International Standard

ISO 16400-2

First edition
2024-02

Automation systems and integration — Equipment behaviour catalogues for virtual production systems —

Part 2: Formal description of a catalogue template

Systèmes d'automatisation et intégration — Catalogues de comportement des équipements pour les systèmes de production virtuelle —

Partie 2: Description formelle d'un modèle de catalogue

Reference number
ISO 16400-2:2024(en)

© ISO 2024



COPYRIGHT PROTECTED DOCUMENT

© ISO 2024

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Abbreviated terms ... **1**
5 Requirements for an EBC template ... **2**
6 Formal structure of an EBC template ... **2**
6.1 General ... 2
6.2 Property set ... 4
6.3 Behaviour ... 4
6.4 External interaction ... 5
6.5 Formal description of an EBC template ... 5
7 Building rules for an EBC template ... **6**
7.1 Building procedure ... 6
7.2 Building criteria ... 7
Annex A (informative) **EBC template and types of EBC items** ... **8**
Annex B (informative) **Example building of EBC templates for a printed circuit assembly (PCA) line** ... **10**
Annex C (informative) **Example building of EBC templates for an injection molding line** ... **32**
Bibliography ... **50**

© ISO 2024 – All rights reserved

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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 184, *Automation systems and integration*, Subcommittee SC 5, *Interoperability, integration, and architectures for enterprise systems and automation applications*.

A list of all parts in the ISO 16400 series can be found on the ISO website.

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.

© ISO 2024 – All rights reserved

Introduction

The ISO 16400 series introduces a concept of an equipment behaviour catalogue (EBC), addresses the requirements of an EBC and proposes guidelines to generate an executable representing the dynamic behaviour of a nominal or physical instance of an equipment. Such executable plays a vital role when configuring virtual production systems used for simulation and verification of a future process as well as monitoring of a current process. Therefore, EBCs will constitute an important part of the evolution of smart manufacturing.

An EBC enables an efficient and standardized way for a provider of equipment to communicate its dynamic behaviour.

© ISO 2024 – All rights reserved

Automation systems and integration — Equipment behaviour catalogues for virtual production systems —

Part 2:
Formal description of a catalogue template

1 Scope

This document specifies a formal structure and building rules for an equipment behaviour catalogue (EBC) template.

The formal structure of an EBC template represents a schema for descriptions of behaviour and related entities.

Building rules for an EBC template provide required processes and compliance criteria to construct an EBC template.

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 16400-1:2020, *Automation systems and integration — Equipment behaviour catalogues for virtual production system — Part 1: Overview*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16400-1 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 Abbreviated terms

ID	Identifier
JSON	JavaScript Object Notation
mathML	Mathematical Markup Language
UML	Unified Modeling Language
XML	eXtensible Markup Language

© ISO 2024 – All rights reserved