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English version

Terminology definition for domain ontologies in materials science

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Foreword

This CEN Workshop Agreement (CWA 18353:2026) has been developed in accordance with the CEN-CENELEC Guide 29 “CEN/CENELEC Workshop Agreements – A rapid way to standardization” and with the relevant provisions of CEN/CENELEC Internal Regulations - Part 2. It was approved by the Workshop CEN “Terminology definition for domain ontologies in materials science”, the secretariat of which is held by DIN, consisting of representatives of interested parties on 2025-05-16, the constitution of which was supported by CEN following the public call for participation made on 2025-04-14. However, this CEN Workshop Agreement does not necessarily include all relevant stakeholders.

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Introduction

Semantic technologies — including ontologies and knowledge graphs — are increasingly applied to manage materials and process data in line with the FAIR principles (Findability, Accessibility, Interoperability, Reusability — see Annex A for further information). In materials science and manufacturing, large volumes of heterogeneous data often remain difficult to access and integrate, limiting comprehensive analysis and reuse.

Ontologies provide the conceptual foundation for semantic technologies. However, developing ontologies solely through a top-down approach can be time-consuming and cumbersome, as experts must start from general concepts and iteratively specialise them for specific domains. In contrast, a bottom-up approach starts from specific applications and data, identifies the application-specific terminology, and maps the data to well-defined concepts.

While attractive in practice, bottom-up ontology development raises practical questions about how to define terminology consistently — covering naming conventions, concise and differentiating definitions, sources and provenance of descriptions, multilingual labels, relations between concepts, and quality assurance.

This CEN Workshop Agreement addresses these challenges by providing a guideline and repeatable workflow for identifying, defining, and maintaining terminology for application ontologies in materials science and engineering (MSE). The guideline aims to support consistent, scalable, and interoperable ontology creation driven by real use cases and datasets, and to complement existing terminology standards and ontology best practices.

1 Scope

This CWA defines a workflow how to define, review, and implement domain-specific terminology of an application in materials science and engineering (MSE) to support domain ontology creation.

The CWA covers:

— roles and responsibilities for terminology work;

— a stepwise process from scoping and term harvesting to publication and implementation;

— a structured term record with mandatory data categories (e.g. definition type, relations, sources);

— quality insurance and review gates; and

— implementation in terminology databases.

This CWA is applicable to industrial and research use cases across MSE sub-domains and languages. It is intended for terminology curators, domain experts, ontology engineers, and data stewards involved in terminology-driven ontology development.

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 704, *Terminology work — Principles and methods*

ISO 860, *Terminology work — Harmonization of concepts and terms*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

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

3.1
concept
unit of knowledge created by a unique combination of characteristics

Note 1 to entry: Concepts are not necessarily bound to particular natural languages. They are, however, influenced by the social or cultural background which often leads to different categorizations.

Note 2 to entry: Due to their dynamic nature, concepts are also defined as units of thinking (see ISO 704:2009, 5.1 and DIN 2342:2011-08, 4.1).

[SOURCE: ISO 26162-1:2020, 3.1.2]

3.2
designation
representation of a *concept* (3.1) by a sign which denotes it in a domain or subject