

DEVELOPMENT OF NUCLEAR FUEL CYCLE TERMINOLOGY STANDARDS IN ISO

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Abstract

The paper is a review of recent activities in the management of terminology standards within the International Organization for Standardization's (ISO) technical committee for nuclear technology, nuclear facilities, and radiological protection. ISO/TC 85 has developed a six-part terminology standard based on terms and definitions within its documents. The most recently updated document in this series is ISO 12749-3, which addresses vocabulary for nuclear installations, processes and technologies excluding nuclear reactors. ISO 12749-3 was originally published in 2015 but was updated in 2024 to add key terms and concepts in the nuclear fuel cycle that had not been originally included. The paper describes how terms and associated definitions were selected for inclusion in ISO 12749-3, and the use of concepts and concept diagrams to arrange the terms in the document independently from languages such as English. Where terms have been defined in the IAEA Nuclear Safety and Security Glossary, consideration is given to utilization of the IAEA definition. It should be noted that a separate part, ISO 12749-5, addresses vocabulary for nuclear reactors. This part, published in 2018, includes a definition for "molten salt reactor." Part 1 (ISO 12749-1), which contains general terms and definitions used throughout ISO/TC 85, was published in 2020 and is now being reviewed for possible revision.

1. INTRODUCTION

The International Organization for Standardization (ISO) has over 270 technical committees [1] covering a wide variety of topics and industry sectors. Many, if not most, technical committees have one or more documents defining key terms used within the committee. The purpose of glossaries (such as the IAEA Nuclear Safety and Security Glossary [2]) and terminology documents (such as those published by ISO technical committees) is to harmonize terms used in the industry and achieve a common understanding of their meaning.

ISO/TC 85 currently has three subcommittees and two active working groups, one of which is devoted to terminology. This working group has developed a six-part vocabulary document¹, known as the ISO 12749 series, where each part addresses terms and definitions from a particular segment of the nuclear industry. Development of the first edition of each document was completed in 2020. Two of the six parts has been revised since then. Table 1 identifies the subcommittees within ISO/TC 85 and the part(s) of the ISO 12749 series associated with each.

¹ ISO uses "vocabulary" to refer to documents that deal exclusively with terms and associated definitions.

TABLE 1. TERMINOLOGY STANDARDS PUBLISHED BY ISO/TC 85

Committee / Subcommittee/ Group	Description	ISO 12749 Part	Edition	Year of Publication
ISO/TC 85	Main Committee	ISO 12749-1 [3] (General terminology)	1	2020
ISO/TC 85/WG 3	Dosimetry (disbanded)	ISO 12749-4 [6]	1	2015
ISO/TC 85/SC 2	Radiological Protection	ISO 12749-2 [4]	2	2022
ISO/TC 85/SC 5	Nuclear installations, processes, and technologies	ISO 12749-3 [5]	2	2024
ISO/TC 85/SC 6	Reactor Technology	ISO 12749-5 [7]	1	2018

In addition, in 2020 ISO/TC 85 published a terminology document for nuclear medicine, ISO 12749-6 [8].

The most recently completed work is a revision of ISO 12749-3 that was published in 2024. A revision to ISO 12749-5 is currently in progress [9].

Key aspects of the revision process for ISO 12749-3 are described below. A similar process is utilized for revisions of other parts of the ISO 12749 series. It should be noted that while ISO 12749-3 includes terms and definitions for nuclear installations, it excludes nuclear reactors, which are included in ISO 12749-5 (currently under revision). For example, ISO 12749-5 currently includes the following definition of “molten salt reactor [7]:²

molten salt reactor

nuclear reactor where the fuel is a molten salt mixed with a carrier molten salt that acts as *primary coolant*

Note 1 to entry: Molten salt is typically uranium, plutonium and thorium fluorides. Carrier molten salt is typically lithium fluorides.

2. SELECTION AND ORGANIZATION OF TERMS

2.1. Selection of Terms

In each part of the ISO 12749 series, terms are selected on the basis of whether they are used in one or more of the standards developed by ISO/TC 85 in the topical area covered by that part. As an example, for ISO 12749-3, this would primarily include terms in the standards of ISO/TC 85/SC 5 (i.e., the nuclear fuel cycle) since that part addresses the technical area of that subcommittee, as shown in Table 1.

Not all of the terms included in the ISO/TC 85/SC 5 standards are defined in ISO 12749-3. The terminology section of each standard was reviewed, and those terms considered important for harmonization and for promoting understanding of the concepts were selected for inclusion. In the second edition, emphasis was placed on terms included in newer standards (i.e., those published since the first edition) or in standards that had recently been revised.

2.2. Organization of Terms

The recommended organization of terms in an ISO vocabulary standard is described in ISO 10241-1 [11]. Organization based on a specific language is discouraged; instead, a concept system is established and the terms and the terms are arranged and presented based on the concept system. The second edition of ISO 12749-3 arranges terms on the basis of six primary concepts: nuclear materials, nuclear fuels, nuclear fuel cycle, nuclear criticality safety, transport of radioactive material, and radioactive waste [5]. These groupings are

² This term is not defined in any other ISO standard based on the ISO Online Browsing Platform [10].

different from those used in the first edition. For the convenience of users, ISO 12749-3 includes an annex with terms arranged alphabetically based on English.

As a comparison, the IAEA Safeguards Glossary [12] is also structured in a conceptual manner, including 13 sections or subject areas. By contrast, the IAEA Safety and Security Glossary [2] and the IAEA Radioactive Waste Management Glossary [13] are organized alphabetically based on English.

3. SELECTION OF DEFINITIONS

In most cases, the definition for a given term was based on the definition provided in the originating standard. Modifications were made in some cases for greater clarity or to conform with ISO style requirements. Some terms in ISO 12749-3 are also defined in the IAEA Safety and Security Glossary [2]. In the interest of harmonization, these definitions were adopted where possible. The working group has an IAEA liaison representative who assisted with this process. Any modifications that were made are clearly identified, as required by the ISO Directives [14].

At the time of publication of the first edition of ISO 12749-3, the general terminology part, ISO 12749-1, had not yet been developed. In some cases, ISO 12749-1 adopted terms found in ISO 12749-3, but used modified definitions. Where this was the case, the second edition of ISO 12749-3 adopted the definition found in ISO 12749-1.

4. APPROVAL OF ISO STANDARDS

ISO standards, including vocabulary standards, are prepared by a cognizant working group (in this case, ISO/TC 85/WG 1) whose members are appointed by their respective national standards bodies. The documents in the ISO 12749 series are then reviewed and approved by the participating members of ISO/TC 85. Currently, there are 26 participating members and an additional 22 observing members that can review but do not approve or disapprove [15].

In summary, the process of revision for ISO 12749-3 has been described. Table 2 recaps the current status of each part of the ISO 12749 series.

TABLE 2. STATUS OF EACH PART OF THE ISO 12749 SERIES

Document	Edition	Status
ISO 12749-1	1	Being reviewed for possible revision
ISO 12749-2	2	Current
ISO 12749-3	2	Current
ISO 12749-4	1	Current
ISO 12749-5	1	Edition 2: Draft International Standard later in 2025
ISO 12749-6	1	Current

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