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BSI Standards Publication

Road vehicles — Open diagnostic data exchange (ODX)

Part 3: Fault symptom exchange description (FXD)

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National foreword

This British Standard is the UK implementation of ISO 22901-3:2018.

The UK participation in its preparation was entrusted to Technical Committee AUE/16, Data Communication (Road Vehicles).

A list of organizations represented on this committee can be obtained on request to its secretary.

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Published by BSI Standards Limited 2018

ISBN 978 0 580 81925 4

ICS 43.180

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 March 2018.

Amendments/corrigenda issued since publication

Date	Text affected

INTERNATIONAL ISO

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First edition
2018-02

Road vehicles — Open diagnostic data exchange (ODX) —

Part 3: Fault symptom exchange description (FXD)

Véhicules routiers — Diagnostic généralisé, échange de données (ODX) —

Partie 3: Format d'échange de système de défaut (FXD)

Reference number
ISO 22901-3:2018(E)

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Contents

Page

Foreword ... **vi**

Introduction ... **vii**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Abbreviated terms ... **1**

5 Specification release version information ... **2**
5.1 Specification for FXD XML-Schema release version ... 2

6 FXD concept ... **2**
6.1 Overview ... 2
6.2 Traditional workflow ... 3
6.3 Raw information ... 3
6.3.1 General definition and background ... 3
6.3.2 Requirements ... 3
6.4 FXD format and example ... 4
6.5 Basic concept of FXD ... 5
6.5.1 Basic requirements ... 5
6.5.2 Formal description of diagnosis algorithms ... 5
6.5.3 Value inheritance mechanism to support use cases ... 6
6.6 FXD workflow ... 7
6.7 FXD workflow example ... 8
6.8 Constraints for schema updates ... 9

7 FXD use cases ... **10**
7.1 General ... 10
7.2 UC 1 Delivery of "raw information" by ECU software suppliers ... 10
7.3 UC 2 – Generation of documentation based on FXD raw information ... 11
7.3.1 UC 2.1 Generation of OBD summary sheet for vehicle type approval ... 11
7.3.2 UC 2.2 FXD-based repair and maintenance information ... 11

8 General properties of FXD elements ... **12**
8.1 Attributes ... 12
8.1.1 DESC-EXTENT (Content) ... 13
8.1.2 HREF (Content) ... 13
8.1.3 ID (Infrastructure) ... 13
8.1.4 ID-REF (Infrastructure) ... 14
8.1.5 OID (Content) ... 14
8.1.6 OPERATOR (Content) ... 15
8.1.7 SI (Content) ... 15
8.1.8 DESC-STATE (Content) ... 15
8.1.9 TI (Infrastructure) ... 16
8.1.10 VERSION (Content) ... 16
8.1.11 xml:base (Infrastructure) ... 16
8.1.12 xml:lang (Infrastructure) ... 16
8.1.13 xsi:nil (Content) ... 17
8.1.14 xsi:type (Infrastructure) ... 17
8.2 Variant coding ... 17
8.3 Generic selection lists ... 18
8.4 External document references ... 18
8.5 Referencing ECU variables and calibration labels ... 18
8.6 General FXD elements, used for identification and description ... 18

9 Description of FXD elements ... **19**
9.1 General ... 19

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9.2 ADMIN-DATA ... 19
9.2.1 General ... 19
9.2.2 COMPANY-DATA-REF ... 19
9.2.3 ECU-FAMILY ... 19
9.2.4 PROJECT ... 19
9.2.5 RESOURCES ... 19
9.2.6 DOC-REVISIONS ... 19
9.3 COMPANY-DATAS ... 20
9.3.1 General ... 20
9.3.2 COMPANY-DATA ... 20
9.4 DATA-DICTIONARY ... 20
9.4.1 DATA-DECLARATIONS ... 20
9.4.2 COMPUTATIONS ... 21
9.4.3 UNIT-SPEC ... 22
9.5 VARIABLE-DESCRIPTIONS ... 22
9.5.1 General ... 22
9.5.2 Element-Id ... 23
9.5.3 COMPANY-DATA-REF ... 23
9.5.4 ECU-FUNCS ... 23
9.5.5 CONFIGURATION ... 23
9.5.6 DATA-DECLARATION described by a VARIABLE-DESCRIPTION ... 23
9.5.7 SIMPLE-VARIABLE ... 23
9.5.8 BIT-FIELD-VARIABLE ... 23
9.5.9 STATE-GRAPH ... 24
9.6 FAULT-SYMPTOMS ... 24
9.6.1 General ... 24
9.6.2 Element-Id ... 24
9.6.3 COMPANY-DATA-REF ... 25
9.6.4 ECU-FUNCS ... 25
9.6.5 CONFIGURATION ... 25
9.6.6 FAULT-IDENTIFICATION ... 25
9.6.7 MON-COMPONENT or system ... 26
9.6.8 FAULT-CLASSIFICATION ... 26
9.6.9 RATIO-GROUPS for in-use monitor performance ratio (IUMPR) ... 27
9.6.10 READINESS-GROUP ... 28
9.6.11 FAULT-DETECTIONS ... 28
9.6.12 CENTRAL-CALIBRATION-INFOS ... 38
9.6.13 INHIBITIONS information ... 39
9.6.14 SUBSTITUTION-FUNCTION ... 41
9.6.15 PROTECTIVE-FUNCTION ... 41
9.6.16 SIMULATION-METHOD ... 41
9.6.17 ##other-Information (for symptoms) ... 42
9.7 FAULT-SYMPTOM-3RD-PARTYS ... 43
9.8 SERVICE-06-IDS ... 43
9.9 FIDS ... 44
9.9.1 General ... 44
9.9.2 Element-Id ... 45
9.9.3 FID-TYPE ... 45
9.9.4 ECU-FUNC ... 45
9.9.5 FAULT-SYMPTOM-REFS ... 45
9.9.6 AUXILIARY-OBJECT-REFS ... 45
9.9.7 EXPLANATION ... 45
9.10 AUXILIARY-OBJECTS ... 46
9.11 MASKS ... 46
9.12 TEXT-MAPPINGS ... 46
9.13 Any Other-Information (for container) ... 46

Annex A (normative) **Digital Annex of FXD XML-Schema** ... **47**

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Annex B (normative) **Digital Annex of FXD Selection Dictionary** **76**
Annex C (normative) **Digital Annex of FXD Rule Set** **151**
Annex D (informative) **Inhibition of fault symptoms** **194**
Bibliography **198**

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 ISO/TC 22, *Road vehicles*, Subcommittee SC 31, *Data communication*.

Annex A, B and C of this document are normative and Annex D is for information only.

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Introduction

0.1 Overview

This document has been established in order to define a new format called FXD (Fault symptom eXchange Description) which has been developed for provision of machine-readable descriptions of mainly fault symptom algorithms which are implemented as diagnostic software in an Electronic Control Unit (ECU).

The main business case is the data exchange from a function and software supplier to a vehicle manufacturer in a standardized format (FXD XML-Schema) in order to enable a tool based processing.

The software supplier will provide software related raw data, which have to be extended and refined by the vehicle manufacturer for different use cases. Based on the FXD content and associated calibration values, several end user documents can be generated such as the summary table for OBD documentation.

The expected main benefits of the FXD approach are an overall improved efficiency as well as an independency of system supplier and vehicle manufacturer-specific format handling.

FXD is an extension of ODX in order to support the documentation and fault symptom data exchange use cases for type approval and repair and maintenance information (RMI).

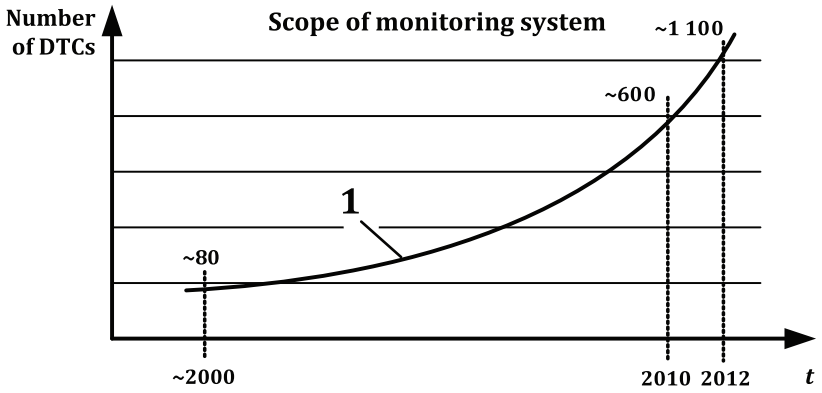
A normative annex will include the FXD XML-Schema which represents the data model for the digital exchange of the FXD data.

0.2 Motivation

The complexity of OBD monitoring systems is continuously evolving. Technological progress and regulatory updates drive the complexity of both engine systems themselves and the related OBD monitoring systems. For instance, the number of monitors and thereby also Diagnostic Trouble Codes (DTC) has considerably increased over time as shown here for a 6-cylinder gasoline application from calendar year 2000 up to 2012.

In addition to the pure number of monitors, also the OBD monitors themselves have become more and more sophisticated.

Figure 1 shows the evolving complexity of OBD systems.



Key

1 6-cyl gasoline engine

Figure 1 — Evolving complexity of OBD systems

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0.3 Project complexity

Today's project complexity (e.g. variants) at the vehicle manufacturers is also an important aspect for diagnostic documentation. For all OBD-relevant monitoring strategies, the corresponding OBD documentation is generated. When these monitors are integrated by often different project teams, they may need to be specifically adapted and calibrated in order to operate properly in the different projects.

To ensure accurate OBD documentation across all projects, considerable efforts for synchronization and manual adjustment are necessary. Obviously, this specific approach will provide only a limited reuse potential.

Figure 2 shows the project complexity and accurate OBD documentation.

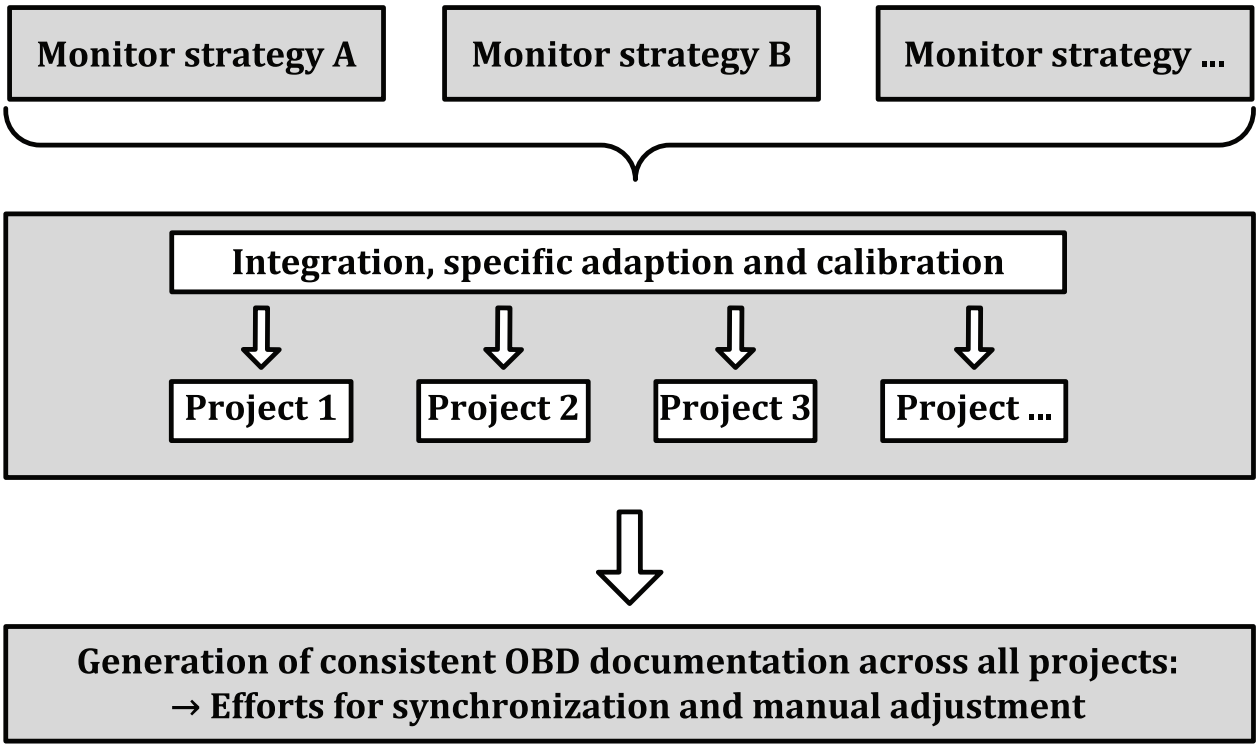

Figure 2 — Project complexity and accurate OBD documentation

In addition more complicated business models (multiple job shares across companies) challenge the OBD documentation process.

In the past, typically one ECU supplier also supplied most of the corresponding software. Nowadays and even more in future with the Autosar approach, the trend towards software packages from vehicle manufacturer and 3rd parties will increase.

As a consequence, multiple suppliers provide the information for the generation of OBD documentation with different format, structure and content. For understanding, it is often necessary to dig into the details of the complete software documentation itself. This is why the efforts for the integration and generation of OBD relevant information increases due to manual analysis and adjustment. Obviously this scenario will allow only a limited reuse.

Figure 3 shows the challenging job share and consistent OBD documentation.

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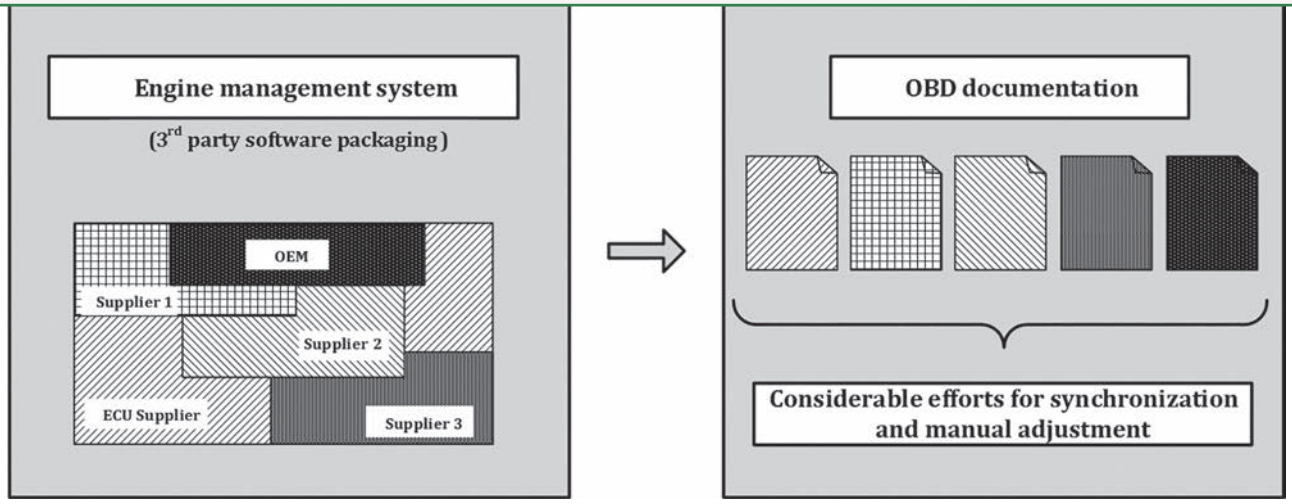

Figure 3 — Job sharing challenge and consistent OBD documentation

Scheduling constraints for generating OBD documentation during the development phase also represent a motivating factor for the introduction of the FXD approach. As the OBD development has become more and more extensive, the documentation is established as early as possible, but on the other hand late changes will cause iterations. Without efficient management of the corresponding OBD-relevant information, it is nearly impossible to answer to the challenging engineering targets and tight project schedules of today.

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Road vehicles — Open diagnostic data exchange (ODX) —

Part 3: Fault symptom exchange description (FXD)

1 Scope

This document specifies machine-readable descriptions of all fault symptom algorithms which are implemented as diagnostic software in an electronic control unit (ECU). The main use case is the standardized data exchange from a function & software supplier to a vehicle manufacturer (VM) in order to enable a tool-based information processing. Based on the FXD content and associated calibration values, several end user documents can be generated such as the "summary sheet" needed as part of the vehicle type approval documentation package or the “repair and maintenance information” (RMI). The expected main benefits of the FXD approach are an overall efficiency improvement as well as an independency of supplier- and VM-specific format handling.

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 22901-1, *Road vehicles — Open diagnostic data exchange (ODX) — Part 1: Data model specification*

SAE J1930-DA, *Digital Annex of E/E Systems Diagnostic Terms, Definitions, Abbreviations, and Acronyms*

SAE J1979-DA, *Digital Annex of E/E Diagnostic Test Modes*

SAE J2012-DA, *Digital Annex of E/E Diagnostic Trouble Code Definitions and Failure Type Byte Definitions*

3 Terms and definitions

No terms and definitions are listed in this document.

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

4 Abbreviated terms

For the purposes of this document, the abbreviated terms given in SAE J1930-DA, SAE J1979-DA and SAE J2012-DA and the following apply.

a2l	ASA P2 description file
AUTOSAR	AUTomotive Open System ARchitecture
DCY	driving cycle
DTC	diagnostic trouble code

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