INTERNATIONAL STANDARD ISO 10303-215:2004
TECHNICAL CORRIGENDUM 1

Published 2008-12-15

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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

Part 215:
Application protocol: Ship arrangement

TECHNICAL CORRIGENDUM 1

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

Partie 215: Protocole d'application: Aménagement des navires

RECTIFICATIF TECHNIQUE 1

Technical Corrigendum 1 to ISO 10303-215:2004 was prepared by Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 4, *Industrial data.*

Introduction

The purpose of the modifications to the text of ISO 10303-215:2004 is to correct errors in the Global Rule EXPRESS definitions likely to cause compilation problems, to correct errors in the Mapping Specification, to allow unique identification of geometric surfaces to improve interoperability between this standard and other standards within the suite of shipbuilding application protocols, and to replace the object identifier for the document and the applicable schema.

ICS 25.040.40 **Ref. No. ISO 10303-215:2004/Cor.1:2008(E)**

Published in Switzerland

Modifications to the text of ISO 10303-215:2004

Page 3, Normative references
The purpose for this change is to replace the Normative reference of ISO/TS 10303-28 with the 2007 version. Replace the reference to ISO/TS 10303-28 with the following text.

ISO 10303-28, *Industrial automation systems and integration — Product data representation and exchange — Part 28: Implementation methods: XML representations of EXPRESS schemas and data, using XML schemas.*

Page 20, 4.1.19
The purpose for this change is to allow unique identification of geometric surfaces to improve interoperability between this standard and other standards within the suite of shipbuilding application protocols using the existing Global_id application object. Add Surface_with_identifier application object to the ARM in the surface_representations UoF. Replace second paragraph with the following corrected text.

The following application objects are used by the surface_representations UoF:

— Non_manifold_surface_shape;

— Surface_with_identifier.

Page 146
The purpose for this change is to add Surface_with_identifier application object to the ARM. Insert the following new subclause after 4.2.160. Renumber succeeding subclauses accordingly. Add surface_with_identifier to Index.

4.2.161 Surface_with_identifier

A Surface_with_identifier is a geometric surface of any of the surface types allowed within a Non_manifold_surface_shape_representation, as specified by ISO 10303-508, additionally constrained to include a persistent, global identifier which uniquely identifies the surface.

NOTE The capability for persistent, globally unique surface identification is provided to aid in the interoperability and reuse of data between this part of ISO 10303, ISO 10303-216, and ISO 10303-218. A receiving system that has stored a surface with persistent identifier from an exchange file conforming to this part of ISO 10303 may be able to identify that the surface is an identical copy of one that is received in a separate exchange file conforming to ISO 10303-216 or 10303-218.

The data associated with a Surface_with_identifier are the following:

— id.

4.2.161.1 id

The id specifies the globally unambiguous identifier for the surface. See 4.3.133 for the application assertion.

Page 180
The purpose for this change is to add an assertion between the Surface_with_identifier and Global_id application objects in the ARM. Insert the following new subclause after 4.3.132. Renumber succeeding subclauses accordingly.

4.3.133 Surface_with_identifier to Global_id

Each Surface_with_identifier has id defined by exactly one Global_id. Each Global_id defines the id for zero, one, or many Surface_with_identifier objects.

Page 218, 5.1.2.4.4
The purpose for this change is to correct the Reference path for external_instance_reference to reference the global_id attribute on the Planned_physical_plant_item entity in ISO 10303-227 Edition 2. Replace 5.1.2.4.4 with the following text.

5.1.2.4.4 space_connection_relationship to external_instance_reference (as connecting_system)

AIM element: PATH
Reference path: product_definition_relationship
{[/CLASS_ID(product_definition_relationship, 'space connection relationship')/]
[/EXT_INST_REF(product_definition, 'plant spatial configuration', 'planned physical plant item')/]}

Page 274, 5.1.5.2.4
The purpose for this change is to remove the final line of the mapping path to correct a conflict in the assignment of property_definition_representation names between the Compartment_property supertype and its subtypes. Replace 5.1.5.2.4 with the following text.

5.1.5.2.4 compartment_design_definition to compartment_property (as properties)

AIM element: PATH
Reference path: product_definition_shape <=
property_definition =
represented_definition <-
property_definition_representation.definition
property_definition_representation

Page 275, 5.1.5.2.6
The purpose for this change is to correct the Reference path to remove the use of shape_aspect. Replace 5.1.5.2.6 with the following text.

5.1.5.2.6 compartment_design_definition to external_instance_reference (as boundaries)

AIM element: PATH
Reference path: product_definition_shape =>
property_definition
property_definition.definition ->
characterized_definition = characterized_product_definition
characterized_product_definition = product_definition
product_definition
{/CLASS_ID(product_definition, 'compartment'/}
product_definition <-

product_definition_relationship.relating_product_definition
product_definition_relationship
{product_definition_relationship.name = ‘compartment boundary’}
product_definition_relationship.related_product_definition ->
product_definition
{([/CLASS_ID(product_definition, 'moulded form')/]
[/EXT_INST_REF(product_definition, 'ship moulded form schema',
'moulded form')/])
([/CLASS_ID(product_definition, 'structural system')/]
[/EXT_INST_REF(product_definition, 'ship structures schema',
'structural system')/])}

Page 278, 5.1.5.3.9
The purpose for this change is to correct the Reference path to remove the use of shape_aspect. Replace 5.1.5.3.9 with the following text.

5.1.5.3.9 deck_zone_design_definition to external_instance_reference (as constituent_compartments)

AIM element: PATH
Reference path: product_definition_shape =>
property_definition
property_definition.definition ->
characterized_definition = characterized_product_definition
characterized_product_definition = product_definition
product_definition
{/CLASS_ID(product_definition, 'deck zone'/}
product_definition <-
product_definition_relationship.relating_product_definition
product_definition_relationship
{product_definition_relationship.name = ‘compartment in deck zone’}
product_definition_relationship.related_product_definition ->
product_definition
{[/CLASS_ID(product_definition, 'compartment')/]
[/EXT_INST_REF(product_definition, 'ship arrangement schema',
'compartment')/]}

Page 278, 5.1.5.3.10
The purpose for this change is to correct the Reference path to remove the use of shape_aspect. Replace 5.1.5.3.10 with the following text.

5.1.5.3.10 deck_zone_design_definition to external_instance_reference (as deck_for_zone)

AIM element: PATH
Reference path: product_definition_shape =>
property_definition
property_definition.definition ->
characterized_definition = characterized_product_definition
characterized_product_definition = product_definition
product_definition
{/CLASS_ID(product_definition, 'deck zone'/}
product_definition <-

product_definition_relationship.relating_product_definition
product_definition_relationship
{product_definition_relationship.name = ‘deck for deck zone’}
product_definition_relationship.related_product_definition ->
product_definition
{([/CLASS_ID(product_definition, 'moulded form')/]
[/EXT_INST_REF(product_definition, 'ship moulded form schema',
'moulded form')/])
([/CLASS_ID(product_definition, 'structural system')/]
[/EXT_INST_REF(product_definition, 'ship structures schema',
'structural system')/])}

Page 279, 5.1.5.4.3
The purpose for this change is to correct the notation of the multiple select type mapping path and to remove the extraneous colon from the last line of the Reference path. Replace 5.1.5.4.3 with the following text.

5.1.5.4.3 zone_design_definition to compartment (as constituent_compartments)

AIM element: PATH
Reference path: product_definition_shape
{/CLASS_ID(product_definition_shape, 'zone design definition')/}
product_definition_shape <=
property_definition
property_definition.definition ->
characterized_definition = characterized_product_definition
characterized_product_definition = product_definition
product_definition
{/CLASS_ID(product_definition, 'zone')/}
product_definition <-
product_definition_relationship.relating_product_definition
product_definition_relationship
product_definition_relationship.related_product_definition ->
product_definition
{/CLASS_ID(product_definition, 'compartment')/}

Page 280, 5.1.5.4.6
The purpose for this change is to correct the Reference path to remove the use of shape_aspect. Replace 5.1.5.4.6 with the following text.

5.1.5.4.6 zone_design_definition to external_instance_reference (as boundaries)

AIM element: PATH
Reference path: product_definition_shape =>
property_definition
property_definition.definition ->
characterized_definition = characterized_product_definition
characterized_product_definition = product_definition
product_definition
{/CLASS_ID(product_definition, 'zone'/}
product_definition <-
product_definition_relationship.relating_product_definition

product_definition_relationship
{product_definition_relationship.name = ‘zone boundary’}
product_definition_relationship.related_product_definition ->
product_definition
{([/CLASS_ID(product_definition, 'moulded form')/]
[/EXT_INST_REF(product_definition, 'ship moulded form schema',
'moulded form')/])
([/CLASS_ID(product_definition, 'structural system')/]
[/EXT_INST_REF(product_definition, 'ship structures schema',
'structural system')/])}

Page 294, 5.1.6.16.2
The purpose for this change is to correct the mapping path to replace numeric_measure with count_measure. Replace 5.1.6.16.2 with the following text.

5.1.6.16.2 occupancy

AIM element: value_representation_item.value_component
Source: ISO 10303-43
Reference path: property_definition_representation
property_definition_representation.used_representation ->
/REP_TO_VAL_REP_ITEM('occupancy', count_measure)/

Page 390, 5.1.16.1.3
The purpose for this change is to modify the mapping to prevent a conflict with the Group name attribute assignment from the use of LINK_TO_GROUP Mapping template in 5.1.16.1. Replace 5.1.16.1.3 with the following text.

5.1.16.1.3 product_structure_type

AIM element: group.description
Source: ISO 10303-41
Reference path: group
group.description
{(group.description = ‘compartments in arrangement’)
(group.description = ‘items in compartment’)}

Page 391, 5.1.16.1.4
The purpose for this change is to correct the mapping path to be consistent with similar mappings in ISO 10303-216 and ISO 10303-218. Replace 5.1.16.1.4 with the following text.

5.1.16.1.4 version_id

AIM element: applied_identification_assignment.assigned_id
Source: ISO 10303-215
Rules: 5.2.4.251
Reference path: /VERSION_ID(group)/

Page 391, 5.1.16.1.6
The purpose for this change is to correct the Reference path for external_instance_reference to reference the global_id attribute on the Planned_physical_plant_item entity in ISO 10303-227 Edition 2 and to reference the correct structural part types in ISO 10303-218. Replace 5.1.16.1.6 with the following text.

5.1.16.1.6 space_product_structure to external_instance_reference (as external_items)

AIM element: PATH
Reference path: group <-
/GROUPS(product_definition, ’item structure’)/
{([/CLASS_ID(product_definition, 'plate')/]
[/EXT_INST_REF(product_definition, 'ship structures schema', 'plate')/])
([/CLASS_ID(product_definition, 'profile')/]
[/EXT_INST_REF(product_definition, 'ship structures schema', 'profile')/])
([/CLASS_ID(product_definition, 'planned physical plant item')/]
[/EXT_INST_REF(product_definition, 'plant spatial configuration',
'planned physical plant item')/])
([/CLASS_ID(product_definition, 'compartment')/]
[/EXT_INST_REF(product_definition, 'ship arrangement schema', 'compartment')/])}

Page 393, 5.1.17
The purpose for this change is to correct the name of the UoF in this portion of the document. Replace the existing subclause title with the following corrected text.

5.1.17 Surface_representations UoF

Page 393
The purpose for this change is to add the mapping specification for the Surface_with_identifier application object. Insert the following new subclause after 5.1.17.1.

5.1.17.2 SURFACE_WITH_IDENTIFIER

AIM element: surface
Source: ISO 10303-508
Reference path: /ROOT_CLASS(surface,‘surface with identifier’)/

5.1.17.2.1 surface_with_identifier to global_id (as id)

AIM element: PATH
Rules: 5.2.4.45, 5.2.4.226
Reference path: surface
identification_item = surface <-
applied_identification_assignment.items[i]
applied_identification_assignment

Page 426, 5.1.20.2.5
The purpose for this change is to add an additional line to the Reference path to complete the mapping. Replace 5.1.20.2.5 with the following text.

5.1.20.2.5 compartment_functional_definition to compartment (as defined_for)

AIM element: PATH
Reference path: /PROP_TO_PROD_DEF/
{/CLASS_ID(product_definition, 'compartment'/}

Page 428, 5.1.20.4.5
The purpose for this change is to add an additional line to the Reference path to complete the mapping. Replace 5.1.20.4.5 with the following text.

5.1.20.4.5 deck_zone_functional_definition to deck_zone (as defined_for)

AIM element: PATH
Reference path: /PROP_TO_PROD_DEF/
{/CLASS_ID(product_definition, 'deck zone'/}

Page 431, 5.1.20.7.5
The purpose for this change is to correct the subclause title and to add an additional line to the Reference path to complete the mapping. Replace 5.1.20.7.5 with the following text.

5.1.20.7.5 zone_functional_definition to zone (as defined_for)

AIM element: PATH
Reference path: /PROP_TO_PROD_DEF/
{/CLASS_ID(product_definition, 'zone'/}

Page 439, 5.2
The purpose for this change is to add action_relationship to USE FROM action_schema as it is referenced in a mapping path. Replace EXPRESS definition with the following text.

```
USE FROM action_schema                                  -- ISO 10303-41
  (action,
  action_method,
  action_relationship,
  action_request_solution,
  executed_action,
  versioned_action_request);
```

Page 441, 5.2
Conversion_based_units are allowed in exchange files conforming to this Part of ISO 10303, but require the use of measure_with_unit constructs. The purpose for this change is to add measure_with_unit and its allowable subtypes to USE FROM measure_schema. Replace EXPRESS definition with the following text.

```
USE FROM measure_schema                                 -- ISO 10303-41
  (amount_of_substance_measure,
  amount_of_substance_unit,
  amount_of_substance_measure_with_unit,
  area_measure,
  area_measure_with_unit,
  context_dependent_measure,
```



```
  context_dependent_unit,
  conversion_based_unit,
  count_measure,
  derived_unit,
  electric_current_measure,
  electric_current_unit,
  electric_current_measure_with_unit,
  derived_unit_element,
  global_unit_assigned_context,
  length_measure,
  length_measure_with_unit,
  length_unit,
  luminous_intensity_measure,
  luminous_intensity_measure_with_unit,
  luminous_intensity_unit,
  mass_measure,
  mass_measure_with_unit,
  mass_unit,
  measure_with_unit,
  named_unit,
  parameter_value,
  plane_angle_measure,
  plane_angle_measure_with_unit,
  plane_angle_unit,
  positive_length_measure,
  positive_plane_angle_measure,
  ratio_measure,
  ratio_measure_with_unit,
  ratio_unit,
  si_unit,
  solid_angle_measure,
  solid_angle_measure_with_unit,
  solid_angle_unit,
  thermodynamic_temperature_measure,
  thermodynamic_temperature_measure_with_unit,
  thermodynamic_temperature_unit,
  time_measure,
  time_measure_with_unit,
  time_unit,
  volume_measure,
  volume_measure_with_unit);
```

Page 442, 5.2

The purpose for this change is to add product_category_relationship to USE FROM product_definition_schema as it is referenced in a mapping path. Replace EXPRESS definition with the following text.

```
USE FROM product_definition_schema                  -- ISO 10303-41
  (product,
  product_category,
  product_category_relationship,
  product_definition,
  product_definition_relationship,
  product_definition_with_associated_documents,
  product_related_product_category);
```

Page 445, 5.2.2.1.4

The purpose for this change is to modify the AIM EXPRESS to add the mapping of Surface_with_identifier application object and to correct global rule compilation errors. Add surface and representation_item to classification_item Select type. Replace 5.2.2.1.4 with the following text.

5.2.2.1.4 classification_item

A classification_item identifies an **action**, **action_request_solution**, **applied_action_request_-assignment**, **approval**, **compound_representation_item**, **document**, **executed_action**, **external_source**, **group**, **identification_assignment_relationship**, **product**, **product_definition**, **product_definition_relationship**, **product_definition_shape**, **product_related_product_category**, **property_definition**, **property_definition_representation, representation**, **representation_item**, **shape_aspect**, **surface** or **versioned_action_request** to which a classification may be assigned.

EXPRESS specification:

```
*)
TYPE classification_item = SELECT(
   action,
   action_request_solution,
   applied_action_request_assignment,
   approval,
   compound_representation_item,
   document,
   executed_action,
   external_source,
   group,
   identification_assignment_relationship,
   product,
   product_definition,
   product_definition_relationship,
   product_definition_shape,
   product_related_product_category,
   property_definition,
   property_definition_representation,
   representation,
   representation_item,
   shape_aspect,
   surface,
   versioned_action_request);
END_TYPE;
(*
```

Page 446, 5.2.2.2

The purpose for this change is to correct the subclause numbering for 5.2.2.2. Replace 5.2.2.2 with the following text.

5.2.2.1.7 effectivity_item

An **effectivity_item** identifies a **product_definition**, **product_definition_shape**, **product_related_-product_category**, or **property_definition** to which an effectivity may be assigned.

EXPRESS specification:

```
*)
TYPE effectivity_item = SELECT(
product_definition,
product_definition_shape,
product_related_product_category,
```



```
property_definition
);
END_TYPE;
(*
```

Page 446, 5.2.2.2.1

The purpose for this change is to to correct the subclause numbering for 5.2.2.2.1 and to modify the AIM EXPRESS to remove shape_aspect from the external_identification_item Select type as it is no longer used in the external_instance_reference mapping paths. Replace 5.2.2.2.1 with the following text.

5.2.2.1.8 external_identification_item

An **external_identification_item** identifies an **action**, **document**, **product**, **product_definition,** or **property_definition** to which an external_identification may be assigned.

EXPRESS specification:

```
*)
TYPE external_identification_item = SELECT(
   action,
   document,
   product,
   product_definition,
   property_definition);
END_TYPE;
(*
```

Page 446, 5.2.2.2.2

The purpose for this change is to correct the subclause numbering for 5.2.2.2.2. Replace 5.2.2.2.2 with the following text.

5.2.2.1.9 group_item

A group_item identifies an **applied_external_identification_assignment**, **approval**, **document**, **group**, **identification_assignment_relationship**, **product, product_definition**, **product_-definition_relationship**, **product_definition_shape**, **product_related_product_category**, or **property_definition** to which a group may be assigned.

EXPRESS specification:

```
*)
TYPE group_item = SELECT(
applied_external_identification_assignment,
approval,
document,
group,
identification_assignment_relationship,
product,
product_definition,
product_definition_relationship,
product_definition_shape,
product_related_product_category,
property_definition);
END_TYPE;
(*
```


Page 447, 5.2.2.2.3

The purpose for this change is to is to correct the subclause numbering for 5.2.2.2.3 and to modify the AIM EXPRESS to add mapping of Surface_with_identifier application object and to correct a global rule error. Add compound_representation_item and surface to identification_item Select type. Replace 5.2.2.2.3 with the following text.

5.2.2.1.10 identification_item

An **identification_item** identifies an **action**, **action_request_solution**, **compound_representation_-item**, **document**, **executed_action**, **group**, **product**, **product_definition**, **product_definition_-relationship**, **product_definition_shape**, **product_related_product_category**, **property_definition**, **surface**, or **versioned_action_request** to which an identification may be assigned.

EXPRESS specification:

```
*)

TYPE identification_item = SELECT(
   action,
   action_request_solution,
   compound_representation_item,
   document,
   executed_action,
   group,
   product,
   product_definition,
   product_definition_relationship,
   product_definition_shape,
   product_related_product_category,
   property_definition,
   surface,
   versioned_action_request);
END_TYPE;
(*
```

Page 447, 5.2.2.2.4

The purpose for this change is to correct the subclause numbering for 5.2.2.2.4. Replace 5.2.2.2.4 with the following text.

5.2.2.1.11 organization_item

An **organization_item** identifies a **document**, **product_definition**, or **property_definition** to which an organization may be identified.

EXPRESS specification:

```
*)
TYPE organization_item = SELECT(
document,
product_definition,
property_definition);
END_TYPE;
(*
```


Page 448, 5.2.2.2.5
The purpose for this change is to correct the subclause numbering for 5.2.2.2.5. Replace 5.2.2.2.5 with the following text.

5.2.2.1.12 person_item

A **person_item** identifies a **document** to which a person may be identified.

EXPRESS specification:

```
*)
TYPE person_item = SELECT(
document);
END_TYPE;
(*
```

Page 448, 5.2.2.2.6
The purpose for this change is to correct the subclause numbering for 5.2.2.2.6. Replace 5.2.2.2.6 with the following text.

5.2.2.1.13 person_and_organization_item

A **person_and_organization_item** identifies an **action**, **action_request_solution**, **document**, **executed_action**, or **versioned_action_request** to which a person_and_organization may be identified.

EXPRESS specification:

```
*)
TYPE person_and_organization_item = SELECT(
action,
action_request_solution,
document,
executed_action,
versioned_action_request);
END_TYPE;
(*
```

Page 508, 5.2.4.41
The purpose for this change is to correct a compilation error in the global rule. Replace EXPRESS definition with the following text.

EXPRESS specification:

```
*)

RULE external_instance_reference_has_same_identifier FOR (
           applied_external_identification_assignment);
LOCAL
  violation : LOGICAL := FALSE;
  extref_set : SET OF applied_external_identification_assignment := [];
  aia_set : SET OF applied_identification_assignment := [];
END_LOCAL;

  extref_set := QUERY ( i <* applied_external_identification_assignment |
      (i.role.name = 'external instance reference') );

REPEAT i := 1 TO HIINDEX(extref_set) BY 1 WHILE NOT violation;
  aia_set := bag_to_set(USEDIN(extref_set[i].items[1],
    'SHIP_ARRANGEMENT_SCHEMA.APPLIED_IDENTIFICATION_ASSIGNMENT.ITEMS'));
```



```
  violation := NOT (aia_set[1].assigned_id = extref_set[i].assigned_id);
END_REPEAT;

WHERE
wr1: NOT violation;
END_RULE; -- external_instance_reference_has_same_identifier
(*
```

Page 684, 5.2.4.221

The purpose for this change is to correct a compilation error in the global rule and make the rule consistent with others of the same type. Replace 5.2.4.221 with the following text.

5.2.4.221 spacing_position_with_offset_compound_representation_has_class

The **spacing_position_with_offset_compound_representation_has_class** rule specifies the **item_-element** attribute of a **compound_representation_item** with the class id 'spacing position with offset' to have in the **list_representation_item** exactly one **compound_representation_item** with the class id 'spacing position'.

EXPRESS specification:

```
*)

RULE spacing_position_with_offset_compound_representation_has_class
      FOR (applied_classification_assignment);
    LOCAL
      t3_set     : SET OF representation_item := [];
      violation  : LOGICAL := FALSE;
      t1_set     : SET OF compound_representation_item := [];
      c_a_set    : SET OF applied_classification_assignment := [];
      c_a_set2   : SET OF applied_classification_assignment := [];
      l_rep_item : list_representation_item;
      t2_set     : SET OF compound_representation_item := [];
    END_LOCAL;
    c_a_set := QUERY ( i <* applied_classification_assignment | (i.
       assigned_class.name = 'spacing position with offset') );
    REPEAT i := 1 TO HIINDEX(c_a_set) BY 1;
      REPEAT j := 1 TO HIINDEX(c_a_set[i].items) BY 1;
        t1_set := t1_set + c_a_set[i].items[j];
      END_REPEAT;
    END_REPEAT;
    c_a_set2 := QUERY ( i <* applied_classification_assignment | (i.
       assigned_class.name = 'spacing position') );
    REPEAT i := 1 TO HIINDEX(c_a_set2) BY 1;
      REPEAT j := 1 TO HIINDEX(c_a_set2[i].items) BY 1;
        t2_set := t2_set + c_a_set2[i].items[j];
      END_REPEAT;
    END_REPEAT;
    REPEAT i := 1 TO HIINDEX(t1_set) BY 1 WHILE NOT violation;
      REPEAT j := 1 TO HIINDEX(t1_set[i].item_element) BY 1;
        l_rep_item := t1_set[i].item_element;
        t3_set := t3_set + l_rep_item[j];
      END_REPEAT;
      violation := SIZEOF(t3_set * t2_set) <> 1;
      t3_set := [];
    END_REPEAT;

  WHERE
    wr1: (NOT violation);
END_RULE;
(*
```

Argument definitions:

applied_classification_assignment: the set of all instances of **applied_classification_assignment** entities.

Formal propositions:

WR1: Every instance of **compound_representation_item** that has an **applied_classification_-assignment** whose attribute **assigned_class** is a **group** with attribute **name** equal 'spacing position with offset' shall have its attribute **item_element** instantiated as a **list_representation_item** which shall collect exactly one instance of **compound_representation_item** that has an **applied_-classification_assignment** whose attribute **assigned_class** equals 'spacing position'.

Page 690
The purpose for this change is to modify the AIM EXPRESS to add the mapping of the Surface_with_identifier to Global_id application assertion. Add Global rule to enforce the application assertion. Insert the following new subclause after 5.2.4.225. Renumber succeeding subclauses accordingly. Add surface_with_identification_assignment to Index.

5.2.4.226 surface_with_identification_assignment

The **surface_with_identification_assignment** rule specifies a list of entities that require an identification. The identification is defined by the **applied_identification_assignment** attribute.

EXPRESS specification:

```
*)
RULE surface_with_identification_assignment
FOR (APPLIED_CLASSIFICATION_ASSIGNMENT);
  LOCAL
    c_a_set: SET OF APPLIED_CLASSIFICATION_ASSIGNMENT := [];
    t1_set:  SET OF surface := [];
    t2_set:  SET OF applied_identification_assignment := [];
    arg_list:  LIST OF STRING := ['surface with identifier'];
    violation: LOGICAL := FALSE;
  END_LOCAL;

  (* get all classification_assignment instances  *)
    REPEAT j:=1 TO HIINDEX(arg_list) WHILE (NOT violation);
        c_a_set := QUERY(i <* APPLIED_CLASSIFICATION_ASSIGNMENT |
                    i.assigned_class.NAME =  arg_LIST[j]);
   END_REPEAT;

  (* get all instances of surface that have class id *)
  REPEAT i := 1 TO HIINDEX(c_a_set);
    REPEAT j := 1 TO HIINDEX(c_a_set[i].items);
      t1_set := t1_set + c_a_set[i].items[j];
    END_REPEAT;
  END_REPEAT;
    REPEAT i := 1 TO HIINDEX(t1_set) BY 1 WHILE NOT violation;
      t2_set := bag_to_set(USEDIN(t1_set[i],
'SHIP_ARRANGEMENT_SCHEMA.APPLIED_IDENTIFICATION_ASSIGNMENT.ITEMS'));
      t2_set := QUERY ( j <* t2_set |
          j.role.name = 'globally unambiguous identifier');
     violation := NOT (SIZEOF(T2_SET) = 1);
    END_REPEAT;

  WHERE
    wr1: NOT violation;
END_RULE;
```


(*

Argument definitions:

applied_classification_assignment: the set of all instances of **applied_classification_assignment**.

Formal propositions:

WR1: Every instance of **surface** that is referenced by an **applied_classification_assignment** whose **assigned_class** has a **name** attribute of value 'surface with identifier' shall require an **applied_identification_assignment** to define the instance identifier.

Page 715, Table 1
The purpose for this change is to add the Hull_class_applicability Unit of Functionality to all conformance classes specified in this part of ISO 10303. Insert the following row in the table following the row for external_references.

hull_class_applicability	X	X	X	X	X

Page 716, Table 2
The purpose for this change is to add action_relationship to the Conformance class elements Table. Insert the following row in the table following the row for action_method.

action_relationship	X	X	X	X	X

Page 716, Table 2
The purpose for this change is to add amount_of_substance_measure_with_unit and amount_of_substance_unit to the Conformance class elements Table. Insert the following rows in the table following the row for advanced_face.

amount_of_substance_measure_with_unit	X	X	X	X	X
amount_of_substance_unit	X	X	X	X	X

Page 717, Table 2
The purpose for this change is to add area_measure_with_unit to the Conformance class elements Table. Insert the following row in the table following the row for approval_status.

area_measure_with_unit	X	X	X	X	X

Page 718, Table 2
The purpose for this change is to add conversion_based_unit to the Conformance class elements Table. Insert the following row in the table following the row for context_dependent_unit.

conversion_based_unit	X	X	X	X	X

Page 719, Table 2
The purpose for this change is to add electric_current_measure_with_unit and electric_current_unit to the Conformance class elements Table. Insert the following rows in the table following the row for effectivity_assignment.

electric_current_measure_with_unit	X	X	X	X	X
electric_current _unit	X	X	X	X	X

Page 720, Table 2
The purpose for this change is to add length_measure_with_unit to the Conformance class elements Table. Insert the following row in the table following the row for item_defined_transformation.

length_measure_with_unit	X	X	X	X	X

Page 720, Table 2
The purpose for this change is to add luminous_intensity_measure_with_unit to the Conformance class elements Table. Insert the following row in the table following the row for loop.

luminous_intensity_measure_with_unit	X	X	X	X	X

Page 720, Table 2
The purpose for this change is to add mass_measure_with_unit to the Conformance class elements Table. Insert the following row in the table following the row for mapped_item.

mass_measure_with_unit	X	X	X	X	X

Page 722, Table 2
The purpose for this change is to add plane_angle_measure_with_unit to the Conformance class elements Table. Insert the following row in the table following the row for plane.

plane_angle_measure_with_unit	X	X	X	X	X

Page 722, Table 2
The purpose for this change is to add product_category_relationship to the Conformance class elements Table. Insert the following row in the table following the row for product_category.

product_category_relationship	X	X	X	X	X

Page 722, Table 2
The purpose for this change is to add ratio_measure_with_unit to the Conformance class elements Table. Insert the following row in the table following the row for quasi_uniform_surface.

ratio_measure_with_unit	X	X	X	X	X

Page 723, Table 2
The purpose for this change is to add solid_angle_measure_with_unit and solid_angle_unit to the Conformance class elements Table. Insert the following rows in the table following the row for si_unit.

solid_angle_measure_with_unit	X	X	X	X	X
solid_angle _unit	X	X	X	X	X

Page 723, Table 2
The purpose for this change is to add thermodynamic_temperature_measure_with_unit to the Conformance class elements Table. Insert the following row in the table following the row for swept_surface.

thermodynamic_temperature_measure_with_unit	X	X	X	X	X

Page 723, Table 2
The purpose for this change is to add time_measure_with_unit to the Conformance class elements Table. Insert the following row in the table following the row for thermodynamic_temperature_unit.

time_measure_with_unit	X	X	X	X	X

Page 724, Table 2
The purpose for this change is to add volume_measure_with_unit to the Conformance class elements Table. Insert the following row in the table following the row for vertex_point.

volume_measure_with_unit	X	X	X	X	X

Page 726, Annex A
The purpose for this change is to modify the AIM EXPRESS expanded listing to add the mapping of the Surface_with_identifier application object and to correct global rule compilation errors. Add surface and representation_item to classification_item Select type. Replace EXPRESS definition with the following text.

```
TYPE classification_item = SELECT(
   action,
   action_request_solution,
   applied_action_request_assignment,
   approval,
   compound_representation_item,
   document,
   executed_action,
   external_source,
   group,
   identification_assignment_relationship,
   product,
   product_definition,
   product_definition_relationship,
   product_definition_shape,
   product_related_product_category,
   property_definition,
   property_definition_representation,
```



```
   representation,
   representation_item,
   shape_aspect,
   surface,
   versioned_action_request);
END_TYPE;
```

Page 728, Annex A

The purpose for this change is to modify the AIM EXPRESS expanded listing to remove shape_aspect from the external_identification_item Select type as it is no longer used in the external_instance_-reference mapping paths. Replace EXPRESS definition with the following text.

```
TYPE external_identification_item = SELECT(
   action,
   document,
   product,
   product_definition,
   property_definition);
END_TYPE;
```

Page 728, Annex A

The purpose for this change is to modify the AIM EXPRESS expanded listing to add mapping of Surface_with_identifier application object and to correct a global rule error. Add compound_-representation_item and surface to identification_item Select type. Replace EXPRESS definition with the following text.

```
TYPE identification_item = SELECT(
   action,
   action_request_solution,
   compound_representation_item,
   document,
   executed_action,
   group,
   product,
   product_definition,
   product_definition_relationship,
   product_definition_shape,
   product_related_product_category,
   property_definition,
   surface,
   versioned_action_request);
END_TYPE;
```

Page 731, Annex A

The purpose for this change is to modify the AIM EXPRESS expanded listing to add action_assignment to the role_select type to correct a global rule compilation error. Replace EXPRESS definition with the following text.

```
TYPE role_select = SELECT
  (action_assignment,
  action_request_assignment,
  approval_assignment,
  approval_date_time,
  document_reference,
  effectivity_assignment,
  group_assignment);
END_TYPE; -- role_select
```


Page 733, Annex A

The purpose for this change is to modify the AIM EXPRESS expanded listing to add the action_relationship Entity. Insert the following text after the EXPRESS definition for Entity action_method. Add action_relationship to Index.

```
ENTITY action_relationship;
  name : label;
  description : OPTIONAL text;
  relating_action : action;
  related_action : action;
END_ENTITY; -- action_relationship
```

Page 735, Annex A

The purpose for this change is to add measure_with_unit subtypes that are required for the use of conversion_based_units. Insert the following text after the EXPRESS definition for Entity advanced_face. Add amount_of_substance_measure_with_unit and amount_of_substance_unit to Index.

```
ENTITY amount_of_substance_measure_with_unit
    SUBTYPE OF (measure_with_unit);
    WHERE
      wr1: ('SHIP_ARRANGEMENT_SCHEMA.AMOUNT_OF_SUBSTANCE_UNIT' IN
      TYPEOF(SELF\measure_with_unit.unit_component));
END_ENTITY; -- amount_of_substance_measure_with_unit

ENTITY amount_of_substance_unit
    SUBTYPE OF (named_unit);
    WHERE
      wr1: ((SELF\named_unit.dimensions.length_exponent = 0) AND
      (SELF\named_unit.dimensions.mass_exponent = 0) AND
      (SELF\named_unit.dimensions.time_exponent = 0) AND
      (SELF\named_unit.dimensions.electric_current_exponent = 0) AND
      (SELF\named_unit.dimensions.thermodynamic_temperature_exponent = 0)
      AND (SELF\named_unit.dimensions.amount_of_substance_exponent = 1)
      AND (SELF\named_unit.dimensions.luminous_intensity_exponent = 0));
END_ENTITY; -- amount_of_substance_unit
```

Page 737, Annex A

The purpose for this change is to add measure_with_unit subtypes that are required for the use of conversion_based_units. Insert the following text after the EXPRESS definition for Entity approval_status. Add area_measure_with_unit to Index.

```
ENTITY area_measure_with_unit
    SUBTYPE OF (measure_with_unit);
    WHERE
      wr1: ('SHIP_ARRANGEMENT_SCHEMA.LENGTH_UNIT' IN
       TYPEOF(SELF\measure_with_unit.unit_component));
END_ENTITY; -- area_measure_with_unit
```

Page 742, Annex A

The purpose for this change is to add constructs required for the use of conversion_based_units. Insert the following text after the EXPRESS definition for Entity context_dependent_unit. Add conversion_based_unit to Index.

```
ENTITY conversion_based_unit
  SUBTYPE OF (named_unit);
      name              : label;
      conversion_factor : measure_with_unit;
END_ENTITY; -- conversion_based_unit
```


Page 745, Annex A

The purpose for this change is to add measure_with_unit subtypes that are required for the use of conversion_based_units. Insert the following text after the EXPRESS definition for Entity effectivity_assignment. Add electric_current_measure_with_unit and electric_current_unit to Index.

```
ENTITY electric_current_measure_with_unit
    SUBTYPE OF (measure_with_unit);
    WHERE
      wr1: ('SHIP_ARRANGEMENT_SCHEMA.ELECTRIC_CURRENT_UNIT' IN
      TYPEOF(SELF\measure_with_unit.unit_component));
END_ENTITY; -- electric_current_measure_with_unit

ENTITY electric_current_unit
    SUBTYPE OF (named_unit);
    WHERE
      wr1: ((SELF\named_unit.dimensions.length_exponent = 0) AND
      (SELF\named_unit.dimensions.mass_exponent = 0) AND
      (SELF\named_unit.dimensions.time_exponent = 0) AND
      (SELF\named_unit.dimensions.electric_current_exponent = 1) AND
      (SELF\named_unit.dimensions.thermodynamic_temperature_exponent = 0)
      AND (SELF\named_unit.dimensions.amount_of_substance_exponent = 0)
      AND (SELF\named_unit.dimensions.luminous_intensity_exponent = 0));
END_ENTITY; -- electric_current_unit
```

Page 748, Annex A

The purpose for this change is to add measure_with_unit subtypes that are required for the use of conversion_based_units. Insert the following text after the EXPRESS definition for Entity item_defined_transformation. Add length_measure_with_unit to Index.

```
ENTITY length_measure_with_unit
    SUBTYPE OF (measure_with_unit);
    WHERE
      wr1: ('SHIP_ARRANGEMENT_SCHEMA.LENGTH_UNIT' IN
      TYPEOF(SELF\measure_with_unit.unit_component));
END_ENTITY; -- length_measure_with_unit
```

Page 749, Annex A

The purpose for this change is to add measure_with_unit subtypes that are required for the use of conversion_based_units. Insert the following text after the EXPRESS definition for Entity loop. Add luminous_intensity_measure_with_unit to Index.

```
ENTITY luminous_intensity_measure_with_unit
    SUBTYPE OF (measure_with_unit);
    WHERE
      wr1: ('SHIP_ARRANGEMENT_SCHEMA.LUMINOUS_INTENSITY_UNIT' IN

      TYPEOF(SELF\measure_with_unit.unit_component));
END_ENTITY; -- luminous_intensity_measure_with_unit
```

Page 749, Annex A

The purpose for this change is to add measure_with_unit subtypes that are required for the use of conversion_based_units. Insert the following text after the EXPRESS definition for Entity mapped_item. Add mass_measure_with_unit to Index.

```
ENTITY mass_measure_with_unit
    SUBTYPE OF (measure_with_unit);
    WHERE
      wr1: ('SHIP_ARRANGEMENT_SCHEMA.MASS_UNIT' IN
```



```
      TYPEOF(SELF\measure_with_unit.unit_component));
END_ENTITY; -- mass_measure_with_unit
```

Page 749, Annex A

The purpose for this change is to add the measure_with_unit supertype declaration to the measure_with_unit EXPRESS definition. Replace the EXPRESS definition for Entity measure_with_unit with the following text.

```
ENTITY measure_with_unit
  SUPERTYPE OF (ONEOF (amount_of_substance_measure_with_unit,
      area_measure_with_unit, electric_current_measure_with_unit,
      length_measure_with_unit, luminous_intensity_measure_with_unit,
      mass_measure_with_unit, plane_angle_measure_with_unit,
      ratio_measure_with_unit, thermodynamic_temperature_measure_with_unit,
      time_measure_with_unit, uncertainty_measure_with_unit,
      volume_measure_with_unit));
    value_component : measure_value;
    unit_component  : unit;
  WHERE
    wr1: valid_units(SELF);
END_ENTITY; -- measure_with_unit
```

Page 749, Annex A

The purpose for this change is to modify the named_unit EXPRESS declaration to correct the supertype statement. Replace the EXPRESS definition for Entity named_unit with the following text.

```
ENTITY named_unit
  SUPERTYPE OF (ONEOF (si_unit, context_dependent_unit,
conversion_based_unit) ANDOR ONEOF (amount_of_substance_unit,
electric_current_unit, length_unit, luminous_intensity_unit, mass_unit,
plane_angle_unit, ratio_unit, solid_angle_unit,
thermodynamic_temperature_unit, time_unit));
  dimensions : dimensional_exponents;
END_ENTITY; -- named_unit
```

Page 756, Annex A

The purpose for this change is to add measure_with_unit subtypes that are required for the use of conversion_based_units. Insert the following text after the EXPRESS definition for Entity plane. Add plane_angle_measure_with_unit to Index.

```
ENTITY plane_angle_measure_with_unit
    SUBTYPE OF (measure_with_unit);
    WHERE
      wr1: ('SHIP_ARRANGEMENT_SCHEMA.PLANE_ANGLE_UNIT' IN
      TYPEOF(SELF\measure_with_unit.unit_component));
END_ENTITY; -- plane_angle_measure_with_unit
```

Page 757, Annex A

The purpose for this change is to modify the AIM EXPRESS expanded listing to add the product_category_relationship Entity. Insert the following text after the EXPRESS definition for Entity product_category. Add product_category_relationship to Index.

```
ENTITY product_category_relationship;
    name : label;
    description : OPTIONAL text;
    category : product_category;
    sub_category : product_category;
  WHERE
    wr1: acyclic_product_category_relationship(SELF,[SELF.sub_category]);
```



```
END_ENTITY; -- product_category_relationship
```

Page 759, Annex A

The purpose for this change is to add measure_with_unit subtypes that are required for the use of conversion_based_units. Insert the following text after the EXPRESS definition for Entity quasi_uniform_surface. Add ratio_measure_with_unit to Index.

```
ENTITY ratio_measure_with_unit
    SUBTYPE OF (measure_with_unit);
    WHERE
      wr1: ('SHIP_ARRANGEMENT_SCHEMA.RATIO_UNIT' IN
      TYPEOF(SELF\measure_with_unit.unit_component));
END_ENTITY; -- ratio_measure_with_unit
```

Page 761, Annex A

The purpose for this change is to add measure_with_unit subtypes that are required for the use of conversion_based_units. Insert the following text after the EXPRESS definition for Entity si_unit. Add solid_angle_measure_with_unit and solid_angle_unit to Index.

```
ENTITY solid_angle_measure_with_unit
    SUBTYPE OF (measure_with_unit);
    WHERE
      wr1: ('SHIP_ARRANGEMENT_SCHEMA.SOLID_ANGLE_UNIT' IN
      TYPEOF (SELF\measure_with_unit.unit_component)) ;
END_ENTITY; -- solid_angle_measure_with_unit

ENTITY solid_angle_unit
   SUBTYPE OF (named_unit);
   WHERE
   wr1: ( SELF\named_unit.dimensions.length_exponent = 0.0 )
   AND ( SELF\named_unit.dimensions.mass_exponent = 0.0 )
   AND ( SELF\named_unit.dimensions.time_exponent = 0.0 )
   AND ( SELF\named_unit.dimensions.electric_current_exponent = 0.0 )
   AND
   (SELF\named_unit.dimensions.thermodynamic_temperature_exponent = 0.0 )
   AND ( SELF\named_unit.dimensions.amount_of_substance_exponent = 0.0 )
   AND (SELF\named_unit.dimensions.luminous_intensity_exponent = 0.0 ) ;
END_ENTITY; -- solid_angle_unit
```

Page 762, Annex A

The purpose for this change is to add measure_with_unit subtypes that are required for the use of conversion_based_units. Insert the following text after the EXPRESS definition for Entity swept_surface. Add thermodynamic_temperature_measure_with_unit to Index.

```
ENTITY thermodynamic_temperature_measure_with_unit
    SUBTYPE OF (measure_with_unit);
    WHERE
      wr1: ('SHIP_ARRANGEMENT_SCHEMA.THERMODYNAMIC_TEMPERATURE_UNIT' IN
      TYPEOF (SELF\measure_with_unit.unit_component));
END_ENTITY; -- thermodynamic_temperature_measure_with_unit
```

Page 762, Annex A

The purpose for this change is to add measure_with_unit subtypes that are required for the use of conversion_based_units. Insert the following text after the EXPRESS definition for Entity thermodynamic_temperature_unit. Add time_measure_with_unit to Index.

```
ENTITY time_measure_with_unit
    SUBTYPE OF (measure_with_unit);
    WHERE
      wr1: ('SHIP_ARRANGEMENT_SCHEMA.TIME_UNIT' IN
```



```
      TYPEOF(SELF\measure_with_unit.unit_component));
END_ENTITY; -- time_measure_with_unit
```

Page 763, Annex A

The purpose for this change is to add measure_with_unit subtypes that are required for the use of conversion_based_units. Insert the following text after the EXPRESS definition for Entity vertex_point. Add volume_measure_with_unit to Index.

```
ENTITY volume_measure_with_unit
    SUBTYPE OF (measure_with_unit);
    WHERE
      wr1: ('SHIP_ARRANGEMENT_SCHEMA.LENGTH_UNIT' IN
      TYPEOF(SELF\measure_with_unit.unit_component));
END_ENTITY; -- volume_measure_with_unit
```

Page 777, Annex A

The purpose for this change is to correct a compilation error in the global rule. Replace EXPRESS definition with the following text.

```
RULE external_instance_reference_has_same_identifier FOR (
            applied_external_identification_assignment);
LOCAL
  violation : LOGICAL := FALSE;
  extref_set : SET OF applied_external_identification_assignment := [];
  aia_set : SET OF applied_identification_assignment := [];
END_LOCAL;

  extref_set := QUERY ( i <* applied_external_identification_assignment |
      (i.role.name = 'external instance reference') );

REPEAT i := 1 TO HIINDEX(extref_set) BY 1 WHILE NOT violation;
  aia_set := bag_to_set(USEDIN(extref_set[i].items[1],
    'SHIP_ARRANGEMENT_SCHEMA.APPLIED_IDENTIFICATION_ASSIGNMENT.ITEMS'));
  violation := NOT (aia_set[1].assigned_id = extref_set[i].assigned_id);
END_REPEAT;

WHERE
wr1: NOT violation;
END_RULE; -- external_instance_reference_has_same_identifier
```

Page 851, Annex A

The purpose for this change is to modify the AIM EXPRESS expanded listing to add the mapping of the Surface_with_identifier to Global_id application assertion. Add Global rule to enforce the application assertion. Insert the following text before RULE tonnage_definition_has_properties.

```
RULE surface_with_identification_assignment
FOR (APPLIED_CLASSIFICATION_ASSIGNMENT);
  LOCAL
    c_a_set: SET OF APPLIED_CLASSIFICATION_ASSIGNMENT := [];
    t1_set:  SET OF surface := [];
    t2_set:  SET OF applied_identification_assignment := [];
    arg_list:  LIST OF STRING := ['surface with identifier'];
    violation: LOGICAL := FALSE;
  END_LOCAL;

  (* get all classification_assignment instances  *)
    REPEAT j:=1 TO HIINDEX(arg_list) WHILE (NOT violation);
        c_a_set := QUERY(i <* APPLIED_CLASSIFICATION_ASSIGNMENT |
                   i.assigned_class.NAME =  arg_LIST[j]);
   END_REPEAT;

  (* get all instances of surface that have class id *)
```



```
  REPEAT i := 1 TO HIINDEX(c_a_set);
    REPEAT j := 1 TO HIINDEX(c_a_set[i].items);
      t1_set := t1_set + c_a_set[i].items[j];
    END_REPEAT;
  END_REPEAT;
    REPEAT i := 1 TO HIINDEX(t1_set) BY 1 WHILE NOT violation;
      t2_set := bag_to_set(USEDIN(t1_set[i],
'SHIP_ARRANGEMENT_SCHEMA.APPLIED_IDENTIFICATION_ASSIGNMENT.ITEMS'));
      t2_set := QUERY ( j <* t2_set |
          j.role.name = 'globally unambiguous identifier');
         violation := NOT (SIZEOF(T2_SET) = 1);
    END_REPEAT;

  WHERE
    wr1: NOT violation;
END_RULE;
```

Page 860, Annex A

The purpose for this change is to modify the AIM EXPRESS expanded listing to add the acyclic_product_category_relationship Function. Insert the following text after the EXPRESS definition for Function acyclic_mapped_representation. Add acyclic_product_category_relationship to Index.

```
FUNCTION acyclic_product_category_relationship(
        relation: product_category_relationship;
        children: SET OF product_category
        ): BOOLEAN;

    LOCAL
      x : SET OF product_category_relationship;
      local_children : SET OF product_category;
    END_LOCAL;

  REPEAT i := 1 TO HIINDEX(children) BY 1;
    IF relation.category :=: children[i] THEN
      RETURN(FALSE);
    END_IF;
  END_REPEAT;

  x := bag_to_set(USEDIN(relation.category,'SHIP_ARRANGEMENT_SCHEMA.' +
      'PRODUCT_CATEGORY_RELATIONSHIP.SUB_CATEGORY'));

  local_children := children + relation.category;

  IF SIZEOF(x) > 0 THEN
    REPEAT i := 1 TO HIINDEX(x) BY 1;
      IF NOT acyclic_product_category_relationship(x[i],local_children)
        THEN
        RETURN(FALSE);
      END_IF;
    END_REPEAT;
  END_IF;
RETURN(TRUE);
END_FUNCTION; -- acyclic_product_category_relationship
```

Page 870, Annex A

The purpose for this change is to modify the AIM EXPRESS to correct a global rule compilation error in Function get_role. Replace EXPRESS definition with the following text.

```
FUNCTION get_role(
            obj: role_select
    ): object_role;
```



```
  LOCAL
    role_bag : BAG OF role_association := USEDIN(obj,
            'SHIP_ARRANGEMENT_SCHEMA.' + 'ROLE_ASSOCIATION.' +
            'ITEM_WITH_ROLE');
  END_LOCAL;
  IF SIZEOF(role_bag) = 1 THEN
    RETURN(role_bag[1].role);
  ELSE
    RETURN(?);
  END_IF;
END_FUNCTION; -- get_role
```

Page 884, Table B.1
The purpose for this change is to add action_relationship to the Short names Table. Insert the following row in the table following the row for action_method.

ACTION_RELATIONSHIP	ACTRLT

Page 884, Table B.1
The purpose for this change is to add amount_of_substance_measure_with_unit and amount_of_substance_unit to the Short names Table. Insert the following rows in the table following the row for advanced_face.

AMOUNT_OF_SUBSTANCE_MEASURE_WITH_UNIT	AOSMWU
AMOUNT_OF_SUBSTANCE_UNIT	AOSU

Page 885, Table B.1
The purpose for this change is to add area_measure_with_unit to the Short names Table. Insert the following row in the table following the row for approval_status.

AREA_MEASURE_WITH_UNIT	AMWU

Page 886, Table B.1
The purpose for this change is to add conversion_based_unit to the Short names Table. Insert the following row in the table following the row for context_dependent_unit.

CONVERSION_BASED_UNIT	CNBSUN

Page 887, Table B.1
The purpose for this change is to add electric_current_measure_with_unit and electric_current_unit to the Short names Table. Insert the following rows in the table following the row for effectivity_assignment.

ELECTRIC_CURRENT_MEASURE_WITH_UNIT	ECMWU
ELECTRIC_CURRENT _UNIT	ELCRUN

Page 888, Table B.1
The purpose for this change is to add length_measure_with_unit to the Short names Table. Insert the following row in the table following the row for item_defined_transformation.

LENGTH_MEASURE_WITH_UNIT	LMWU

Page 888, Table B.1
The purpose for this change is to add luminous_intensity_measure_with_unit to the Short names Table. Insert the following row in the table following the row for loop.

LUMINOUS_INTENSITY_MEASURE_WITH_UNIT	LIMWU

Page 888, Table B.1
The purpose for this change is to add mass_measure_with_unit to the Short names Table. Insert the following row in the table following the row for mapped_item.

MASS_MEASURE_WITH_UNIT	MMWU

Page 889, Table B.1
The purpose for this change is to add plane_angle_measure_with_unit to the Short names Table. Insert the following row in the table following the row for plane.

PLANE_ANGLE_MEASURE_WITH_UNIT	PAMWU

Page 890, Table B.1
The purpose for this change is to add product_category_relationship to the Short names Table. Insert the following row in the table following the row for product_category.

PRODUCT_CATEGORY_RELATIONSHIP	PRCTRL

Page 890, Table B.1
The purpose for this change is to add ratio_measure_with_unit to the Short names Table. Insert the following row in the table following the row for quasi_uniform_surface.

RATIO_MEASURE_WITH_UNIT	RMWU

Page 891, Table B.1
The purpose for this change is to add solid_angle_measure_with_unit and solid_angle_unit to the Short names Table. Insert the following rows in the table following the row for si_unit.

SOLID_ANGLE_MEASURE_WITH_UNIT	SAMWU
SOLID_ANGLE _UNIT	SLANUN

Page 891, Table B.1
The purpose for this change is to add thermodynamic_temperature_measure_with_unit to the Short names Table. Insert the following row in the table following the row for swept_surface.

THERMODYNAMIC_TEMPERATURE_MEASURE_WITH_UNIT	TTMWU

Page 891, Table B.1
The purpose for this change is to add time_measure_with_unit to the Short names Table. Insert the following row in the table following the row for thermodynamic_temperature_unit.

TIME_MEASURE_WITH_UNIT	TMWU

Page 891, Table B.1
The purpose for this change is to add volume_measure_with_unit to the Short names Table. Insert the following row in the table following the row for vertex_point.

VOLUME_MEASURE_WITH_UNIT	VMWU

Page 892, Annex C
The purpose for this change is to remove Part 22 and to add Part 28 as an allowable Implementation method in addition to Part 21. Replace the first paragraph with the following text.

The implementation method defines what types of exchange behavior are required with respect to this part of ISO 10303. Conformance to this part of ISO 10303 shall be realized in an exchange structure. The file format shall be encoded according to the syntax and EXPRESS language mapping defined in either ISO 10303-21 or ISO 10303-28 and in the AIM defined in Annex A of this part of ISO 10303. The header exchange structure shall identify use of this part of ISO 10303 by the schema name ship_arrangement_schema.

Page 892, Annex C
Edition 2 of ISO 10303-21 added the capability to identify the particular Application protocol Conformance Class to which an exchange file conforms. The purpose for this change is to add the specification of values for this part of ISO 10303 to utilize that capability. Insert the following text after the existing paragraph.

C.1 General requirements

For various reasons, some entities may not be completely exported into an exchange structure. There may be mandatory information in the AIM that has no correspondence in the ARM. Sometimes an application may not maintain all the information that is anticipated for the data exchange. Other times, the information may be maintained by a sending system but not included in the data exchange. Nevertheless, the preprocessor must provide values for all mandatory attributes in an exchange file.

When no data is provided by a sending system for a required string value, the preprocessor shall use '.UNUSED.' or the empty string ''.

To further indicate the reason why no data is provided, the following convention shall be used:

— An empty string " indicates user data managed by the sending system but not provided for data exchange. As receiving system software may depend upon population of realistic data values for required attributes, use of empty strings is discouraged;

— A string with a value of '.UNUSED.' indicates user data in a mandatory attribute that is not managed by the sending system, is not known at the time of the data exchange, or is mandatory AIM information that has no correspondence in the ARM;

— $ is used in the physical file if an optional attribute is not instantiated.

C.2 Requirements specific to the implementation method defined in ISO 10303-21

If the implementation method is ISO 10303-21, the file format shall be encoded according to the syntax and EXPRESS language mapping defined in ISO 10303-21.

The FILE_SCHEMA element of the header shall specify the name of the EXPRESS schema used and include its object information identifier (see Annex E).

EXAMPLE The instance below identifies the ship_arrangement schema:

```
FILE_SCHEMA (('SHIP_ARRANGEMENT_SCHEMA { 1 0 10303 215 2 1 1} '))
```

C.3 Requirements specific to the implementation method defined in Edition 2 of ISO 10303-21

ISO 10303-21:2002 added the capability to specify the particular Conformance Class to which the Data section of an exchange file conforms. Exchange files conforming to the 2002 Edition of ISO 10303-21 shall contain one or more instances of the entity Section_context in the Header section of the file.

Example SECTION_CONTEXT ($,('CC1'));

If a single Data section is included in the exchange file, a single instance of the entity Section_context shall be included, and the value of the attribute section_context.section shall be $. The set of values of the attribute section_context.context_identifiers shall contain a single value to identify the particular Application protocol Conformance Class to which the data conforms.

The attribute value shall be one of:

— CC1;

— CC2;

— CC3;

— CC4;

— CC5.

Page 894, E.1
Replace the object identifier with the following text.

{iso standard 10303 part(215) version(2)}

Page 894, E.2
Replace the sublause in its entirety with the following text.

E.2 Schema identification

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

```
{ iso standard 10303 part(215) version(2) schema(1) ship-arrangement-
                              schema(1) }
```

is assigned to the ship_arrangement_schema expanded schema (see annex A). The meaning of this value is defined in ISO/IEC 8824-1, and is described in ISO 10303-1.

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

```
{ iso standard 10303 part(215) version(2) schema(1) ship-arrangement-
                              schema(2) }
```

is assigned to the ship_arrangement_schema short form schema (see 5.2). The meaning of this value is defined in ISO/IEC 8824-1, and is described in ISO 10303-1.

Page 940, Annex G

The purpose for this change is to modify the ARM EXPRESS-G to add the Surface_with_identifier application object. Replace Figure G.21 with the following figure.

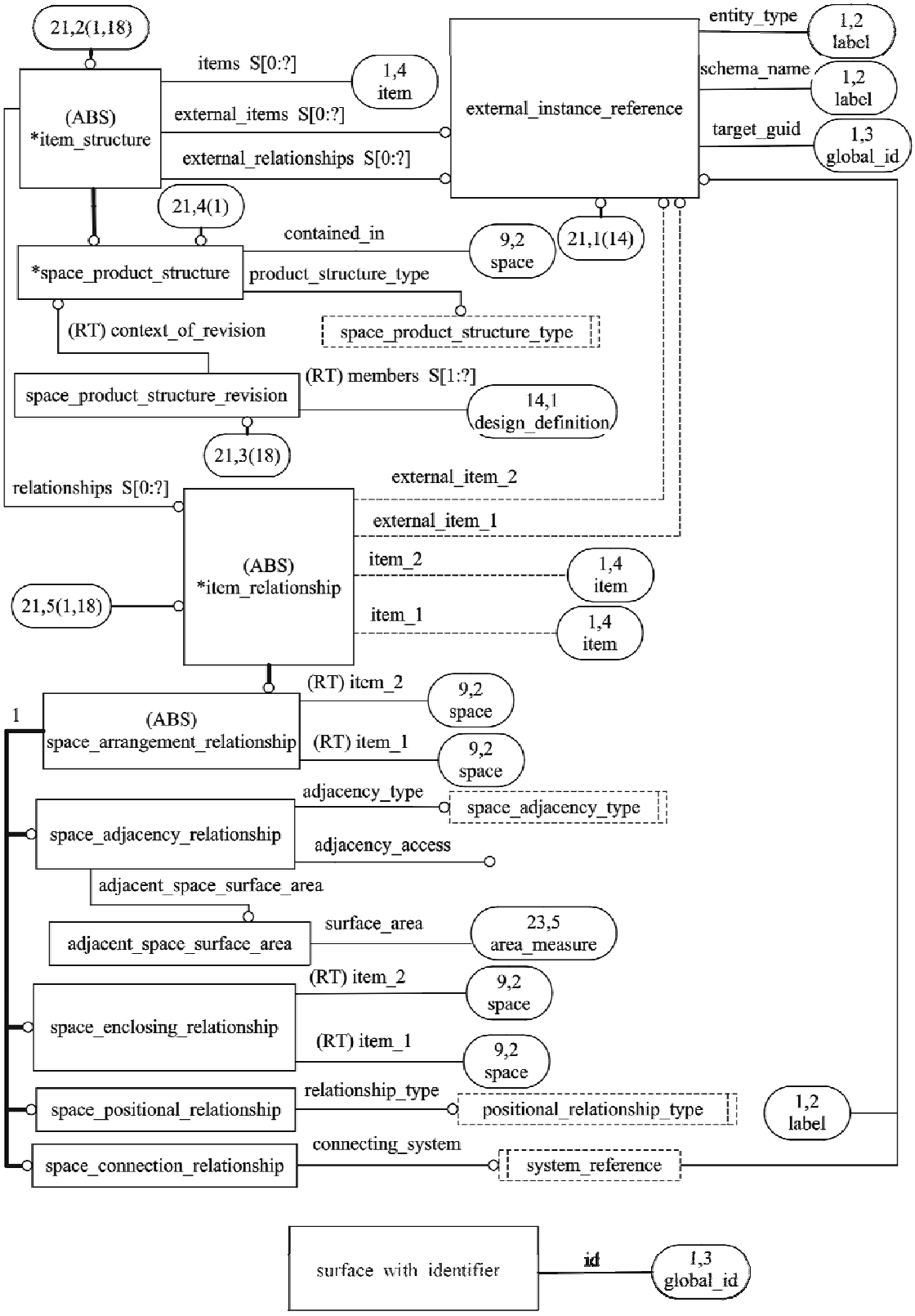

Figure G.21 — ARM diagram (21 of 23)

Page 944, Annex H

The purpose for this change is to modify the AIM EXPRESS-G to add the product_category_relationship entity. Replace Figure H.1 with the following figure.

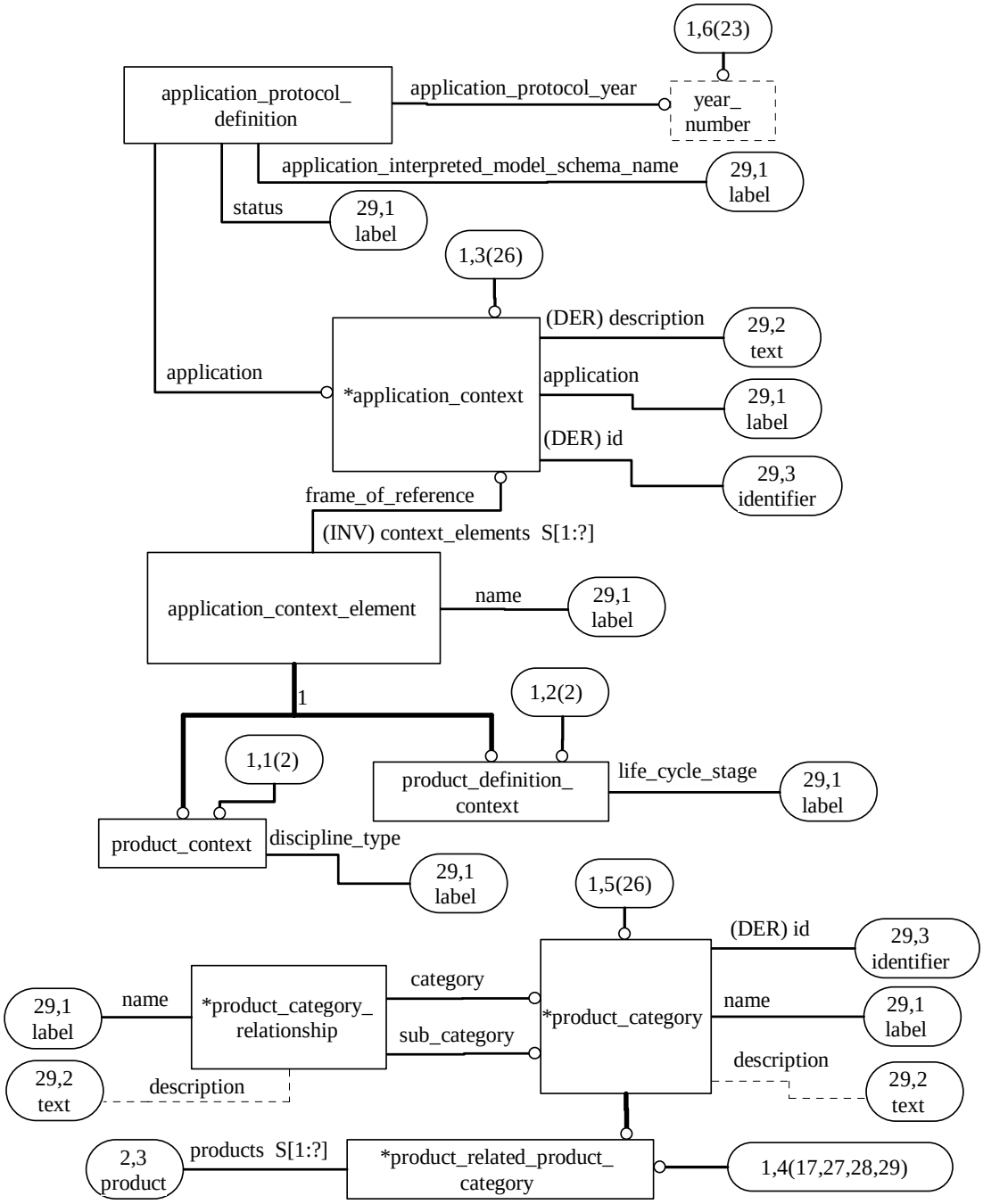

Figure H.1 — AIM EXPRESS-G diagram application context

Page 947, Annex H

The purpose for this change is to modify the AIM EXPRESS-G to delete the off-page reference to shape_aspect from external_identification_item Select type. Replace Figure H.4 with the following figure.

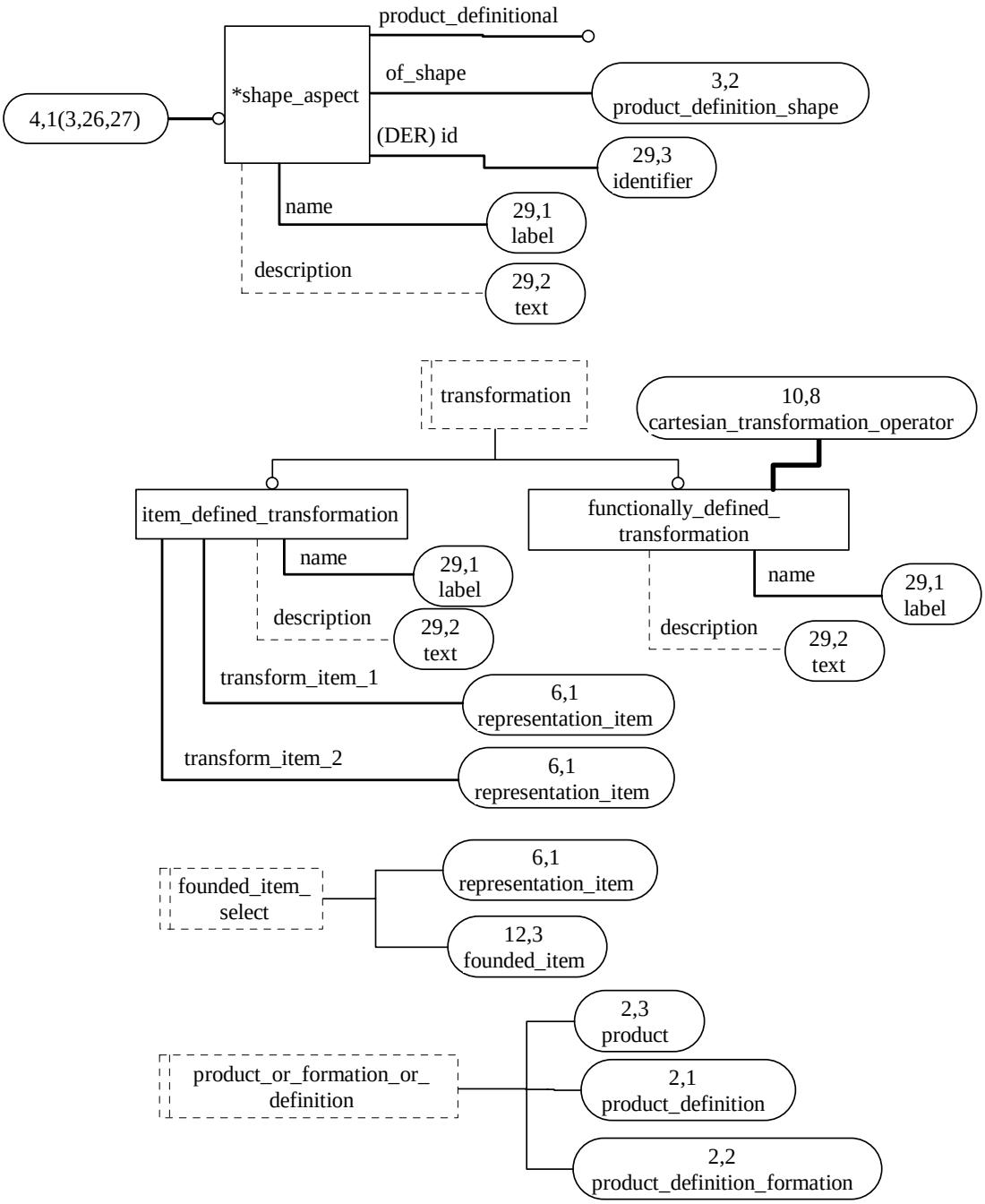

Figure H.4 — AIM EXPRESS-G diagram shape aspect

Page 949, Annex H

The purpose for this change is to modify the AIM EXPRESS-G to add off-page references from identification_item Select type to compound_representation_item and from classification_item Select type to representation_item. Replace Figure H.6 with the following figure.

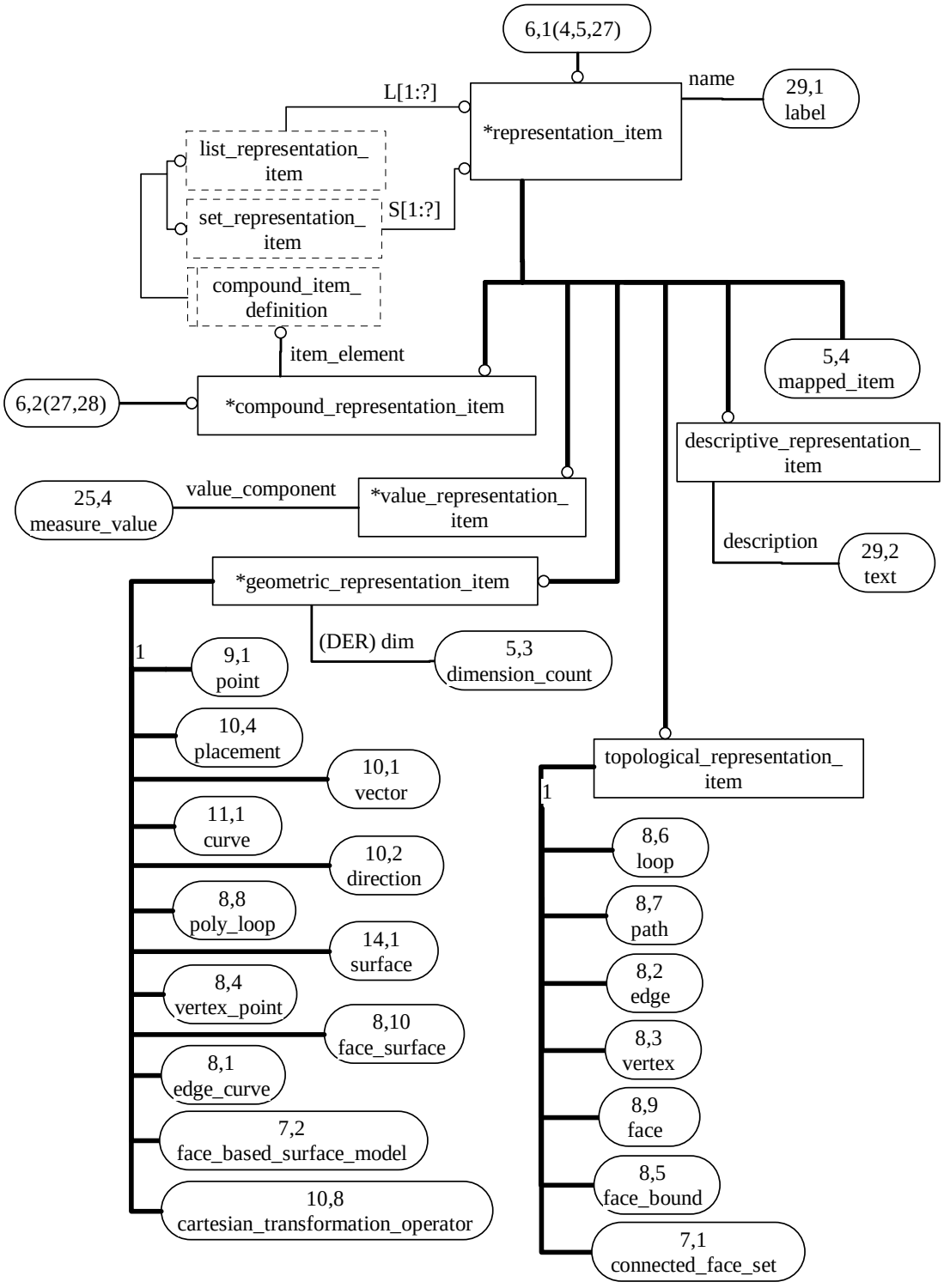

Figure H.6 — AIM EXPRESS-G diagram geometry and topology

Page 957, Annex H

The purpose for this change is to modify the AIM EXPRESS-G to add off-page references from identification_item Select type and from classification_item Select type to surface. Replace Figure H.14 with the following figure.

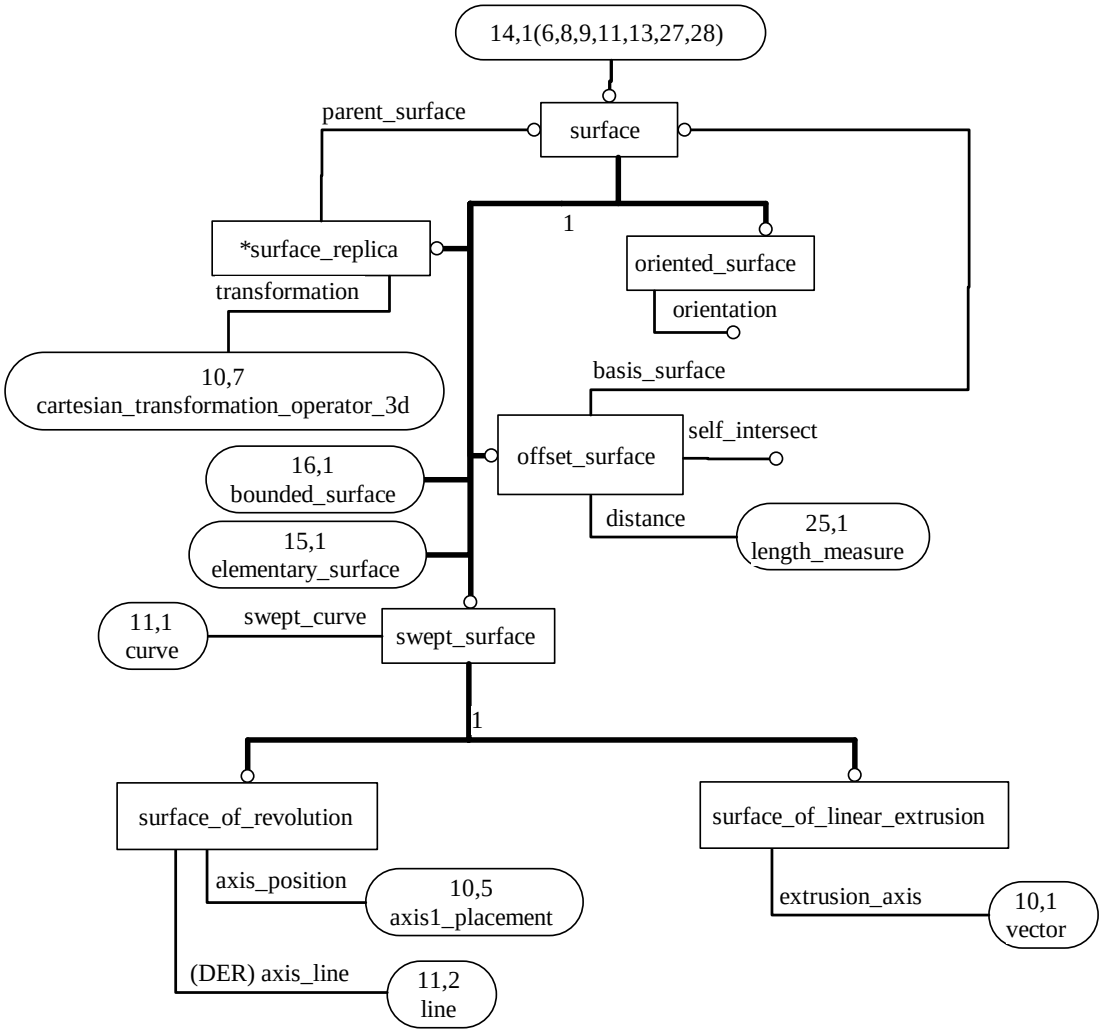

Figure H.14 — AIM EXPRESS-G diagram surface

Page 960, Annex H

The purpose for this change is to modify the AIM EXPRESS-G to add off-page references from role_select Select type to action_assignment and to add action_relationship entity. Replace Figure H.17 with the following figure.

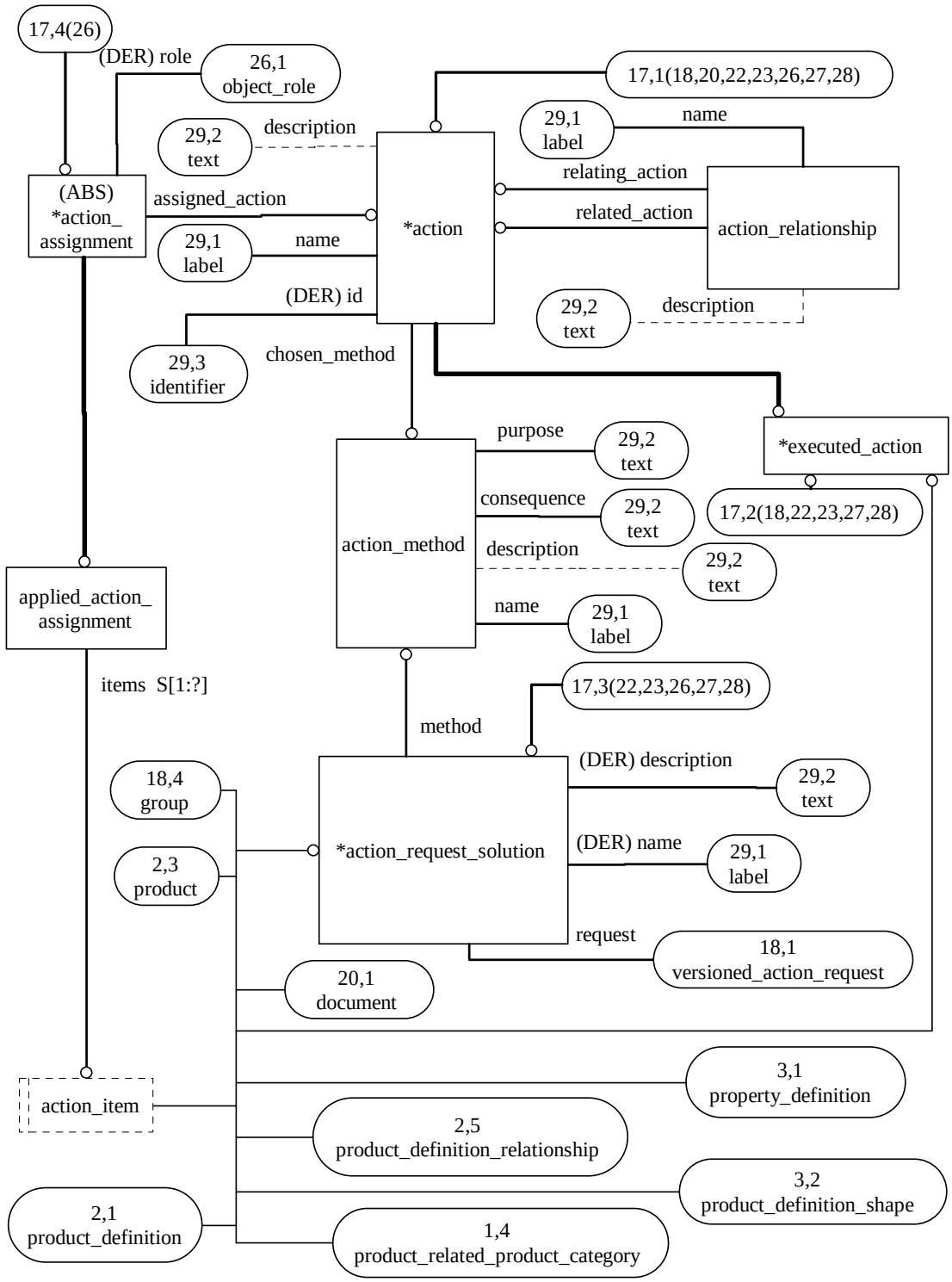

Figure H.17 — AIM EXPRESS-G diagram action

Page 967, Annex H

The purpose for this change is to modify the AIM EXPRESS-G to add conversion_based_unit, solid_angle_unit, electric_current_unit, and amount_of_substance_unit. Replace Figure H.24 with the following figure.

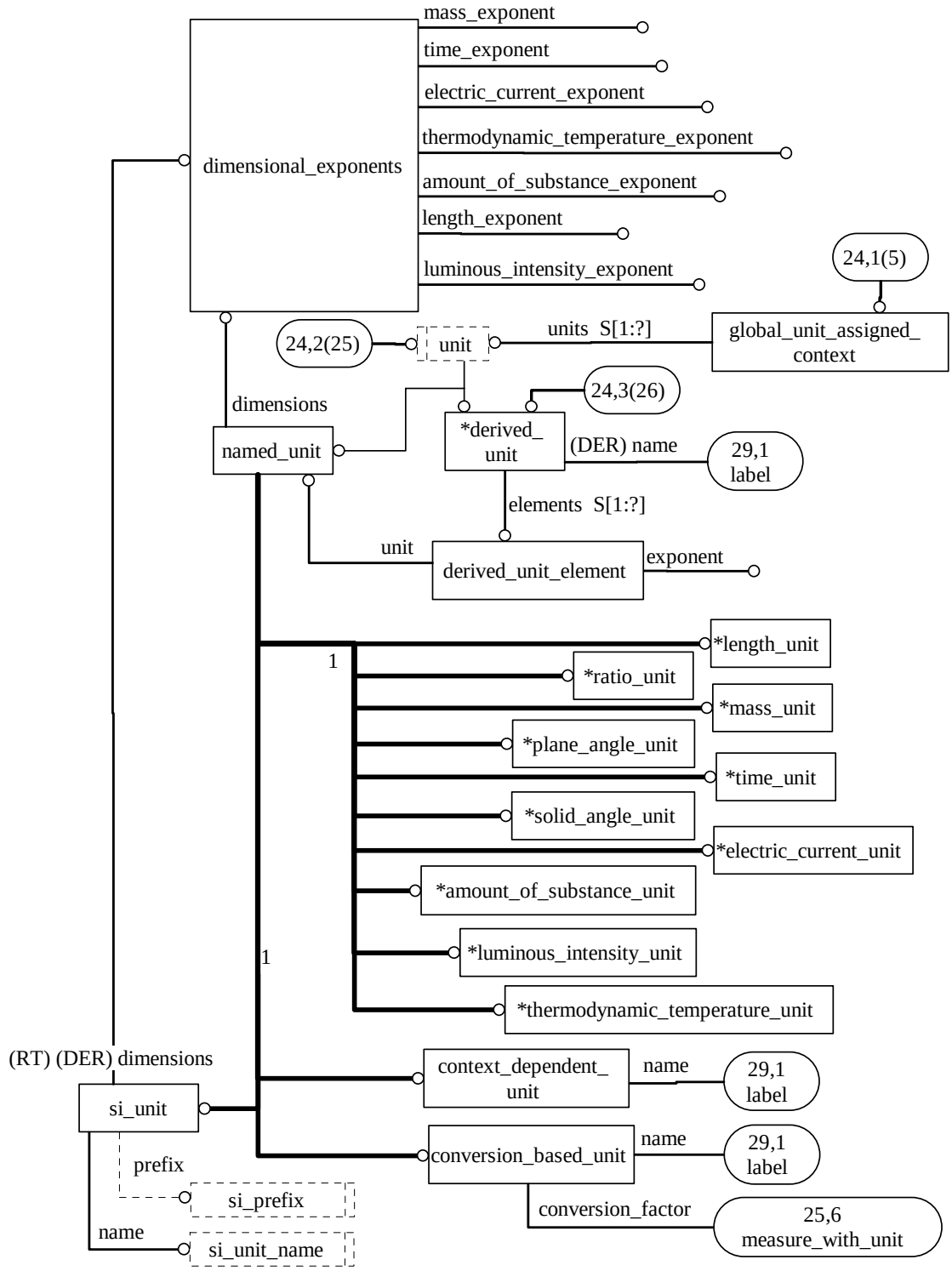

Figure H.24 — AIM EXPRESS-G diagram units

Page 968, Annex H

The purpose for this change is to modify the AIM EXPRESS-G to add measure_with_unit subtypes. Replace Figure H.25 with the following figure.

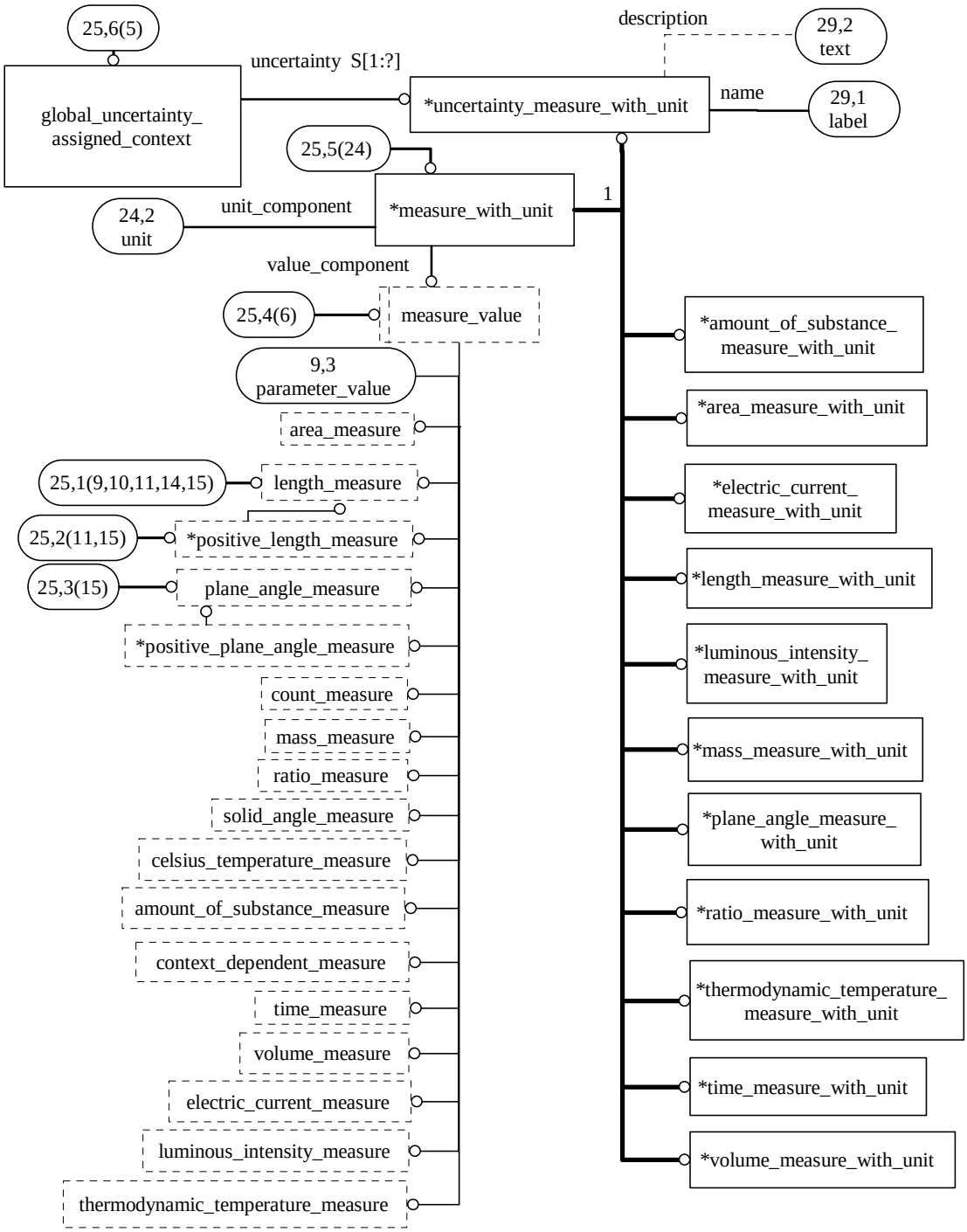

Figure H.25 — AIM EXPRESS-G diagram measures

Page 969, Annex H

The purpose for this change is to modify the AIM EXPRESS-G to add action_assignment to the role_select Select type. Replace Figure H.26 with the following figure.

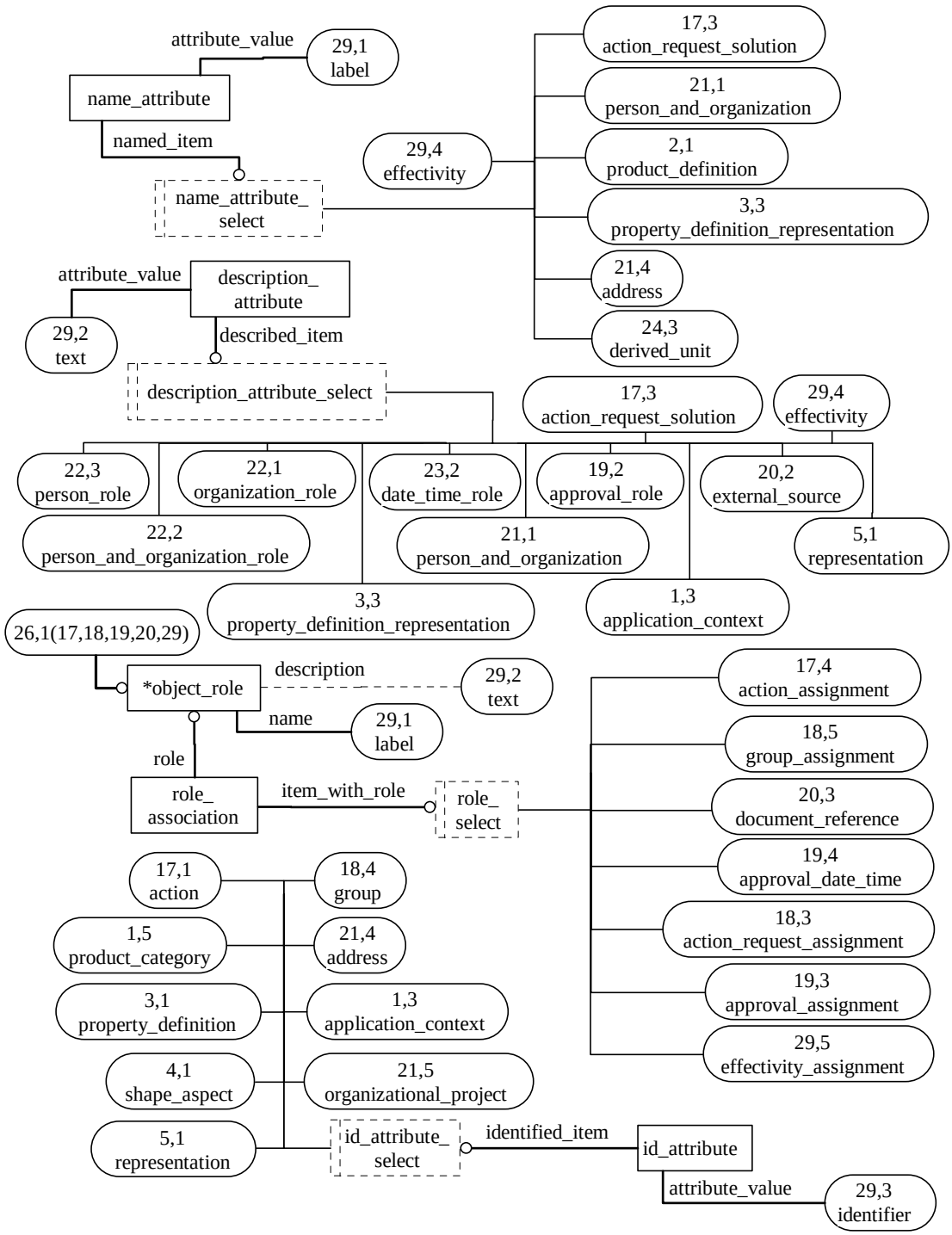

Figure H.26 — AIM EXPRESS-G diagram associations and attributes

Page 970, Annex H

The purpose for this change is to modify the AIM EXPRESS-G to add surface and representation_item to the classification_item Select type. Replace Figure H.27 with the following figure.

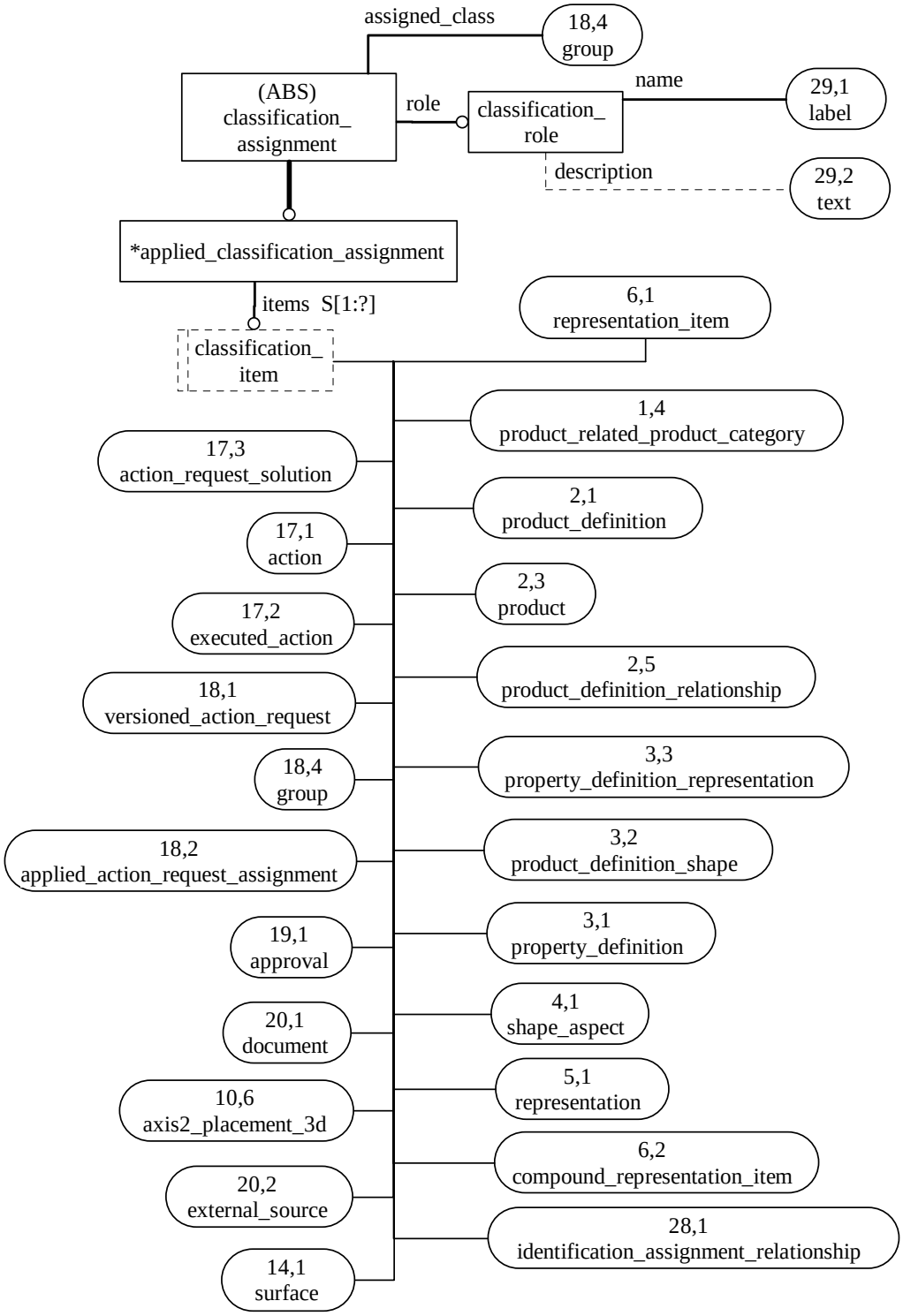

Figure H.27 — AIM EXPRESS-G diagram classification assignment

Page 971, Annex H

The purpose for this change is to modify the AIM EXPRESS-G to add surface and compound_representation_item to the identification_item Select type and to remove shape_aspect from the external_identification_item Select type. Replace Figure H.28 with the following figure.

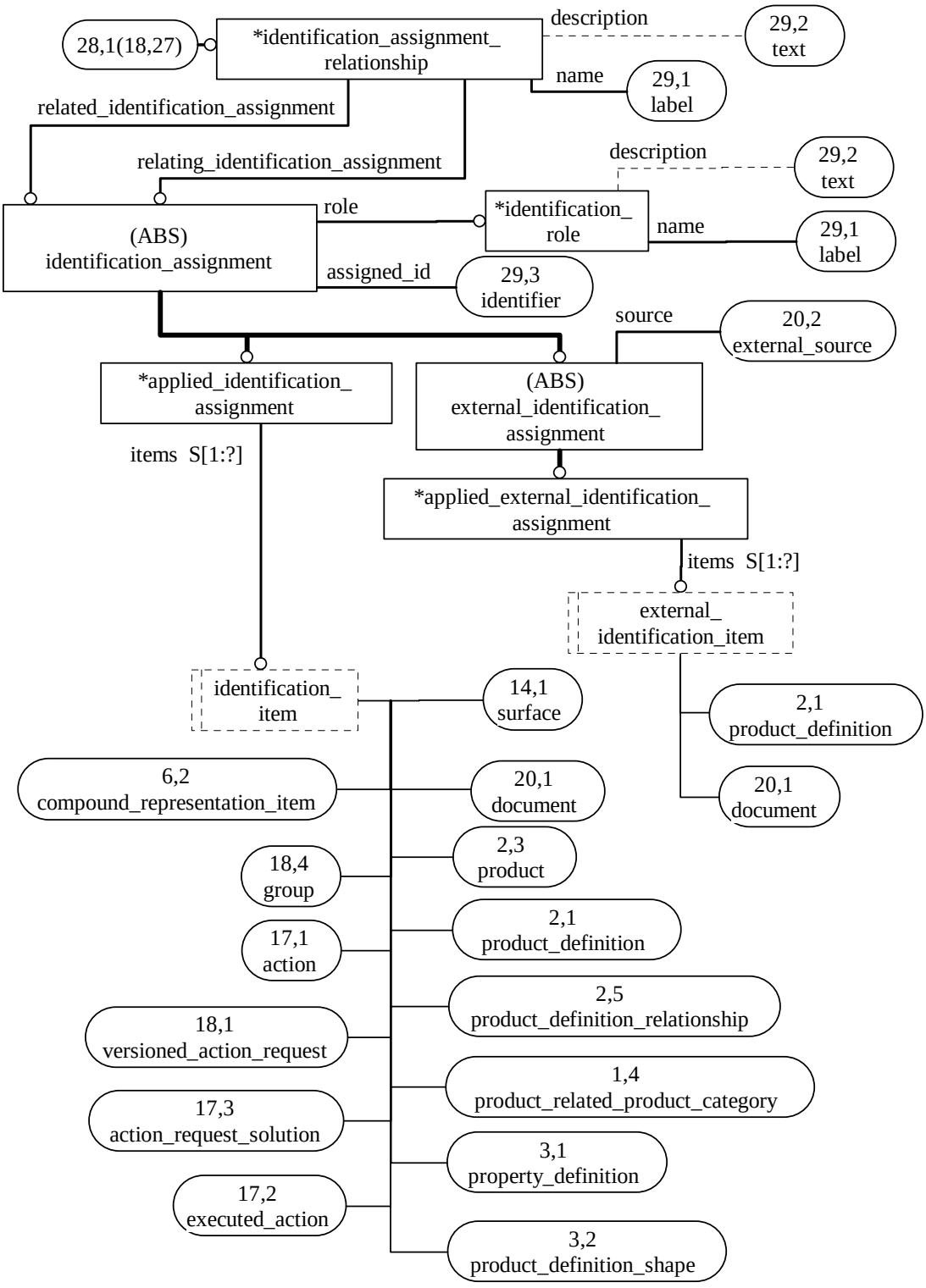

Figure H.28 — AIM EXPRESS-G diagram identification assignment