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# Road Vehicles — Extended vehicle (ExVe) methodology —

## Part 2: Methodology for designing the extended vehicle

*Véhicules routiers — Méthodologie du véhicule étendu (ExVe) — Partie 2: Méthodologie pour désigner le véhicule étendu*



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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).

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This document was prepared by Technical Committee is ISO/TC 22 *Road vehicles*, Subcommittee SC 31, *Data communication*.



A list of all parts in the ISO 20077 series can be found on the ISO website.

# Introduction

This document is dedicated to the extended vehicle (ExVe).

In the early 2010s, advances in technology have led to new ways of communicating with the vehicle where digital information could be accessed not only in a physical way, but also wirelessly.

The removal of the constraint of a physical connection has enabled

— remote access to vehicle functionality that previously was impossible or very difficult, and

— simplified access to multiple information sources which have together created opportunities for new functionalities.

These advances have generated an increased need for interconnection with data specific to each vehicle. This phenomenon was similar to the increase of new functionalities enabled by the usage of multiplexed buses in vehicles.

This evolution has led to the introduction of the “extended vehicle” (ExVe) concept as described in ISO 20077-1.

Technical constraints and societal needs should be taken into account when designing these new functionalities. It is also necessary to mitigate the risks introduced by the new communication means between the ExVe and the external world.

In this context, this document aims at guiding the ExVe manufacturer by specifying a set of general rules and basic principles from which each ExVe manufacturer derives their own detailed and specific methods or procedures to design an extended vehicle.

# Road Vehicles — Extended vehicle (ExVe) methodology —

# Part 2:
# Methodology for designing the extended vehicle

## 1 Scope

This document specifies general rules and basic principles the manufacturer of the extended vehicle (ExVe) considers when elaborating its own design method. It does not specify the manner in which these design methods are drafted and implemented.

It specifies by means of a template the necessary information that is communicated to the ExVe manufacturer for requesting the design of a new ExVe functionality. It also specifies, by means of a template, the information the ExVe manufacturer provides for responding to that request. It does not specify the process leading to the elaboration of the request information nor the process associated to communication of the response information.

It concerns the design of the extended vehicles mentioned in the scope of ISO 20077-1, regardless of the type of communication interface which is used between the ExVe and external systems or parties. It does not concern the internal communication of the ExVe. It does not standardize the implementation of software or hardware nor preclude any technical solution the ExVe manufacturer might select when designing a new ExVe functionality.



It relates to the design and production phases of a vehicle, where these phases include the subsequent design upgrades by the ExVe manufacturer of vehicle models, variants, or types still in production.



NOTE Should new interfaces for remote communication with the vehicle become mandatory, then this document is also applicable for designing the requested ExVe functionalities.

## 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 20077-1, *Road vehicles — Extended vehicle (ExVe) — Methodology — Part 1: General information*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20077-1 and the following apply.

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

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

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

**3.1**
**basic principle**
design principle that is considered when designing an extended vehicle

**3.2**
**life cycle**
various situations that the vehicle will encounter during its whole life including manufacture, customer's use, maintenance and recycling

**3.3**
**local diagnostic facilitator**
person at the vehicle that is in communication with the remote technician and facilitates the diagnostics by that person's capacity to act as requested by the remote technician and to answer the remote technician's questions

Note 1 to entry: Any person not able, at the minimum, to understand or describe the indications of the on-board instruments and tell-tales shall not be considered as local diagnostic facilitator.

**3.4**
**operator**
person at the vehicle who is operating, controlling or working on an extended vehicle

EXAMPLE The local diagnostic facilitator.

**3.5**
**requester**
company or legal entity who is submitting to an ExVe manufacturer a request for a new ExVe functionality in the ExVe

Note 1 to entry: When submitting a request, a vehicle manufacturer acting as an after-sales service provider shall be considered as a requester.

Note 2 to entry: When the vehicle manufacturer is the same as the ExVe manufacturer, they may use their own internal processes.



**3.6**
**rule**
fundamental design requirement that is complied with when designing an extended vehicle

## 4 Abbreviated terms

BP Basic Principle

ECU Electronic Control Unit

ExVe Extended Vehicle

LDF Local Diagnostic Facilitator

NUM rule or BP number

R Rule

VER Version of rule or BP number

VM Vehicle Manufacturer

# 5 Conventions for identifying rules and basic principles and for specifying their content

In this document, rules and basic principles are formalized as follows:

| **XX_NUM** | Text of the rule or basic principle |
|---|---|
| *VER* | |

XX_NUM_VER: reference of the rule (R) or basic principle (BP) in which

— XX is a letter to identify rule (R) or basic principle (BP),

— NUM is an integer which allows the rule or basic principle to be distinguished. NUM is an integer between 001 to and including 999, and

— VER: Version of the XX_NUM. VER is an integer between 001 and including 999. Any new version shall have an integer greater than the previous version.

In this document, there can only be a single version (VER) for each rule or basic principle considered.

EXAMPLE 1

R_025_011 and R_026_011 are 2 different rules.

EXAMPLE 2

BP_025_010 and BP_025_030 are 2 versions of the same basic principle which cannot belong to the same version of the standard.



NOTE Rules and basic principle can be followed by an explanatory text.



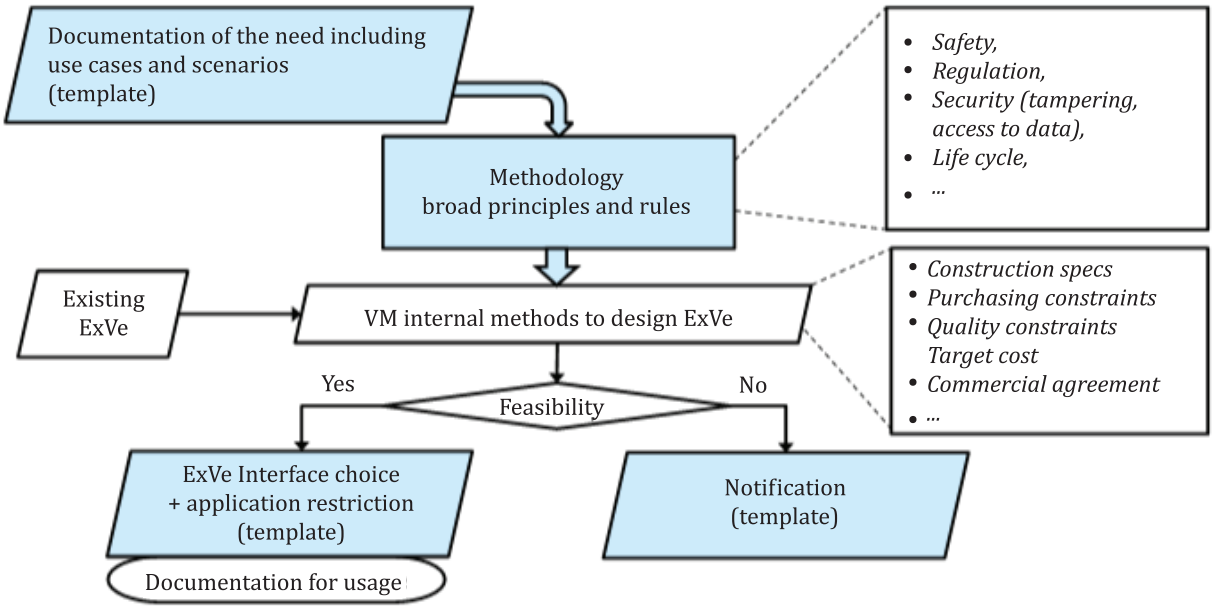
# 6 Overview of the design methodology of the extended vehicle

## 6.1 Role of the design methodology in the design process of an extended vehicle

The role of this methodology is to provide guidelines for the design of the extended vehicle and its interfaces (physical, documentation, support, etc.) by specifying a system of general requirements, including rules and basic principles, from which the ExVe manufacturer shall derive its own methods or procedures to design an extended vehicle that address a specific set of use-cases and scenarios.

It does not specify these methods and procedures, which remain part of the know-how of the ExVe manufacturer.

Each ExVe manufacturer has usually formalized the way of working in this design process through corporate methods and procedures as illustrated in Figure 1.




NOTE Blue areas in this figure are within the scope of this document.

**Figure 1 — Schematic of the ExVe design methodology context**



## 6.2 The ExVe design methodology content

The ExVe design methodology contains (see Figure 2)



— a standardised template for providing the minimum information needed for a complete description of the new requested ExVe functionality (see 9.2),

— a generic system of rules and basic principles enabling the introduction of a new ExVe functionality (see Clauses 7 and 8), and

— a standardised template for providing the minimum information needed when responding to a request for an ExVe functionality (see 9.2).

Figure 2 illustrates this content in the case when the request and response information is provided by means of the templates specified in respectively Annexes A and B.

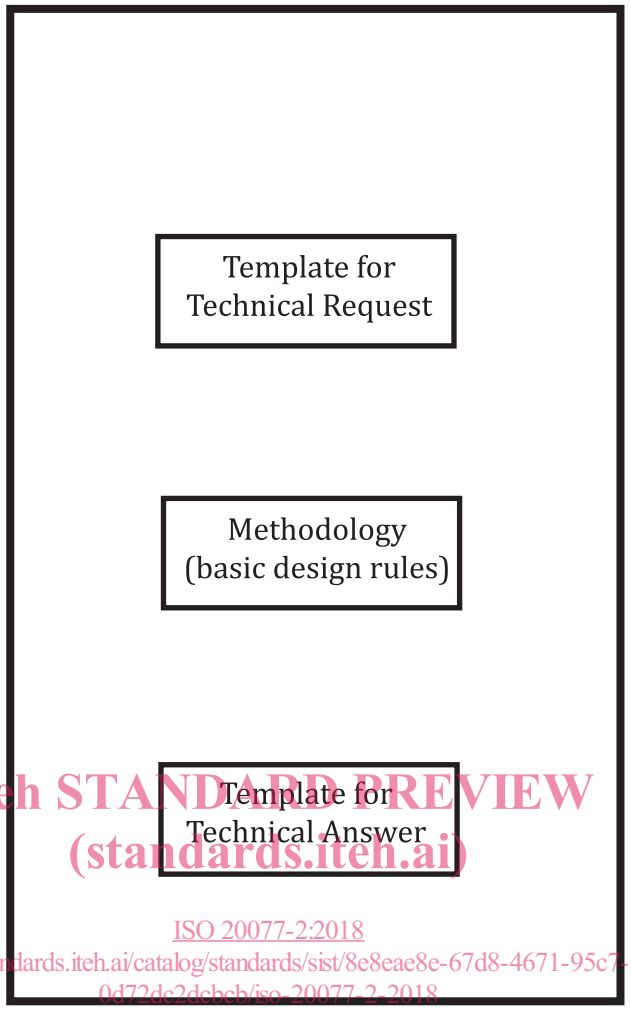





**Figure 2 — Structure of this document**

## 6.3 Consideration of new ExVe functionalities

The ExVe design methodology is applied by the ExVe manufacturer by considering the rules and basic principles of this document.

This applies during the design of or a design change to an extended vehicle involving direct or indirect communication between that vehicle and third parties, which may, for example, be the vehicle operator, the vehicle owner, service providers, or other ExVe's.

The need for new ExVe functionalities can result from legislation, standards or individual requests from requesters. In that case, the need for a new ExVe functionality shall be defined by the requester through the request template describing precisely all the required elements (e.g. performance related).

Designing specific new interfaces for remote communication with the vehicle may result from regulatory requirements. This methodology is also applicable in that case.

This methodology concerns any request from a requester for a new functionality of the ExVe. It also concerns the case when an existing functionality is requested to be extended or remotely available. It is applicable by all the involved manufacturers in the case of a multi-stage manufacturing.

Enabling new functionalities by just adding new equipment without taking the existing design into account may not give a satisfying result. On the one hand, new requested functionalities may uncontrollably interfere with functionalities which were installed in the initial or existing design. On the other hand, all the components required for these additional functionalities are not usually found in