INTERNATIONAL STANDARD

ISO 10303-504

First edition
2000-06-15

Industrial automation systems and integration — Product data representation and exchange —

Part 504:
Application interpreted construct: Draughting annotation

Systèmes d'automatisation industrielle et intégration — Représentation et échange de données de produits —

Partie 504: Construction interprétée d'application: Annotation de traçage

Reference number
ISO 10303-504:2000(E)

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 734 10 79
E-mail copyright@iso.ch
Web www.iso.ch

Printed in Switzerland

Contents

Page

Figures

Tables

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 3.

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 part of ISO 10303 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 10303-504 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 4, *Industrial data*.

This International Standard is organized as a series of parts, each published separately. The parts of ISO 10303 fall into one of the following series: description methods integrated resources, application protocols, abstract test suites, implementation methods, and conformance testing. The series are described in ISO 10303-1.

A complete list of parts of ISO 10303 is available from the internet:

http://www.nist.gov/sc4/editing/step/titles/

Annexes A and B form a normative part of this part of ISO 10303. Annexes C and D are for information only.

Introduction

ISO 10303 is an International Standard for the computer-interpretable representation and exchange of product data. The objective is to provide a neutral mechanism capable of describing product data throughout the life cycle of a product, independent from any particular system. The nature of this description makes it suitable not only for neutral file exchange, but also as a basis for implementing and sharing product databases and archiving.

This International Standard is organized as a series of parts, each published separately. The parts of ISO 10303 fall into one of the following series: description methods, integrated resources, application interpreted constructs, application protocols, abstract test suites, implementation methods, and conformance testing. The series are described in ISO 10303-1. This part of ISO 10303 is a member of the application interpreted constructs series.

An application interpreted construct (AIC) provides a logical grouping of interpreted constructs that supports a specific functionality for the usage of product data across multiple application contexts. An interpreted construct is a common interpretation of the integrated resources that supports shared information requirements among application protocols.

This document specifies the application interpreted construct for the description of annotation presented on a drawing that has a specific meaning or purpose within the scope of draughting. Annotation, in the form of text and symbology, provides additional product data that may be needed to fully define the product or interpret the drawing.

Industrial automation systems and integration — Product data representation and exchange —

Part 504: Application interpreted construct: Draughting annotation

1 Scope

This part of ISO 10303 specifies the interpretation of the integrated resources to satisfy requirements for the definition of annotation for the purpose of communicating product data and drawing interpretation information.

The following are within the scope of this part of ISO 10303:

— the presentation of non-shape product data depicted by two-dimensional or planar three-dimensional annotation;

— the structures for representing the presentation characteristics of annotation;

— the structures for representing subfigures and symbols;

— the structures for representing externally defined symbols and presentation characteristics;

— pre-defined symbols and presentation characteristics.

The following are outside the scope of this part of ISO 10303:

— annotation that presents a dimension or draughting callout.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 10303. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 10303 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 8824-1:1995, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation*.

ISO 10209-1:1992, *Technical product documentation — Vocabulary — Part 1: Terms relating to technical drawings: general and types of drawings*.

ISO 10303-1:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 1: Overview and fundamental principles*.

ISO 10303-11:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 11: Description methods: The EXPRESS language reference manual*.

ISO 10303-41:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 41: Integrated generic resources: Fundamentals of product description and support*.

ISO 10303-42:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 42: Integrated generic resources: Geometric and topological representation*.

ISO 10303-43:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 43: Integrated generic resources: Representation structures*.

ISO 10303-46:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 46: Integrated generic resources: Visual presentation*.

ISO 10303-101:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 101: Integrated application resources: Draughting*.

ISO 10303-202:1996, *Industrial automation systems and integration — Product data representation and exchange — Part 202: Application protocol: Associative draughting*.

3 Terms, definitions and abbreviations

3.1 Terms defined in ISO 10209-1

For the purposes of this part of ISO 10303, the following terms defined in ISO 10209-1 apply:

— drawing.

3.2 Terms defined in ISO 10303-1

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-1 apply:

— application;

— application context;

— application protocol (AP);

— implementation method;

— integrated resource;

— interpretation;

— product;

— product data.

3.3 Terms defined in ISO 10303-46

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-46 apply:

— annotation;

— presentation.

3.4 Terms defined in ISO 10303-101

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-101 apply:

— callout;

— draughting.

3.5 Terms defined in ISO 10303-202

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-202 apply:

— baseline;

— draughting shape model;

— externally defined;

— predefined;

— subfigure;

— symbol.

3.5.1
application interpreted construct
AIC
a logical grouping of interpreted constructs that supports a specific function for the usage of product data across multiple application contexts

[ISO 10303-202:1996]

3.6 Abbreviations

For the purposes of this part of ISO 10303, the following abbreviations apply:

AIC application interpreted construct

AP application protocol

4 EXPRESS short listing

This clause specifies the EXPRESS schema that uses elements from the integrated resources and contains the types, entity specializations, and functions that are specific to this part of ISO 10303.

NOTE 1 - There may be subtypes and items of select lists that appear in the integrated resources that are not imported into the AIC. Constructs are eliminated from the subtype tree or select list through the use of the implicit interface rules of ISO 10303-11. References to eliminated constructs are outside the scope of the AIC. In some cases, all items of the select list are eliminated. Because AICs are intended to be implemented in the context of an application protocol, the items of the select list will be defined by the scope of the application protocol.

EXPRESS Specification

```
*)
SCHEMA aic_draughting_annotation;

USE FROM draughting_element_schema                          -- ISO 10303-101
  (draughting_callout,
   terminator_symbol);

USE FROM geometry_schema                                     -- ISO 10303-42
  (axis2_placement_2d,
   geometric_representation_context);

USE FROM measure_schema                                      -- ISO 10303-41
  (conversion_based_unit,
   derived_unit,
   global_unit_assigned_context,
   length_measure_with_unit,
   length_unit,
   measure_with_unit,
   named_unit,
   plane_angle_unit,
   plane_angle_measure_with_unit,
   si_unit);
USE FROM presentation_appearance_schema                      -- ISO 10303-46
  (box_height,
   box_rotate_angle,
   box_slant_angle,
   box_width,
   context_dependent_invisibility,
   curve_style,
   curve_style_font,
   externally_defined_curve_font,
```

```
   externally_defined_hatch_style,
   externally_defined_tile_style,
   fill_area_style,
   fill_area_style_colour,
   fill_area_style_hatching,
   fill_area_style_tile_symbol_with_style,
   fill_area_style_tiles,
   null_style,
   pre_defined_curve_font,
   presentation_style_by_context,
   symbol_colour,
   symbol_style,
   text_style,
   text_style_for_defined_font,
   text_style_with_box_characteristics,
   text_style_with_mirror,
   text_style_with_spacing);

USE FROM presentation_definition_schema                    -- ISO 10303-46
  (annotation_curve_occurrence,
   annotation_fill_area,
   annotation_fill_area_occurrence,
   annotation_occurrence,
   annotation_symbol,
   annotation_symbol_occurrence,
   annotation_text_occurrence,
   composite_text,
   composite_text_with_associated_curves,
   composite_text_with_blanking_box,
   composite_text_with_extent,
   defined_symbol,
   externally_defined_symbol,
   pre_defined_symbol,
   symbol_representation,
   symbol_representation_map,
   text_alignment,
   text_literal,
   text_literal_with_associated_curves,
   text_literal_with_blanking_box,
   text_literal_with_delineation,
   text_literal_with_extent);

USE FROM presentation_resource_schema                      -- ISO 10303-46
  (colour_rgb,
   externally_defined_text_font,
   font_select,
   pre_defined_colour,
   pre_defined_text_font);

USE FROM representation_schema                             -- ISO 10303-43
  (mapped_item,
   representation,
   representation_item);
(*
```

NOTE 2 - The schemas referenced above can be found in the following parts of ISO 10303:

draughting_element_schema	ISO 10303-101
geometry_schema	ISO 10303-42
measure_schema	ISO 10303-41

presentation_appearance_schema	ISO 10303-46
presentation_definition_schema	ISO 10303-46
presentation_resource_schema	ISO 10303-46
representation_schema	ISO 10303-43

4.1 Fundamental concepts and assumptions

The following entities are intended to be independently instantiated in the application protocol schema that use this AIC:

— colour_rgb;

— curve_style;

— derived_unit;

— externally_defined_symbol;

— fill_area_style_colour;

— fill_area_style;

— measure_with_unit;

— named_unit;

— pre_defined_colour;

— pre_defined_symbol;

— presentation_style_by_context;

— representation;

— symbol_colour;

— text_style_for_defined_font;

— text_style.

4.2 aic_draughting_annotation entity definitions

4.2.1 annotation_subfigure_occurrence

An **annotation_subfigure_occurrence** is a grouping of annotation that is recognized as a subfigure.

EXPRESS specification:

```
*)
ENTITY annotation_subfigure_occurrence
  SUBTYPE OF (annotation_symbol_occurrence);
WHERE
  WR1: SIZEOF (QUERY (sty <* SELF.styles |
         NOT (SIZEOF (sty.styles) = 1)
       )) = 0;
  WR2: SIZEOF (QUERY (sty <* SELF.styles |
         NOT ('AIC_DRAUGHTING_ANNOTATION.NULL_STYLE'
               IN TYPEOF (sty.styles[1]))       ))=0;
  WR3: ('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_SYMBOL'
           IN TYPEOF (SELF.item));
  WR4: ('AIC_DRAUGHTING_ANNOTATION.DRAUGHTING_SUBFIGURE_REPRESENTATION'
           IN TYPEOF
           (SELF.item\mapped_item.mapping_source.mapped_representation));
END_ENTITY;
(*
```

Formal propositions:

WR1: The **annotation_subfigure_occurrence** shall have exactly one style.

WR2: The type of style shall be **null_style**.

WR3: The item of the **annotation_subfigure_occurrence** shall be an **annotation_symbol**.

WR4: The source of the **annotation_subfigure_occurrence** shall be a **draughting_subfigure_-representation**.

4.2.2 draughting_annotation_occurrence

A **draughting_annotation_occurrence** is an **annotation_occurrence** that specifies constraints within the context of draughting.

NOTE - An application protocol that uses this AIC may ensure that the **annotation_occurrence** entity is instantiated as an **draughting_annotation_occurrence**.

EXPRESS specification:

```
*)
ENTITY draughting_annotation_occurrence
  SUBTYPE OF (annotation_occurrence);
WHERE
  WR1:                                                -- curve_has_curve_style:
    (NOT ('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_CURVE_OCCURRENCE'
            IN TYPEOF (SELF))) OR
    (SIZEOF (QUERY (sty <* SELF.styles |
       NOT ((SIZEOF (sty.styles) = 1)
         AND ('AIC_DRAUGHTING_ANNOTATION.CURVE_STYLE'
                 IN TYPEOF (sty.styles[1])))  )) = 0);
```

```
WR2:                                          -- fill_area_has_fill_style:
  (NOT ('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_FILL_AREA_OCCURRENCE'
         IN TYPEOF (SELF))) OR    (SIZEOF (QUERY (sty <* SELF.styles |
    NOT ((SIZEOF (sty.styles) = 1)
      AND ('AIC_DRAUGHTING_ANNOTATION.FILL_AREA_STYLE'
           IN TYPEOF (sty.styles[1])))) )) = 0);
WR3:                                           -- styled_fill_boundaries:
  (NOT ('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_FILL_AREA_OCCURRENCE'
         IN TYPEOF (SELF))) OR    (SIZEOF (QUERY (bound <*
                 SELF.item\annotation_fill_area.boundaries |
     NOT (SIZEOF (QUERY (si <*
                USEDIN (bound, 'PRESENTATION_APPEARANCE_SCHEMA.' +
                               'STYLED_ITEM.ITEM') |
       ('AIC_DRAUGHTING_ANNOTATION.' +
          'ANNOTATION_CURVE_OCCURRENCE' IN TYPEOF (si)))) > 0))) = 0);
WR4:                                         -- symbol_has_symbol_style:
  (NOT ('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_SYMBOL_OCCURRENCE'
         IN TYPEOF (SELF))) OR    (SIZEOF (QUERY (sty <* SELF.styles |
     NOT ((SIZEOF (sty.styles) = 1)           AND
          (SIZEOF (TYPEOF (sty.styles[1]) *
              ['AIC_DRAUGHTING_ANNOTATION.SYMBOL_STYLE',
               'AIC_DRAUGHTING_ANNOTATION.NULL_STYLE']) = 1)) )) = 0);
WR5:                                  -- allowable_symbol_representations:
  (NOT (('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_SYMBOL_OCCURRENCE'
          IN TYPEOF (SELF)) AND
       ('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_SYMBOL'
          IN TYPEOF(SELF.item))) OR
       (SIZEOF (['AIC_DRAUGHTING_ANNOTATION.' +
                  'DRAUGHTING_SYMBOL_REPRESENTATION',
                 'AIC_DRAUGHTING_ANNOTATION.' +
                 'DRAUGHTING_SUBFIGURE_REPRESENTATION'] *
        TYPEOF (SELF.item\mapped_item.mapping_source.
                 mapped_representation)) = 1);
WR6:                                              -- text_has_text_style:
  (NOT ('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_TEXT_OCCURRENCE'
         IN TYPEOF (SELF))) OR
  (SIZEOF (QUERY (sty <* SELF.styles |
     NOT ((SIZEOF (sty.styles) = 1)
      AND ('AIC_DRAUGHTING_ANNOTATION.TEXT_STYLE'
           IN TYPEOF (sty.styles[1])))) )) = 0);
WR7:                                                -- allowable_text:
   (('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_TEXT_OCCURRENCE'
          IN TYPEOF (SELF))) OR
       (SIZEOF (TYPEOF(SELF.item) *
           ['AIC_DRAUGHTING_ANNOTATION.COMPOSITE_TEXT',
            'AIC_DRAUGHTING_ANNOTATION.TEXT_LITERAL']) = 1);
WR8:                                             -- text_not_nested:
  (NOT (('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_TEXT_OCCURRENCE'
          IN TYPEOF (SELF)) AND
       ('AIC_DRAUGHTING_ANNOTATION.COMPOSITE_TEXT'
          IN TYPEOF (SELF.item)))) OR    (SIZEOF (QUERY (tl <*
                SELF.item\composite_text.collected_text |
          NOT ('AIC_DRAUGHTING_ANNOTATION.TEXT_LITERAL'
          IN TYPEOF (tl)) )) = 0);
WR9:                                          -- text_alignment_literals:
  (NOT (('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_TEXT_OCCURRENCE'
          IN TYPEOF (SELF)) AND
       ('AIC_DRAUGHTING_ANNOTATION.TEXT_LITERAL'
          IN TYPEOF (SELF.item)))) OR (SELF.item\text_literal.alignment
          IN ['baseline left', 'baseline centre', 'baseline right']);
```

```
WR10:                                        -- text_alignment_composites:
  (NOT (('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_TEXT_OCCURRENCE'
          IN TYPEOF (SELF)) AND
        ('AIC_DRAUGHTING_ANNOTATION.COMPOSITE_TEXT'
          IN TYPEOF (SELF.item)))) OR
        (SIZEOF (QUERY (tl <* QUERY (text <* SELF.
                item\composite_text.collected_text
           |('AIC_DRAUGHTING_ANNOTATION.TEXT_LITERAL' IN TYPEOF(text))) |
         NOT (tl\text_literal.alignment IN
        ['baseline left', 'baseline centre', 'baseline right']) )) = 0);
WR11:                                          -- single_text_alignment:
  NOT (('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_TEXT_OCCURRENCE'
          IN TYPEOF(SELF)) AND
        ('AIC_DRAUGHTING_ANNOTATION.COMPOSITE_TEXT'
          IN TYPEOF (SELF.item))) OR check_text_alignment(SELF.item);
WR12:                                             -- single_text_font:
  NOT (('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_TEXT_OCCURRENCE'
          IN TYPEOF(SELF)) AND
        ('AIC_DRAUGHTING_ANNOTATION.COMPOSITE_TEXT'
          IN TYPEOF (SELF.item))) OR check_text_font(SELF.item);
WR13:                                       -- allowable_text_literals:
  (NOT (('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_TEXT_OCCURRENCE'
          IN TYPEOF(SELF)) AND
        ('AIC_DRAUGHTING_ANNOTATION.COMPOSITE_TEXT'
           IN TYPEOF (SELF.item)))) OR
        (SIZEOF (QUERY (tl <* QUERY (text <*
           SELF.item\composite_text.collected_text |
           ('AIC_DRAUGHTING_ANNOTATION.TEXT_LITERAL' IN TYPEOF (text))) |
            NOT (SIZEOF (TYPEOF(tl) *
                 ['AIC_DRAUGHTING_ANNOTATION.' +
                  'TEXT_LITERAL_WITH_BLANKING_BOX',
                  'AIC_DRAUGHTING_ANNOTATION.' +
                  'TEXT_LITERAL_WITH_ASSOCIATED_CURVES']) = 0) )) = 0);
WR14:                                    -- styled_text_literal_curves:
  (NOT (('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_TEXT_OCCURRENCE'
          IN TYPEOF (SELF)) AND
        ('AIC_DRAUGHTING_ANNOTATION.TEXT_LITERAL_WITH_ASSOCIATED_CURVES'
          IN TYPEOF (SELF.item)))) OR
  (SIZEOF (QUERY (crv <*
                SELF.item\text_literal_with_associated_curves.
                associated_curves |
    NOT (SIZEOF (QUERY (si <*  USEDIN (crv,
          'PRESENTATION_APPEARANCE_SCHEMA.STYLED_ITEM.ITEM') |
       ('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_CURVE_OCCURRENCE'
          IN TYPEOF (si)) )) > 0) )) = 0);
WR15:                                  -- styled_composite_text_curves:
  (NOT (('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_TEXT_OCCURRENCE'
          IN TYPEOF (SELF)) AND
        ('AIC_DRAUGHTING_ANNOTATION.COMPOSITE_TEXT_WITH_ASSOCIATED_CURVES'
          IN TYPEOF (SELF.item)))) OR
         (SIZEOF (QUERY (crv <*
               SELF.item\composite_text_with_associated_curves.
               associated_curves |
          NOT (SIZEOF (QUERY (si <*  USEDIN (crv,
               'PRESENTATION_APPEARANCE_SCHEMA.STYLED_ITEM.ITEM') |
              ('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_CURVE_OCCURRENCE'
          IN TYPEOF (si)) )) > 0) )) = 0);
```

```
WR16:                                              -- curve_style_has_width:
    SIZEOF (QUERY (cs <* QUERY (sty <* SELF.styles |
      ('AIC_DRAUGHTING_ANNOTATION.CURVE_STYLE' IN TYPEOF (sty.styles[1])))
      | NOT (('AIC_DRAUGHTING_ANNOTATION.LENGTH_MEASURE_WITH_UNIT'
        IN TYPEOF (cs.styles[1]\curve_style.curve_width)) AND
       ('MEASURE_SCHEMA.POSITIVE_LENGTH_MEASURE'
        IN TYPEOF (cs.styles[1]\curve_style.
        curve_width\measure_with_unit.value_component))))) = 0;
WR17:                                               -- tiling_constraints:
    SIZEOF (QUERY (fas <* QUERY (sty <* SELF.styles |
      ('AIC_DRAUGHTING_ANNOTATION.FILL_AREA_STYLE'
          IN TYPEOF (sty.styles[1]))) |
      NOT ((SIZEOF (QUERY (fs <* fas.styles[1]\fill_area_style.fill_styles
                    | ('AIC_DRAUGHTING_ANNOTATION.FILL_AREA_STYLE_TILES'
                       IN TYPEOF (fs)))) <= 1)
       AND (SIZEOF (QUERY (fst <* QUERY (fs <*
                           fas.styles[1]\fill_area_style.fill_styles |
              ('AIC_DRAUGHTING_ANNOTATION.FILL_AREA_STYLE_TILES'
                  IN TYPEOF (fs))) |
                 NOT (SIZEOF (fst\fill_area_style_tiles.tiles) = 1)
          )) = 0))
    )) = 0;
  WR18:                                              -- hatching_constraints:
    SIZEOF (QUERY (fas <* QUERY (sty <* SELF.styles |
           ('AIC_DRAUGHTING_ANNOTATION.FILL_AREA_STYLE'
            IN TYPEOF (sty.styles[1]))) |
             NOT (SIZEOF (QUERY (fsh <* QUERY (fs <*
                          fas.styles[1]\fill_area_style.fill_styles |
              ('AIC_DRAUGHTING_ANNOTATION.FILL_AREA_STYLE_HATCHING'
                IN TYPEOF (fs))) |
        NOT (fsh\fill_area_style_hatching.point_of_reference_hatch_line :=:
             fsh\fill_area_style_hatching.pattern_start)  )) = 0)  )) = 0;
  WR19:                                             -- text_style_constraint:
    SIZEOF (QUERY (ts <* QUERY (sty <* SELF.styles |
         ('AIC_DRAUGHTING_ANNOTATION.TEXT_STYLE'
         IN TYPEOF(sty.styles[1]))) |
             NOT ('AIC_DRAUGHTING_ANNOTATION.' +
                  'TEXT_STYLE_WITH_BOX_CHARACTERISTICS'
             IN TYPEOF (ts.styles[1])))) = 0;
  WR20:                                        -- text_style_characteristics:
    SIZEOF (QUERY (ts <* QUERY (sty <* SELF.styles |
         ('AIC_DRAUGHTING_ANNOTATION.TEXT_STYLE_WITH_BOX_CHARACTERISTICS'
             IN TYPEOF (sty.styles[1]))) |
           NOT (SIZEOF (ts.styles[1]\text_style_with_box_characteristics.
                characteristics) = 4) )) = 0;
END_ENTITY;
(*
```

Formal propositions:

WR1: Each **draughting_annotation_occurrence** that is an **annotation_curve_occurrence** shall have exactly one style that is a **curve_style**.

WR2: Each **draughting_annotation_occurrence** that is an **annotation_fill_area_occurrence** shall have exactly one style that is a **fill_area_style**.

WR3: If the **draughting_annotation_occurrence** is an **annotation_fill_area_occurrence**, each boundary of the **annotation_fill_area** shall be the **item** for an **annotation_curve_occurrence**.

WR4: Each **draughting_annotation_occurrence** that is an **annotation_symbol_occurrence** shall have exactly one style that is either a **symbol_style** or **null_style**.

WR5: If the **draughting_annotation_occurrence** is an **annotation_symbol_occurrence** whose item is an **annotation_symbol**, the **symbol_representation** shall be a **draughting_symbol_representation** or **draughting_subfigure_representation**.

WR6: Each **draughting_annotation_occurrence** that is an **annotation_text_occurrence** shall have exactly one style that is a **text_style**.

WR7: If the **draughting_annotation_occurrence** is an **annotation_text_occurrence**, the item shall be either **composite_text** or a **text_literal**.

WR8: If the **draughting_annotation_occurrence** is an **annotation_text_occurrence**, each **composite_-text** shall only collect **text_literal**.

WR9: If the **draughting_annotation_occurrence** is an **annotation_text_occurrence** whose item is a **text_literal**, the **text_literal** shall have the value of 'baseline left', 'baseline centre', or 'baseline right' for the **alignment**.

WR10: If the **draughting_annotation_occurrence** is an **annotation_text_occurrence** whose item is a **composite_text**, each **text_literal** included in the **composite_text** shall have the value of 'baseline left', 'baseline centre', or 'baseline right' for the **alignment**.

WR11: If the **draughting_annotation_occurrence** is an **annotation_text_occurrence**, each **text_literal** shall have the same **alignment**.

WR12: If the **draughting_annotation_occurrence** is an **annotation_text_occurrence**, each **text_literal** shall have the same **font**.

WR13: If the **draughting_annotation_occurrence** is an **annotation_text_occurrence**, each **composite_-text** shall not contain **text_literal_with_blanking_box** nor **text_literal_with_associated_curves**.

WR14: If the **draughting_annotation_occurrence** is an **annotation_text_occurrence** whose item is a **text_literal_with_associated_curves**, each curve associated with the text shall be the **item** for an **annotation_curve_occurrence**.

WR15: If the **draughting_annotation_occurrence** is an **annotation_text_occurrence** whose item is a **composite_text_with_associated_curves**, each curve associated with the text shall be the **item** for an **annotation_curve_occurrence**.

WR16: If the style of the **draughting_annotation_occurrence** is a **curve_style**, this style shall specify the units of measure associated with its **curve_width**.

WR17: If the style of the **draughting_annotation_occurrence** is a **fill_area_style**, this style shall contain, in the set of **fill_styles**, no more than one **fill_area_style_tiles** and that **fill_area_style_tiles** shall contain exactly one tile.

WR18: If the style of the **draughting_annotation_occurrence** is a **fill_area_style**, for each **fill_area_style_hatching** in the set of **fill_styles**, the **point_of_reference_hatch_line** shall be the same as the **pattern_start**.

WR19: If the style of the **draughting_annotation_occurrence** is a **text_style**, this style shall be a **text_style_with_box_characteristics**.

WR20: If the style of the **draughting_annotation_occurrence** is a **text_style_with_box_characteristics**, this style shall have exactly four elements in the set of **characteristics**.

4.2.3 draughting_subfigure_representation

A **draughting_subfigure_representation** is a **symbol_representation** that collects **annotation_occurrence**s as the definition of a subfigure.

EXPRESS specification:

```
*)
ENTITY draughting_subfigure_representation
  SUBTYPE OF (symbol_representation);
WHERE
  WR1: SIZEOF (QUERY (item <* SELF\representation.items |
         NOT (SIZEOF (['AIC_DRAUGHTING_ANNOTATION.ANNOTATION_OCCURRENCE',
              'AIC_DRAUGHTING_ANNOTATION.DRAUGHTING_CALLOUT',
              'GEOMETRY_SCHEMA.AXIS2_PLACEMENT']
               * TYPEOF (item)) = 1))) = 0;
  WR2: SIZEOF (QUERY (item <* SELF\representation.items |
         SIZEOF (['AIC_DRAUGHTING_ANNOTATION.ANNOTATION_OCCURRENCE',
                  'AIC_DRAUGHTING_ANNOTATION.DRAUGHTING_CALLOUT'] *
           TYPEOF (item)) = 1)) >= 1;
  WR3: SIZEOF (QUERY (srm <* QUERY (rm <*
          USEDIN (SELF, 'REPRESENTATION_SCHEMA.' +
                        'REPRESENTATION_MAP.MAPPED_REPRESENTATION') |
          ('AIC_DRAUGHTING_ANNOTATION.SYMBOL_REPRESENTATION_MAP'
             IN TYPEOF(rm)) |
            NOT (SIZEOF (QUERY (a_s <* QUERY (mi <* srm.map_usage |
            ('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_SYMBOL' IN TYPEOF(mi)))
          | NOT (SIZEOF (QUERY (aso <*
            USEDIN (a_s, 'PRESENTATION_APPEARANCE_SCHEMA.' +
                         'STYLED_ITEM.ITEM') |
          NOT ('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_SUBFIGURE_OCCURRENCE'
            IN TYPEOF(aso)))) = 0))) = 0))) > 0;
  WR4: NOT (acyclic_mapped_item_usage (SELF));
  WR5: SIZEOF (SELF.context_of_items.representations_in_context) = 1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **items** in a **draughting_subfigure_representation** shall be **annotation_occurrence**, **draughting_callout**, or **axis2_placement**.

WR2: At least one of the **items** in a **draughting_subfigure_representation** shall be an **annotation_occurrence** or a **draughting_callout**.

WR3: A **draughting_subfigure_representation** shall be the definition of at least one **annotation_subfigure_occurrence**.

WR4: A **draughting_subfigure_representation** shall not be the source of any **mapped_item** that participates in its definition.

WR5: The **representation_context** of a **draughting_subfigure_representation** shall not be the context of any other **representation**.

4.2.4 draughting_symbol_representation

A **draughting_symbol_representation** is a **symbol_representation** that collects **annotation_curve_occurrence**s, **annotation_symbol_occurrence**s, **annotation_text_occurrence**s, and **annotation_fill_area_occurrence**s as the definition of a symbol.

EXPRESS specification:

```
*)
ENTITY draughting_symbol_representation
  SUBTYPE of (symbol_representation);
UNIQUE
  UR1: SELF\representation.name;
WHERE
  WR1:
    SIZEOF (QUERY (item <* SELF\representation.items |
         NOT (SIZEOF (TYPEOF (item) *
            ['AIC_DRAUGHTING_ANNOTATION.ANNOTATION_CURVE_OCCURRENCE',
             'AIC_DRAUGHTING_ANNOTATION.ANNOTATION_SYMBOL_OCCURRENCE',
             'AIC_DRAUGHTING_ANNOTATION.ANNOTATION_FILL_AREA_OCCURRENCE',
             'AIC_DRAUGHTING_ANNOTATION.ANNOTATION_TEXT_OCCURRENCE',
             'GEOMETRY_SCHEMA.AXIS2_PLACEMENT']) = 1)
       )) = 0;
  WR2:
    SIZEOF (QUERY (item <* SELF\representation.items |
         (SIZEOF (TYPEOF (item) *
            ['AIC_DRAUGHTING_ANNOTATION.ANNOTATION_CURVE_OCCURRENCE',
             'AIC_DRAUGHTING_ANNOTATION.ANNOTATION_SYMBOL_OCCURRENCE',
             'AIC_DRAUGHTING_ANNOTATION.ANNOTATION_FILL_AREA_OCCURRENCE',
             'AIC_DRAUGHTING_ANNOTATION.ANNOTATION_TEXT_OCCURRENCE']) = 1)
       )) >= 1;
  WR3:
    SIZEOF (QUERY (item <* SELF\representation.items |
         'AIC_DRAUGHTING_ANNOTATION.ANNOTATION_SUBFIGURE_OCCURRENCE'
          IN TYPEOF (item))) = 0;
```

```
  WR4:
    SIZEOF (QUERY (srm <* QUERY (rm <*
          USEDIN (SELF, 'REPRESENTATION_SCHEMA.' +
                        'REPRESENTATION_MAP.MAPPED_REPRESENTATION') |
          ('REPRESENTATION_SCHEMA.SYMBOL_REPRESENTATION_MAP'
             IN TYPEOF(rm)) |
         NOT (SIZEOF (QUERY (a_s <* QUERY (mi <* srm.map_usage |
           ('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_SYMBOL' IN TYPEOF(mi))) |
         NOT (SIZEOF (QUERY(aso <*
             USEDIN(a_s, 'PRESENTATION_APPEARANCE_SCHEMA.' +
                         'STYLED_ITEM.ITEM') |
             NOT ('AIC_DRAUGHTING_ANNOTATION.ANNOTATION_SYMBOL_OCCURRENCE'
                  IN TYPEOF(aso))
          )) = 0) )) = 0) )) > 0;
  WR5:
    NOT (acyclic_mapped_item_usage (SELF));
  WR6:
    SIZEOF (SELF.context_of_items.representations_in_context) = 1;
END_ENTITY;
(*
```

Formal propositions:

UR1: The name of a **draughting_symbol_representation** shall be unique.

WR1: The **items** in a **draughting_symbol_representation** shall be **annotation_curve_occurrence**, **annotation_text_occurrence**, **annotation_symbol_occurrence**, **annotation_fill_area_occurrence**, or **axis2_placement**.

WR2: At least one of the **items** in a **draughting_symbol_representation** shall be **annotation_curve_-occurrence**, **annotation_text_occurrence**, **annotation_symbol_occurrence**, or **annotation_fill_area_-occurrence**.

WR3: The **items** in a **draughting_symbol_representation** shall not be **annotation_subfigure_-occurrence**.

WR4: A **draughting_symbol_representation** shall be the definition of at least one **annotation_symbol_-occurrence**.

WR5: No **draughting_symbol_representation** shall be the source of any **mapped_item** that participates in its definition.

WR6: The **representation_context** of a **draughting_symbol_representation** shall not be the context of any other **representation**.

4.2.5 draughting_text_literal_with_delineation

A **draughting_text_literal_with_delineation** is a **text_literal** that specifies the delineation of the text as overline or underline.

EXPRESS specification:

```
*)
ENTITY draughting_text_literal_with_delineation
  SUBTYPE OF (text_literal_with_delineation);
WHERE
  WR1: SELF.delineation IN ['underline', 'overline'];
END_ENTITY;
(*
```

Formal propositions:

WR1: Every **draughting_text_literal_with_delineation** shall have either an “underline” or an “overline” delineation.

4.3 aic_draughting_annotation function definitions

4.3.1 acyclic_mapped_item_usage

The **acyclic_mapped_item_usage** boolean function returns true if the given **representation** contains one or more **mapped_item**s that are a mapping of the **representation** itself.

EXPRESS specification:

```
*)
FUNCTION acyclic_mapped_item_usage (rep: representation) : BOOLEAN;
  -- returns TRUE if the representation contains one or more mapped_items
  -- that are a mapping of the representation itself
  LOCAL
    items : SET OF representation_item;
  END_LOCAL;

  items := QUERY (item <* rep.items |
           'AIC_DRAUGHTING_ANNOTATION.MAPPED_ITEM' IN TYPEOF (item));
  IF SIZEOF (items) = 0
  THEN
    RETURN (FALSE);
  ELSE
    REPEAT i := 1 TO HIINDEX (items);
      IF items[i]\mapped_item.mapping_source.mapped_representation :=: rep
      THEN
        RETURN (TRUE);
      ELSE
        RETURN (acyclic_mapped_item_usage(items[i]\
                  mapped_item.mapping_source.mapped_representation));
      END_IF;
    END_REPEAT;
  RETURN (FALSE);
  END_IF;
END_FUNCTION;
(*
```

Argument definitions:

rep: the input **representation** to be checked.

4.3.2 check_text_alignment

The **check_text_alignment** boolean function returns true if the given **composite_text** has a common **alignment** value for each **text_literal** contained in the set of **collected_text**.

EXPRESS specification:

```
*)
FUNCTION check_text_alignment (ct : composite_text) : BOOLEAN;

  LOCAL
    a : SET OF text_alignment := [];
  END_LOCAL;

  -- create a set of all the alignments
  REPEAT i := 1 TO HIINDEX (ct.collected_text);
    a := a + [ct.collected_text[i]\text_literal.alignment];
  END_REPEAT;

  -- if there is more than one element in the set
  -- then not all alignments were the same
  RETURN (SIZEOF(a) = 1);
END_FUNCTION;
(*
```

Argument definitions:

ct: the input **composite_text** to be checked.

NOTE - Although there is no group reference, the attribute reference “ct.collected_text” in function **check_text_alignment** is correct, since parameter “ct” is of type **composite_text** and “collected_text” is an attribute of this type.

4.3.3 check_text_font

The **check_text_font** boolean function returns true if the given **composite_text** has a common **font** value for each **text_literal** contained in the set of **collected_text**.

EXPRESS specification:

```
*)
FUNCTION check_text_font (ct : composite_text) : BOOLEAN;

  LOCAL
    f : SET OF font_select := [];
  END_LOCAL;
```

```
  -- build a set of all the fonts
  REPEAT i := 1 TO HIINDEX (ct.collected_text);
    f := f + [ct.collected_text[i]\text_literal.font];
  END_REPEAT;

  -- if there is more than one element in the set
  -- then not all fonts were the same
  RETURN (SIZEOF(f) <= 1);
END_FUNCTION;
(*
```

NOTE - Although there is no group reference, the attribute reference “ct.collected_text” in function **check_text_font** is correct, since parameter “ct” is of type **composite_text** and “collected_text” is an attribute of this type.

Argument definitions:

ct: the input **composite_text** to be checked.

```
*)
END_SCHEMA; -- aic_draughting_annotation
(*
```

Annex A
(normative)

Short names of entities

Table A.1 provides the short names of entities specified in this part of ISO 10303. Requirements on the use of the short names are found in the implementation methods included in ISO 10303.

Table A.1 - Short names of entities

Entity names	Short names
ANNOTATION_SUBFIGURE_OCCURRENCE	ANSBOC
DRAUGHTING_ANNOTATION_OCCURRENCE	DRANOC
DRAUGHTING_SUBFIGURE_REPRESENTATION	DRSBRP
DRAUGHTING_SYMBOL_REPRESENTATION	DRSYRP

Annex B
(normative)

Information object registration

B.1 Document identification

To provide for unambiguous identification of an information object in an open system, the object identifier

{ iso standard 10303 part(504) version(1) }

is assigned to this part of ISO 10303. The meaning of this value is defined in ISO/IEC 8824-1 and is described in ISO 10303-1.

B.2 Schema identification

To provide for unambiguous identification of the aic_draughting_annotation in an open system, the object identifier

{ iso standard 10303 part(504) version(1) object(1) aic-draughting-annotation (1) }

is assigned to the aic_draughting_annotation schema (see clause 4). The meaning of this value is defined in ISO/IEC 8824-1 and is described in ISO 10303-1.

Annex C
(informative)

EXPRESS-G diagrams

Figure C.1 through Figure C.13 correspond to the EXPRESS generated from the short listing given in clause 4 using the interface specifications of ISO 10303-11. The diagrams use the EXPRESS-G graphical notation for the EXPRESS language. EXPRESS-G is defined in annex D of ISO 10303-11.

NOTE - The following select types: curve_on_surface, founded_item_select, geometric_set_select, measure_-value, reversible_topology, reversible_topology_item, transformation, trimming_select, vector_or_direction are interfaced into the AIC expanded listing according to the implicit interface rules of ISO 10303-11. These select types are not referenced by other entities of this part of ISO 10303.

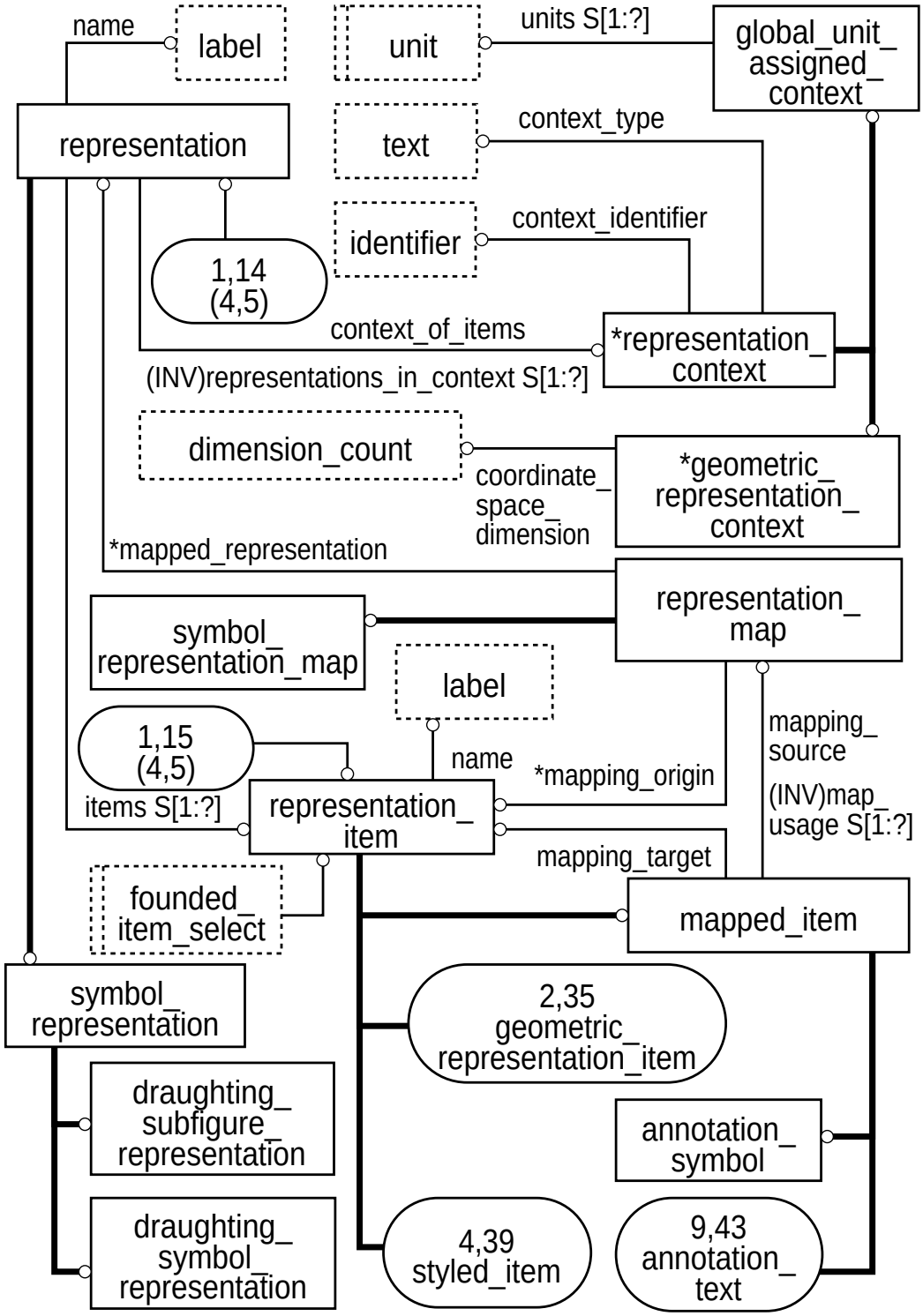

Figure C.1 - AIC expanded listing diagram in EXPRESS-G: 1 of 13

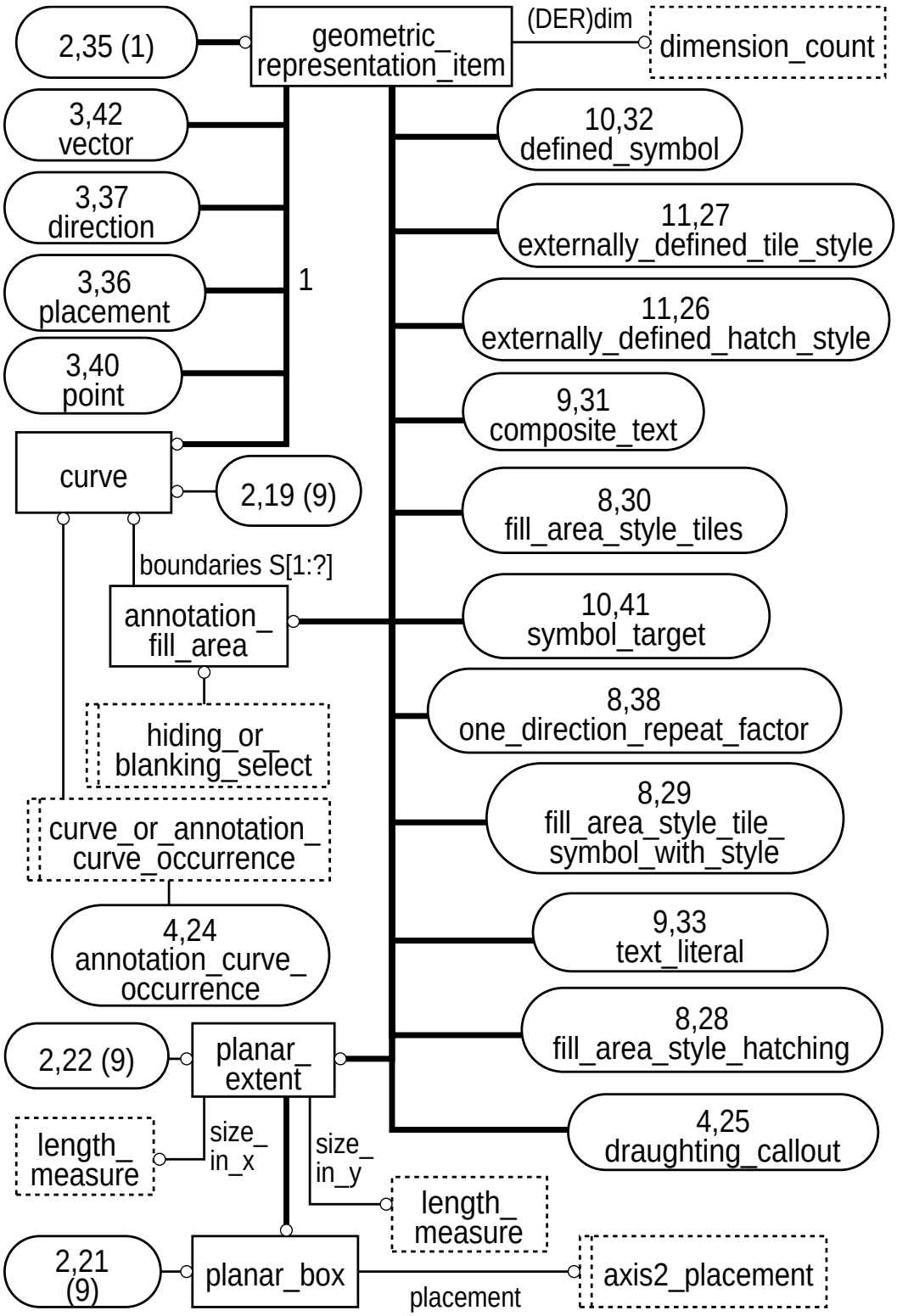

Figure C.2 - AIC expanded listing diagram in EXPRESS-G: 2 of 13

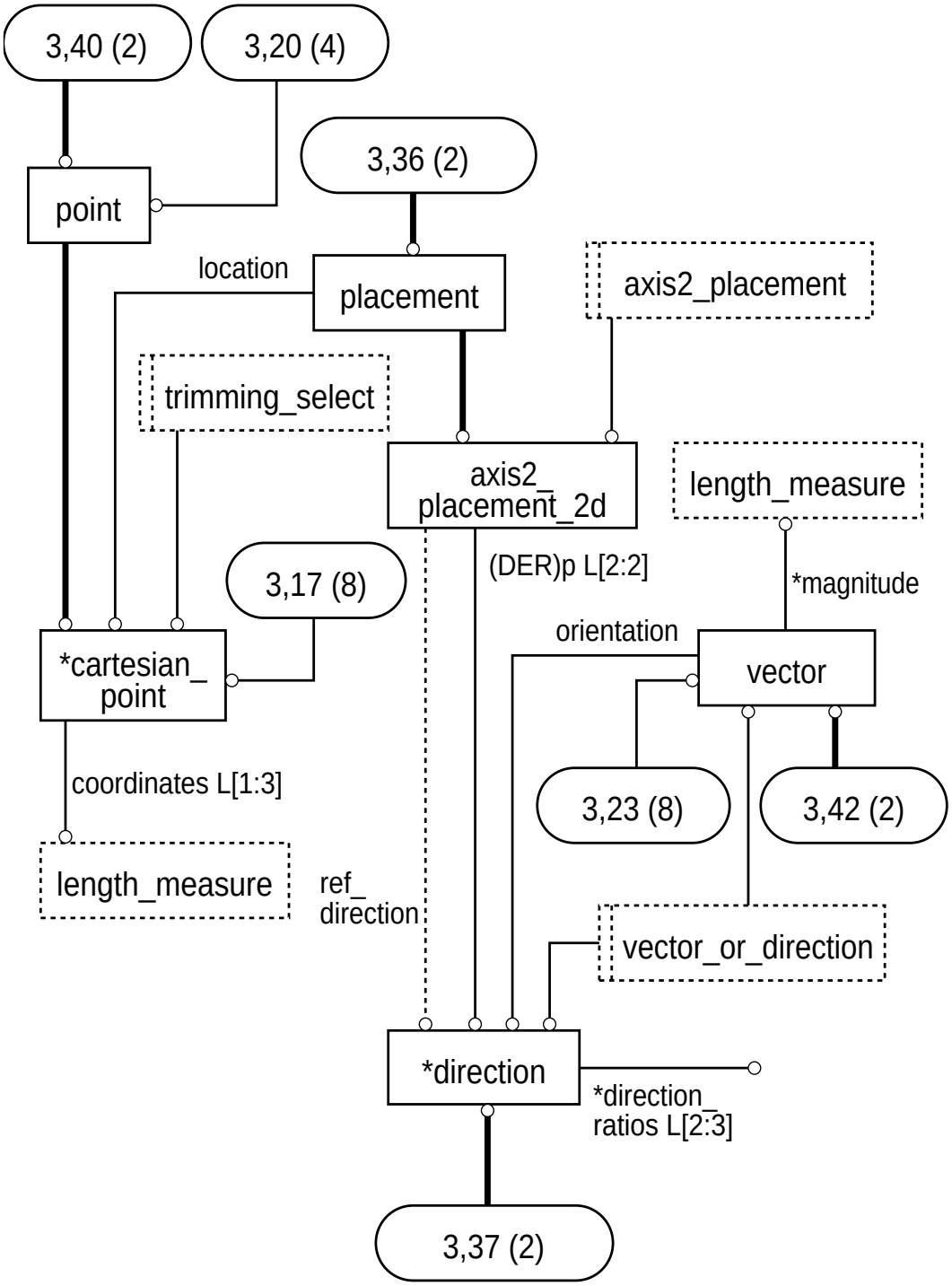

Figure C.3 - AIC expanded listing diagram in EXPRESS-G: 3 of 13

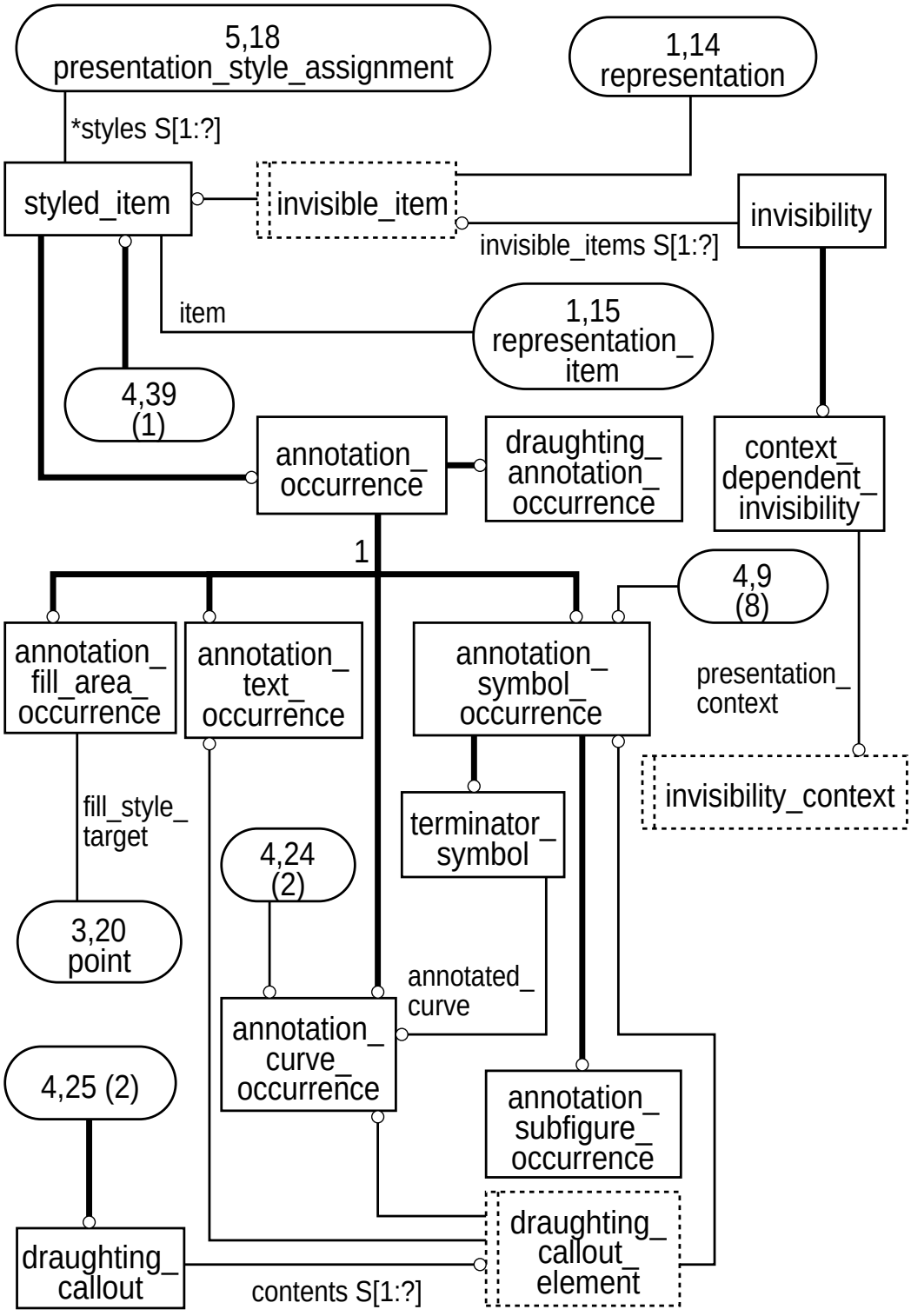

Figure C.4 - AIC expanded listing diagram in EXPRESS-G: 4 of 13

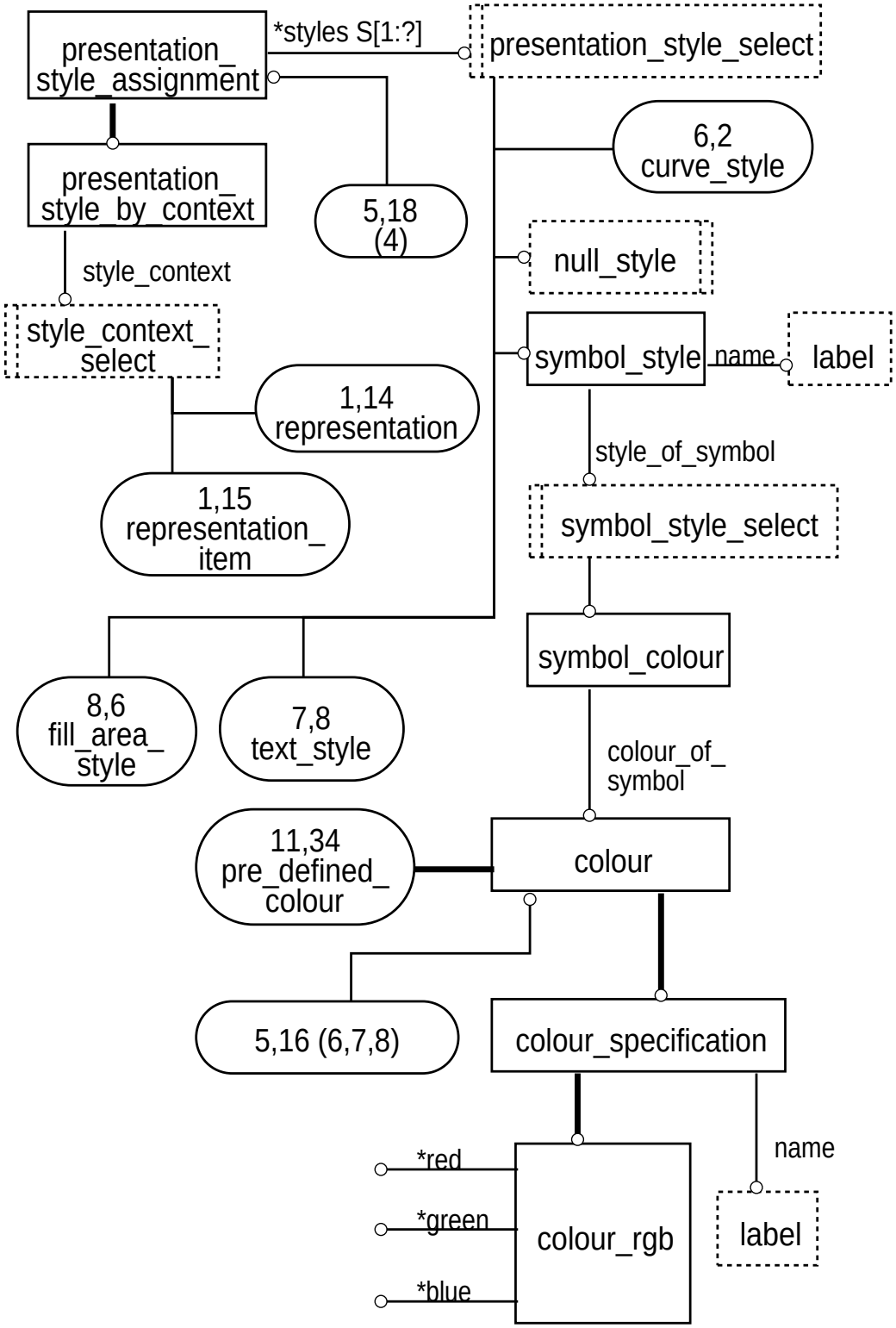

Figure C.5 - AIC expanded listing diagram in EXPRESS-G: 5 of 13

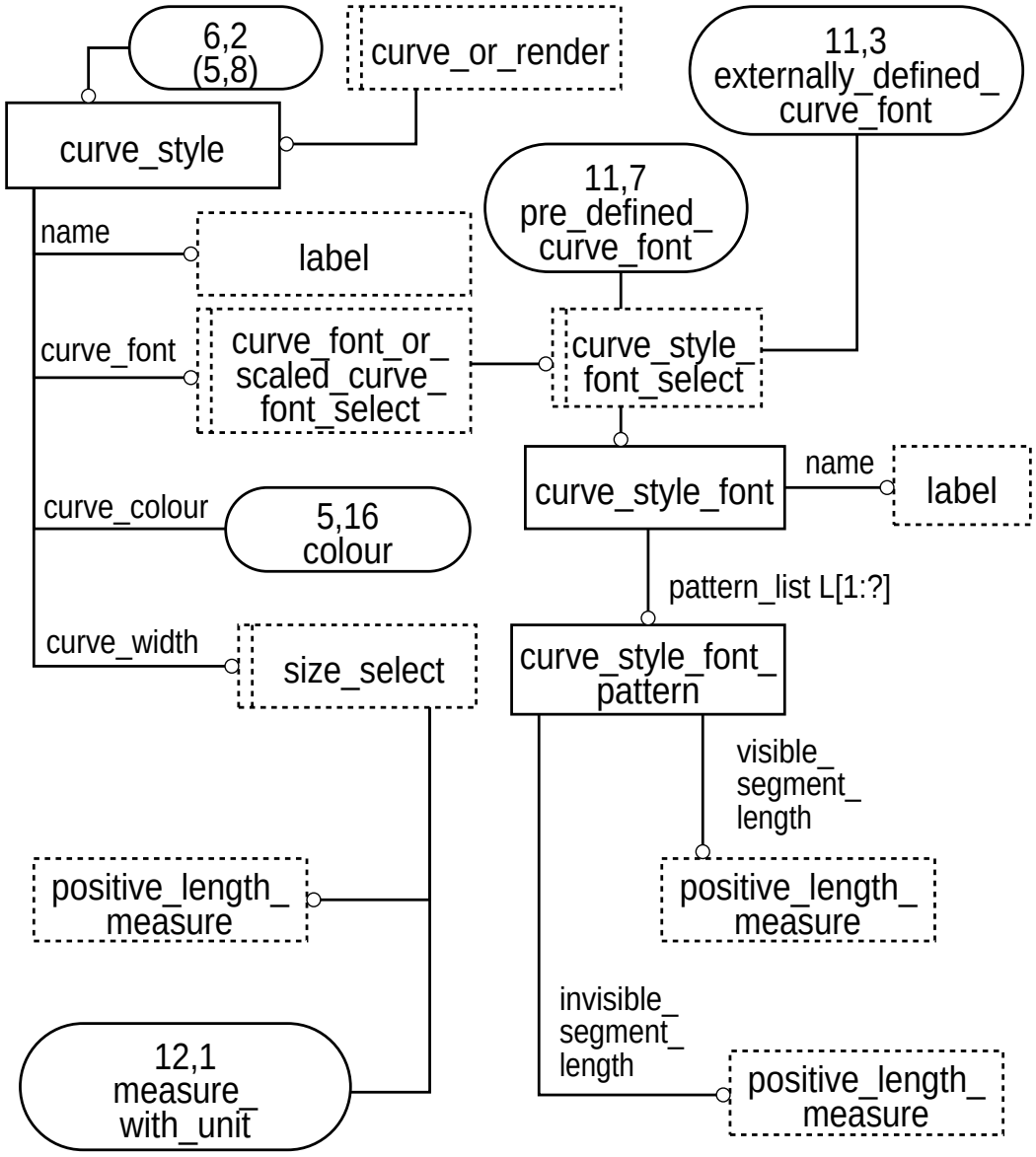

Figure C.6 - AIC expanded listing diagram in EXPRESS-G: 6 of 13

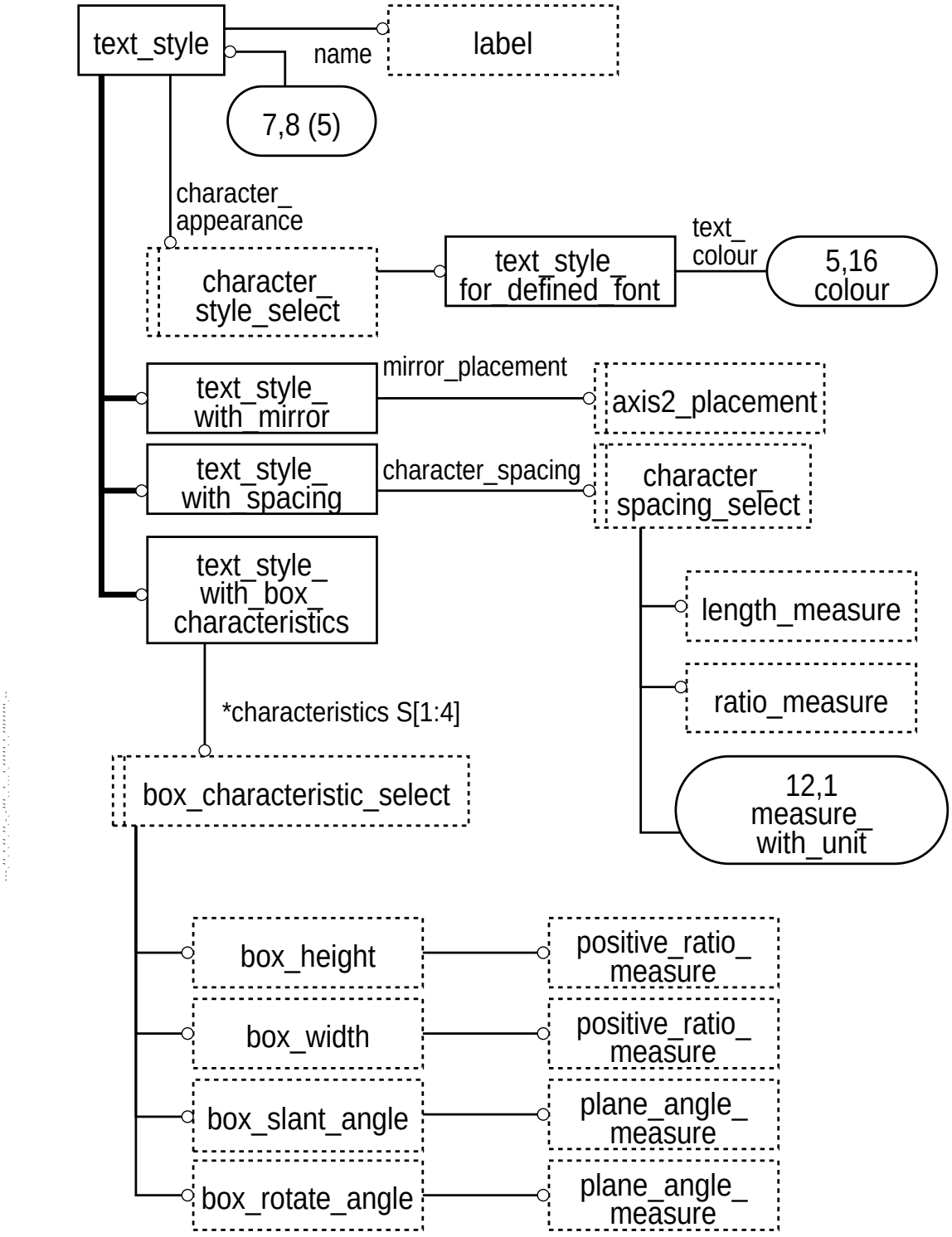

Figure C.7 – AIC expanded listing diagram in EXPRESS-G: 7 of 13

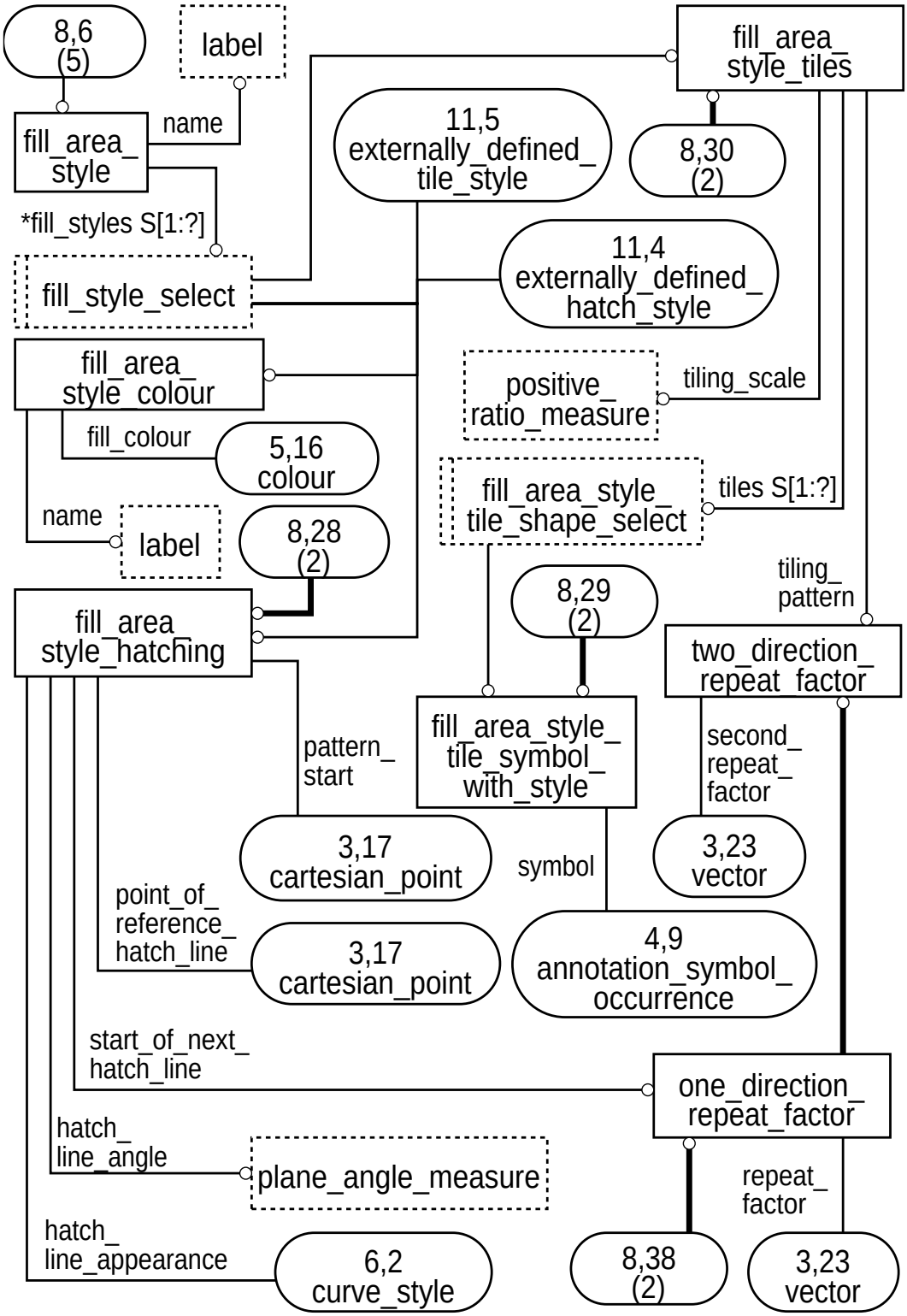

Figure C.8 – AIC expanded listing diagram in EXPRESS-G: 8 of 13

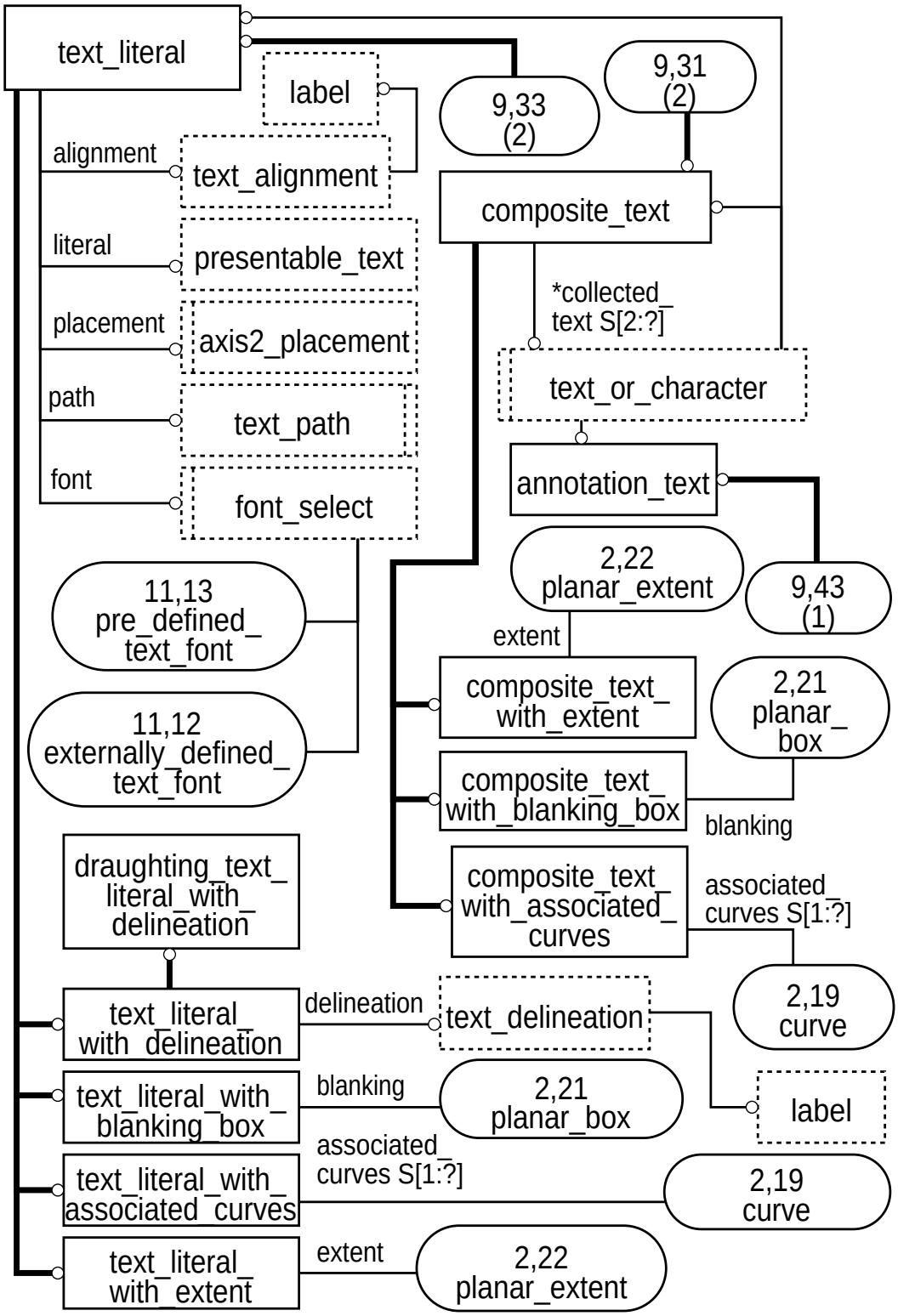

Figure C.9 – AIC expanded listing diagram in EXPRESS-G: 9 of 13

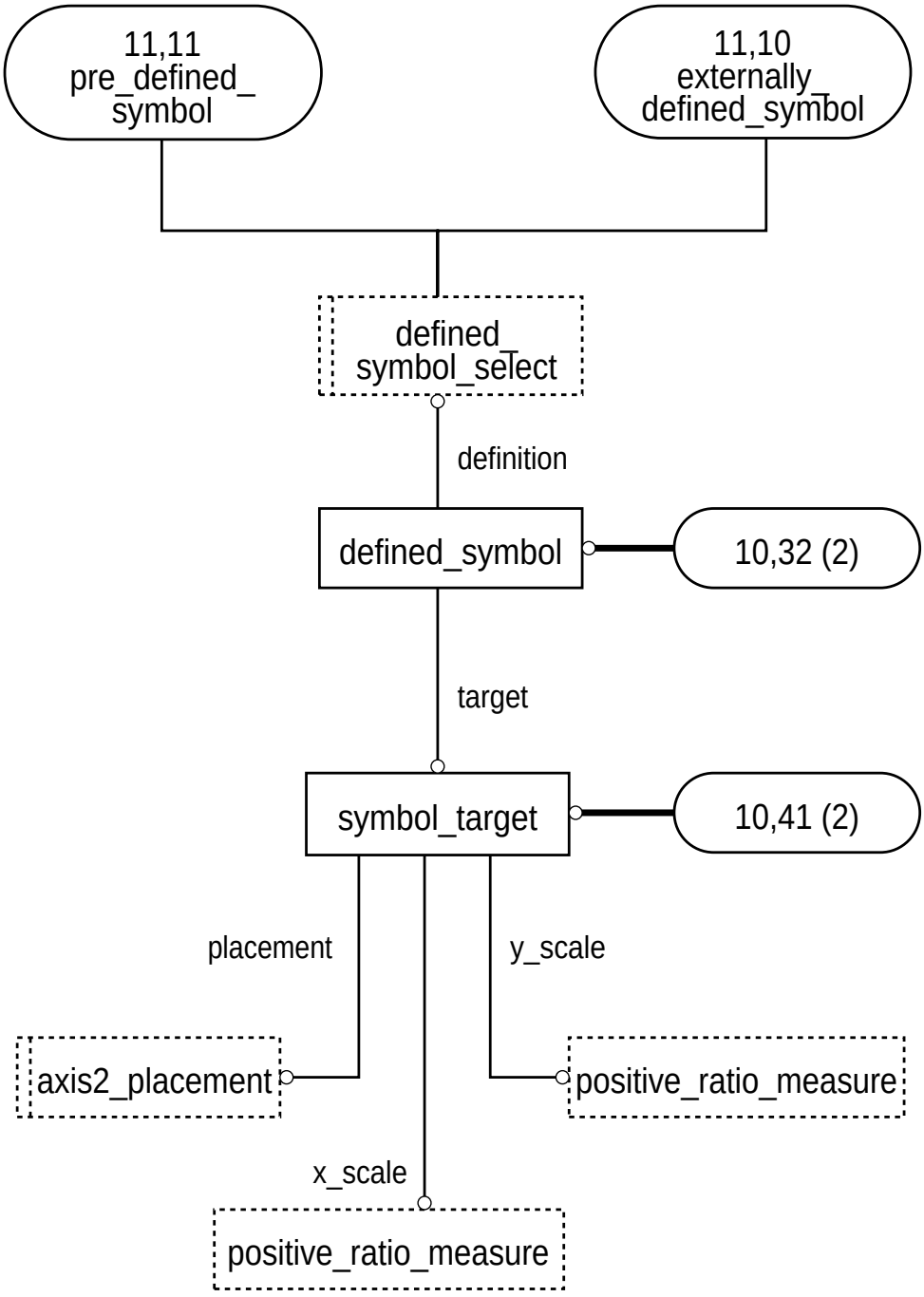

Figure C.10 – AIC expanded listing diagram in EXPRESS-G: 10 of 13

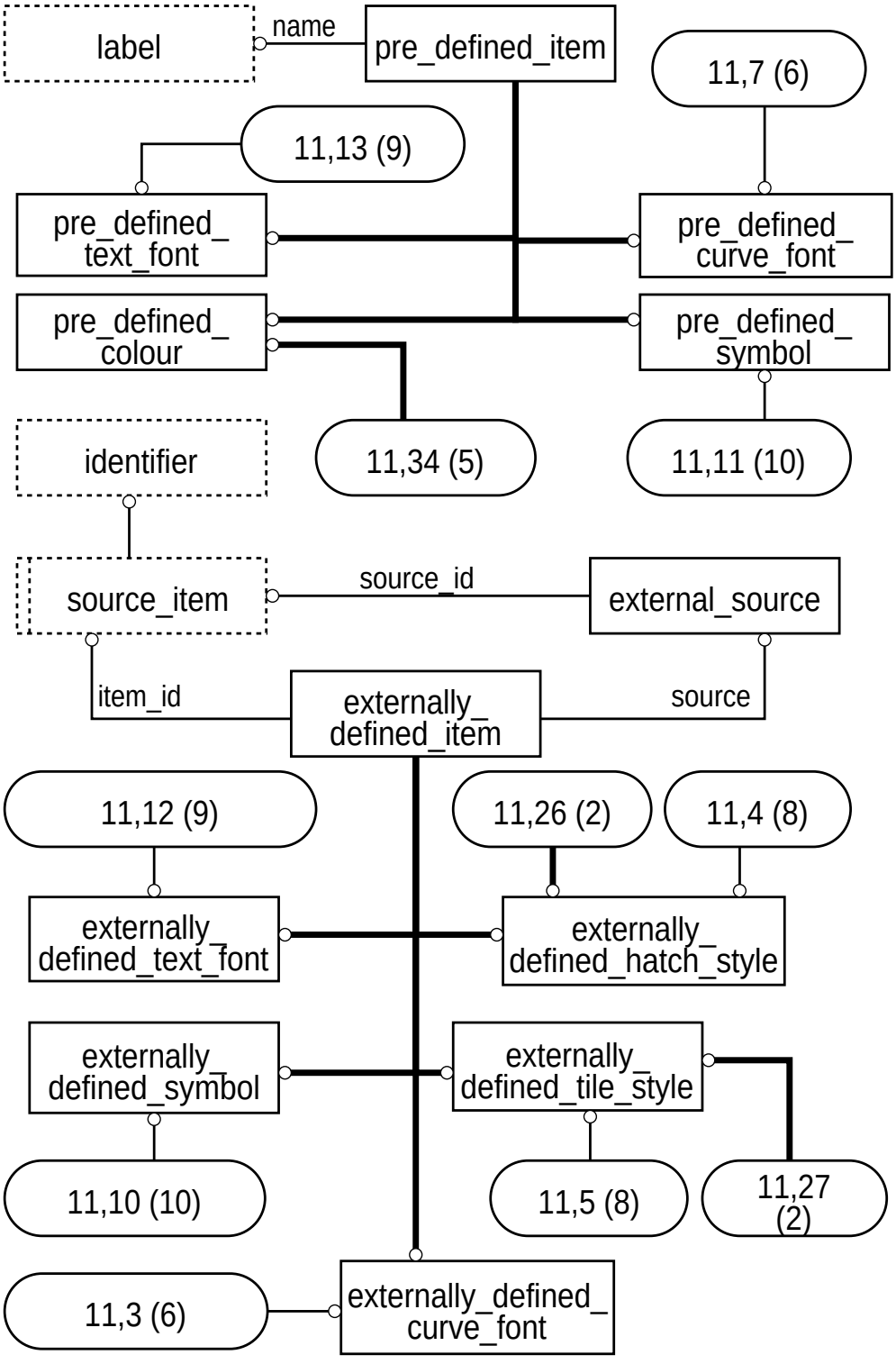

Figure C.11 – AIC expanded listing diagram in EXPRESS-G: 11 of 13

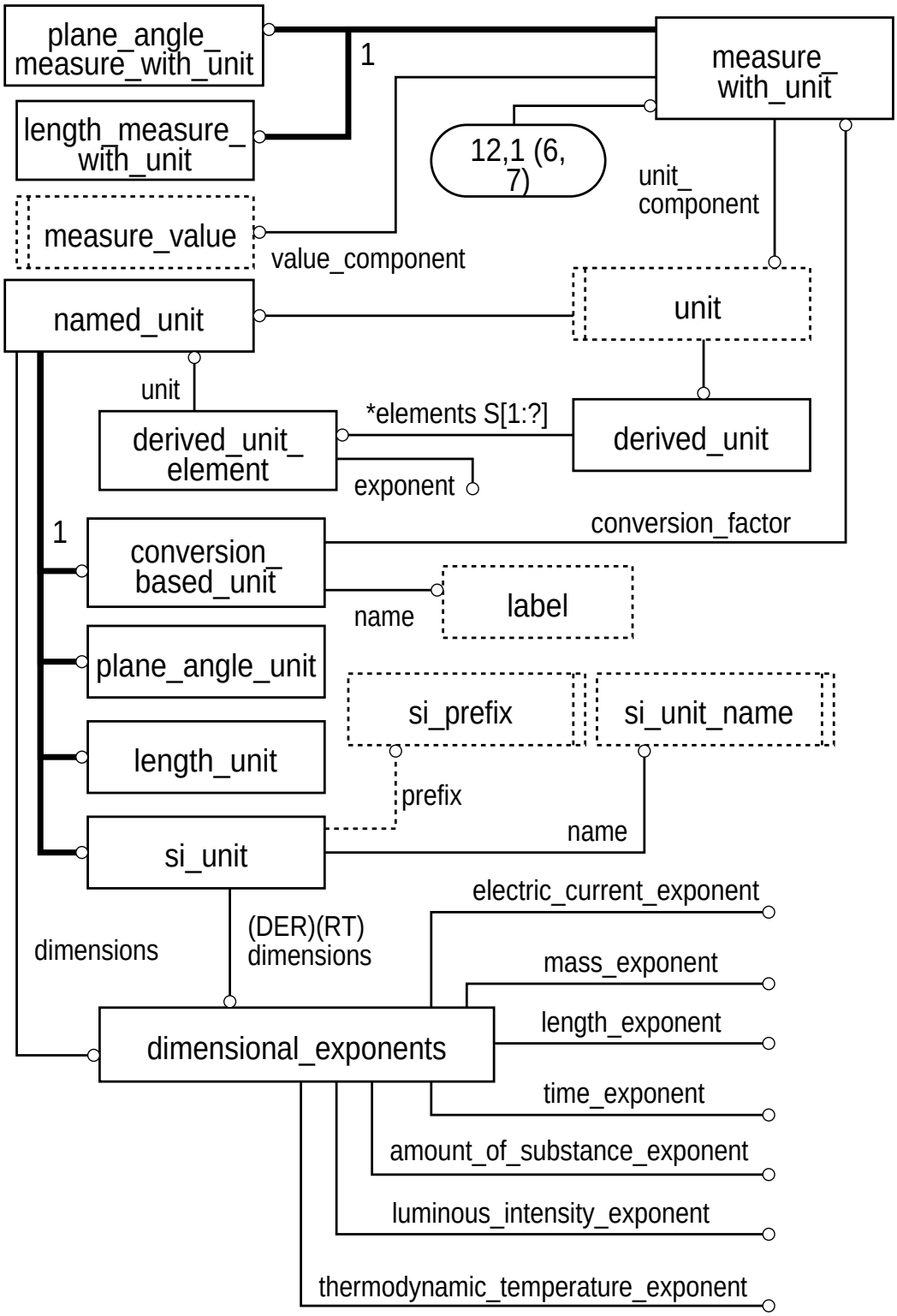

Figure C.12 – AIC expanded listing diagram in EXPRESS-G: 12 of 13

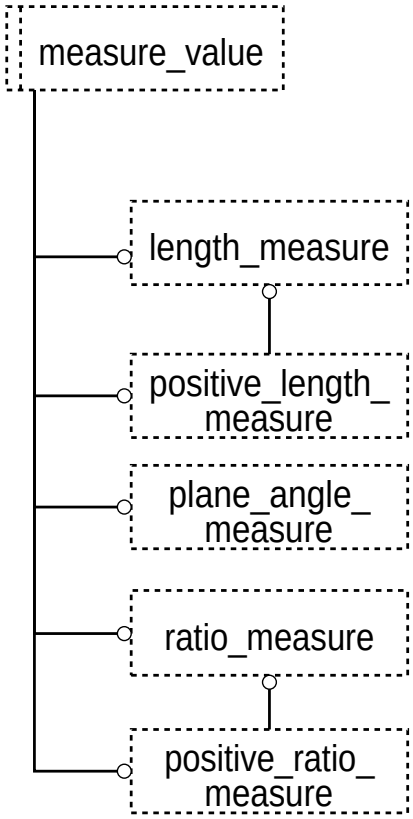

Figure C.13 – AIC expanded listing diagram in EXPRESS-G: 13 of 13

Annex D
(informative)

Computer interpretable listings

This annex references a listing of the EXPRESS entity names and corresponding short names as specified in this part of ISO 10303. It also provides a listing of each EXPRESS schema specified in this part of ISO 10303 without comments or other explanatory text. These listings are available in computer-interpretable form and can be found at the following URLs:

Short names: http://www.mel.nist.gov/div826/subject/apde/snr/
EXPRESS: http://www.mel.nist.gov/step/parts/part504/IS/

If there is difficulty accessing these sites contact ISO Central Secretariat or contact the ISO TC 184/SC4 Secretariat directly at: sc4sec@cme.nist.gov.

NOTE - The information provided in computer-interpretable form at the above URLs is informative. The information that is contained in the body of this part of ISO 10303 is normative.

Index

ICS 25.040.40

Price based on 39 pages