 70/156/EEC of a vehicle type with regard to its heating system shall be submitted by the manufacturer.
 - 1.2. A model for the information document is given in Appendix 1.
 - 1.3. The following must be submitted to the technical service responsible for conducting the type-approval tests:
 - 1.3.1. a vehicle representative of the type to be approved.
2. GRANTING OF EC TYPE-APPROVAL OF A VEHICLE TYPE
 - 2.1. If the relevant requirements are satisfied, EC type-approval pursuant to Article 4(3) of Directive 70/156/EEC shall be granted.
 - 2.2. A model for the EC type-approval certificate is given in Appendix 2.
 - 2.3. An approval number in accordance with Annex VII to Directive 70/156/EEC shall be assigned to each type of vehicle approved. The same Member State shall not assign the same number to another type of vehicle.
3. APPLICATION FOR EC TYPE-APPROVAL OF A TYPE OF COMBUSTION HEATER
 - 3.1. The application for EC type-approval pursuant to Article 3(4) of Directive 70/156/EEC of a type of combustion heater as a component shall be submitted by the manufacturer of the heating system.
 - 3.2. A model for the information document is given in Appendix 3.
 - 3.3. The following must be submitted to the technical service responsible for conducting the type-approval tests:
 - 3.3.1. a combustion heater representative of the type to be approved.
4. GRANTING OF EC TYPE-APPROVAL OF A TYPE OF COMBUSTION HEATER
 - 4.1. If the relevant requirements are satisfied, EC type-approval pursuant to Article 4(3) and, if applicable, Article 4(4) of Directive 70/156/EEC shall be granted.
 - 4.2. A model for the EC type-approval certificate is given in Appendix 4.
 - 4.3. An approval number in accordance with Annex VII to Directive 70/156/EEC shall be assigned to each type of combustion heater approved. The same Member State shall not assign the same number to another type of combustion heater.
 - 4.4. Every combustion heater conforming to a type approved pursuant to this Directive shall bear an EC component type-approval mark as specified in Appendix 5.
5. MODIFICATIONS OF THE TYPE AND AMENDMENTS TO APPROVALS
 - 5.1. In the case of modifications of the type of vehicle or type of combustion heater approved pursuant to this Directive, the provisions of Article 5 of Directive 70/156/EEC shall apply.
6. CONFORMITY OF PRODUCTION
 - 6.1. Measures to ensure the conformity of production shall be taken in accordance with the provisions laid down in Article 10 of Directive 70/156/EEC.



Appendix 1

INFORMATION DOCUMENT No

in accordance with Annex I to Council Directive 70/156/EEC (*) relating to EC type-approval of a vehicle with regard to its heating systems () (Directive 2001/56/EC)**

The following information, if applicable, must be supplied in triplicate and include a list of contents. Any drawings must be supplied in appropriate scale and in sufficient detail on size A4 or on a folder of A4 format. Photographs, if any, must show sufficient detail.

If the systems, components or separate technical units have electronic controls, information concerning their performance must be supplied.

- 0. GENERAL
 - 0.1. Make (trade name of manufacturer):
 - 0.2. Type:
 - 0.2.1. Commercial name(s) if available:
 - 0.3. Means of identification of type, if marked on the vehicle (†):
 - 0.3.1. Location of that marking:
 - 0.4. Category of vehicle (‡):
 - 0.5. Name and address of manufacturer:
 - 0.8. Address(es) of assembly plant(s):
- 1. GENERAL CONSTRUCTION CHARACTERISTICS OF THE VEHICLE
 - 1.1. Photographs and/or drawings of a representative vehicle:
- 3. POWER PLANT (¶)
 - 3.1.1. Manufacturer's engine code:
(as marked on the engine, or other means of identification)
 - 3.2.1.1. Working principle: positive ignition/compression ignition, four stroke/two stroke (¶)
 - 3.2.1.2. Number and arrangement of cylinders:
 - 3.2.1.8. Maximum net power:kW at min⁻¹ (manufacturer's declared value)
 - 3.2.7. Cooling system (liquid/air) (¶)
 - 3.2.7.1. Nominal setting of the engine temperature control mechanism:
 - 3.2.8.1. Pressure charger: yes/no (¶)
 - 3.2.8.1.2. Type(s):
 - 3.2.8.1.3. Description of the system (e.g. maximum charge pressure: kPa, wastegate if applicable)

(*) The item numbers and footnotes used in this information document correspond to those set out in Annex I to Directive 70/156/EEC. Items not relevant for the purpose of this Directive are omitted.

(**) In the case of heating systems using heat from the engine cooling fluid, only items 0 to 0.8, 3.2.7 and 9.10.5.1 are applicable.

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9. BODYWORK

9.10.5. *Heating systems for the passenger compartment*

- 9.10.5.1. A brief description of the vehicle type with regard to the heating system if the heating system uses the heat of the engine cooling fluid:
- 9.10.5.2. 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:
- 9.10.5.2.1. layout drawing of the heating system showing its position in the vehicle:
- 9.10.5.2.2. 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):
- 9.10.5.2.3. 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:
- 9.10.5.2.4. 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.
- 9.10.5.3. Maximum electrical consumption: kW
-

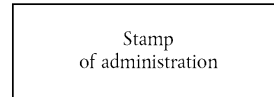
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Appendix 2

MODEL

(maximum format: A4 (210 mm × 297 mm))

EC TYPE-APPROVAL CERTIFICATE



Communication concerning the

- type-approval ⁽¹⁾,
- extension of type-approval ⁽¹⁾,
- refusal of type-approval ⁽¹⁾,
- withdrawal of type-approval ⁽¹⁾,

of a type of vehicle/component/separate technical unit ⁽¹⁾ with regard to Directive 2001/56/EC.

Type-approval No:

Reason for extension:

SECTION I

- 0.1. Make (trade name of manufacturer):
- 0.2. Type:
- 0.2.1. Commercial name(s), if available:
- 0.3. Means of identification of type if marked on the vehicle/component/separate technical unit ⁽¹⁾ ⁽²⁾:
- 0.4. Category of vehicle ⁽¹⁾ ⁽³⁾:
- 0.5. Name and address of manufacturer:
- 0.7. In the case of components and separate technical units, location and method of affixing of the EC approval mark:
- 0.8. Address(es) of assembly plant(s):

SECTION II

- 1. Additional information (where applicable): see addendum
- 2. Technical service responsible for carrying out the tests:
- 3. Date of test report:
- 4. Number of test report:
- 5. Remarks (if any): see addendum
- 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⁾ Delete where not applicable.

⁽²⁾ If the means of identification of type contains characters not relevant to describe the vehicle, component or separate technical unit types covered by this type-approval certificate, such characters shall be represented in the documentation by the symbol: '?' (e.g. ABC??123??).

⁽³⁾ As defined in Annex II A to Directive 70/156/EEC.

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Addendum

to EC type-approval certificate No ... concerning the type-approval of a type of vehicle with regard to Directive 2001/56/EC

1. Additional information:
- 1.1. Heating system using heat from the engine cooling fluid/exhaust gases/engine cooling air ⁽¹⁾:
- 1.2. Combustion heaters, if any:
5. Remarks:

⁽¹⁾ As defined in Annex II to Directive 70/156/EEC.



Appendix 3

**Information document No relating to EC component type-approval of a combustion heater
(Directive 2001/56/EC)**

The following information, if applicable, must be supplied in triplicate and include a list of contents. Any drawings must be supplied in appropriate scale and in sufficient detail on size A4 or on a folder of A4 format. Photographs, if any, must show sufficient detail.

If the systems, components or separate technical units have electronic controls, information concerning their performance must be supplied.

- 0. GENERAL
 - 0.1. Make (trade name of manufacturer):
 - 0.2. Type:
 - 0.2.1. Commercial description(s) (if available):
 - 0.5. Name and address of manufacturer:
 - 0.7. In the case of components and separate technical units, location and method of affixing of the EC type-approval mark:
.....
 - 0.8. Address(es) of assembly plant(s):
- 1.0 COMBUSTION HEATER
 - 1.1. Test pressure (in the case of a combustion heater) fuelled by liquified petroleum gas or similar, the pressure applied at the gas inlet connector of the heater:
 - 1.2. etc.

—

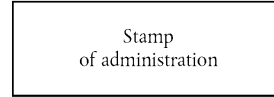
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Appendix 4

MODEL

(maximum format: A4 (210 mm × 297 mm))

EC TYPE-APPROVAL CERTIFICATE



Communication concerning the:

- type-approval ⁽¹⁾,
- extension of type-approval ⁽¹⁾,
- refusal of type-approval ⁽¹⁾,
- withdrawal of type-approval ⁽¹⁾,

of a type of vehicle/component/separate technical unit ⁽¹⁾ with regard to Directive 2001/56/EC.

Type-approval number:

Reason for extension:

SECTION I

- 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/component/separate technical unit ⁽¹⁾ ⁽²⁾:
- 0.4. Category of vehicle ⁽¹⁾ ⁽³⁾:
- 0.5. Name and address of manufacturer:
- 0.6. In the case of components and separate technical units, location and method of affixing of the EC approval mark:
- 0.7. Address(es) of assembly plant(s):

SECTION II

- 1. Additional information (where applicable): see addendum
- 2. Technical service responsible for carrying out the tests:
- 3. Date of test report:
- 4. Number of test report:
- 5. Remarks (if any): see addendum
- 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⁾ Delete where not applicable.

⁽²⁾ If the means of identification of type contains characters not relevant to describe the vehicle, component or separate technical unit types covered by this type-approval certificate, such characters shall be represented in the documentation by the symbol: '?' (e.g. ABC??123??).

⁽³⁾ As defined in Annex II A to Directive 70/156/EEC.

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Addendum

to EC type-approval certificate No ... concerning the type-approval of a type of combustion heater with regard to Directive 2001/56/EC

1. *Additional information:*

1.1. Description of the type of combustion heater:
etc.

5. Remarks:

▼B*Appendix 5***EC COMPONENT TYPE-APPROVAL MARK**

1. GENERAL

1.1. The EC component type-approval mark consists of:

1.1.1. a rectangle surrounding the lower case letter 'e' followed by the distinguishing number or letters of the Member State which has granted the EC component type-approval:

- 1 for Germany
- 2 for France
- 3 for Italy
- 4 for the Netherlands
- 5 for Sweden
- 6 for Belgium

▼A1

- 7 for Hungary
- 8 for the Czech Republic

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- 9 for Spain
- 11 for the United Kingdom
- 12 for Austria
- 13 for Luxembourg
- 17 for Finland
- 18 for Denmark

▼A1

- 20 for Poland

▼B

- 21 for Portugal
- 23 for Greece
- 24 for Ireland

▼A1

- 26 for Slovenia
- 27 for Slovakia
- 29 for Estonia
- 32 for Latvia
- 36 for Lithuania
- CY for Cyprus
- MT for Malta

▼B

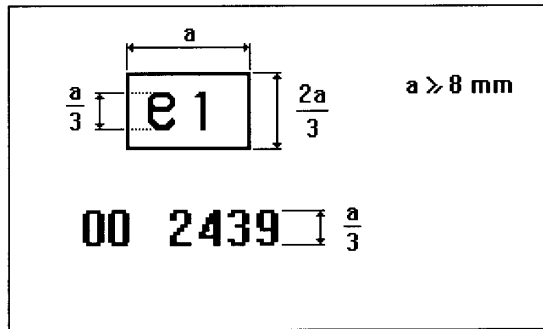
1.1.2. in the vicinity of the rectangle the 'base approval number' contained in Section 4 of the type-approval number referred to in Annex VII to Directive 70/156/EEC, preceded by the two figures indicating the sequence number assigned to the most recent major technical amendment to Directive 78/548/EEC on the date EC component type-approval was granted. In this Directive, the sequence number is 00.

1.2. The EC component type-approval mark must be clearly legible and indelible.

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2. EXAMPLE OF THE EC COMPONENT TYPE-APPROVAL MARK

2.1.



The above component type-approval mark shows that the combustion heater in question has been approved in Germany (e1) under approval number 2439. The first two digits (00) indicate that this component was approved according to this Directive.



ANNEX II

SCOPE, DEFINITIONS AND REQUIREMENTS

1. SCOPE

- 1.1. This Directive applies to all vehicles in categories M, N and O where a heating system is fitted.

2. DEFINITIONS

For the purposes of this Directive:

- 2.1. 'Heating system' means any type of device which is designed to increase the temperature of the interior of a vehicle, including any load area.
- 2.2. '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.
- 2.3. 'Vehicle type with regard to heating system' means vehicles which do not differ in essential respects such as:
- functioning principle(s) of the heating system,
 - type of combustion heater, if any.
- 2.4. '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).
- 2.5. '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.
- 2.6. 'Interior' means the inside of a vehicle used for the accommodation of the vehicle occupants and/or the load.
- 2.7. 'Heating system for the passenger compartment' means any type of device designed to increase the temperature of the passenger compartment.
- 2.8. 'Heating system for the load area' means any type of device designed to increase the temperature of the load area.
- 2.9. 'Passenger compartment' means the interior part of the vehicle used to accommodate the driver and any passengers.
- 2.10. '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).
- 2.11. 'Overheating' means the condition that exists when the air inlet for the heating air to the combustion heater is completely blocked.

3. REQUIREMENTS FOR HEATING SYSTEMS

- 3.1. The passenger compartment of every vehicle in categories M and N shall be fitted with a heating system.
- 3.2. The general 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 IV, V and VI.

- 3.2.1. The following table indicates which Annexes apply to each type of heating system within each vehicle category:

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Heating system	Vehicle category	Annex IV Air quality	Annex V Temperature	Annex VI Exhaust	Annex VIII LPG safety
Engine waste heat — water	M				
	N				
	O				
Engine waste heat — air See Note 1	M	1	1		
	N	1	1		
	O				
Engine waste heat — oil	M	1	1		
	N	1	1		
	O				
Gaseous fuel heater See Notes 2 and 3	M	1	1	1	1
	N	1	1	1	1
	O	1	1	1	1
Liquid fuel heater See Note 3	M	1	1	1	
	N	1	1	1	
	O	1	1	1	

- 3.3. Other requirements for combustion heaters and their installation in vehicles are laid down in Annex VII.

Note 1: Vehicles which comply with the requirements of Annex III are exempt from these test requirements.

Note 2: A new Annex VIII 'Safety requirements for LPG combustion heaters' will be added to this Directive in accordance with Article 5.

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



ANNEX III

REQUIREMENTS FOR WASTE HEATING SYSTEMS — AIR

1. The requirements set out in paragraph 3.2 of Annex II 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 point 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 heating systems using the cooling air of the engine for heating purposes, the conditions of paragraph 3.2 of Annex II are considered satisfied without the use of a heat exchanger provided that the following conditions are satisfied:
 - 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
 - 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:

- 6.1. a sheath around each sparking plug draws off any gas leaks outside the heating air circuit;
- 6.2. the joint between the cylinder head and the exhaust manifold is situated outside the heating air circuit;
- 6.3. 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 IV***TEST PROCEDURE FOR AIR QUALITY**

1. In the case of complete vehicles 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:
 - (a) a point outside the vehicle as close as possible to the heating air inlet, and
 - (b) 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 (b) shall be less than 20 ppm CO higher than from position (a).
2. In the case of combustion heaters as components the following test shall be carried out after the tests of Annexes V, VI and item 1.3 of Annex VII.
 - 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 ≤ 30 dm³/h.

*ANNEX V***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.
- 3.1. 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.
- 3.2. 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.
4. The temperature of the heated air entering the passenger compartment shall not exceed 150 °C to be measured at the centre of the outlet.

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ANNEX VI

TEST PROCEDURE FOR EXHAUST EMISSIONS

1. Operate heater for one hour at maximum output in conditions of still air (wind speed ≤ 2 m/s) and an ambient temperature of $20 \pm 10^\circ$ 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	$\leq 0,1$ % vol.	$\leq 0,1$ % vol.
NO _x	≤ 200 ppm	≤ 200 ppm
HC	≤ 100 ppm	≤ 100 ppm
Bacharach reference unit (*)	≤ 1	≤ 4

(*) Reference unit 'Bacharach' ASTM D 2156 is used.

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.



ANNEX VII

REQUIREMENTS FOR COMBUSTION HEATERS AND THEIR INSTALLATION

1. GENERAL REQUIREMENTS
 - 1.1. 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.
 - 1.2. 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.
 - 1.3. 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.
 - 1.4. The heater must have a maker's label showing the maker'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.
 - 1.5. *Delayed shut-off of combustion air blowers*
 - 1.5.1. 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.
 - 1.5.2. 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.
 - 1.6. *Requirements for electrical supply*
 - 1.6.1. All technical requirements affected by the voltage must be within the voltage range of $\pm 16\%$ of the rated figure. However, if undervoltage 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.
 - 1.7. *Warning light*
 - 1.7.1. A clearly visible tell-tale in the operator's field of view shall inform when the combustion heater is switched on or off.
2. VEHICLE INSTALLATION REQUIREMENTS
 - 2.1. *Scope*
 - 2.1.1. Subject to paragraph 2.1.2, combustion heaters shall be installed according to the requirements of this Annex.
 - 2.1.2. Vehicles of category O having liquid fuel heaters are deemed to comply with the requirements of this Annex.
 - 2.2. *Positioning of heater*
 - 2.2.1. 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.
 - 2.2.2. The combustion heater shall not constitute a risk of fire, even in the case of overheating. This requirement shall be deemed to be fulfilled 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.
 - 2.2.3. In the case of M₂ and M₃ vehicles, the 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 2.2.2 may be used.

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- 2.2.4. The label referred to in paragraph 1.4, or a duplicate, must be positioned so that it can be easily read when the heater is installed in the vehicle.
- 2.2.5. Every reasonable precaution should be taken in positioning the heater to minimise the risk of injury and damage to personal property.

2.3. Fuel supply

- 2.3.1. The fuel filler must not be situated in the passenger compartment and must be provided with an effective cap to prevent fuel spillage.
- 2.3.2. In the case of liquid fuel heaters, where a supply separate to that of the vehicle is provided, the type of fuel and its filler point must be clearly labelled.
- 2.3.3. 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.

2.4. Exhaust system

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

2.5. Combustion air inlet

- 2.5.1. The air for the combustion chamber of the heater must not be drawn from the passenger compartment of the vehicle.
- 2.5.2. The air inlet must be so positioned or guarded that blocking by rubbish or luggage is unlikely.

2.6. Heating air inlet

- 2.6.1. The heating air supply may be fresh or recirculated 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.
- 2.6.2. The inlet duct must be protected by mesh or other suitable means.

2.7. Heating air outlet

- 2.7.1. 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.
- 2.7.2. The air outlet must be so positioned or guarded that blocking by rubbish or luggage is unlikely.

2.8. Automatic control of the heating system

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.

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ANNEX VIII

SAFETY REQUIREMENTS FOR LPG COMBUSTION HEATERS

(See Annex II, point 3.3, Note 2)