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Road vehicles — Comparison between ISO 26262-12 and other parts of the ISO 26262 series to support motorcycle adaptation

Véhicules routiers — Comparaison entre l'ISO 26262-12 et les autres parties de la série ISO 26262 pour soutenir l'adaptation aux motocycles

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 38, *Motorcycles and mopeds*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The ISO 26262 series is the adaptation of the IEC 61508 series, its purpose is to address the sector-specific needs of electrical and/or electronic (E/E) systems within road vehicles.

This adaptation applies to all activities during the safety lifecycle of safety-related systems comprised of electrical, electronic and software components.

E/E systems on motorcycles comply with the ISO 26262 series by meeting all of the requirements of ISO 26262-2:2018 through ISO 26262-9:2018. However, some requirements can require a degree of tailoring in order to apply them to motorcycles. In such cases, these tailored requirements supersede the corresponding requirements of the ISO 26262 series.

The specific requirements for motorcycles compared in this document correspond to requirements of ISO 26262-2:2018, 5.4.2 and 6.4.9; ISO 26262-3:2018, Clause 6; ISO 26262-4:2018, 7.4.4; and ISO 26262-4:2018, Clause 8.

Road vehicles — Comparison between ISO 26262-12 and other parts of the ISO 26262 series to support motorcycle adaptation

1 Scope

This document lists differences between ISO 26262-12:2018 and other parts of the ISO 26262 series, and supports the adaptation of the ISO 26262 series for motorcycles by clarifying the intention.

This document is based on ISO 26262-12:2018 and makes a comparison with the following documents:

— ISO 26262-2:2018,

— ISO 26262-3:2018,

— ISO 26262-4:2018.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 26262-1:2018, *Road vehicles — Functional safety — Part 1: Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms, definitions and abbreviated terms given in ISO 26262-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 General

4.1 Overview

The objective of this clause is to give an overview of the comparison in this document. This clause describes the contents of ISO 26262-12:2018 and the superseded clauses from ISO 26262-2:2018, ISO 26262-3:2018 and ISO 26262-4:2018. However, identical clauses (Clause 1 to Clause 4) in all parts are excluded from comparison. Additionally, annexes are also excluded from the comparison because of their informative nature.

123 differences are identified as the target of categorization by comparison. The overview for each clause is as follows.

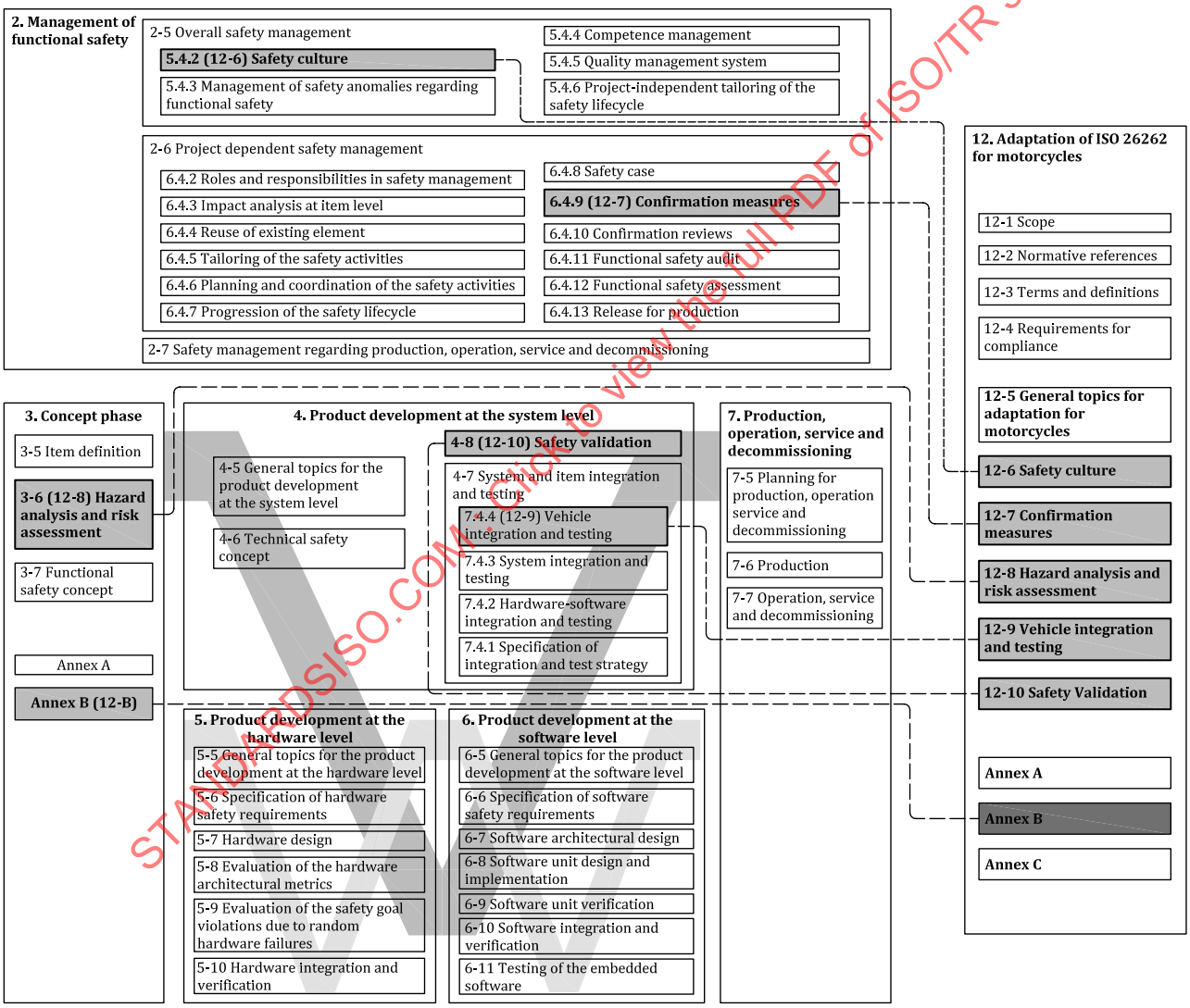
— In Clause 5 regarding safety culture, 5 differences are categorized. These are mainly relevant to communication channels and changed because these are implemented to limited models of motorcycle.

— In Clause 6 regarding confirmation measures, 16 differences are categorized. These are mainly relevant to the level of independence required for confirmation reviews of work products and the definition of their level, and these are changed to adapt the scale of motorcycle development. ISO 26262-12:2018, Figure 3 is added for better understanding of independence.

— In Clause 7 regarding hazard analysis and risk assessment, 72 differences are categorized. These are mainly relevant to how the dynamic behaviour of motorcycle differed from other vehicles, and these are adapted by the classification of parameters for hazardous event (severity, exposure and controllability) and the introduction of MSIL.

— In Clause 8 regarding vehicle integration and testing, 20 differences are categorized. And in Clause 9 regarding safety validation, 10 differences are categorized. These are mainly relevant to the test feasibility for motorcycle and there is no assignment for ASIL D due to ASIL-MSIL mapping.

Figure 1 is reprinted from ISO 26262-12:2018 and it shows the relation of ISO 26262-12:2018 and the other parts of ISO 26262 series.



SOURCE: ISO 26262-12:2018, Figure 2

Figure 1 — Overview of ISO 26262-12:2018 and the relation to the other parts

For detailed explanation of Figure 1, Table 1 shows the list of clauses/subclauses of ISO 26262-12:2018 and the superseded clauses/subclauses of the other parts of the ISO 26262 series, and remarks for them.

Table 1 — Comparison of contents

Clause/subclause of ISO 26262-12:2018	Superseded clause/sub-clause	Remark
5 General topics for adaptation for motorcycles	—	—
5.1 Objectives	N/A	Original
5.2 General	N/A	Original
6 Safety culture	—	—
6.1 Objective	N/A	Original
6.2 Requirements and recommendations	ISO 26262-2:2018, 5.4.2	Modified
7 Confirmation measures	—	—
7.1 Objective	N/A	Original
7.2 Requirements and recommendations	ISO 26262-2:2018, 6.4.9	Modified
8 Hazard analysis and risk assessment	—	—
8.1 Objectives	ISO 26262-3:2018, 6.1	Modified
8.2 General	ISO 26262-3:2018, 6.2	Modified
8.3 Input to this clause	—	—
8.3.1 Prerequisites	ISO 26262-3:2018, 6.3.1	Identical
8.3.2 Further supporting information	ISO 26262-3:2018, 6.3.2	Identical
8.4 Requirements and recommendations	—	—
8.4.1 Initiation of the hazard analysis and risk assessment	ISO 26262-3:2018, 6.4.1	Modified
8.4.2 Situation analysis and hazard identification	ISO 26262-3:2018, 6.4.2	Modified
8.4.3 Classification of hazardous events	ISO 26262-3:2018, 6.4.3	Modified
8.4.4 Determination of safety goals	ISO 26262-3:2018, 6.4.4	Modified
8.4.5 Verification	ISO 26262-3:2018, 6.4.6	Modified
8.5 Work products	ISO 26262-3:2018, 6.5	Identical
9 Vehicle integration and testing	—	—
9.1 Objective	N/A	Original
9.2 Requirements and recommendations	—	—
9.2.1 Vehicle integration	ISO 26262-4:2018, 7.4.4.1	Identical
9.2.2 Test goals and test methods during vehicle testing	ISO 26262-4:2018, 7.4.4.2	Modified
10 Safety validation	—	—
10.1 Objective	ISO 26262-4:2018, 8.1	Modified
10.2 General	ISO 26262-4:2018, 8.2	Identical
10.3 Inputs to this clause	—	—
10.3.1 Prerequisites	ISO 26262-4:2018, 8.3.1	Identical
10.3.2 Further supporting information	ISO 26262-4:2018, 8.3.2	Identical
10.4 Requirements and recommendations	—	—
10.4.1 Safety validation environment	ISO 26262-4:2018, 8.4.1	Modified
10.4.2 Specification of safety validation	ISO 26262-4:2018, 8.4.2	Identical

NOTE 1 The notation “N/A” in the superseded clause/subclause column means that that clause is not applicable because comparison target is added as original.

NOTE 2 The notations in the remark column are as follows:

— —: clauses are not for comparison, for example, clause includes only title;

— Original: clauses are added in ISO 26262-12:2018;

— Modified: clauses include partially superseded requirements from other parts;

— Identical: clauses are same requirements of other parts.

Table 1 *(continued)*

Clause/subclause of ISO 26262-12:2018	Superseded clause/sub-clause	Remark
10.4.3 Execution of safety validation	ISO 26262-4:2018, 8.4.3	Modified
10.4.4 Evaluation	ISO 26262-4:2018, 8.4.4	Identical
10.5 Work products	ISO 26262-4:2018, 8.5	Identical

NOTE 1 The notation "N/A" in the superseded clause/subclause column means that that clause is not applicable because comparison target is added as original.

NOTE 2 The notations in the remark column are as follows:

— —: clauses are not for comparison, for example, clause includes only title;

— Original: clauses are added in ISO 26262-12:2018;

— Modified: clauses include partially superseded requirements from other parts;

— Identical: clauses are same requirements of other parts.

4.2 Categorization of differences

Table 2 explains the method of categorization of differences between ISO 26262-12:2018 and other parts of ISO 26262:2018 series.

Table 2 — Categorization of differences

Categorization	Remarks
Added	It is intended difference to add new phrase, figure or table.
Deleted	It is intended difference to delete existing phrase, figure or table.
Modified	It is intended difference to modify phrase to adapt.
Unintended	It is unintended difference but acceptable.

The following differences are excluded from comparison and categorization results because they have no impact on the section meaning:

— reference number;

— existence of symbol, e.g. comma, hyphen, quotation mark;

— word form, e.g. singular/plural, verb form;

— article and preposition.

4.3 Interpretation of comparison tables

The comparison and categorization results are listed in tables. Different parts of sections are underlined except in case of figure or table constitution or no comparison target. Each superscript for individualization is shown with parentheses because of the possibility of confusing them with the original superscripts of compared sections as follows:

— superscript for footnote: marked by a letter and noted at the bottom of table, e.g. a, b, c;

— superscript for category: marked by number and noted in rightmost column, e.g. (1), (2), (3).

The notation "N/A" in first column and second column means that there is no section to be compared.

5 Comparison of safety culture

This clause explains the differences in content relating to safety culture between ISO 26262-12:2018 and ISO 26262-2:2018. The differences and their categorization are listed in Table 3.

Table 3 — Comparison of safety culture

Sections according to:		No.	Category
ISO 26262-12:2018	ISO 26262-2:2018		
6.1 Objective To provide a tailoring of ISO 26262-2:2018, 5.4.2 for motorcycle.(1)	N/A	1	Added
6.2.1 The organization shall create, foster, and sustain a safety culture that supports and encourages the effective achievement of functional safety for motorcycles(2).	5.4.2.1 The organization shall create, foster, and sustain a safety culture that supports and encourages the effective achievement of functional safety.	2	Added
6.2.3 The organization shall institute and maintain effective communication channels between functional safety, cybersecurity, and other potentially interacting(3) disciplines that are related to the achievement of functional safety, if applicable(4).	5.4.2.3 The organization shall institute and maintain effective communication channels between functional safety, cybersecurity, and other disciplines that are related to the achievement of functional safety.	3 4	Added Added
N/A	5.4.2.3 EXAMPLE 2 Communication channels between functional safety and non-E/E related safety such as mechanical safety.(5)	5	Deleted

6 Comparison of confirmation measures

This clause explains the differences in content relating to confirmation measures between ISO 26262-12:2018 and ISO 26262-2:2018. The differences and their categorization are listed in Table 4.

Table 4 — Comparison of confirmation measures

Sections according to:		No.	Category
ISO 26262-12:2018	ISO 26262-2:2018		
7.1 Objective The objective of this clause is to define the independency requirements of confirmation measures associated with ASIL.(1)	N/A	1	Added
7.2.1 NOTE 1 For motorcycles, Table 1 of this document replaces ISO 26262-2:2018, Table 1.(2)	N/A	2	Added
Table 1 (Columns of ASIL A, B and C)(3)	Table 1 (Columns of ASIL A, B, C and D)(3)	3	Deleted
Table 1 (1st row, 1st column) Confirmation review of the impact analysis at item level (see ISO 26262-2:2018, 6.5.1) Independence with regard to those creating the work product(4)	Table 1 (1st row, 1st column) Confirmation review of the impact analysis at the item level (see 6.5.1) Independence with regard to the author of the impact analysis and project management(4)	4	Modified

Table 4 *(continued)*

Sections according to:		No.	Category
ISO 26262-12:2018	**ISO 26262-2:2018**		
Table 1 (2nd row, 1st column) Confirmation review of the hazard analysis and risk assessment (see Clause 8) Independence with regard to those creating[5] the work product	Table 1 (2nd row, 1st column) Confirmation review of the hazard analysis and risk assessment (see ISO 26262-3:2018, Clause 6) Independence with regard to the developers of the item, project management and the authors of[5] the work product	5	Modified
Table 1 (3rd row, 1st column) Confirmation review of the safety plan (see ISO 26262-2:2018, 6.5.3) Independence with regard to those creating[6] the work product NOTE 1 A confirmation review of the safety plan includes a review of the impact analyses at element level performed due to the reuse of existing elements (see ISO 26262-2:2018, 6.5.2). NOTE 2 The safety plan includes the proven in use arguments (analysis, data and credit) of the proven in use candidates and the corresponding tailoring, if applicable (see ISO 26262-2:2018, 6.4.6 and ISO 26262-8:2018, Clause 14). NOTE 3 The safety plan includes tailoring due to the use of software tools, if applicable (see ISO 26262-2:2018, 6.4.6 and ISO 26262-8:2018, Clause 11).	Table 1 (3rd row, 1st column) Confirmation review of the safety plan (see 6.5.3) Independence with regard to the developers of the item, project management and the authors of[6] the work product. NOTE 1 A confirmation review of the safety plan includes a review of the impact analyses at element level performed due to the reuse of existing elements (see 6.5.2). NOTE 2 The safety plan includes the proven in use arguments (analysis, data and credit) of the proven in use candidates and the corresponding tailoring, if applicable (see 6.4.6 and ISO 26262-8:2018, Clause 14). NOTE 3 The safety plan includes tailoring due to the use of software tools, if applicable (see 6.4.6 and ISO 26262-8:2018, Clause 11).	6	Modified
Table 1 (4th row, 1st column) Confirmation review of the Functional Safety Concept (see ISO 26262-3:2018, Clause 7), supported by the results of the corresponding-safety analyses and dependent failure analyses (see ISO 26262-9:2018, Clause 8 and ISO 26262-9:2018, Clause 7, respectively) Independence with regard to those creating[7] the work product	Table 1 (4th row, 1st column) Confirmation review of the Functional Safety Concept (see ISO 26262-3:2018, Clause 7), supported by the results of the corresponding safety analyses and dependent failure analyses (see ISO 26262-9:2018, Clause 8 and ISO 26262-9:2018, Clause 7, respectively) Independence with regard to the developers of the item, project management and the authors of[7] the work product	7	Modified
Table 1 (5th row, 1st column) Confirmation review of the Technical Safety Concept (see ISO 26262-4:2018, Clause 6), supported by the results of the corresponding safety analyses and dependent failure analyses (see ISO 26262-9:2018, Clause 8 and ISO 26262-9:2018, Clause 7, respectively) Independence with regard to those creating[8] the work product	Table 1 (5th row, 1st column) Confirmation review of the Technical Safety Concept (see ISO 26262-4:2018, Clause 6), supported by the results of the corresponding safety analyses and dependent failure analyses (see ISO 26262-9:2018, Clause 8 and ISO 26262-9:2018, Clause 7, respectively) Independence with regard to the developers of the item, project management and the authors of[8] the work product	8	Modified

Table 4 *(continued)*

Sections according to:		No.	Category
ISO 26262-12:2018	**ISO 26262-2:2018**		
Table 1 (6th row, 1st column) Confirmation review of the integration and test strategy (see ISO 26262-4:2018, Clause 7) Independence with regard to those creating[9] the work product	Table 1 (6th row, 1st column) Confirmation review of the integration and test strategy (see ISO 26262-4:2018, Clause 7) Independence with regard to the developers of the item, project management and the authors of[9] the work product	9	Modified
Table 1 (7th row, 1st column) Confirmation review of the safety validation specification (see ISO 26262-4:2018, Clause 8) Independence with regard to those creating[10] the work product	Table 1 (7th row, 1st column) Confirmation review of the safety validation specification (see ISO 26262-4:2018, Clause 8) Independence with regard to the developers of the item, project management and the authors of[10] the work product	10	Modified
Table 1 (8th row, 1st column) Confirmation review of the safety analyses and the dependent failure analyses (see ISO 26262-9:2018, Clause 8 and ISO 26262-9:2018, Clause 7, respectively) Independence with regard to those creating[11] the work product	Table 1 (8th row, 1st column) Confirmation review of the safety analyses and the dependent failure analyses (see ISO 26262-9:2018, Clause 8 and ISO 26262-9:2018, Clause 7, respectively) Independence with regard to the developers of the item, project management and the authors of[11] the work product	11	Modified
Table 1 NOTE Figure 3 shows a simplified structure for a better understanding of independence. In different companies, the organizational units could be named differently.[12]	N/A	12	Added
Table 1 a (footnote) The indicated levels of independence are intended to represent minimum requirements.[13] The notations are defined as follows:	Table 1 a (footnote) The notations are defined as follows:	13	Added
Table 1 a (footnote) — I2: the confirmation measure shall be performed, by a person from a team that is different from that[14] responsible for the creation of the considered work product(s), i.e. by a person not reporting to the same direct superior; and	Table 1 a (footnote) — I2: the confirmation measure shall be performed, by a person who is independent from the team that is[14] responsible for the creation of the considered work product(s), i.e. by a person not reporting to the same direct superior; and	14	Modified
Table 1 a (footnote) — I3: the confirmation measure shall be performed, by a person from a different department or organization, i.e. not reporting to the same department leader responsible for the release of the[15] work product(s)	Table 1 a (footnote) — I3: the confirmation measure shall be performed by a person who is independent, regarding management, resources and release authority, from the department responsible for the creation of the considered[15] work product(s).	15	Modified
Figure 3 [16]	N/A	16	Added

7 Comparison of hazard analysis and risk assessment

This clause explains the differences in content relating to hazard analysis and risk assessment between ISO 26262-12:2018 and ISO 26262-3:2018. The differences and their categorization are listed in Table 5.

Table 5 — Comparison of hazard analysis and risk assessment

Sections according to:		No.	Category
ISO26262-12:2018	ISO 26262-3:2018		
8.1 a) to specify the necessary requirements that need to be complied with in order to perform a motorcycle specific hazard analysis and risk assessment;(1)	N/A	1	Added
8.2 Due to the fact that the dynamic behaviour of motorcycles differs greatly from that of other vehicles within the scope of the ISO 26262 series of standards, and that controllability of motorcycle specific hazardous events could place more emphasis on the rider, it is recognised that the method of performing risk assessment requires a degree of tailoring to best suit motorcycle specific hazardous events.(2) Hazard analysis, risk assessment and MSIL(3) determination are used to determine the safety goals for the item. For this, the item is evaluated with regard to its potential hazardous events. Safety goals and their assigned MSIL(4) are determined by a systematic evaluation of hazardous events. The MSIL(5) is determined by considering severity, probability of exposure and controllability. It is based on the item's functional behaviour; therefore, the detailed design of the item does not need to be known.	6.2 Hazard analysis, risk assessment and ASIL(3) determination are used to determine the safety goals for the item. For this, the item is evaluated with regard to its potential hazardous events. Safety goals and their assigned ASIL(4) are determined by a systematic evaluation of hazardous events. The ASIL(5) is determined by considering severity, probability of exposure and controllability. It is based on the item's functional behaviour; therefore, the detailed design of the item does not need to be known.	2 3 4 5	Added Modified Modified Modified
8.2 NOTE Product development processes and technical solutions within the motorcycle industry differ from those of the automobile industry. The worldwide established level of technology ("state-of-the-art") in the motorcycle industry suggests that ASIL classification is inappropriate for motorcycles. Therefore MSIL classification as the output of the HARA is used. An alignment between MSIL and ASIL classification is established to use requirements as defined in other parts of ISO 26262 and accommodate worldwide capability of the motorcycle industry.(6)	N/A	6	Added
N/A	6.4.1.2 EXAMPLE Electronic stability control can mitigate the effect of failures in chassis systems by increasing the controllability for the driver if it is shown to be available and independent from the item under evaluation.(7)	7	Deleted

[a] ISO 26262-3:2018, 6.4.3.8 NOTE 2 is divided into two notes and edited respectively: ISO 26262-12:2018, 8.4.3.8 NOTE 1 and NOTE 2. The divided sentence is marked with dotted underline for clarification.

[b] ISO 26262-3:2018, 6.4.5 include some requirements, but they are categorized collectively as "Deleted" because all of them are requirements for T&B.

Table 5 *(continued)*

Sections according to:		No.	Category
ISO26262-12:2018	**ISO 26262-3:2018**		
8.4.2.1 EXAMPLE 1 A normal motorcycle is not expected to travel on unimproved or unpaved surfaces at high speed.(8)	N/A	8	Added
8.4.2.1 EXAMPLE 2 A normal motorcycle is not expected to be used for road race, motocross or trial events.(9)	N/A	9	Added
N/A	6.4.2.2 NOTE 2 The responsibility to establish external measures to mitigate the additional risks from transporting goods is outside of the scope of ISO 26262. Therefore, the additional risks related to the transport of goods are not part of the hazard analysis and risk assessment.(10)	10	Deleted
8.4.2.3 NOTE 1 In general, each hazard will have a variety of potential causes related to the item's implementation but they(11) do not need to be considered in the hazard analysis and risk assessment for the analysis of the malfunctioning behaviour.	6.4.2.3 NOTE 1 In general, each hazard will have a variety of potential causes related to the item's implementation, but these causes(11) do not need to be considered in the hazard analysis and risk assessment for the analysis of the malfunctioning behaviour.	11	Unintended
8.4.2.4 NOTE As these hazards are outside the scope of ISO 26262, this document does not provide guidance for MSIL determination and(12) ASIL compliance of these hazards. Such hazards are classified according to the procedures of the applicable safety discipline.	6.4.2.4 NOTE As these hazards are outside the scope of ISO 26262, this document does not provide guidance for ASIL compliance of these hazards. Such hazards are classified according to the procedures of the applicable safety discipline.	12	Added
N/A	6.4.2.6 EXAMPLE 1 Loss of the functionality of a braking system (ESC) can lead to the simultaneous unavailability of driver assistance functions.(13)	13	Deleted
8.4.2.6 EXAMPLE Failure of the vehicle's electrical power supply system can lead to a simultaneous loss of a number of functions including “engine torque” and “forward illumination”.	6.4.2.6 EXAMPLE 2 Failure of the vehicle's electrical power supply system can lead to a simultaneous loss of a number of functions including "engine torque", "power assisted steering"(14) and "forward illumination".	14	Deleted
8.4.2.7 It shall be ensured that the chosen level of detail of the list of operational situations does not lead to an inappropriate lowering of the MSIL(15).	6.4.2.7 It shall be ensured that the chosen level of detail of the list of operational situations does not lead to an inappropriate lowering of the ASIL(15).	15	Modified

[a] ISO 26262-3:2018, 6.4.3.8 NOTE 2 is divided into two notes and edited respectively: ISO 26262-12:2018, 8.4.3.8 NOTE 1 and NOTE 2. The divided sentence is marked with dotted underline for clarification.

[b] ISO 26262-3:2018, 6.4.5 include some requirements, but they are categorized collectively as “Deleted” because all of them are requirements for T&B.

Table 5 *(continued)*

Sections according to:		No.	Category
ISO26262-12:2018	**ISO 26262-3:2018**		
8.4.2.7 NOTE A very detailed list of operational situations (see 8.4.2.1) for one hazard, with regard to the vehicle state, road conditions and environmental conditions, can lead to a fine granularity of situations for the classification of hazardous events. This can make it easier to rate controllability and severity. However, a larger number of different operational situations can lead to a consequential reduction of the respective classes of exposure, and thus to an inappropriate lowering of the MSIL(16). This can be avoided by aggregating similar situations.	6.4.2.7 NOTE A very detailed list of operational situations (see 6.4.2.1) for one hazard, with regard to the vehicle state, road conditions and environmental conditions, can lead to a fine granularity of situations for the classification of hazardous events. This can make it easier to rate controllability and severity. However, a larger number of different operational situations can lead to a consequential reduction of the respective classes of exposure, and thus to an inappropriate lowering of the ASIL(16). This can be avoided by aggregating similar situations.	16	Modified
8.4.3.2 NOTE 1 The risk assessment of hazardous events focuses on the harm to each person potentially at risk — including the rider(17) or the passengers of the vehicle causing the hazardous event, and other persons potentially at risk such as cyclists, pedestrians or occupants of other vehicles. The description of the Abbreviated Injury Scale (AIS) can be used for characterising the severity and can be found in Annex B, along with informative examples of different types of severity and accidents. Where available, motorcycle appropriate accident databases can be used to provide a basis for determining severity levels.(18)	6.4.3.2 NOTE 1 The risk assessment of hazardous events focuses on the harm to each person potentially at risk – including the driver(17) or the passengers of the vehicle causing the hazardous event, and other persons potentially at risk such as cyclists, pedestrians or occupants of other vehicles. The description of the Abbreviated Injury Scale (AIS) can be used for characterising the severity and can be found in Annex B, along with informative examples of different types of severity and accidents.	17 18	Modified Added
8.4.3.2 NOTE 2 The severity class can be based on a combination of injuries, resulting in(19) a higher classification of the severity than from considering(20) a single injury.	6.4.3.2 NOTE 2 The severity class can be based on a combination of injuries, and this can lead to(19) a higher classification of the severity than would result from just looking at(20) a single injury.	19 20	Unintended Unintended
8.4.3.2 NOTE 5 Standard protective equipment (e.g. helmet, protective jacket, gloves and boots) as prescribed in the vehicle user manual is assumed to be in use.(21)	N/A	21	Added
N/A	6.4.3.3 EXAMPLE 1 If an accident occurs which is not caused by the malfunctioning behaviour of an item, the resulting harm from the accident is not considered for the classification of the severity.(22)	22	Deleted

[a] ISO 26262-3:2018, 6.4.3.8 NOTE 2 is divided into two notes and edited respectively: ISO 26262-12:2018, 8.4.3.8 NOTE 1 and NOTE 2. The divided sentence is marked with dotted underline for clarification.

[b] ISO 26262-3:2018, 6.4.5 include some requirements, but they are categorized collectively as “Deleted” because all of them are requirements for T&B.

Table 5 *(continued)*

Sections according to:		No.	Category
ISO26262-12:2018	**ISO 26262-3:2018**		
8.4.3.3 EXAMPLE For an automotive application,[23] the item under consideration includes an airbag functionality to reduce crash violence[24]. For an accident in which the airbag fails to deploy, the crash violence could be assumed to correspond to a severity class of S3[25]. If a correctly operating airbag would have reduced the crash violence to a level corresponding to a severity class of S2, the difference would be one severity class. Hence the severity class for the failure to deploy the airbag in this situation can be set to S1[26].	6.4.3.3 EXAMPLE 2 The item under consideration includes an airbag functionality to reduce harm caused by the crash[24]. For an accident in which the airbag fails to deploy, the harm caused by the crash can be determined[25]. If a correctly operating airbag would have reduced the harm of the same accident to a lower severity class, then only the difference is considered for the severity classification[26].	23 24 25 26	Added Modified Modified Modified
8.4.3.4 The severity class S0 may be assigned if the hazard analysis and risk assessment determines that the consequences of a malfunctioning behaviour of the item are clearly limited to material damage. If a hazardous event is assigned severity class S0, no MSIL[27] assignment is required.	6.4.3.4 The severity class S0 may be assigned if the hazard analysis and risk assessment determines that the consequences of a malfunctioning behaviour of the item are clearly limited to material damage. If a hazardous event is assigned severity class S0, no ASIL[27] assignment is required.	27	Modified
8.4.3.7 Class E0 may be used for those operational situations that are suggested during hazard analysis and risk assessment, but that are considered incredible and therefore not explored further. A rationale shall be recorded for the exclusion of these situations. If a hazardous event is assigned exposure class E0, no MSIL[28] assignment is required.	6.4.3.7 Class E0 may be used for those operational situations that are suggested during hazard analysis and risk assessment, but that are considered incredible, and therefore not explored further. A rationale shall be recorded for the exclusion of these situations. If a hazardous event is assigned exposure class E0, no ASIL[28] assignment is required.	28	Modified
8.4.3.8 The controllability of each hazardous event, by the rider[29] or other persons involved in the operational situation, shall be estimated based on a defined rationale for each hazardous event. The controllability shall be assigned to one of the controllability classes C0, C1, C2 or C3 in accordance with Table 4.	6.4.3.8 The controllability of each hazardous event, by the driver[29] or other persons involved in the operational situation shall be estimated based on a defined rationale for each hazardous event. The controllability shall be assigned to one of the controllability classes C0, C1, C2 or C3 in accordance with Table 3.	29	Modified
N/A	6.4.3.8 NOTE 1 For classes C1 to C3, the difference in probability from one C class to the next is an order of magnitude.[30]	30	Deleted

[a] ISO 26262-3:2018, 6.4.3.8 NOTE 2 is divided into two notes and edited respectively: ISO 26262-12:2018, 8.4.3.8 NOTE 1 and NOTE 2. The divided sentence is marked with dotted underline for clarification.

[b] ISO 26262-3:2018, 6.4.5 include some requirements, but they are categorized collectively as “Deleted” because all of them are requirements for T&B.

Table 5 *(continued)*

Sections according to:		No.	Category
ISO26262-12:2018	**ISO 26262-3:2018**		
8.4.3.8 NOTE 1 The evaluation of the controllability is an estimate of the probability that someone is able to gain sufficient control of the hazardous event, such that they are able to avoid the specific harm. For this purpose, the parameter C is used, with the classes C0, C1, C2 and C3, to classify the potential of avoiding harm. Some examples, which serve as an interpretation of these classes, are listed in Table B.4. Estimates can be made using either experimental or analytical procedures.(31) 8.4.3.8 NOTE 2 For motorcycles,(32) It is assumed that the rider(33) is in an appropriate condition to ride(34) (e.g. they are not tired), has the appropriate riding(35) training (they have a rider's(36) licence), understands the operational characteristics of the motorcycle in use(37) and is complying with the applicable legal regulations, including due care requirements to avoid risks to other traffic participants.	6.4.3.8 NOTE 2[a] The evaluation of the controllability is an estimate of the probability that someone is able to gain sufficient control of the hazardous event, such that they are able to avoid the specific harm. For this purpose, the parameter C is used, with the classes C0, C1, C2 and C3, to classify the potential of avoiding harm. It is assumed that the driver(33) is in an appropriate condition to drive(34) (e.g. they are not tired), has the appropriate driver(35) training (they have a driver's(36) licence) and is complying with the applicable legal regulations, including due care requirements to avoid risks to other traffic participants. Some examples, which serve as an interpretation of these classes, are listed in Table B.6.	31 32 33 34 35 36 37	Added Added Modified Modified Modified Modified Added
N/A	6.4.3.8 NOTE 3 Reasonably foreseeable misuse is considered, e.g. "not keeping the required distance to the vehicle in front as a common behaviour".(38)	38	Deleted
8.4.3.8 NOTE 5 For motorcycle hazardous events, the evaluation of controllability levels is described in Annex C.(39)	N/A	39	Added
8.4.3.8 NOTE 7 Dedicated regulation refers to requirements set by a governmental agency, which can specify minimum performance limits that must be met by all manufacturers in order for their vehicles to be approved for sale and use.(40)	N/A	40	Added
8.4.3.9 Class C0 may be used for hazards addressing the unavailability of the item if they do not affect the safe operation of the vehicle (e.g. some rider(41) assistance systems) or if an accident can be avoided by routine rider(42) actions. If a hazardous event is assigned controllability class C0, no MSIL(43) assignment is required.	6.4.3.9 Class C0 may be used for hazards addressing the unavailability of the item if they do not affect the safe operation of the vehicle (e.g. some driver(41) assistance systems) or if an accident can be avoided by routine driver(42) actions. If a hazardous event is assigned controllability class C0, no ASIL(43) assignment is required.	41 42 43	Modified Modified Modified

[a] ISO 26262-3:2018, 6.4.3.8 NOTE 2 is divided into two notes and edited respectively: ISO 26262-12:2018, 8.4.3.8 NOTE 1 and NOTE 2. The divided sentence is marked with dotted underline for clarification.

[b] ISO 26262-3:2018, 6.4.5 include some requirements, but they are categorized collectively as "Deleted" because all of them are requirements for T&B.

Table 5 *(continued)*

Sections according to:		No.	Category
ISO26262-12:2018	**ISO 26262-3:2018**		
N/A	6.4.3.9 EXAMPLE 1 If loss of propulsion occurs in the garage when attempting to drive away from the house, C0 can be chosen as any driver can put the car back in park.(44)	44	Deleted
N/A	6.4.3.9 EXAMPLE 2 A dedicated regulation that covers the requirements for the certification of a vehicle system with a precise definition of forces or acceleration values in the case of a failure.(45)	45	Deleted
8.4.3.10 An MSIL(46) shall be determined for each hazardous event based on the classification of severity, probability of exposure and controllability, in accordance with Table 5.	6.4.3.10 An ASIL(46) shall be determined for each hazardous event based on the classification of severity, probability of exposure and controllability, in accordance with Table 4.	46	Modified
8.4.3.10 NOTE Four MSILs(47) are defined: MSIL(48) A, MSIL(49) B, MSIL(50) C and MSIL(51) D, where MSIL(52) A is the lowest safety integrity level and MSIL(53) D the highest one.	6.4.3.10 NOTE 1 Four ASILs(47) are defined: ASIL(48) A, ASIL(49) B, ASIL(50) C and ASIL(51) D, where ASIL(52) A is the lowest safety integrity level and ASIL(53) D the highest one.	47 48 49 50 51 52 53	Modified Modified Modified Modified Modified Modified Modified
N/A	Table 4 a (footnote) See 6.4.3.11 (54)	54	Deleted
N/A	6.4.3.11 If several unlikely situations are combined that result in a lower probability of exposure than E1, QM may be argued for S3, C3 based on this combination.(55)	55	Deleted
N/A	6.4.3.11 EXAMPLE 1 For the malfunction of a high voltage system erroneously supplying power. The combined operational situations are: — a crash which deploys the airbag; — with the vehicle lying partly in the water; and — the high voltage system partially exposed without causing an internal short circuit.(56)	56	Deleted

[a] ISO 26262-3:2018, 6.4.3.8 NOTE 2 is divided into two notes and edited respectively: ISO 26262-12:2018, 8.4.3.8 NOTE 1 and NOTE 2. The divided sentence is marked with dotted underline for clarification.

[b] ISO 26262-3:2018, 6.4.5 include some requirements, but they are categorized collectively as “Deleted” because all of them are requirements for T&B.

Table 5 *(continued)*

Sections according to:		No.	Category
ISO26262-12:2018	**ISO 26262-3:2018**		
N/A	6.4.3.11 EXAMPLE 2 For the malfunction of a fuel pump supplying petrol erroneously. The combined operational situations are: — a crash which deploys the airbag; — the tank system behind the pump remains fully functional; — the fuel line from the pump is broken, such that petrol can drip on hot parts; and — the energy supply of the pump is fully functional.(57)	57	Deleted
8.4.3.11 The MSIL shall be mapped to an ASIL in accordance with Table 6, prior to the definition of the safety goals, so that the applicable requirements of the ISO 26262 series of standards can be adopted.(58)	N/A	58	Added
8.4.3.11 NOTE 1 In addition to these three(59) ASILs, the class QM (quality management) denotes no requirement to comply with ISO 26262. Nevertheless, the corresponding hazardous event can have consequences with regards to safety and safety requirements can be formulated in this case. The classification QM indicates that quality processes are sufficient to manage the identified risk.	6.4.3.10 NOTE 2 In addition to these four(59) ASILs, the class QM (quality management) denotes no requirement to comply with ISO 26262. Nevertheless, the corresponding hazardous event can have consequences with regards to safety and safety requirements can be formulated in this case. The classification QM indicates that quality processes are sufficient to manage the identified risk.	59	Modified
8.4.3.11 NOTE 2 The MSIL is mapped to ASIL so that the most appropriate degree of rigour is used in avoiding unreasonable residual risk associated with malfunctioning E/E items or elements used in motorcycle applications.(60)	N/A	60	Added
8.4.3.11 NOTE 3 The indicated ASIL levels, determined from MSIL levels, are intended to represent minimum requirements.(61)	N/A	61	Added
Table 6(62)	N/A	62	Added
8.4.4.1 A safety goal shall be determined for each hazardous event with an ASIL, mapped from MSIL,(63) evaluated in the hazard analysis and risk assessment. If similar safety goals are determined, these may be combined into one safety goal.	6.4.4.1 A safety goal shall be determined for each hazardous event with an ASIL evaluated in the hazard analysis and risk assessment. If similar safety goals are determined, these may be combined into one safety goal.	63	Added

[a] ISO 26262-3:2018, 6.4.3.8 NOTE 2 is divided into two notes and edited respectively: ISO 26262-12:2018, 8.4.3.8 NOTE 1 and NOTE 2. The divided sentence is marked with dotted underline for clarification.

[b] ISO 26262-3:2018, 6.4.5 include some requirements, but they are categorized collectively as “Deleted” because all of them are requirements for T&B.