



UL 60947-7-3

STANDARD FOR SAFETY

Low-Voltage Switchgear and Controlgear – Part
7-3: Ancillary Equipment – Safety Requirements
for Fuse Terminal Blocks

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Low-Voltage Switchgear and Controlgear – Part 7-3: Ancillary Equipment – Safety Requirements for Fuse Terminal Blocks UL 60947-7-3

Third Edition, Dated January 27, 2017

Summary of Topics

This revision of ANSI/UL 60947-7-3 is to revise the National Differences to include Canada. This standard is harmonized for Canada, Mexico and the United States and co-published by all three standards development organizations (CSA Group, ANCE and UL).

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The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the preface. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a “SUPERSEDED REQUIREMENTS” notice.

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Association of Standardization and Certification
NMX-J-538/7-3-ANCE
First Edition



CSA Group
CAN/CSA-C22.2 No. 60947-7-3:17
First Edition
(IEC 60947-7-3:2002, MOD)



Underwriters Laboratories Inc.
UL 60947-7-3
Third Edition

Low-Voltage Switchgear and Controlgear – Part 7-3: Ancillary Equipment – Safety Requirements for Fuse Terminal Blocks

January 27, 2017

This national standard is based on publication IEC 60947-7-3, first edition (2002) including Corrigendum 1 (2003).



ANSI/UL 60947-7-3-2017

Approved by



Standards Council of Canada
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This ANSI/UL Standard for Safety consists of the Third edition including revisions through January 27, 2017. The most recent designation of ANSI/UL 60947-7-3 as an American National Standard (ANSI) occurred on January 27, 2017. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards.

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Preface

This is the harmonized ANCE, CSA Group, and UL standard for Low-Voltage Switchgear and Controlgear – Part 7-3: Ancillary Equipment – Safety Requirements for Fuse Terminal Blocks. It is the first edition of NMX-J-538/7-3-ANCE, the first edition of CAN/CSA-C22.2 No. 60947-7-3, and the third edition of UL 60947-7-3. This edition of UL 60947-7-3 supersedes the previous edition(s) published on May 6, 2011.

This harmonized standard is based on IEC Publication 60947-7-3: Edition 1 (2002), Low-Voltage Switchgear and Controlgear – Part 7-3: Ancillary Equipment – Safety Requirements for Fuse Terminal Blocks, as revised by corrigendum (March 2003). IEC 60947-7-3 is copyrighted by the IEC.

This harmonized standard was prepared by the Association of Standardization and Certification (ANCE), CSA Group, and Underwriters Laboratories Inc. (UL). The efforts and support of the Technical Harmonization Committee for Industrial Control Equipment, of the Council on the Harmonization of Electrotechnical Standards of the Nations of the Americas (CANENA), are gratefully acknowledged.

This Standard is considered suitable for use for conformity assessment within the stated scope of the Standard.

The Mexican Standard was developed by the CT PIE-A from the Comité de Normalización de la Asociación de Normalización y Certificación, A.C., CONANCE, with the collaboration of the manufacturers and users.

This standard was reviewed by the CSA Subcommittee on Terminal Assemblies, under the jurisdiction of the CSA Technical Committee on Industrial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee.

This standard has been approved as a National Standard of Canada by the Standards Council of Canada (SCC).

This standard has been approved by the American National Standards Institute (ANSI) as an American National Standard.

Application of Standard

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

Note: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

NMX-J-538/7-3-ANCE Standard for Safety for Low-Voltage Switchgear and Controlgear – Part 7-3: Ancillary Equipment – Safety Requirements for Fuse Terminal Blocks is to be used in conjunction with the first edition of NMX-J-538/7-1-ANCE. The requirements for Ancillary Equipment – Safety Requirements for Fuse Terminal Blocks are contained in this Part 2 Standard and NMX-J-538/7-1-ANCE. Requirements of this Part 2 Standard, where stated, amend the requirements of NMX-J-538/7-1-ANCE. Where a particular subclause of NMX-J-538/7-1-ANCE is not mentioned in NMX-J-538/7-3-ANCE, the NMX-J-538/7-1-ANCE subclause applies.

This CAN/CSA-C22.2 No. 60947-7-3, Standard for Safety for Low-Voltage Switchgear and Controlgear – Part 7-3: Ancillary Equipment – Safety Requirements for Fuse Terminal Blocks, is to be used in conjunction with the first edition of CAN/CSA-C22.2 No. 60947-7-1. The requirements for Ancillary

Equipment – Safety Requirements for Fuse Terminal Blocks are contained in this Part 2 Standard and CAN/CSA-C22.2 No. 60947-7-1. Requirements of this Part 2 Standard, where stated, amend the requirements of CAN/CSA-C22.2 No. 60947-7-1. Where a particular subclause of CAN/CSA-C22.2 No. 60947-7-1 is not mentioned in CAN/CSA-C22.2 No. 60947-7-3, the CAN/CSA-C22.2 No. 60947-7-1 subclause applies.

This UL 60947-7-3, Standard for Safety for Low-Voltage Switchgear and Controlgear – Part 7-3: Ancillary Equipment – Safety Requirements for Fuse Terminal Blocks, is to be used in conjunction with the fourth edition of UL 60947-7-1. The requirements for Ancillary Equipment – Safety Requirements for Fuse Terminal Blocks are contained in this Part 2 Standard and UL 60947-7-1. Requirements of this Part 2 Standard, where stated, amend the requirements of UL 60947-7-1. Where a particular subclause of UL 60947-7-1 is not mentioned in UL 60947-7-3, the UL 60947-7-1 subclause applies.

Level of harmonization

This standard adopts the IEC text with national differences.

This standard is published as an equivalent standard for ANCE, CSA Group, and UL.

An equivalent standard is a standard that is substantially the same in technical content, except as follows: Technical national differences are allowed for codes and governmental regulations as well as those recognized as being in accordance with NAFTA Article 905, for example, because of fundamental climatic, geographical, technological, or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is word for word except for editorial changes.

All national differences from the IEC text are included in the ANCE, CSA Group and UL versions of the standard. While the technical content is the same in each organization's version, the format and presentation may differ.

Reasons for differences from IEC

National differences from the IEC are being added in order to address safety and regulatory situations present in the US, Canada and Mexico.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

IEC Copyright

For ANCE, the text, figures, and tables of International Electrotechnical Commission Publication 60947-7-3, Low-Voltage Switchgear and Controlgear – Part 7-3: Ancillary Equipment – Safety Requirements for Fuse Terminal Blocks, are used in this standard according to the guidelines provided in the ISO/IEC/POCOSA.

For CSA Group, the text, figures, and tables of International Electrotechnical Commission Publication 60947-7-3, Low-Voltage Switchgear and Controlgear – Part 7-3: Ancillary Equipment – Safety Requirements for Fuse Terminal Blocks, copyright 2002, are used in this standard with the consent of the International Electrotechnical Commission. The IEC Foreword and Introduction are not a part of the requirements of this standard but are included for information purposes only.

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NATIONAL DIFFERENCES

National Differences from the text of International Electrotechnical Commission (IEC) Publication 60947-7-3, Low-Voltage Switchgear and Controlgear – Part 7-3: Ancillary Equipment – Safety Requirements for Fuse Terminal Blocks, first edition (2002), are indicated by notations (differences) and are presented in bold text. The national difference type is included in the body.

There are five types of National Differences as noted below. The difference type is noted on the first line of the National Difference in the standard. The standard may not include all types of these National Differences.

DR – These are National Differences based on the **national regulatory requirements**.

D1 – These are National Differences which are based on **basic safety principles and requirements**, elimination of which would compromise safety for consumers and users of products.

D2 – These are national differences from IEC requirements based on existing **safety practices**. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.

DC – These are National Differences based on the **component standards** and will not be deleted until a particular component standard is harmonized with the IEC component standard.

DE – These are National Differences based on **editorial comments or corrections**.

Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

Addition / Add - An addition entails adding a complete new numbered clause, subclause, table, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

Modification / Modify - A modification is an altering of the existing base IEC text such as the addition, replacement or deletion of certain words or the replacement of an entire clause, subclause, table, figure, or annex of the base IEC text.

Deletion / Delete - A deletion entails complete deletion of an entire numbered clause, subclause, table, figure, or annex without any replacement text.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR – Part 7-3: Ancillary equipment – Safety requirements for fuse terminal blocks**FOREWORD**

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.

3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.

4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

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6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60947-7-3 has been prepared by subcommittee 17B: Low-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

This standard shall be read in conjunction with IEC 60947-1 and IEC 60947-7-1. The provisions of the general rules dealt with in IEC 60947-1 and the requirements for terminal blocks of IEC 60947-7-1 are applicable to this standard, where specifically called for. Clauses and subclauses, tables, figures and annexes thus applicable are identified by reference to IEC 60947-1 or IEC 60947-7-1, e.g. 1.2 of IEC 60947-1, table 4 of IEC 60947-7-1 or annex A of IEC 60947-1.

DV.1 D2 Modification by replacing the third paragraph after item 6) in the IEC Foreword with the following:

This standard shall be read in conjunction with those standards referenced in Annex DVA, items A and F. The provisions of the general rules dealt with in Annex DVA, item F, and the requirements for terminal blocks of Annex DVA, item A are applicable to this standard. Any references to IEC 60947-1, and IEC 60947-7-1 are to those standards referenced in Annex DVA, items A and F, since the requirements may have been modified by country-specific clauses.

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The text of this standard is based on the following documents:

FDIS	Report on voting
17B/1193/FDIS	17B/1226/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

Annexes A and C form an integral part of this standard.

Annex B is for information only.

DV.2 DR Modification by adding the following paragraph to the IEC Foreword:

Annexes DVA and DVB form an integral part of this standard.

The committee has decided that the contents of this publication will remain unchanged until 2005. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

The contents of the corrigendum of March 2003 have been included in this copy.

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INTRODUCTION

The standard for fuse terminal blocks covers not only the terminal block requirements but also takes into account the specifications of the cartridge fuse-links according to IEC 60127-1 and IEC 60127-2. A connection between these two standards is made by adding (adapting) the fundamental specifications of cartridge fuse-links (rated current, rated voltage, maximum voltage drop and maximum sustained power dissipation for cartridge fuse-links with the dimension of 5 mm × 20 mm or 6,3 mm × 32 mm with their different response characteristics) to the IEC 60947-7-1 requirements for terminal blocks. By this means, it is possible to judge the quality of the product “fuse terminal blocks”.

An important fact when using such cartridge fuse-links with fuse terminal blocks is that fuses heat up much less under rated load than they would do under overload conditions. The rated load is the result of rated current and maximum voltage drop. But there is a considerably increased power dissipation under overload conditions, equalling the maximum sustained power dissipation loss according to IEC 60127-2.

In industrial applications, single fuse terminal blocks are used within an arrangement of terminal blocks or many of them forming an arrangement on their own. This means that the same current and fuse-link will result in different heat emissions. Furthermore, it should be taken into account that apart from the general full range fuse (for overload and short-circuit protection), some fuse terminal blocks are exclusively used for short-circuit protection according to IEC 60364-4-43, e.g. in control circuits, where no overloads occur (i.e. safety coils, indicator lights or similar equipment).

Consequently there are four different types of application that need to be described in the catalogue or indicated on the terminal block. For more information, see annex B.

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LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR – Part 7-3:

Ancillary equipment – Safety requirements for fuse terminal blocks

1 General

1.1 Scope

This part of IEC 60947 applies to fuse terminal blocks with screw-type or screwless-type clamping units for the connection of rigid (solid or stranded) or flexible copper conductors for the reception of cartridge fuse-links in accordance with IEC 60127-2, intended primarily for industrial or similar use in circuits not exceeding 1 000 V a.c., up to 1 000 Hz or 1 500 V d.c., and having a maximum short-circuit breaking capacity of 1 500 A.

They are intended for installation in electrical equipment with enclosures which surround the fuse terminal blocks to such an extent that they are accessible only with the aid of a tool.

For certain applications, for example in control circuits, the fuse terminal blocks may be designed exclusively for short-circuit protection.

NOTE This standard may be used as a guide for fuse terminal blocks for the reception of special cartridge fuse-links which do not meet the requirements of IEC 60127-2.

The object of this standard is to specify safety requirements and test methods for the mechanical, electrical and thermal characteristics of fuse terminal blocks, to ensure the compatibility between terminal blocks and standardized fuse-links.

This standard may be used as a guide for

- fuse terminal blocks requiring the fixing of special devices to the conductors, for example quick connect terminations or wrapped connections, etc.;
- fuse terminal blocks providing direct contact to the conductors by means of edges or points penetrating the insulation, for example insulation displacement connections, etc.

Where applicable in this standard, the term “clamping unit” has been used instead of the term “terminal”. This is taken into account in case of reference to IEC 60947-1.

1.1DV D2 Modification by adding the following:

This standard specifies requirements for fuse terminal blocks with screw-type or screwless-type clamping units for the connection of rigid (solid or stranded) or flexible copper conductors for the reception of cartridge fuse-links, in accordance with Annex DVB, National Electrical Code, NFPA 70 (for use in the USA), CSA C22.1–15 Canadian Electrical Code, Part I (for use in Canada), and NOM-001-SEDE, Electrical Installations (Utility) [for use in Mexico].

1.2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60127-1:1998,

Miniature fuses – Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links

IEC 60127-2:1989,

Miniature fuses – Part 2: Cartridge fuse-links

IEC 60216-1:2001,

Guide for the determination of thermal endurance properties of electrical insulating materials – Part 1: General guidelines for ageing procedures and evaluation of test results

IEC 60695-2-2:1991,

*Fire hazard testing – Part 2: Test methods – Section 2: Needle-flame test
Amendment 1 (1994)*

IEC 60947-1:1999,

*Low-voltage switchgear and controlgear – Part 7: General rules
Amendment 1 (2000)
Amendment 2 (2001)*

IEC 60947-7-1:2002,

Low-voltage switchgear and controlgear – Part 7-1: Ancillary equipment – Terminal blocks for copper conductors

ISO 3:1973,

Preferred numbers – Series of preferred numbers

ISO 4046:1978,

Paper, board, pulp and related terms – Vocabulary

1.2DV DR Modification by adding the following:

For a list of Canada, Mexico, and USA Normative Standards, see Annex DVA of this standard.

2 Definitions

For the purpose of this part of IEC 60947, definitions given in IEC 60947-7-1, together with the following definitions, apply.

2.1 **fuse terminal block** terminal block base with a fuse-carrier

2.1DV D2 Modification by replacing 2.1 with the following:

fuse terminal block: terminal block base with or without a fuse carrier.

2.2 **terminal block base** insulating part of a fuse terminal block carrying the clamping units and contacts, intended to be fixed to a support

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2.3 fuse-carrier movable part of a fuse terminal block designed to carry the cartridge fuse-link and enable its exchange

NOTE The fuse-carrier can be mechanically coupled with the terminal block base.

2.4 maximum power dissipation of the cartridge fuse-link

2.4.1 in the case of an overload of P_{V1} , equal to the maximum sustained power dissipation as given in IEC 60127-2

2.4.2 in the case of an overload of P_{V1} , equal to the maximum sustained power dissipation as given in IEC 60127-2

2.5 separate arrangement of a fuse terminal block arrangement of a single fuse terminal block between adjacent terminal blocks (without additional function) (see figure 2)

NOTE Mounting of fuse terminal blocks side by side with a spacing that securely prevents any mutual thermal influence is also considered as a separate arrangement.

2.6 compound arrangement of fuse terminal blocks arrangement of two or several fuse terminal blocks side by side or the arrangement of a single fuse terminal block between adjacent terminal blocks with additional function (see figure 3)

NOTE Additional functions within the meaning of this standard include all components which may thermally influence the function of the fuse terminal block due to their own power dissipation.

2.7 rated power dissipation value of a fuse terminal block maximum permissible value with which the fuse terminal block can be continuously loaded by the cartridge fuse-link under specified conditions

2.8 rated cross-section value, stated by the manufacturer, of a rigid (solid or stranded) or flexible conductor to which certain thermal, mechanical and electrical requirements are referred

2.9 rated connecting capacity range of cross-sections and/or the number of conductor cross-sections for which the fuse terminal block is designed

3 Classification

Fuse terminal blocks are classified as follows:

- a) fuse terminal block with separate fuse-carrier, e.g. screw type or plug-in type;
- b) fuse terminal block with mechanically coupled fuse-carrier, e.g. hinged type.

3DV.1 D2 Modification by adding the following item:

cDV) fuse terminal block without a fuse-carrier, e.g. fixed mounted fuse clips.

3DV.2 D2 Modification by adding the following:

Clause 3, Classification, of Annex DVA, Item A applies.

3DV.3 D3 Modification by adding the following:

In Canada, the general requirements applicable to this Standard are provided in CAN/CSA-C22.2 No. 0.

4 Characteristics**4.1 Fuse-links**

The fuse links shall be in accordance with IEC 60127-2.

4.1DV D2 Addition:

Dimensions of cartridge fuse-link shall be stated.

4.2 Rated power dissipation value**4.2.1 Overload and short-circuit protection (P_V)**

The rated value (P_V) is the maximum permissible power dissipation value of a fuse terminal block under overload and short-circuit conditions related to an ambient temperature of 23 °C.

4.2.2 Exclusive short-circuit protection (P_{VK})

The rated value (P_{VK}) is the maximum permissible power dissipation value of a fuse terminal block, which can accept a fuse-link with an equal or lower sustained power dissipation used under exclusive short-circuit conditions and related to an ambient temperature of 23 °C (see annex B).

4.2DV D2 Modification by adding the following:

Subclause 4.2 does not apply in the United States.

4.3 Rated and limiting values**4.3.1 Rated voltages**

Subclause 4.3.1 of IEC 60947-7-1 applies.

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4.3.2 Void

4.3.3 Standard cross-sections

Subclause 4.3.3 of IEC 60947-7-1 applies.

4.3.4 Rated cross-section

Subclause 4.3.4 of IEC 60947-7-1 applies.

4.3.5 Rated connecting capacity

Subclause 4.3.5 of IEC 60947-7-1 applies with the following addition.

The conductor cross-section specified for the temperature-rise test according to 8.4.5 shall be included in the range of the rated connecting capacity.

4.3.6 Working voltage

See 2.5.52 of IEC 60947-1.

4.3DV D2 Modification by adding 4.3.7DV and 4.3.8DV:

4.3.7DV D2 Type of terminal block

Subclause 4.2, Type of terminal block, of Annex DVA, Item A applies.

4.3.8DV D2 Rated and limiting values

Subclause 4.3.6DV.1, Rated and limiting values, of Annex DVA, Item A applies.

5 Product information

5.1 Marking

A fuse terminal block shall be marked in a durable and legible manner with the following:

- a) the name of the manufacturer or a trade mark, by which the manufacturer can be readily identified;
- b) a type reference permitting its identification in order to obtain relevant information from the manufacturer or his catalogue;
- c) energy flow direction, if required to ensure protection against electric shock, according to 7.1.8, e.g. line-load marking or →.

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5.2 Additional information

The following information shall be stated by the manufacturer, if applicable, e.g. in the manufacturer's data sheet or catalogue or on the packing unit:

- a) IEC 60947-7-3, if the manufacturer claims compliance with this standard;
- b) the rated cross-section;
- c) the rated connecting capacity, if different from table 2 of IEC 60947-7-1, including the number of conductors simultaneously connectable;
- d) the rated insulation voltage of the terminal block base and the fuse-carrier, if applicable;
- e) the working voltage or working voltage range, primarily determined by the fuse-link or by additional components, e.g. illuminated indicators;
- f) rated impulse voltage;

NOTE This value may be marked on the fuse terminal block only if the rated insulation voltage or the working voltage is also marked on the fuse terminal block, e.g. 250 V/4 kV or 250/4 kV.

- g) rated value of the power dissipation (P_V) and rated current of the fuse-link as declared by the manufacturer
 - in case of separate arrangement,
 - in case of compound arrangement;
- h) maximum power dissipation (P_{VK}) and rated current of the fuse-link
 - in case of separate arrangement,
 - in case of compound arrangement;
- i) operating conditions, if different from clause 6;
- j) size of the fuse-link.

5.2DV.1 D2 Modification by replacing item a) with the following:

a) to Annex DVA, Item F (NMX-J-515-ANCE), if the manufacturer claims compliance with this standard;

5.2DV.2 D2 Deletion of items g) and h):

These items are not applicable.

5.2DV.3 D2 Modification by adding the following:

Subclause 5.2DV, Additional information, of Annex DVA, Item A applies.