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Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 20022-9

Financial services — Universal financial industry message scheme —

Part 9: Syntax generation requirements and rules

ICS: ISO ics

ISO/TC 68/SC 9

Secretariat: **AFNOR**

Voting begins on:
2025-03-04

Voting terminates on:
2025-05-27

This document is circulated as received from the committee secretariat.

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 20022-9 was prepared by Technical Committee ISO/TC 68, *Financial services*.

ISO 20022 consists of the following parts, under the general title Financial services — Universal financial industry message scheme:

- *Part 1: Metamodel*
- *Part 2: UML profile*
- *Part 3: Modelling*
- *Part 4: XML Schema generation*
- *Part 5: Conceptual interoperability and reverse engineering*
- *Part 6: Message transport characteristics*
- *Part 7: Registration*
- *Part 8: ASN.1 generation*
- *Part 9: Syntax Generation Requirements and Rules*

ISO 20022-1, ISO 20022-2, ISO 20022-3, ISO 20022-4, ISO 20022-5, ISO 20022-6, ISO 20022-7, ISO 20022-8 and ISO 20022-9 will be implemented by the Registration Authority, at which time support for the concepts set out within them will be effective. The implementation plan should be agreed between the Registration Authority, Registration Management Group and Technical Support Group. Users and potential users of the ISO 20022 series are encouraged to familiarize themselves with the 2025 editions as soon as possible, in order to understand their impact and take advantage of their content as soon as they are implemented by the Registration Authority. For further guidance, please contact the Registration Authority.

Introduction

This International Standard defines a scalable, methodical process to ensure consistent descriptions of messages throughout the financial services industry.

The purpose of this International Standard is to describe precisely and completely the externally observable aspects of financial services messaging in a way that can be verified independently against operational messaging.

The trigger for the creation of this International Standard was the rapid growth in the scale and sophistication of messaging within financial services during the 1990s using ISO 15022. The financial services industry (from here on referred to as "the industry") created the first version of this International Standard as the successor to ISO 15022 in response to that trigger. Since ISO 15022, the industry has broadened the scope from securities to the entire industry for this International Standard.

This International Standard is based on open technology standards, which historically have evolved more rapidly than the industry itself. Consequently, this International Standard adopted a model-driven approach where the model of the industry's messaging can evolve separately from the evolution of the messaging technology standards. The period during which this International Standard has emerged followed the widespread adoption of the World Wide Web (the Web) for business. XML (eXtensible Mark-up Language) emerged as the *de facto* standard for document representation on the Web and it became the first syntax for ISO 20022.

The modelling process is further refined into three levels which, in addition to the messaging technology standard, is why this International Standard is based on four levels: the Scope level, the Conceptual level, the Logical level and the Physical level.

This four-level approach is based on the first four levels of the Zachman Framework. The remaining two levels of the Zachman Framework are equivalent to the implementations and the operational levels, respectively.

In ISO 20022-1, the first, second and third levels are described in UML (Unified Modelling Language) because it is widely supported and supports multiple levels of abstraction. The models created in accordance with this International Standard are technology independent in that they do not require any particular physical expression or implementation. Such models aim to describe all parts of the message exchange. The models form the definition of the protocol between participants exchanging messages. This International Standard defines a method that describes a process by which these models can be created and maintained by the modellers.

The models and the Physical level artefacts are stored in a central repository, serviced by a Registration Authority. This International Standard's repository is available on the World Wide Web and offers public access for browsing.

The Repository is organized into two areas:

- A DataDictionary containing the industry model elements likely to have further or repeated use.
- A BusinessProcessCatalogue that contains models describing specific message definitions and business processes, and physical syntax implementations.

This International Standard is organized into the following parts.

- ISO 20022-1 describes in MOF (Meta-Object Facility) the metamodel of all the models and the Repository.
- ISO 20022-2 covers the UML profile, a grounding of general UML into a specific subset defined for this International Standard (to be used when UML is selected to define the models).
- ISO 20022-3 describes a modelling method to produce models for this International Standard.
- ISO 20022-4 covers XML schema generation rules to transform a Logical level model into a Physical level description in the syntaxes.

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- ISO 20022-5 covers business concept model interoperability, and logical model alignment and reverse engineering.
- ISO 20022-6 covers message transport characteristics that define the quality of service required by the business process definitions so that they can operate successfully.
- ISO 20022-7 describes the process of managing the registration of models and physical syntax implementations.
- ISO 20022-8 gives ASN.1 syntax generation rules to transform a Logical level model into a Physical level description in ASN.1.
- This part of ISO 20022 describes generic guidelines, which are used to define schema generation rules for any specific syntax.

Financial services — Universal financial industry message scheme —

Part 9: Syntax generation requirements and rules

1 Scope

This part of ISO 20022 is prepared to complement the ISO 20022 Metamodel, as specified in ISO 20022-1, with the generic requirements and guidelines to define specific syntax generation rules for other encodings in order to produce schemas based on each specific syntax generation rules in compliance with this part. Such specific syntaxes include XML, ASN.1, JSON and whatever which will emerge in the future.

Note

- 1) Here, "schema" refers to the "SyntaxMessageScheme" defined in Part 1 technically. However, for ease of reading, this part will hereafter refer to it as "schema" which is a general term for design documents that define data structures.
- 2) "XML" and "ASN.1" above do not imply ISO 20022 XML schema generation (Part 4) and ISO 20022 ASN.1 generation (Part 8) only. W3C XML Schema, ASN.1 and JSON can be used to express/define a variety type of schemas.

Note that this part is NOT a set of specific syntax generation rules, BUT a set of "meta rules" (in other words guidelines) to define a set of specific syntax generation rules.

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 20022-1:2025, *Financial services — Universal financial industry message scheme — Part 1: Metamodel*

ISO 20022-4:2025, *Financial services — Universal financial industry message scheme — Part 4: XML Schema generation*

W3C Recommendation: XML Schema Part 2: Datatypes Second Edition (28 October 2004)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20022-1 apply.

3.1 artefact

a constituent of the specific syntax that is generated by the Syntax Generation Rules.

Note 1 to entry: For example, when the specific syntax is XML, "artefacts" include XML elements "xs:schema", "xs:complexType", "xs:simpleType", "xs:element", "xs:attribute" and so on of W3C's XML Schema Definition Language and their XML attributes "name", "type", "base" and so on.

4 Background

XML (Extensible Markup Language), a standard defined by W3C (the World Wide Web Consortium), was adopted for the representation (i.e. the syntax) of standardized ISO 20022 MessageDefinitions originally when the first edition of ISO 20022 was published in 2004, and Part 4 XML Schema generation of the ISO 20022 defined a set of XML design rules.

A few years later, a need to represent ISO 20022 using a binary format was raised and Part 8 ASN.1 generation was published in 2013. Since then, yet another syntax, JSON (JavaScript Object Notation), has become one of the major data formats for exchanging messages via Web-based systems. It is obvious that dominant data format (syntax) may vary over time and circumstance.

To address such situation and to avoid adding additional syntax-specific parts to the standard, a decision was made to provide Part 9. Part 9 provides the guidelines for documenting the generation and transformation rules for any other syntax the community needs and then to make ISO 20022 itself syntax neutral. Part 4 XML Schema generation and Part 8 ASN.1 generation remain for operational continuity.

In this paradigm shift of ISO 20022, interoperability is ensured at the conceptual level of the metamodel specified in Part 1, rather than at the physical level specified in the original Part 4 XML Schema generation (ISO 20022 XML) and Part 8 ASN.1 generation (ISO 20022 ASN.1).

4.1 The Relationship of This Document with Part 1 of ISO 20022 and specific syntaxes

This part of ISO 20022 is a set of “meta rules” (in other words guidelines) for developing and documenting a set of syntax generation rules for the specific syntax from the meta model to facilitate interoperability. The figure below depicts the relationship of this document with Part 1 of ISO 20022 and specific syntaxes. A set of generation rules is necessary to transform the logical level of the metamodel defined in Part 1 to the physical representations. Part 9 specifies how to develop such a set of generation rules for producing schemas of each syntax (e.g. XML, ASN.1 and JSON).

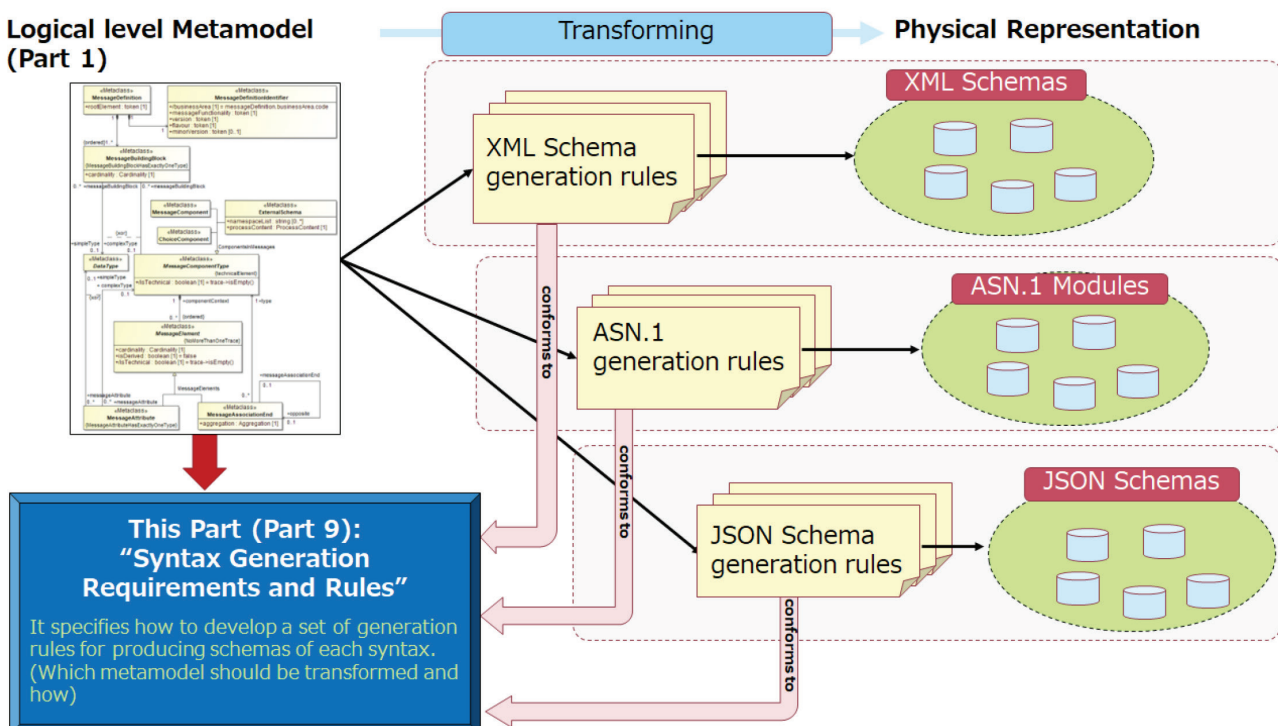


Figure 1 — The Relationship of This Document with Part 1 of ISO 20022 and specific syntaxes.

Note Part 4 XML Schema generation (ISO 20022 XML) and Part 8 ASN.1 generation (ISO 20022 ASN.1) were developed and published before this Part 9 and the guideline in Part 9 is modelled after Part 4 and Part 8. In other words, Part 9 was developed in such a way that it would serve as a guideline for generating Part 4 and Part 8. Therefore, although Part 4 and Part 8 stand alone as they are in ISO 20022, they virtually conform to Part 9, and can be considered as one of XML Schema generation rules and ASN.1 generation rules in [Figure 1](#), respectively. For these reasons, please note that Part 9 is not a specification that supersedes Part 4 and Part 8.

4.2 How to read this document

The following chapters below are the body of the transformation guidelines.

- “5 General Requirements of Syntax Generation”
- “6 ISO 20022 transformation rules for MessageSet”
- “7 MessageInstances”
- “8 Method”
- “9 Syntax Generation Rules of Logical Classes”
- “10 Syntax Generation of User-defined Data Types”

In these chapters, there are two types of notation as follows.

1) SYNTAX GENERATION RULES

This explains the procedure of syntax generation by taking each step. It is the essential part of transformation guidelines.

2) EXAMPLE (*Excerpt from Part 4*)

This is an example syntax generation rules to help readers and implementors understand what [Syntax Generation Rules] means easily because [Syntax Generation Rules] are described in very generic and abstract manner.

This Part 9 chose “ISO 20022 Part 4: XML Schema generation” as examples of transformation guidelines because Part 4 can be regarded as the concrete syntax generation specification based on Part 9 even though Part 4 had been already published before the development of Part 9.

4.3 Difference between terms(verbs) of “use” and “utilise” in Syntax Generation Rules

When processing literal information of metamodel such as names, this part uses the terms(verbs) “use” and “utilise” to express separate meanings.

- The term(verb) “use” is for expressing that the literal information is used as-is without editing or modifying.
- The term(verb) “utilise” is for expressing that the literal information may be edited/modified by abbreviating, adding prefix and/or suffix, etc.

4.4 Outline of steps to create Syntax Generation Rules

Below is an outline of the steps to create a document of syntax generation rules using Part 9 (this document).

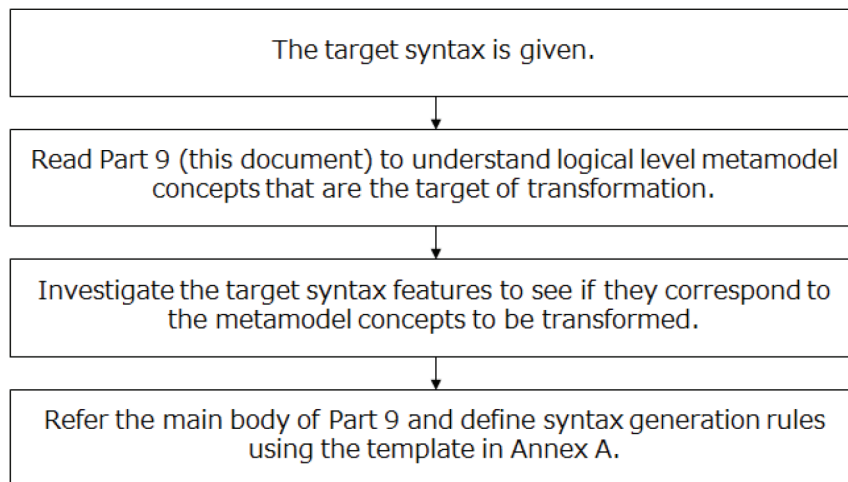


Figure 2 — Outline of steps to create Syntax Generation Rules

5 General Requirements of Syntax Generation

5.1 Transformation of logical level metamodel concepts

The following logical level metamodel concepts (or metaclass) defined in ISO 20022 Part 1 are the sources of transformation. When developing syntax generation rules these metamodel concepts shall describe how they are to be transformed to specific artefacts of the target syntax. Where concepts are not applicable and not transformed it should be noted accordingly.

When semantic markup is used to define additional logical metadata, transformation rules shall document if they or how they should be transformed.

List 1 — Logical level metamodel concepts to be transformed.

- MessageSet
- MessageDefinition
- MessageDefinitionIdentifier
- MessageBuildingBlock
- MessageComponentType
- ExternalSchema
- MessageComponent
- ChoiceComponent
- MessageElement
- MessageAttribute
- MessageAssociationEnd

See Part 1 for definitions of each concept.

Any other constraints and/or considerations may be specified for the syntax if needed.

5.2 Transformation of data types

The following DataType representations defined in ISO 20022 Part 1 are also the sources of transformation. When developing syntax generation rules, those DataType representations shall be described how they are transformed to specific data type representations of the syntax (even though some of them might not be used for the transformation for some reasons).

List 2 — User-defined DataTypes to be transformed.

- Amount
- Binary
- Boolean
- CodeSet
- Date
- DateTime
- Day
- Decimal
- Duration
- IdentifierSet
- Indicator
- Month
- MonthDay
- Pointer
- Quantity
- Rate
- String
- Text
- Time
- Year
- YearMonth

See Part 1 for definitions of each DataType.

Note Not all DataTypes have to be transformed.

5.3 Common content structure of a syntax generation specification document

The following content structure of a syntax generation specification document shall be followed.

By following the [Annex A](#) template, which consists of the metamodel concepts specified in Part 1, it becomes easier to establish semantic correspondences at the level of metamodel concepts between different syntaxes or even different applications of the same syntax.

Note The chapter number "N" below depends on the number of previous sections in each specific syntax generation specification document.

[Chapter N]: ISO 20022 transformation rules for MessageSet

- Comprehensive description of transformation for a specific syntax regarding MessageSet.

[Chapter N+1]: MessageInstances

- Description of constraints and/or requirements of physical instances for a specific syntax.

[Chapter N+2]: Method

- Explanation of general method of transformation and define components of the transformation rules as specified in the following sections, i.e., logical classes transformation, user-defined DataTypes transformation and Date and Time data types transformation.

[Chapter N+3]: Logical Classes

- Transformation rules of logical class meta-models to artefacts of the specific syntax.

[Chapter N+4]: User-defined DataTypes

- Transformation rules of user-defined data types which use DataType representations other than Date and Time related ones defined in ISO 20022 Part 1 to artefacts of the specific syntax.

[Chapter N+5]: Date and Time data types

- Transformation rules of user-defined data types which use Date and Time related DataType representations defined in ISO 20022 Part 1 to artefacts of the specific syntax.

6 ISO 20022 transformation rules for MessageSet

This section describes general requirements for transformation itself as a whole.

“Preconditions” shall at least be described as they are common for all syntaxes. Other rules for the specific syntax may be described in addition to these.

6.1 Preconditions

First of all, it is necessary to know what the input of the transformation is when developing transformation rules.

SYNTAX GENERATION RULES

The input of transformation is MessageSet meta-class which is common for all syntaxes. Therefore, the following description shall be stated as below.

“The MessageSet used as input for the transformation is a valid instance of the MessageSet meta-class.”

6.2 Annotation

In addition to information relevant for the validation of message instances with a generated schema, annotations may include unabbreviated names (original full names), definitions and meaning of concepts, along with constraints and metadata such as the units, referenced type and identification scheme. This is beneficial for users, including software developers and operational staff.

Therefore, if the syntax has a feature of adding such explanation (hereafter “annotation”), the specific syntax generation rules may specify rules for adding annotations in a schema document.

SYNTAX GENERATION RULES

Describe how a specific artefact(s) of the syntax corresponding to the annotation for each concept is generated.

The metamodel information used for annotation includes:

Definition:

- For RepositoryConcept: its "name" property and "definition" property

Application Information:

- For all RepositoryConcepts: its "name" property
- For Indicator Data Type: its "meaningWhenFalse" property and "meaningWhenTrue" property
- For Quantity Data Type: its "unitCode" property
- For Rate Data Type: its "baseUnitCode" property and "baseValue" property
- For IdentifierSet Data Type: its "identificationScheme" property
- For CodeSet Data Type: its "identificationScheme" property and "reference" property

Minor Version Information:

- For MessageDefinition, MessageDefinition and CodeSet Data Type: its "revision" property, "variation" property and "draft" property

Constraint Information:

- For RepositoryConcept: "expression" property and "expressionLanguage" property of Constraint referenced by its "constraint" property

Quantity Information:

- For Amount Data Type with non-empty "currencyIdentifierSet" property: its "name" property to generate a quantity identifier

Reference Information:

- For MessageComponentType that is referenced by non-composite MessageAssociationEnd: its "name" property to generate a reference identifier

General Information:

- For MessageDefinition: "area" property, "function" property, "flavour" property and "version" property of MessageDefinitionIdentifier referenced by its "messageDefinitionIdentifier" property

Non-metamodel information used for annotation includes:

Metadata Information:

- Date of the repository, date time the schema was generated
- The identifier of the generator software
- Its registration status in the repository, its revision and variant.

6.3 Other rules for the specific syntax

Syntax-specific requirements, such as use of some functions of the specific syntax, namespace of syntax elements and granularity of schemas, shall be described as required by each syntax.