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Automation systems and integration — Evaluating energy efficiency and other factors of manufacturing systems that influence the environment —

Part 5: Environmental performance evaluation data

Systèmes d'automatisation et intégration — Évaluation de l'efficacité énergétique et autres facteurs de fabrication des systèmes qui influencent l'environnement —

Partie 5: Données d'évaluation de la performance environnementale

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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).

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.

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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 184, *Automation systems and integration*, Subcommittee SC 5, *Interoperability, integration, and architectures for enterprise systems and automation applications,* in collaboration with the International Electrotechnial Commission (IEC), Technical Committee IEC/TC 65, *Industrial-process measurement, control and automation*.

This second edition cancels and replaces the first edition (ISO 20140-5:2017), which has been technically revised.

The main changes are as follows:

a) renewal of Clause 4 according to EPE data class definition;

b) restructuring and updates of Clauses 5 to 8 into new Clause 5 and Clause 6 in terms of EPE data class definitions and their properties;

c) replacement of Annexes with new Annex A, Annex B and Annex C.

A list of all parts in the ISO 20140 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.

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Introduction

The ISO 20140 series specifies a method for evaluating the energy efficiency and other factors of a manufacturing system that influence the environment, such as energy consumption, waste, and release.

The ISO 20140 series can be used for:

— benchmarking the environmental performance against a generic reference manufacturing system or comparing between different manufacturing systems;

— alternative studies for improving environmental performance;

— setting targets for improving environmental performance;

— visualizing the environmental performance of a manufacturing system under operation;

— managing carbon footprints of products (CFP) in a supply chain;

— evaluating the environmental performance of manufacturing systems.

Expected users of the ISO 20140 series are:

a) managers who are responsible for the environmental conditions of a manufacturing system;

b) engineers who design manufacturing processes for products;

c) engineers who design a manufacturing system;

d) engineers and supervisors who are responsible for manufacturing products.

This document classifies environmental performance evaluation (EPE) data. The classification intends to support the association of EPE data with context information and transferring them across various locations and disciplines in the manufacturing system.

This document provides EPE data classes which are used in the aggregation process specified in ISO 20140-3 to evaluate environmental performance of a manufacturing system. This document intends to allow mapping EPE data to various implementations based on different technologies by providing formal and technology-independent definitions of EPE data classes. The EPE data classes are intended to be stored in concept data dictionaries (e.g. IEC CDD).

This document is the second edition of ISO 20140-5, which replaces the first edition ISO 20140-5: 2017. The objective and the scope of both documents are the same. Both documents define the same set of EPE data classes. In order to improve the applicability of EPE data for evaluating various manufacturing processes, this document defines EPE data classes by a classification scheme differently from the first edition. The classification of the first edition is based on properties of manufacturing operations, i.e., source and time of EPE data generation. The classification of this document is based on a general concept of a manufacturing process, and detailed EPE data classes are defined systematically. The definitions of EPE data classes and types of properties are given respectively in Clause 5 and Clause 6 of this document. In order to retain the general use of the definitions, individual EPE data derived from EPE data classes and its properties are not described in this document. Detailed individual EPE data and properties specified in the first edition of ISO 20140-5 can be represented by using the class definitions given in this document.

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Automation systems and integration — Evaluating energy efficiency and other factors of manufacturing systems that influence the environment —

Part 5: Environmental performance evaluation data

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1 Scope

This document defines a set of environmental performance evaluation (EPE) data classes, including their properties.

It is applicable to entire manufacturing facilities or to parts of a manufacturing facility.

This document applies to manufacturing systems including discrete, batch and continuous control, which are defined in IEC 62264-1.

The following are outside the scope of this document:

— syntax of EPE data and data models;

— protocols to exchange EPE data;

— functions that can be enabled by the use of EPE data;

— product life cycle assessment;

— EPE data that are specific to a particular industry sector, manufacturer or machinery;

— acquisition of EPE data.

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 10303 (all parts), *Industrial automation systems and integration — Product data representation and exchange*

ISO 11014, *Safety data sheet for chemical products — Content and order of sections*

ISO 13584-42, *Industrial automation systems and integration — Parts library — Part 42: Description methodology: Methodology for structuring parts families*

ISO 14224, *Petroleum, petrochemical and natural gas industries — Collection and exchange of reliability and maintenance data for equipment*

ISO/TS 15926-4, *Industrial automation systems and integration — Integration of life-cycle data for process plants including oil and gas production facilities — Part 4: Initial reference data*

ISO 20140-1, *Automation systems and integration — Evaluating energy efficiency and other factors of manufacturing systems that influence the environment — Part 1: Overview and general principles*

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IEC TS 62720, *Identification of units of measurement for computer-based processing*

IEC 60721 (all parts), *Classification of environmental conditions*

IEC 61360-4, *IEC/SC 3D — Common Data Dictionary (CDD — V2.0015.0004)*

IEC 61987 (all parts), *Industrial-process measurement and control — Data structures and elements in process equipment catalogues*

IEC 62683-1, *Low-voltage switchgear and controlgear — Product data and properties for information exchange — Part 1: Catalogue data*

IEC/TR 63213, *Power measurement applications within electrical distribution networks and electrical installations*

3 Terms, definitions, abbreviated terms and conventions

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20140-1 and the following 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/

3.1.1
assembly
number of parts, subassemblies or combinations thereof joined together

[SOURCE: IEC 60194:2021, 3.1.72, modified — removed Note 1 to entry.]

3.1.2
attribute
data element for the computer-sensible description of a class definition or a property

[SOURCE: IEC 61360-1:2017, 3.1.2, modified — “a property, a relation or a class” was replaced with “a class definition or a property".]

3.1.3
classifying property
property applicable for a particular class, having a value list whose values define the subclasses of the class

[SOURCE: IEC 61360-1:2017, 3.1.7]

3.1.4
consumable
any part or material that is necessary for continued use or maintenance of the product

[SOURCE: IEC/IEEE 82079-1:2019, 3.7]

3.1.5
environmental performance evaluation data
EPE data
data that are used to evaluate the environmental performance

[SOURCE: ISO 20140-3:2019, 3.7]

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