APPENDIX A

GLOSSARY OF DDLM ATTRIBUTES

THE DDLM REFERENCE DICTIONARY

The *DDLm* attributes used to construct the definitions of data items in domain-specific dictionaries are themselves defined in a similarly constructed dictionary; this is the *dictionary-dictionary* known as the DDLm Reference Dictionary. In this document, the attribute items are used to define their own function and properties.

We shall first look at the overall contents of the Reference dictionary before describing the function of the individual attribute items.

The list below (generated from the version 3.10.01 DDLm Reference dictionary with the program INDX) shows the attribute item names grouped in categories (shown with capitalized header names) in two columns. The left-hand column shows how each data name will appear in an instance application, and the right-hand column shows the data object names in their internal DDLm hierarchical representation.

```
Instance Application                    Categories & Objects (with hierarchy)
 --------------------                    -------------------------------------

                                                ATTRIBUTES
                                                |
loop_                                           |    ALIAS
    _alias.definition_id                        |    definition_id
    _alias.dictionary_uri                       |    dictionary_uri
                                                |
                                                |    CATEGORY
_category.key_id                                |    key_id
                                                |
                                                |    DEFINITION
_definition.class                               |    class
_definition.id                                  |    id
_definition.scope                               |    scope
_definition.update                              |    update
_definition.xref_code                           |    xref_code
                                                |
                                                |    DESCRIPTION
_description.key_words                          |    key_words
_description.common                             |    common
_description.text                               |    text
                                                |    |
loop_                                           |    |    EXAMPLE
    _description_example.case                   |    |    case
    _description_example.detail                 |    |    detail
                                                |
                                                |    DICTIONARY
_dictionary.class                               |    class
_dictionary.date                                |    date
_dictionary.ddl_conformance                     |    ddl_conformance
_dictionary.namespace                           |    namespace
_dictionary.title                               |    title
_dictionary.uri                                 |    uri
_dictionary.version                             |    version
                                                |    |
loop_                                           |    |    AUDIT
    _dictionary_audit.date                      |    |    date
    _dictionary_audit.revision                  |    |    revision
    _dictionary_audit.version                   |    |    version
                                                |    |
loop_                                           |    |    VALID
    _dictionary_valid.attributes                |    |    attributes
    _dictionary_valid.option                    |    |    option
    _dictionary_valid.application               |    |    application
                                                |    |
```

```
loop_                                                |     |    XREF
    _dictionary_xref.code                            |     |    code
    _dictionary_xref.date                            |     |    date
    _dictionary_xref.format                          |     |    format
    _dictionary_xref.name                            |     |    name
    _dictionary_xref.uri                             |     |    uri
                                                     |
                                                     |    ENUMERATION
_enumeration.default                                 |    default
_enumeration.def_index_id                            |    def_index_id
_enumeration.range                                   |    range
_enumeration.mandatory                               |    mandatory
                                                     |     |
loop_                                                |     |    DEFAULT
    _enumeration_default.index                       |     |    index
    _enumeration_default.value                       |     |    value
                                                     |     |
loop_                                                |     |    SET
    _enumeration_set.state                           |     |    state
    _enumeration_set.table_id                        |     |    table_id
    _enumeration_set.detail                          |     |    detail
    _enumeration_set.xref_code                       |     |    xref_code
    _enumeration_set.xref_dictionary                 |     |    xref_dictionary
                                                     |
                                                     |    IMPORT
_import.file_id                                      |    file_id
_import.frame_id                                     |    frame_id
_import.mode                                         |    mode
_import.if_dupl                                      |    if_dupl
_import.if_miss                                      |    if_miss
_import.get                                          |    get
                                                     |
                                                     |    LOOP
_loop.level                                          |    level
                                                     |
loop_                                                |    METHOD
    _method.purpose                                  |    purpose
    _method.expression                               |    expression
                                                     |
                                                     |    NAME
_name.object_id                                      |    object_id
_name.category_id                                    |    category_id
_name.linked_item_id                                 |    linked_item_id
                                                     |
                                                     |    TYPE
_type.container                                      |    container
_type.contents                                       |    contents
_type.purpose                                        |    purpose
_type.source                                         |    source
_type.dimension                                      |    dimension
                                                     |
                                                     |    UNITS
_units.code                                          |    code
```

USE OF ATTRIBUTES IN DEFINITIONS

The basic organizational framework for the attributes within a definition is consistent across all definitions and domain dictionaries. However, the attributes used in the definition of a data item or category will depend on the definition type (dictionary, category or item), and on the nature of the data (text, numerical, etc.). An attribute may be essential, optional or unnecessary to the correct and precise definition of an item, a category or a dictionary.

The rules on using different attributes according to the *definition type* are straightforward and are explicitly specified in the *DDLM* dictionary using the attributes `_dictionary_valid.application` and `_dictionary_valid.attributes`. The *DDLM* dictionary is the only dictionary in which these two attributes are specified, and this invocation is shown below.

```
 loop_
_dictionary_valid.application
_dictionary_valid.attributes
```

```
["Dictionary","Mandatory"]      ["_dictionary.title",
                                 "_dictionary.class",
                                 "_dictionary.version",
                                 "_dictionary.date",
                                 "_dictionary.uri",
                                 "_dictionary.ddl_conformance",
                                 "_dictionary.namespace"]

  ["Dictionary","Recommended"]  ["_description.text",
                                 "_dictionary_audit.version",
                                 "_dictionary_audit.date",
                                 "_dictionary_audit.revision"]

  ["Dictionary","Prohibited"]   ["ALIAS",
                                 "CATEGORY",
                                 "DEFINITION",
                                 "ENUMERATION",
                                 "LOOP",
                                 "METHOD",
                                 "NAME",
                                 "TYPE",
                                 "UNITS"]

  ["Category","Mandatory"]      ["_definition.id",
                                 "_definition.scope",
                                 "_definition.class",
                                 "_name.category_id",
                                 "_name.object_id"]

  ["Category","Recommended"]    ["_category.key_id",
                                 "_description.text"]

  ["Category","Prohibited"]     ["ALIAS",
                                 "DICTIONARY",
                                 "ENUMERATION",
                                 "IMPORT",
                                 "LOOP",
                                 "TYPE",
                                 "UNITS"]

   ["Item","Mandatory"]         ["_definition.id",
                                 "_definition.update",
                                 "_name.object_id",
                                 "_name.category_id",
                                 "_type.purpose",
                                 "_type.container",
                                 "_type.contents"]

   ["Item","Recommended"]       ["_definition.scope",
                                 "_definition.class",
                                 "_type.source",
                                 "_description.text",
                                 "_description.common"]

   ["Item","Prohibited"]        ["CATEGORY",
                                 "DICTIONARY"]
```

THE DESCRIPTION OF DDLM ATTRIBUTES

For the sake of brevity, the descriptions of the DDLm attribute items that follow, in the order they appear in a DDLM dictionary, will exclude certain definition information. That is, only the information that identifies the unique role of each attribute item will be shown.

• ALIAS Attributes

The ALIAS attributes identify *identically equivalent* tags that may be aliased (i.e. substituted) for the defined tag. These attributes are included when equivalent items exist in this or another dictionary.

CATEGORY ALIAS

```
_definition.class           Loop
_name.category_id           ATTRIBUTES
_name.object_id             ALIAS
_category.key_id          '_alias.definition_id'
```

_alias.definition_id

Specifies the data names of items that are identically equivalent to the item in the current definition.

```
_type.purpose               Key
_type.container             Single
_type.contents              Tag
```

_alias.dictionary_uri

Specifies the universal resource identifier of the dictionary containing the definition of items aliased to the item in the current definition.

```
_type.purpose               Identify
_type.container             Single
_type.contents              Uri
```

• CATEGORY Attributes

The CATEGORY attributes specify the group properties of a related set of items.

CATEGORY CATEGORY

```
_definition.class           Set
_name.category_id           ATTRIBUTES
_name.object_id             CATEGORY
```

_category.key_id

Specifies the data name of the item whose value is the key to packets of items in a Loop category.

```
_type.purpose               Identify
_type.container             Single
_type.contents              Tag
```

• DEFINITION Attributes

The DEFINITION attributes identify the nature and purpose of definition frames in a dictionary.

CATEGORY DEFINITION

```
_definition.class           Set
_name.category_id           ATTRIBUTES
_name.object_id             DEFINITION
```

_definition.class

Specifies the class or purpose of the dictionary, category or item being defined. The allowed definition classes are listed below.

```
    _type.purpose               State
    _type.container             Single
    _type.contents              Code
     loop_
    _enumeration_set.state
    _enumeration_set.detail

     Attribute
;                Item used as an attribute in the definition
                 of other data items. Applied in dictionaries only.
;
     Datum
;                Item in a domain-specific dictionary.  These items
                 appear in data files.
;
     Head
;                Category of items that is the parent of
                 all other categories in the dictionary.
;
     Loop
;                Category of items that in a data file must
                 reside in a looped list with a key item defined.
;
     Set
;                Category of items that form a set (but not a
                 Loop). These items may be referenced as a class
                of items in a dREL methods expression.
;
     Ref-loop
;                A category containing one item that identifies the
                 a category of items that is repeated in a sequence
                 of save frames. The item, which is specifies as a
                 as a Ref-table value (see type.container), is looped.
                 This construction is for loop categories that contain
                 child categories.
                 If in the instance file, the child items have only
                 one set of values, the Ref-loop item need not be used
                 and child items need not be placed in a save frame.
;
    _enumeration.default        Datum
```

_definition.id

Specifies the data name of the *item or category* being defined within the current definition frame.

```
    _type.purpose               Identify
    _type.container             Single
    _type.contents              Tag
```

_definition.scope

Specifies the *scope* of item being defined in terms of its inheritance. The allowed definition scopes are shown.

```
    _type.purpose               State
    _type.container             Single
    _type.contents              Code
     loop_
    _enumeration_set.state
    _enumeration_set.detail
```

```
        Dictionary        "applies to all defined items in the dictionary"
        Category          "applies to all defined items in the category"
        Item              "applies to a single item definition"
    _enumeration.default        Item
```

_definition.update
Specifies the calendar date (format "yyyy-mm-dd") that the item definition was last updated.

```
    _type.purpose               Audit
    _type.container             Single
    _type.contents              Date
```

_definition.xref_code
Specifies a code that identifies the same item defined in another dictionary identified by the DICTIONARY_XREF category of attributes.

```
    _type.purpose               Audit
    _type.container             Single
    _type.contents              Code
```

• DESCRIPTION Attributes

The DESCRIPTION attributes provide various text descriptions of the defined data item.

CATEGORY DESCRIPTION

```
    _definition.class           Set
    _name.category_id           ATTRIBUTES
    _name.object_id             DESCRIPTION
```

_description.key_words
Specifies a list of comma-delimited word sequences that are "key words" identifying an item for thematic searches.

```
    _type.purpose               Describe
    _type.container             List
    _type.contents              Text
```

_description.common
Specifies the commonly used name of the defined item.

```
    _type.purpose               Describe
    _type.container             Single
    _type.contents              Text
```

_description.text
Specifies the text describing of the defined item.

```
    _type.purpose               Describe
    _type.container             Single
    _type.contents              Text
```

• DESCRIPTION_EXAMPLE Attributes

The DESCRIPTION_EXAMPLE attributes provide descriptive example values of the defined item. These values are not machine-interpretable.

CATEGORY DESCRIPTION_EXAMPLE

```
_definition.class            Loop
_name.category_id            DESCRIPTION
_name.object_id              EXAMPLE
_category.key_id           '_description_example.case'
```

_description_example.case
Specifies an example value for the defined item.

```
_type.purpose                Key
_type.container              Single
_type.contents               Text
```

_description_example.detail
Specifies the text details of an example value for the defined item.

```
_type.purpose                Describe
_type.container              Single
_type.contents               Text
```

• DICTIONARY Attributes
The DICTIONARY attributes describe aspects of the dictionary as a whole. These attributes are specified within the dictionary block but not within a definition save frame.

CATEGORY DICTIONARY

```
_definition.class            Set
_name.category_id            ATTRIBUTES
_name.object_id              DICTIONARY
```

_dictionary.class
Specifies the nature or purpose of the items defined in the dictionary.

```
_type.purpose                State
_type.container              Single
_type.contents               Code
 loop_
_enumeration_set.state
_enumeration_set.detail
          Reference      'DDLm reference attribute definitions'
          Instance       'domain-specific data instance definitions'
          Template       'domain-specific attribute/enumeration templates'
          Function       'domain-specific method function templates'
_enumeration.default         Instance
```

_dictionary.date
Specifies the calendar date (format "yyyy-mm-dd") that the dictionary was last updated.

```
_type.purpose                Audit
_type.container              Single
```

```
    _type.contents                Date
```

_dictionary.ddl_conformance
Specifies the version code (nn.mm.ii) for the DDL dictionary to which all definitions in the current dictionary conform.

```
    _type.purpose                 Audit
    _type.container               Single
    _type.contents                Version
```

_dictionary.namespace
Specifies a unique name for the dictionary that may be prefixed to an item data name (defined within the specific dictionary) with a separating colon character ":" when used in dictionary applications. Because tags must be unique, dictionary namespace prefixes are unlikely to be used in data files.

```
    _type.purpose                 Audit
    _type.container               Single
    _type.contents                Code
```

_dictionary.uri
Specifies the URI location and filename of the current dictionary.

```
    _type.purpose                 Identify
    _type.container               Single
    _type.contents                Uri
```

_dictionary.title
Specifies the common title for the current dictionary.

```
    _type.purpose                 Audit
    _type.container               Single
    _type.contents                Code
```

_dictionary.version
Specifies the version code (nn.mm.ii) of the dictionary. This code must match a value for `_dictionary_audit.version` in the dictionary audit information.

```
    _type.purpose                 Audit
    _type.container               Single
    _type.contents                Version
```

• DICTIONARY_AUDIT Attributes

The `DICTIONARY_AUDIT` attributes describe the status and the origins of a dictionary.

CATEGORY DICTIONARY_AUDIT

```
    _definition.class             Loop
    _name.category_id             DICTIONARY
    _name.object_id               AUDIT
    _category.key_id             '_dictionary_audit.version'
```

_dictionary_audit.date

Specifies the calendar date (format "yyyy-mm-dd") of the last revision of the dictionary.

```
_type.purpose                 Audit
_type.container               Single
_type.contents                Date
```

_dictionary_audit.revision

Specifies the description of the revision applied.

```
_type.purpose                 Describe
_type.container               Single
_type.contents                Text
```

_dictionary_audit.version

Specifies the code (nn.mm.ii) identifying the version of a dictionary (see _dictionary.version) associated with a revision.

```
_type.purpose                 Key
_type.container               Single
_type.contents                Version
```

• DICTIONARY_VALID Attributes

The DICTIONARY_VALID attributes identify when attributes are used in the different definition scopes. That is, whether specific attributes are mandatory or prohibited in the dictionary, category or item definitions. *The DICTIONARY_VALID attributes are only used in the DDLM dictionary.*

CATEGORY DICTIONARY_VALID

```
_definition.class             Loop
_name.category_id             DICTIONARY
_name.object_id               VALID
_category.key_id            '_dictionary_valid.application'
```

_dictionary_valid.attributes

Specifies a list of the names of attributes that are mandatory, prohibited or encouraged.

```
_type.purpose                 Audit
_type.container               List
_type.contents                Text
```

_dictionary_valid.option

Specifies the options for using the attributes in the _dictionary_valid.attributes list.

```
_type.purpose                 Audit
_type.container               Single
_type.contents                Code
 loop_
_enumeration_set.state
_enumeration_set.detail
          Mandatory     'attribute must be present in definition frame'
          Recommended   'attribute is usually in definition frame'
          Prohibited    'attribute must not be used in definition frame'
```

_dictionary_valid.application
Specifies the options for using the attributes in the _dictionary_valid.attributes list.

```
    _type.purpose               Key
    _type.container             List
    _type.contents              Code
    _type.dimension             [2]
    _method.purpose
    _method.expression
     Definition
;
     _dictionary_valid.application
                    = [_definition.scope,_dictionary_valid.option]
;
```

• DICTIONARY_XREF Attributes

The DICTIONARY_XREF attributes identify external dictionaries to which items in the current dictionary are cross-referenced using the _definition.xref_code attribute. The cross-referenced dictionary need not be based on the DDLm-STAR construction rules.

CATEGORY DICTIONARY_XREF

```
    _definition.class           Loop
    _name.category_id           DICTIONARY
    _name.object_id             XREF
    _category.key_id          '_dictionary_xref.code'
```

_dictionary_xref.code
Specifies the key code of the cross-referenced dictionary.

```
    _type.purpose               Key
    _type.container             Single
    _type.contents              Code
```

_dictionary_xref.date
Specifies the calendar date (format "yyyy-mm-dd") of the cross-referenced dictionary.

```
    _type.purpose               Audit
    _type.container             Single
    _type.contents              Date
```

_dictionary_xref.format
Specifies the format description of the cross-referenced dictionary.

```
    _type.purpose               Audit
    _type.container             Single
    _type.contents              Text
```

_dictionary_xref.name
Specifies the common name of the cross-referenced dictionary.

```
    _type.purpose               Audit
    _type.container             Single
    _type.contents              Text
```

_dictionary_xref.uri

Specifies the universal resource indicator of the cross-referenced dictionary.

```
    _type.purpose              Audit
    _type.container            Single
    _type.contents             Uri
```

• ENUMERATION ATTRIBUTES

The ENUMERATION attributes specify any prescribed constraints on the values of defined items.

CATEGORY ENUMERATION

```
    _definition.class          Set
    _name.category_id          ATTRIBUTES
    _name.object_id            ENUMERATION
```

_enumeration.default

Specifies the default value of the defined item, which is used if a value is not present in the instance data file.

```
    _type.purpose              Quantity
    _type.container            Single
    _type.contents             Inherited
```

_enumeration.range

Specifies the range of values the defined item must lie within. The minimum and maximum values are separated by a colon ":" character.

```
    _type.purpose              Composite
    _type.container            Single
    _type.contents             Range
```

_enumeration.def_index_id

Specifies the data name of an item whose coded value is used as an index to select a default enumeration value from the _enumeration_default loop category (see below). The code value must match one of the _enumeration_default.index values.

```
    _type.purpose              Identify
    _type.container            Single
    _type.contents             Tag
```

_enumeration.mandatory

Specifies if it obligatory that the enumeration constraints (set by other attributes) MUST be adhered to in any validation process. The default is *Yes*.

```
    _type.purpose              State
    _type.container            Single
    _type.contents             Code
loop_
    _enumeration_set.state
    _enumeration_set.detail
```

```
                                Yes  'Use of state is mandatory'
                                No   'Use of state is unnecessary'
    _enumeration.default        Yes
```

• ENUMERATION_DEFAULT Attributes

The ENUMERATION_DEFAULT attributes specify the allowed default values for the defined item. The single default value applicable for a specific instance document is determined by the value of tag identified by the attribute _enumeration.def_index_id . The code value is used as an index to select a default enumeration value from the _enumeration_default loop by matching one of the _enumeration_default.index values.

CATEGORY ENUMERATION_DEFAULT

```
    _definition.class           Loop
    _name.category_id           ENUMERATION
    _name.object_id             DEFAULT
    _category.key_id          '_enumeration_default.index'
```

_enumeration_default.index

Specifies the key index codes to the loop of eligible default values. This code is matched at instantiation time with the value of the item identified by the attribute _enumeration.def_index_id.

```
    _type.purpose               Key
    _type.container             Single
    _type.contents              Code
```

_enumeration_default.value

Specifies eligible default values. The appropriate default is selected at instantiation time by matching the _enumeration_default.index code with that of the item identified by the attribute _enumeration.def_index_id.

```
    _type.purpose               State
    _type.container             Single
    _type.contents              Inherited
```

• ENUMERATION_SET Attributes

The ENUMERATION_SET attributes specify a set of predetermined values (i.e. states) for an item.

CATEGORY ENUMERATION_SET

```
    _definition.class           Loop
    _name.category_id           ENUMERATION
    _name.object_id             SET
    _category.key_id          '_enumeration_set.state'
```

_enumeration_set.state

Specifies permitted codes or “states” for a item.

```
    _type.purpose               Key
    _type.container             Single
    _type.contents              Code
```

_enumeration_set.detail
Specifies the description of a permitted enumeration state.

_type.purpose	Describe
_type.container	Single
_type.contents	Text

_enumeration_set.table_id
Specifies the permitted identification codes in a Table item for the form {"*id*":"*value*", …}.

_type.purpose	Quantity
_type.container	Single
_type.contents	Code

_enumeration_set.xref_code
Specifies a cross-reference code for a permitted state with respect to the codes used in the dictionary identified with the DICTIONARY_XREF category attributes.

_type.purpose	Audit
_type.container	Single
_type.contents	Code

_enumeration_set.xref_dictionary
Specifies the code for the dictionary identified with the DICTIONARY_XREF category attributes.

_type.purpose	Audit
_type.container	Single
_type.contents	Code

• IMPORT Attributes

The IMPORT attributes facilitate the importation of definition lines from external files. These attributes do not contribute to the direct definition of an item but provide a mechanism for inserting external definition material into a dictionary.

CATEGORY IMPORT

_definition.class	Set
_name.category_id	ATTRIBUTES
_name.object_id	IMPORT

_import.file_id
Specifies the name or URI of the file containing the definitions to be imported with _import.get.

_type.purpose	Identify
_type.container	Single
_type.contents	Uri

_import.frame_id
Specifies the frame code of the definition save frame containing the definitions to be imported.

_type.purpose	Identify
_type.container	Single

```
    _type.contents                Code
```

_import.mode
Specifies whether the save frame shell is imported, as well as the save frame contents.

```
    _type.purpose                 Identify
    _type.container               Single
    _type.contents                Code
loop_
    _enumeration_set.state
    _enumeration_set.detail
                     Full     'import requested definition with frame'
                     Contents 'import contents of requested defn frame'
    _enumeration.default          Contents
```

_import.if_dupl
Specifies the action to be taken if the imported definition block already exists in the importing dictionary file. The actions allowed appear as enumerated states.

```
    _type.purpose                 State
    _type.container               Single
    _type.contents                Code
     loop_
    _enumeration_set.state
    _enumeration_set.detail
                     Ignore  'ignore imported definitions if id conflict'
                     Replace 'replace existing with imported definitions'
                     Exit    'issue error exception and exit'
    _enumeration.default          Exit
```

_import.if_miss
Specifies the action to be taken if the imported definition block is missing from the file identified by _import.file. The actions allowed appear as enumerated states.

```
    _type.purpose                 State
    _type.container               Single
    _type.contents                Code
     loop_
    _enumeration_set.state
    _enumeration_set.detail
                      Ignore     'ignore import'
                      Exit       'issue error exception and exit'
    _enumeration.default          Exit
     save_
```

_import.get
A special "action" attribute used to insert the definition information specified by the other attributes and invoked as a list of tables, each table being responsible for an importation action.

```
    _type.purpose                 Import
    _type.container               List[Table]
    _type.contents                Table

     loop_
    _enumeration_set.table_id
    _enumeration_set.detail
                        file  'filename/URI of source dictionary'
                        save  'save framecode of source definition'
                        mode  'mode for including save frames'
                        dupl  'option for duplicate entries'
```

```
                        miss  'option for missing duplicate entries'
     loop_
    _method.purpose
    _method.expression
     Evaluation
;
     With  i  as  import
          _import.get = [{"file":i.file_id, "save":i.frame_id, "mode":i.mode,
                          "dupl":i.if_dupl, "miss":i.if_miss}]
;
```

• LOOP Attributes

The LOOP category attributes specify the loop level of the defined item. For CIF data this will always be 1, but for STAR File data nested loops to any level are permitted.

CATEGORY LOOP

```
    _definition.class            Set
    _name.category_id            ATTRIBUTES
    _name.object_id              LOOP
```

_loop.level

Specifies the loop level of the defined item.

```
    _type.purpose                Quantity
    _type.container              Single
    _type.contents               Index
    _enumeration.range           1:
    _enumeration.default         1
```

• METHOD Attributes

The METHOD category attributes specify methods for expressing relationships between the defined item and other defined items.

CATEGORY METHOD

```
    _definition.class            Loop
    _name.category_id            ATTRIBUTES
    _name.object_id              METHOD
    _category.key_id            '_method.purpose'
```

_method.purpose

Specifies the purpose code of the method for the defined item. Three method classes exist: *Evaluation*, *Definition* and *Validation*.

```
    _type.purpose                State
    _type.container              Single
    _type.contents               Code
     loop_
    _enumeration_set.state
    _enumeration_set.detail
     Evaluation    "method evaluates an item from related item values"
     Definition    "method generates attribute value(s) in the definition"
     Validation    "method compares an evaluation with existing item value"
    _enumeration.default         Evaluation
```

_method.expression
Specifies the script, in the dREL language, relating the defined item to other items.

```
_type.purpose              Method
_type.container            Single
_type.contents             Text
```

• NAME Attributes

The NAME attributes specify the name constructs of the defined item.

CATEGORY NAME

```
_definition.scope          Set
_name.category_id          ATTRIBUTES
_name.object_id            NAME
```

_name.object_id
Specifies the "object" identifier of the defined item or category that is available for use in methods scripts. This is a unique name string identifying a member of the category specified by _name.category_id.

```
_type.purpose              Identify
_type.container            Single
_type.contents             Name
```

_name.category_id
Specifies the "category" identifier of the defined item or category that is available for use in methods scripts. This is a unique name string identifying the parent of the category or item specified by _name.object_id.

```
_type.purpose              Identify
_type.container            Single
_type.contents             Name
```

_name.linked_item_id
Specifies the data name of an item that the defined item is a derivative of, and implicitly dependent on. That is, the existence of the defined item depends on the linked item when used in an instance document. Its inclusion is mandatory for the definition of items of type 'Su'; this attribute provides the data name of the Measurement item to which the standard uncertainty applies.

```
_type.purpose              Identify
_type.container            Single
_type.contents             Tag
```

• TYPE Attributes

The TYPE attributes specify the nature and origin of the defined item.

CATEGORY TYPE

```
    _definition.class            Set
    _name.category_id            ATTRIBUTES
    _name.object_id              TYPE
```

_type.container

Specifies the container type of the defined item. This is the simplest type description of the text string representing a value.

```
    _type.purpose                State
    _type.container              Single
    _type.contents               Code
     loop_
    _enumeration_set.state
    _enumeration_set.detail
        Single    'a single value'
        Multiple  'values related by boolean ',|&!*' or range ":" ops'
        List      'list of values bounded by []; separated by commas'
        Array     'array of values bounded by []; separated by commas'
        Matrix    'matrix of values bounded by []; separated by commas'
        Table     'key:value elements bounded by {}; separated by commas'
        Implied   'implied by type.container of associated value'
        Ref-table '''Is a STAR construction with key:value elements
                     bounded by ${..}$ and separated by commas.
                     The key tags are privileged and optional.
                     source  - filename or URI
                     block   - data blockname
                     frame   - framecode or [framecode,framecode,..]
                     item    - dataname or [dataname,dataname,..]
                     key     - key value if item is in a list '''
_enumeration.default         Single
```

_type.contents

Specifies the code identifying nature of the defined item. The allowed codes are specified in an enumeration list stored in the external file `com_val.dic`.

```
    _type.purpose                State
    _type.container              Multiple
    _type.contents               Code
     loop_
    _enumeration_set.state
    _enumeration_set.detail
     Inherited    'type inherited from referenced item'
     Text         'a case-sensitive string/lines of text'
     Name         'case-insensitive name of alpha-num chars and underscore'
     Tag          'case-insensitive data tag'
     Table        'table "key:"value" pairs all assumed to be text'
     Filename     'name of an external file'
     Code         'code used for indexing data or referencing data resources'
     Date         'ISO date format yyyy-mm-dd'
     Uri          'an universal resource indicator string specifying a file'
     Version      'version digit string of the form <major>.<version>.<update>'
     Dimension    'integer dimensions of an array in square brackets'
     Range        'An inclusive range of numerical values min:max'
     Digit        'a single digit unsigned number'
     Count        'an unsigned integer number'
     Index        'an unsigned non-zero integer number'
     Digit        'a single digit unsigned number'
     Count        'an unsigned integer number'
     Index        'an unsigned non-zero integer number'
     Integer      'a positive or negative integer number'
     Float        'a floating-point real number'
     Real         'a floating-point real number'
     Imag         'a floating-point imaginary number'
     Complex      'a complex number <R>+j<I>'
     Binary       'a binary number \b<N>'
```

```
      Hexadecimal  'a hexadecimal number \x<N>'
      Octal        'a octal number \o<N>'
      loop_
     _description_example.case
     _description_example.detail
           'Integer'         'elements are integer'
           'List(Real,Code)' 'elements in muliples of real number and codes'
           'Real|Code'       'elements either a real number or a code'
 '
```

_type.purpose

Specifies the purpose or function code of the defined item.

```
    _type.purpose               State
    _type.container             Single
    _type.contents              Code
     loop_
    _enumeration_set.state
    _enumeration_set.detail

     Import
;                   >>> Applied ONLY in the DDLm Reference Dictionary <<<
                    Used to type the SPECIAL attribute "_import.get" that
                    is present in dictionaries to instigate the importation
                    of external dictionary definitions.
;
     Method
;                   >>> Applied ONLY in the DDLm Reference Dictionary <<<
                    Used to type the attribute "_method.expression" that
                    is present in dictionary definitions to provide the
                    text method expressing the defined item in terms of
                    other defined items.
;
     Audit
;                   >>> Applied ONLY in the DDLm Reference Dictionary <<<
                    Used to type attributes employed to record the audit
                    definition information (creation date, update version and
                    cross reference codes) of items, categories and files.
;
     Identify
;                   >>> Applied ONLY in the DDLm Reference Dictionary <<<
                    Used to type attributes that identify an item tag (or
                    part thereof), save frame or the URI of an external file.
;

#............... PURPOSE types used in all dictionaries ...........

     Extend
;                   *** Used to EXTEND the DDLm Reference Dictionary ***
                    Used in a definition, residing in the "extensions"
                    save frame of a domain dictionary, to specify a new
                    enumeration state using an Evaluation method.
;
     Describe
;                   Used to type items with values that are descriptive
                    text intended for human interpretation but may be
                    specially formatted to be machine parsible.
;
     State
;                   Used to type items with values that are restricted to
                    codes present in their "enumeration_set.state" lists.
;
     Key
;                   Used to type an item with a value that is unique within
                    the looped list of these items, and may be used as a
                    reference "key" to identify a specific packet of items
```

```
                    within the category.
;
     Link
;                   Used to type an item with a value that is unique within
                    a looped list of items belonging to another category.
                    The definition of this item must contain the attribute
                    "_name.linked_item_id" specifying the data name of the
                    key item for this list. The defined item represents a
                    a foreign key linking packets in this category list to
                    packets in another category.
;
     Composite
;                   Used to type items with value strings composed of
                    separate parts. These will usually need to be separated
                    and parsed for complete interpretation and application.
;
     Quantity
;                   Used to type an item with a recorded value, numerical
                    or otherwise, that is exact (i.e. it has no standard
                    uncertainty value). Typical examples: "5","A","blue"
;
     Measurand
;                   Used to type an item with a numerically estimated value
                    that has been recorded by measurement or derivation. This
                    value must be accompanied by its standard uncertainty
                    (SU) value, expressed either as:
                      1) appended integers, in parentheses (), at the
                         precision of the trailing digits,       or
                      2) a separately defined item with the same name as the
                         measurand item but with an additional suffix '_su'.
;
     SU
;                   Used to type an item with a numerical value that is the
                    standard uncertainty of an item with the identical name
                    except for the suffix '_su'. The definition of an SU item
                    must include the attribute "_name.linked_item_id" which
                    explicitly identifies the associated measurand item.
;
```

_type.source

Specifies the origin or source code of the defined item.

```
    _type.purpose               State
    _type.container             Single
    _type.contents              Code
     loop_
    _enumeration_set.state
    _enumeration_set.detail

     Assigned
;               A quantity, as either an exact number or text value,
                assigned as a record of the data collected, analysed
                or modelled for a domain instance. This is a PRIMITIVE
                data item, in that this item cannot be determined
                from other defined items.
;
     Observed
;               A quantity, as either an exact number or text value,
                that records an observation made during the collection
                of data for a domain instance. This item is PRIMITIVE.
;
     Measured
;               A numerical value measured manually or instrumentally
                with an associated standard uncertainty value for a
                domain instance. This item is PRIMITIVE.
```

```
;
     Derived
;              A quantity derived from other data items within the
               domain instance. This item is NOT PRIMITIVE.
;
     Selected
;              A quantity selected arbitrarily to identify a packet of
               data present in a loop list. The quantity has no intrinsic
               meaning other than it being a unique string. This is
               in contrast to Assigned items whose values can determine
               derivation outcomes.  This item is NOT PRIMITIVE.
;
     Assembled
;              A quantity that has been assembled or syntactically
               composed as a preferred representation of other data
               items for the domain instance. An assembled item is
               in a sense redundant, and therefore NOT PRIMITIVE.
;
```

`_type.dimension`

Specifies the dimensions (number of elements) of the defined item.

```
    _type.purpose                Composite
    _type.container              Single
    _type.contents               Text
     loop_
    _description_example.case
    _description_example.detail  "[[Real*3],[Real*2],[Real*1]]" 'a lower triangular matrix'
                                 "[[Real*3]*3]"     'a 3x3 matrix of reals'
                                 "[Integer*6]"      'in list of 6 integer numbers'
                                 "[Integer,Text*4]" '5 element list, in 4 text elements'
                                 "[]"               'unknown number of list elements'
```

• UNITS Attributes

The `UNITS` attributes specify the units of measurement for a defined item.

CATEGORY UNITS

```
    _definition.class            Set
    _definition.scope            Category
    _name.category_id            ATTRIBUTES
    _name.object_id              UNITS
```

`_units.code`

Specifies the name of the units of measurement of the defined. The allowed codes are specified as an enumeration list in the external enumeration template file `templ_enum.cif`.

```
    _type.purpose                State
    _type.container              Single
    _type.contents               Code
    _import.get    [{"file":templ_enum.cif', "save":'units_code'}]
```

The allowed `_units.code` values are imported from the external enumeration template file `templ_enum.cif` as follows.

```
     loop_
         _enumeration_set.state
         _enumeration_set.detail
```

```
'centimetres'  "length    'centimetres (meters * 10^( -2))'"
'millimetres'  "length    'millimetres (meters * 10^( -3))'"
'nanometres'   "length    'nanometres  (meters * 10^( -9))'"
'angstroms'    "length    'angstroms   (meters * 10^(-10))'"
'picometres'   "length    'picometres  (meters * 10^(-12))'"
'femtometres'  "length    'femtometres (meters * 10^(-15))'"

'reciprocal_centimetres'
"per_length 'reciprocal centimetres (meters * 10^( -2)^-1)'"
'reciprocal_millimetres'
"per_length 'reciprocal millimetres (meters * 10^( -3)^-1)'"
'reciprocal_nanometres'
"per-length 'reciprocal nanometres  (meters * 10^( -9)^-1)'"
'reciprocal_angstroms'
"per-length 'reciprocal angstroms   (meters * 10^(-10)^-1)'"
'reciprocal_picometres'
"per-length 'reciprocal picometres  (meters * 10^(-12)^-1)'"

'nanometre_squared'
"length_squared 'nanometres squared (meters * 10^( -9))^2'"
'angstrom_squared'
"length_squared 'angstroms squared  (meters * 10^(-10))^2'"
'8pi_angstroms_squared'
"length_squared '8pi^2 * angstroms squared (meters * 10^(-10))^2'"
'picometre_squared'
"length_squared 'picometres squared (meters * 10^(-12))^2'"

'nanometre_cubed'
"length_cubed 'nanometres cubed (meters * 10^( -9))^3'"
'angstrom_cubed'
"length_cubed 'angstroms cubed  (meters * 10^(-10))^3'"
'picometre_cubed'
"length_cubed 'picometres cubed (meters * 10^(-12))^3'"

'kilopascals'      "pressure      'kilopascals'"
'gigapascals'      "pressure      'gigapascals'"

'hours'            "time      'hours'"
'minutes'          "time      'minutes'"
'seconds'          "time      'seconds'"
'microseconds'     "time      'microseconds'"

'degrees'          "angle      'degrees (of arc)'"

'degree_per_minute' "rotation_per_time  'degrees (of arc) per minute'"

'celsius'      "temperature     'degrees (of temperature) Celsius'"
'kelvins'      "temperature     'degrees (of temperature) Kelvin'"

'electrons'    "electrons              'electrons'"

'electron_squared'  "electrons-squared    'electrons squared'"

'electron_per_nanometres_cubed'
"electron-density 'electrons per nanometres cubed (meters * 10^( -9))^3'"
'electron_per_angstroms_cubed'
"electron-density 'electrons per angstroms  cubed (meters * 10^(-10))^3'"
'electron_per_picometres_cubed'
"electron-density 'electrons per picometres cubed (meters * 10^(-12))^3'"

'kilowatts'     "power       'kilowatts'"
'milliamperes'  "current     'milliamperes'"
'kilovolts'     "emf         'kilovolts'"

'arbitrary'    "arbitary    'arbitrary system of units'"
```