Expression Constraint Language - Specification and Guide

Expression Constraint Language

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The *Expression Constraint Language* is a formal syntax for representing SNOMED CT expression constraints. Expression constraints are computable rules used to define a bounded sets of clinical meanings represented by either precoordinated or postcoordinated expressions. Expression constraints can be used to restrict the valid values for a data element in an EHR, as the intensional definition of a concept-based reference set, as a machine processable query that identifies a set of matching expressions, or as a constraint that restricts the range of an attribute defined in the SNOMED CT concept model.

Web browsable version: http://snomed.org/ecl

SNOMED CT Document Library: http://snomed.org/doc

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[1] http://www.ihtsdo.org/
[2] mailto:info@ihtsdo.org

1 1. Introduction

1.0.1 Background

SNOMED CT is a clinical terminology with global scope covering a wide range of clinical specialties and requirements. The use of SNOMED CT expressions in Electronic Health Records (EHRs) provides a standardized way to represent clinical meanings captured by clinicians and enables the automatic interpretation of these meanings. SNOMED CT expressions are a structured combination of one or more concept identifiers used to represent a clinical idea in a logical manner. The SNOMED CT Compositional Grammar[3] provides a lightweight syntax for the representation of SNOMED CT expressions.

In contrast, a *SNOMED CT Expression Constraint* is a computable rule that can be used to define *a bounded set of* clinical meanings represented by either precoordinated or postcoordinated expressions. Expression constraints can be used as formal constraints on the content of a particular data element in an EHR, as the intensional definition of a concept-based reference set, as a machine processable query that identifies a set of matching precoordinated or postcoordinated expressions, or as a constraint that restricts the range of an attribute defined in the SNOMED CT concept model.

1.0.2 Purpose

The purpose of this document is to define and describe a formal language for representing SNOMED CT Expression Constraints. A SNOMED CT Expression Constraint is a computable rule that defines a bounded set of clinical meanings represented by either precoordinated or postcoordinated expressions. Two equivalent syntaxes are presented – a brief syntax, which is designed to be as compact as possible for interoperable communication between systems, and a long syntax, which introduces textual alternatives to the symbols from the brief syntax. This document also provides examples and guidance to assist in the implementation of this language.

1.0.3 Scope

This document presents the specification of an Expression Constraint Language, which can be used to represent SNOMED CT Expression Constraints. It includes a logical model of the language, two syntaxes, a set of example expression constraints and a summary of implementation considerations.

The Expression Constraint Language specified in this document is part of a consistent set of computer processable languages designed to support a variety of use cases involving the use of SNOMED CT. Other SNOMED CT computable languages, which are either complete or under development include:

- Compositional Grammar[4]: designed to represent SNOMED CT expressions; and
- Template Syntax[5]: which allow slots to be added to expressions, expression constraints or queries that can be filled with specific values at a later time.

The compositional grammar is designed to provide a common foundation for the additional functionality added by the other languages.

This document does not include a full description of how to implement an expression constraint parser, classifier or interpreter. It does not describe how to transform an expression constraint into other languages, such as OWL, SPARQL or SQL; or how to determine whether two expression constraints are equivalent. It also does not describe how to implement an EHR which uses expression constraints to constrain or query its content, or a terminology

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3 http://snomed.org/scg
4 http://snomed.org/scg
5 http://snomed.org/sts

server which uses expression constraints to query its content. Instead, it provides a specification, examples and general guidance to assist in the implementation of expression constraints in any of these applications.

1.0.4 New Features in this Version

This document defines and describes the current version of the Expression Constraint Language - ECL v1.5. This version of ECL has introduced the filter constraint. These constraints allow the result set to be filtered, by matching only on concepts which have a description that satisfies the filter criteria. To support this significant new features, the following pages have been updated or added:

- 3.2 Expression Constraint and Query Requirements(see page 13)
- 4. Logical Model(see page 17)
- 5.1 Brief Syntax (Normative)(see page 20)
- 5.2 Long Syntax (Informative)(see page 23)
- 5.3 Informative Comments(see page 25)
- 5.5 Character Collation for Term Filters(see page 49) - new
- 6.8 Filter Constraints(see page 105) - new
- Appendix C - Dialect Aliases(see page 187) - new

1.0.5 History

Expression constraints have been used in projects and programs around the world for a number of years – for example HL7 TermInfo[6], and the NHS Logical Record Architecture[7].

In 2013, a draft document on "SNOMED CT Expression Constraint Syntax Specification for Terminology Binding" was developed as an assignment during the SNOMED CT Implementation Advisor (SIA) scheme.

In 2014, this work was revised and extended to support a wider range of relevant use cases to produce version 1.0 of the Expression Constraint Language specification (2015). These updates included:

- Concrete values (e.g. integers, decimals and strings) are now permitted as attribute values. This is to provide alignment with the recent extensions to SNOMED CT Compositional Grammar;
- Cardinality constraints have been introduced, and as a result the optional operator (i.e. ~) is no longer provided;
- Attributes may now be preceded by a 'descendantOf' or 'descendantOrSelfOf' operator to indicate whether attribute descendants and/or the attribute itself should be used in the matching process;
- A reverse flag has been introduced, which allows relationships to be traversed in the reverse direction;
- Exclusion has been changed from a unary operator ('negation') to a binary operator ('minus');
- A wildcard character ('*') has been introduced to represent any concept in the substrate;
- A number of clarifications have been made, including the 'memberOf' operator and the default substrate upon which the expression constraints are executed.

An update to the Expression Constraint Language was then published in 2016 (version 1.1) to incorporate some additional features requested by implementers of the language. These updates include:

- Two new operators 'childOf' and 'parentOf' were added to support querying immediate children and immediate parents of a concept during user interface design;
- A new 'dot notation' was introduced (as an alternative to the Reverse flag) to refer to an attribute value for a concept or expression;
- The ability for a constraint operator (e.g. 'descendantOf') to be applied to a nested expression constraint was added;
- The ability to add comments within the text of an expression constraint was added;

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6 http://snomed.org/hl7terminfo
7 https://isd.hscic.gov.uk/trud3/user/guest/group/0/pack/12

- Additional optional brackets were allowed around subexpressions; and
- The non-normative syntax (previously named the 'Full Syntax') was renamed to the 'Long Syntax'.

Early in 2017 version 1.2 was published, to include a new feature requested by implementers: namely, the ability for the 'memberOf' function to be applied to a set of reference set concepts defined using an expression constraint. In this version, the explanation of *Operator Precedence* was also moved from section 6.7 to section 5.4. Version 1.3 was then published in mid 2017 to support a range of additional features - including allowing the refinement of subexpression constraints, permitting the use of subexpression constraints to represent a set of valid attribute names and simplifying the parsing of dotted expression constraints.

In mid 2020, version 1.4 was published to support boolean attribute values and to introduce the 'childOrSelfOf' and 'parentOrSelfOf' operators. Later that year, version 1.5 was published to support filter constraints. These constraints filter the result set, by matching only on concepts which have a description that satisfies the filter criteria. Section 5.5 (Character Collation for Term Filters) and section 6.8 (Filter Constraints) were added in ECL version 1.5.

For a full list of previous versions and a summary of updates, please refer to Previous Versions.

1.0.6 Audience

The target audiences of this document include:

- SNOMED National Release Centres;
- SNOMED CT designers and developers, including designers and developers of EHR systems, information models, data entry interfaces, storage systems, decision support systems, retrieval and analysis systems, communication standards and terminology services;
- SNOMED CT terminology developers, including concept model designers, content authors, map developers, subset and constraint developers and release process managers.

It should be noted that this document contains both technical and non-technical content. In particular, the detailed logical model and formal syntax is specifically focussed at more technical readers. Less technical readers are encouraged to read the introductory material (including the use cases and requirements) and the extensive set of examples that is presented. It should also be noted that even though complex expression constraints are possible, most expression constraints are likely to be very simple, such as those described in Simple Expression Constraints[8].

1.0.7 Document Overview

This document defines the SNOMED CT Expression Constraint Language[9] and describes how and where it may be implemented. Chapter 2[10] begins by describing the use cases in which it is anticipated that SNOMED CT Expression Constraint Language will be used. Chapter 3[11] then describes the requirements used to guide the definition of this language. In Chapter 4[12], the logical model of the Expression Constraint Language is presented, while in Chapter 5[13] two syntaxes are defined using an ABNF serialisation of the logical model. Chapter 6[14] then presents some examples of expression constraints that conform to the SNOMED CT Expression Constraint syntaxes, and Chapter 7[15] discusses some implementation considerations. Appendix A – Examples Of Valid Expressions provides some examples of precoordinated and postcoordinated expressions that satisfy each of the expression constraints presented earlier in the document. Appendix B – Examples Of Invalid Expressions then

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8 https://confluence.ihtsdotools.org/display/WIPECL/6.1+Simple+Expression+Constraints
9 http://snomed.org/ecl
10 https://confluence.ihtsdotools.org/display/WIPECL/2.+Use+Cases
11 https://confluence.ihtsdotools.org/display/WIPECL/3.+Requirements
12 https://confluence.ihtsdotools.org/display/WIPECL/4.+Logical+Model
13 https://confluence.ihtsdotools.org/display/WIPECL/5.+Syntax+Specification
14 https://confluence.ihtsdotools.org/display/WIPECL/6.+Examples
15 https://confluence.ihtsdotools.org/display/WIPECL/7.+Implementation+Considerations

provides some examples that do not satisfy these expression constraints. And finally, Appendix C - Dialect Aliases(see page 187) provides a list of example aliases that may be used to specify a particular dialect in an ECL filter constraint.

2 2. Use Cases

The SNOMED CT Expression Constraint Language enables the intensional definition of a bounded set of clinical meanings. This is important for a number of use cases, including:

- Terminology Binding(see page 11);
- Intensional Reference Set Definitions(see page 11);
- SNOMED CT Content Queries(see page 11); and
- SNOMED CT concept model specifications(see page 11).

In the following subsections, we describe each of these key use cases.

2.1 2.1 Terminology Binding

Most Electronic Health Records (EHRs) are designed and developed using one or more information models, which describe the information that is collected, stored, communicated and displayed. Some information models are designed for a specific proprietary system, while others are based on a common health information standard (e.g. HL7 FHIR resource, HL7 CDA template, ISO 13606 archetype). Information models may also be defined using a wide variety of representations (e.g. UML class diagram, database table design, Archetype Definition Language, or XML Schema). Irrespective of the purpose, design and representation of the information models, however, the use of clinical terminology is an important part of making the models complete and useful.

Terminology binding provides the links between the information model and the terminology. These links may be used to constrain the set of possible values which can populate a given coded data element in the information model, or they may define the meaning of an information model artefact using the terminology. Terminology binding is an important part of supporting the following clinical information system functions:

- Data capture;
- Retrieval and querying;
- Information model library management; and
- Semantic interoperability.

To enable terminology binding to be defined using intensional rules, a formal language must be used. The SNOMED CT Expression Constraint Language[16] can be used in this way to define terminology bindings which constrain the set of possible coded values within an information model.

2.2 2.2 Intensional Reference Set Definitions

Reference sets are a flexible, extensible SNOMED CT file structure used to support a variety of requirements for the customization and enhancement of SNOMED CT content. These include the representation of subsets, language preferences, or maps to/from other code systems.

Some reference sets (using the Query Specification type) allow a serialised query to represent the membership of a subset of SNOMED CT components. A query contained in this reference set is executed against the content of SNOMED CT to produce a subset of concepts, descriptions or relationships. This query is referred to as an intensional definition of the subset. It can be run against future releases of SNOMED CT to generate a potentially different set of subset members. The members of the resulting subset may also be represented in an enumerated form as a Simple Reference Set. An enumerated representation of a subset is referred to as an extensional definition.

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16 http://snomed.org/ecl

The SNOMED CT Expression Constraint Language[17] can be used in this way to represent the intensional definition of a subset of SNOMED CT concepts that can be enumerated as a Simple Reference Set.

2.3 2.3 SNOMED CT Content Queries

SNOMED CT provides both hierarchies and formal concept definitions to allow a range of advanced query techniques. SNOMED CT queries can be performed over different sets of terminology artefacts (known as the substrate of the query), including:

- The precoordinated components distributed as part of the SNOMED CT international edition;
- The precoordinated components distributed by a local release centre as part of a national or local SNOMED CT edition;
- The postcoordinated expressions stored within an expression repository; or
- The SNOMED CT expressions stored within an Electronic Health Record (EHR).

The SNOMED CT Expression Constraint Language[18] enables queries over SNOMED CT content to be expressed. These queries may be performed for a range of purposes, including the authoring and quality assurance of new SNOMED CT content, the design and development of extensional reference sets, and the design and display of SNOMED CT subsets in clinical user interfaces. While the language itself does not support querying over the full EHR content, the SNOMED CT Expression Constraint Language[19] could be embedded within record-based query languages (such as SQL) to represent the terminological aspects of these queries.

2.4 2.4 SNOMED CT Concept Model

The SNOMED CT Concept Model is the set of rules that determines the permitted sets of attributes and values that may be applied to particular types of concepts. There are also additional rules on the cardinality and grouping of each type of attribute. The SNOMED CT Concept Model includes the definition of the domain and range of each attribute. The domain is the set of concepts which are permitted to be used as the source of the attribute, while the range is the set of concepts which are permitted to be used as the target of the attribute. For example, the domain of the attribute 363698007 |Finding site|[20] is the descendants and self of 404684003 |Clinical finding|[21], while the range is the descendants and self of 442083009 |Anatomical or acquired body structure|[22]The SNOMED CT Concept Model rules are represented in a computable form in the SNOMED CT Machine Readable Concept Model[23].

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17 http://snomed.org/ecl
18 http://snomed.org/ecl
19 http://snomed.org/ecl
20 http://snomed.info/id/363698007
21 http://snomed.info/id/404684003
22 http://snomed.info/id/442083009
23 http://snomed.org/mrcm

3 3. Requirements

In this chapter, we state the requirements of the SNOMED CT Expression Constraint Language[24]. These requirements are grouped into General SNOMED CT Language Requirements(see page 13) (which are shared by all SNOMED CT computable languages), Expression Constraint and Query Requirements(see page 13), and Concept Model Requirements(see page 15).

3.1 3.1 General SNOMED CT Language Requirements

The general SNOMED CT language requirements include:

Requirement G.1: Backward compatibility

> The language must be backwardly compatible with any version of the language that has previously been adopted as an SNOMED International standard.

Requirement G.2: Consistency

> Each logical feature of the language should have a single, consistent meaning across all the languages in the SNOMED CT family of languages. Each logical feature should also have a consistent set of syntax representations.

Requirement G.3: Sufficient and necessary

> Each language must be sufficiently expressive to meet the requirements of the use cases for which it was designed. However, functionality without a corresponding use case will not be included, as this increases the complexity of implementation unnecessarily.

Requirement G.4: Machine processability

> In order to facilitate the easy adoption by technical audiences, instances of each language must be able to be parsed into a logical representation using a machine processable syntax specification. This requirement will be met by defining the language syntax in ABNF.

Requirement G.5: Human readability

> Non-technical stakeholders require that the language is as human readable as possible, while still meeting the other requirements. This is essential for both the clinical validation of expressions, as well as for the education and training required to author expressions.

3.2 3.2 Expression Constraint and Query Requirements

The general expression constraint language requirements include:

Requirement E.1: Able to be evaluated against SNOMED CT content

> Expression constraints must be able to be evaluated against a specific set of SNOMED CT content (referred to as the substrate). When evaluated against a finite set of precoordinated concepts or postcoordinated SNOMED CT expressions, a finite subset of the substrate can be found which satisfies the expression constraint.

> Please note that the substrate over which the expression constraint is evaluated is not explicitly defined within the expression constraint, and must therefore be established by some other means. By default, the assumed substrate is the set of active components from the snapshot release (in distribution normal form) of the SNOMED CT versioned edition currently loaded into the given tool.

Requirement E.2: Expression constraint functional requirements

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24 http://snomed.org/ecl

The expression constraint language must support the following capabilities:

Function	Details
Concept reference	The ability to reference a precoordinated SNOMED CT concept using its identifier and optional human-readable term.
Concept hierarchy	The ability to refer to a set of concepts which is exactly equal to the descendants, descendants and self, ancestors, or ancestors and self of a given concept.
Immediate children and parents	The ability to refer to a set of concepts which are either immediate children or immediate parents of a given concept (based on non-redundant 116680003 |is a|[25]relationships) (with or without the given concept itself).
Conjunction	The ability to connect two expression constraints, attribute groups or attribute sets via a logical AND operator.
Disjunction	The ability to connect two expression constraints, attribute groups or attribute sets via a logical OR operator.
Refinement	The ability to refine (or specialize) the meaning of an expression constraint using one or more attributes values.
Reverse	The ability to constrain the source concepts of a set of relationships, and refer to the destination concepts of these relationships.
Dotted attribute	The ability to refer to the value (or set of values) of an attribute that is included in the definition of a set of concepts.
Attribute group	The ability to group a collection of attributes which operate together as part of a refinement.
Attribute	The ability to specify an attribute name-value pair which further refines the meaning of the matching expressions.

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[25] http://snomed.info/id/116680003

Attribute descendants	The ability to define an attribute which may apply to either the descendants of the given attribute name, or the descendants and self of the given attribute name.
Nesting	The ability to use an expression constraint to represent the valid set of attribute names and/or attribute values.
Concrete values	The ability to use integers, decimals, strings and booleans as attribute values.
Concrete value comparison	The ability to compare the attribute value of the matching expressions with the attribute value in the expression constraint using mathematical comparison operators (e.g. =, <, >, <=, >=, !=).
Member of	The ability to refer to a set of concepts that are referenced by members of a reference set (or set of reference sets).
Exclusion	The ability to filter out a set of expressions from the result, by either removing expressions whose focus concept is in a specific set, or removing expressions whose attribute value matches a given value.
Any	The ability to refer to any concept in the substrate, without relying on the availability of a single root concept.
Term filter	The ability to filter the result set, based on each concept having a matching description. Matching criteria for descriptions should be able to restrict the term, type, language, membership of a language reference set, and acceptability within that language reference set. Term matching approaches should include wildcard and word-prefix-any-order.

3.3 3.3 Concept Model Requirements

The SNOMED CT concept model requirements include:

Requirement C.1: The ability to express SNOMED CT concept model constraints

The language must support the ability to express SNOMED CT concept model constraints, such that the resulting expression constraint can be used to validate SNOMED CT concept definitions and postcoordinated expressions.

In particular, the language must support the ability to define the domain and cardinality of each attribute in the SNOMED CT concept model, and the range of all concept model **object** attributes (whose range is a set of SNOMED CT concepts). The domain of an attribute is the set of valid source concepts of relationships of that type. In most cases, this will be defined as the descendants and self of a given concept. The range of a concept

model object attribute is the set of valid destination concepts of relationships of that type. This will be defined as the set of concepts that match a given expression constraint. The cardinality of an attribute constrains the number of times an active relationship of this type can be added to a concept in the SNOMED CT snapshot release (in necessary normal form). For more information about the SNOMED CT necessary normal form, please refer to 2.5. Generating Necessary Normal Form[26] in the SNOMED CT OWL Guide (http://snomed.org/owl).

Please note that the range of a concept model **data** attribute (whose value is concrete) will be specified using a value list constraint[27] from the SNOMED CT Template Syntax (http://snomed.org/sts).

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[26] https://confluence.ihtsdotools.org/display/WIPOWL/
2.5.+Generating+Necessary+Normal+Form+Relationships+from+the+OWL+Refsets
[27] https://confluence.ihtsdotools.org/display/DOCSTS/8.3.+Constrained+Replacement+Slots

4 4. Logical Model

A SNOMED CT Expression Constraint contains either a single focus concept, or a series of focus concepts joined by either conjunction, disjunction or exclusion. Each focus concept in an Expression Constraint is either a concept reference or a wildcard, and is normally preceded by either a constraint operator or a memberOf function. An Expression Constraint may also contain a refinement, which consists of grouped or ungrouped attributes (or both). Each attribute consists of the attribute name (optionally preceded by a cardinality, reverse flag and/or attribute operator) together with the value of the attribute. The attribute name is either a concept reference or a wild card. The attribute value is either an expression constraint or a concrete value (i.e. string, integer, decimal or boolean). Conjunction or disjunction can be applied at a variety of levels, including between expression constraints, refinements, attribute groups, and attributes. An expression constraint can also be followed by a dot and attribute name pair. One or more filters may be applied to an expression constraint, which can include term, language, type and dialect filters.

Figure 1 below illustrates the overall structure of an expression constraint using an abstract representation. Those parts of an expression constraint, which are in common with SNOMED CT Compositional Grammar[28] expressions, are shown with dotted lines to emphasise the new features (using solid lines) in the Expression Constraint Language[29]. Please note that no specific semantics should be attributed to each arrow in this abstract diagram.
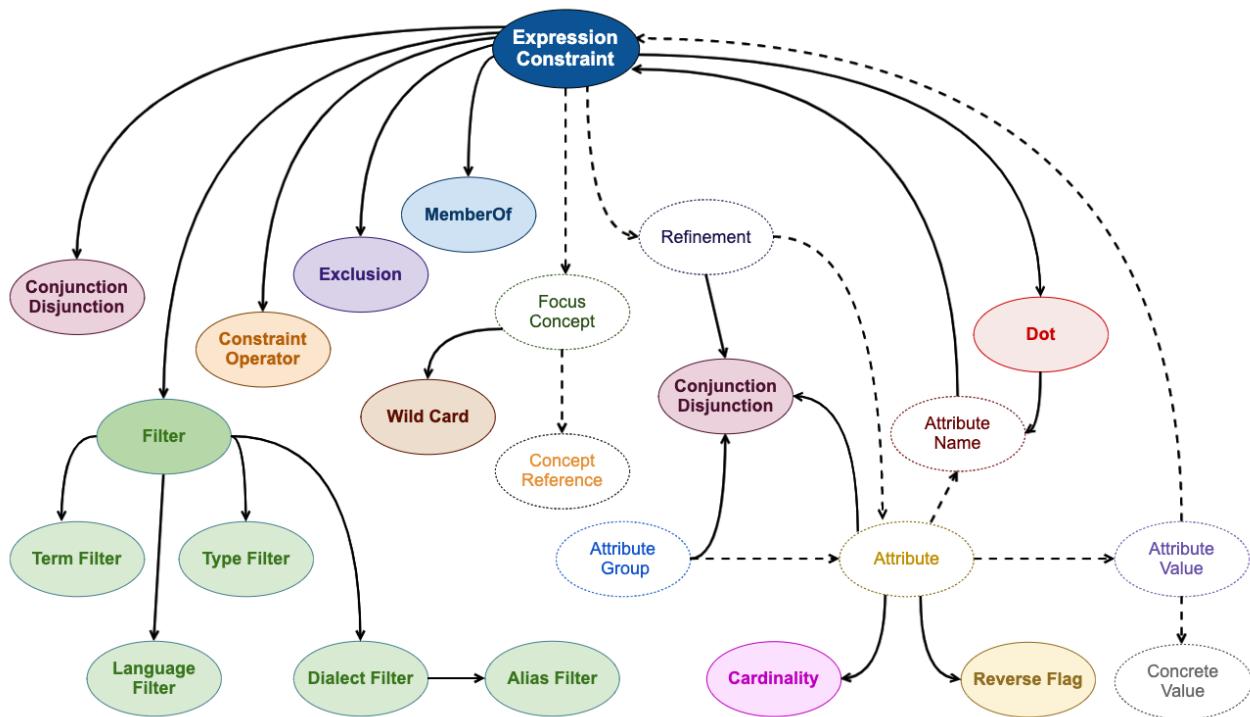
Figure 1: Abstract Model of a SNOMED CT Expression Constraint

Figure 2 below shows an example of an expression constraint [1](see page 0) with the main components marked. These components will be explained further in the subsequent sections of this document.

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28 http://snomed.org/scg
29 http://snomed.org/ecl
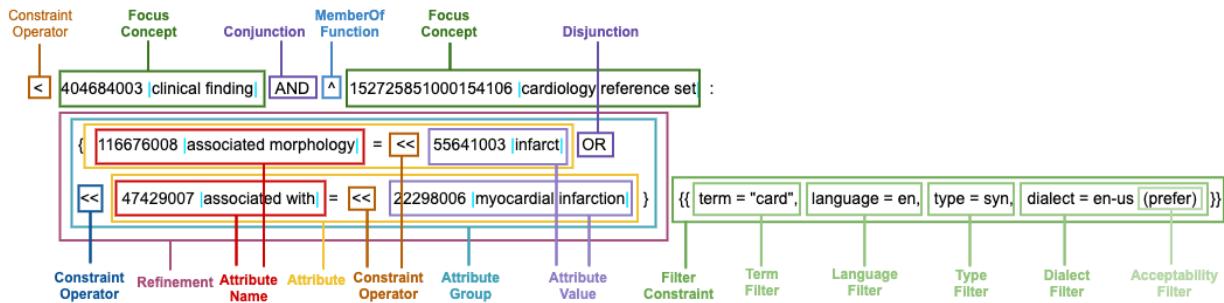
Figure 2: The main components of an example expression constraint

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[1](see page 0) The expression constraint in Figure 2 is satisfied by concepts which are clinical findings **and** members of the cardiology reference set **and** have an attribute group that either has an associated morphology of infarct (or descendant) **or** are associated with myocardial infarction (or descendant). In addition, all matching concepts must also have a description that matches the term "card", has a language of English, has a type of |Synonym|[30] and are preferred in the en-us language reference set.

4.1 4.1 Details

Figure 3 below provides a non-normative representation of the logical model of the SNOMED CT Expression Constraint Language[31] using a UML class diagram. Please note that each of the classes in this diagram corresponds to a rule in the syntax specification defined in Chapter 5(see page 20). For a short description of each of these, please refer to Section 5.4(see page 25).

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30 http://snomed.info/id/900000000000013009
31 http://snomed.org/ecl
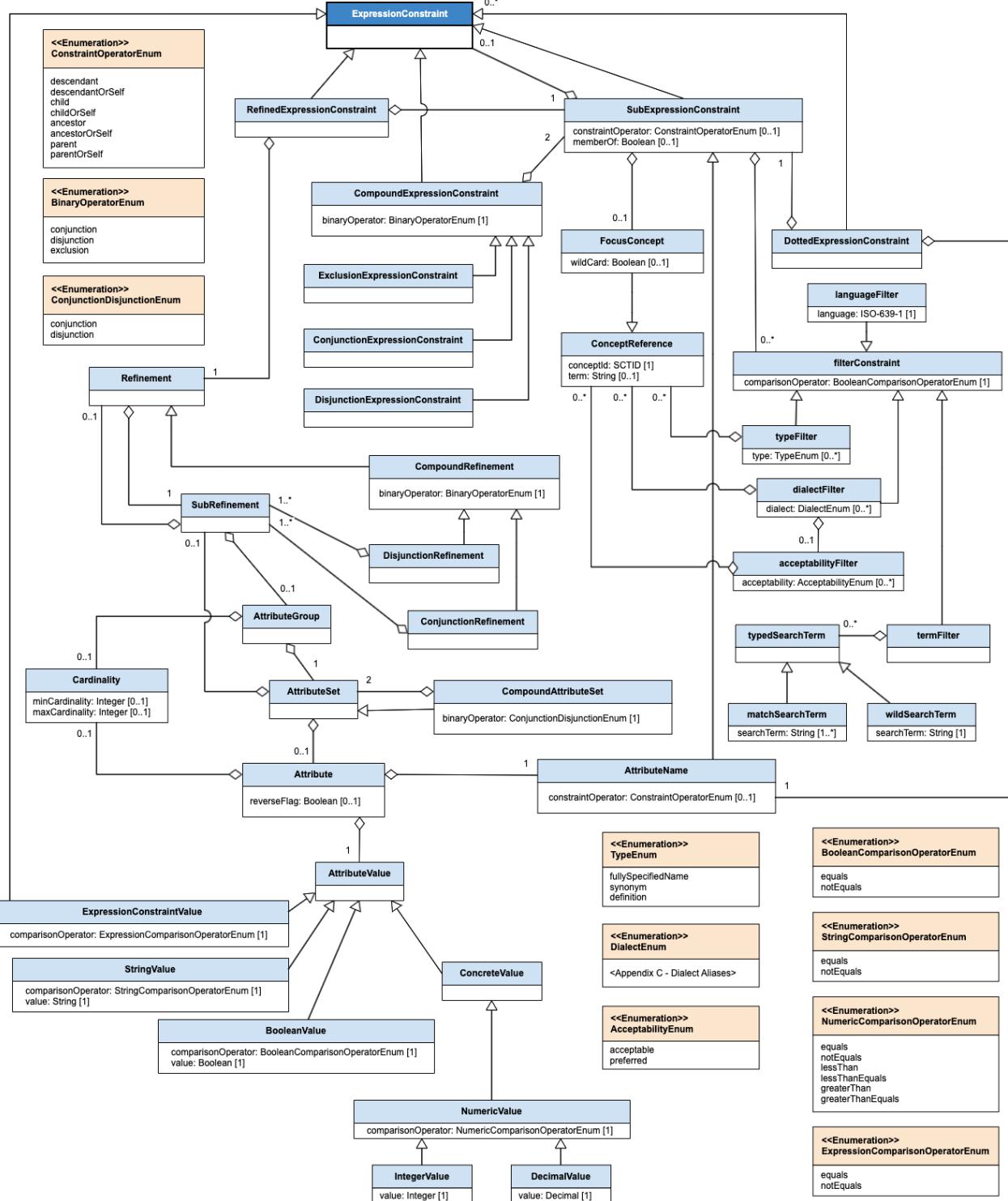
Figure 3: Logical Model of Expression Constraint Language

5 5. Syntax Specification

The following sections describe two syntaxes for use with the SNOMED CT Expression Constraint Language. These syntaxes are serialised representations of the logical model presented in the previous chapter, and are therefore logically equivalent.

The first of these syntaxes is referred to as the 'brief syntax' as it primarily uses a symbolic representation aimed to be as compact as possible. This syntax is considered to be the normative syntax, and is recommended for use in interoperable communications between systems.

The second syntax is referred to as the 'long syntax'. The long syntax introduces English-based textual alternatives to the symbols defined in the 'brief syntax', with the aim of increasing the human readability of the language. The textual alternatives provided in the 'long syntax' may (in theory) be translated into other languages to provide equivalent expression constraint representations that are human-readable by non-English speakers. Please note that the 'long syntax' (and any translations) is non-normative, and should only be used when a reliable mapping to the normative brief syntax is possible.

Please note that by default each expression constraint is evaluated against only the active components (and active members of each reference set) from the snapshot release (in distribution normal form) of a specified SNOMED CT versioned edition.

5.1 5.1 Brief Syntax (Normative)

The following ABNF definition specifies the Brief Syntax of the SNOMED CT Expression Constraint Language.

expressionConstraint = ws (refinedExpressionConstraint / compoundExpressionConstraint / dottedExpressionConstraint / subExpressionConstraint) ws
refinedExpressionConstraint = subExpressionConstraint ws ":" ws eclRefinement
compoundExpressionConstraint = conjunctionExpressionConstraint / disjunctionExpressionConstraint / exclusionExpressionConstraint
conjunctionExpressionConstraint = subExpressionConstraint 1*(ws conjunction ws subExpressionConstraint)
disjunctionExpressionConstraint = subExpressionConstraint 1*(ws disjunction ws subExpressionConstraint)
exclusionExpressionConstraint = subExpressionConstraint ws exclusion ws subExpressionConstraint
dottedExpressionConstraint = subExpressionConstraint 1*(ws dottedExpressionAttribute)
dottedExpressionAttribute = dot ws eclAttributeName
subExpressionConstraint = [constraintOperator ws] [memberOf ws] (eclFocusConcept / "(" ws expressionConstraint ws ")") *(ws filterConstraint)
eclFocusConcept = eclConceptReference / wildCard
dot = "."
memberOf = "^"
eclConceptReference = conceptId [ws "|" ws term ws "|"]
eclConceptReferenceSet = "(" ws eclConceptReference *(mws eclConceptReference) ws ")"
conceptId = sctId
term = 1*nonwsNonPipe *(1*SP 1*nonwsNonPipe)
wildCard = "*"
constraintOperator = childOf / childOrSelfOf / descendantOrSelfOf / descendantOf / parentOf / parentOrSelfOf / ancestorOrSelfOf / ancestorOf
descendantOf = "<"

descendantOrSelfOf = "<<"
childOf = "<!"
childOrSelfOf = "<<!"
ancestorOf = ">"
ancestorOrSelfOf = ">>"
parentOf = ">!"
parentOrSelfOf = ">>!"
conjunction = (("a"/"A") ("n"/"N") ("d"/"D") mws) / ","
disjunction = ("o"/"O") ("r"/"R") mws
exclusion = ("m"/"M") ("i"/"I") ("n"/"N") ("u"/"U") ("s"/"S") mws
eclRefinement = subRefinement ws [conjunctionRefinementSet / disjunctionRefinementSet]
conjunctionRefinementSet = 1*(ws conjunction ws subRefinement)
disjunctionRefinementSet = 1*(ws disjunction ws subRefinement)
subRefinement = eclAttributeSet / eclAttributeGroup / "(" ws eclRefinement ws ")"
eclAttributeSet = subAttributeSet ws [conjunctionAttributeSet / disjunctionAttributeSet]
conjunctionAttributeSet = 1*(ws conjunction ws subAttributeSet)
disjunctionAttributeSet = 1*(ws disjunction ws subAttributeSet)
subAttributeSet = eclAttribute / "(" ws eclAttributeSet ws ")"
eclAttributeGroup = ["[" cardinality "]" ws] "{" ws eclAttributeSet ws "}"
eclAttribute = ["[" cardinality "]" ws] [reverseFlag ws] eclAttributeName ws (expressionComparisonOperator ws
subExpressionConstraint / numericComparisonOperator ws "#" numericValue / stringComparisonOperator ws QM
stringValue QM / booleanComparisonOperator ws booleanValue)
cardinality = minValue to maxValue
minValue = nonNegativeIntegerValue
to = ".."
maxValue = nonNegativeIntegerValue / many
many = "*"
reverseFlag = "R"
eclAttributeName = subExpressionConstraint
expressionComparisonOperator = "=" / "!="
numericComparisonOperator = "=" / "!=" / "<=" / "<" / ">=" / ">"
stringComparisonOperator = "=" / "!="
booleanComparisonOperator = "=" / "!="
filterConstraint = "{{" ws filter *(ws "," ws filter) ws "}}"
filter = termFilter / languageFilter / typeFilter / dialectFilter
termFilter = termKeyword ws booleanComparisonOperator ws (typedSearchTerm / typedSearchTermSet)
termKeyword = ("t"/"T") ("e"/"E") ("r"/"R") ("m"/"M")
typedSearchTerm = ([match ws ":" ws] matchSearchTermSet) / (wild ws ":" ws wildSearchTermSet)
typedSearchTermSet = "(" ws typedSearchTerm *(mws typedSearchTerm) ws ")"
wild = ("w"/"W") ("i"/"I") ("l"/"L") ("d"/"D")
match = ("m"/"M") ("a"/"A") ("t"/"T") ("c"/"C") ("h"/"H")
matchSearchTerm = 1*(nonwsNonEscapedChar / escapedChar)
matchSearchTermSet = QM ws matchSearchTerm *(mws matchSearchTerm) ws QM
wildSearchTerm = 1*(anyNonEscapedChar / escapedWildChar)
wildSearchTermSet = QM wildSearchTerm QM
languageFilter = language ws booleanComparisonOperator ws (languageCode / languageCodeSet)
language = ("l"/"L") ("a"/"A") ("n"/"N") ("g"/"G") ("u"/"U") ("a"/"A") ("g"/"G") ("e"/"E")
languageCode = 2alpha
languageCodeSet = "(" ws languageCode *(mws languageCode) ws ")"
typeFilter = typeIdFilter / typeTokenFilter
typeIdFilter = typeId ws booleanComparisonOperator ws (eclConceptReference / eclConceptReferenceSet)
typeId = ("t"/"T") ("y"/"Y") ("p"/"P") ("e"/"E") ("i"/"I") ("d"/"D")
typeTokenFilter = type ws booleanComparisonOperator ws (typeToken / typeTokenSet)

type = ("t"/"T") ("y"/"Y") ("p"/"P") ("e"/"E")
typeToken = synonym / fullySpecifiedName / definition
typeTokenSet = "(" ws typeToken *(mws typeToken) ws ")"
synonym = ("s"/"S") ("y"/"Y") ("n"/"N")
fullySpecifiedName = ("f"/"F") ("s"/"S") ("n"/"N")
definition = ("d"/"D") ("e"/"E") ("f"/"F")
dialectFilter = (dialectIdFilter / dialectAliasFilter) [ws acceptabilitySet]
dialectIdFilter = dialectId ws booleanComparisonOperator ws (eclConceptReference / dialectIdSet)
dialectId = ("d"/"D") ("i"/"I") ("a"/"A") ("l"/"L") ("e"/"E") ("c"/"C") ("t"/"T") ("i"/"I") ("d"/"D")
dialectAliasFilter = dialect ws booleanComparisonOperator ws (dialectAlias / dialectAliasSet)
dialect = ("d"/"D") ("i"/"I") ("a"/"A") ("l"/"L") ("e"/"E") ("c"/"C") ("t"/"T")
dialectAlias = alpha *(dash / alpha / integerValue)
dialectAliasSet = "(" ws dialectAlias [ws acceptabilitySet] *(mws dialectAlias [ws acceptabilitySet]) ws ")"
dialectIdSet = "(" ws eclConceptReference [ws acceptabilitySet] *(mws eclConceptReference [ws acceptabilitySet]) ws ")"
acceptabilitySet = acceptabilityIdSet / acceptabilityTokenSet
acceptabilityIdSet = eclConceptReferenceSet
acceptabilityTokenSet = "(" ws acceptabilityToken *(mws acceptabilityToken) ws ")"
acceptabilityToken = acceptable / preferred
acceptable = ("a"/"A") ("c"/"C") ("c"/"C") ("e"/"E") ("p"/"P") ("t"/"T")
preferred = ("p"/"P") ("r"/"R") ("e"/"E") ("f"/"F") ("e"/"E") ("r"/"R")
numericValue = ["-"/"+"] (decimalValue / integerValue)
stringValue = 1*(anyNonEscapedChar / escapedChar)
integerValue = digitNonZero *digit / zero
decimalValue = integerValue "." 1*digit
booleanValue = true / false
true = ("t"/"T") ("r"/"R") ("u"/"U") ("e"/"E")
false = ("f"/"F") ("a"/"A") ("l"/"L") ("s"/"S") ("e"/"E")
nonNegativeIntegerValue = (digitNonZero *digit) / zero
sctId = digitNonZero 5*17(digit)
ws = *(SP / HTAB / CR / LF / comment) ; optional white space
mws = 1*(SP / HTAB / CR / LF / comment) ; mandatory white space
comment = "/*" *(nonStarChar / starWithNonFSlash) "*/"
nonStarChar = SP / HTAB / CR / LF / %x21-29 / %x2B-7E /UTF8-2 / UTF8-3 / UTF8-4
starWithNonFSlash = %x2A nonFSlash
nonFSlash = SP / HTAB / CR / LF / %x21-2E / %x30-7E /UTF8-2 / UTF8-3 / UTF8-4
SP = %x20 ; space
HTAB = %x09 ; tab
CR = %x0D ; carriage return
LF = %x0A ; line feed
QM = %x22 ; quotation mark
BS = %x5C ; back slash
star = %x2A ; asterisk
digit = %x30-39
zero = %x30
digitNonZero = %x31-39
nonwsNonPipe = %x21-7B / %x7D-7E / UTF8-2 / UTF8-3 / UTF8-4
anyNonEscapedChar = SP / HTAB / CR / LF / %x20-21 / %x23-5B / %x5D-7E / UTF8-2 / UTF8-3 / UTF8-4
escapedChar = BS QM / BS BS
escapedWildChar = BS QM / BS BS / BS star
nonwsNonEscapedChar = %x21 / %x23-5B / %x5D-7E / UTF8-2 / UTF8-3 / UTF8-4
alpha = %x41-5A / %x61-7A
dash = %x2D

UTF8-2 = *%xC2-DF UTF8-tail*
UTF8-3 = *%xE0 %xA0-BF UTF8-tail / %xE1-EC 2(UTF8-tail) / %xED %x80-9F UTF8-tail / %xEE-EF 2(UTF8-tail)*
UTF8-4 = *%xF0 %x90-BF 2(UTF8-tail) / %xF1-F3 3(UTF8-tail) / %xF4 %x80-8F 2(UTF8-tail)*
UTF8-tail = *%x80-BF*

5.2 5.2 Long Syntax (Informative)

The following ABNF definition specifies the Long Syntax the [SNOMED CT Expression Constraint Language](#)[32]. Please note that all keywords are case insensitive.

expressionConstraint = *ws (refinedExpressionConstraint / compoundExpressionConstraint / dottedExpressionConstraint / subExpressionConstraint) ws*
refinedExpressionConstraint = *subExpressionConstraint ws ":" ws eclRefinement*
compoundExpressionConstraint = *conjunctionExpressionConstraint / disjunctionExpressionConstraint / exclusionExpressionConstraint*
conjunctionExpressionConstraint = *subExpressionConstraint 1*(ws conjunction ws subExpressionConstraint)*
disjunctionExpressionConstraint = *subExpressionConstraint 1*(ws disjunction ws subExpressionConstraint)*
exclusionExpressionConstraint = *subExpressionConstraint ws exclusion ws subExpressionConstraint*
dottedExpressionConstraint = *subExpressionConstraint 1*(ws dottedExpressionAttribute)*
dottedExpressionAttribute = *dot ws eclAttributeName*
subExpressionConstraint = *[constraintOperator ws] [memberOf ws] (eclFocusConcept / "(" ws expressionConstraint ws ")") *(ws filterConstraint ws)*
eclFocusConcept = *eclConceptReference / wildCard*
dot = *"."*
memberOf = *"^" / ("m"/"M") ("e"/"E") ("m"/"M") ("b"/"B") ("e"/"E") ("r"/"R") ("o"/"O") ("f"/"F")*
eclConceptReference = *conceptId [ws "|" ws term ws "|"]*
eclConceptReferenceSet = *"(" ws eclConceptReference *(mws eclConceptReference) ws ")"*
conceptId = *sctId*
term = *1*nonwsNonPipe *(1*SP 1*nonwsNonPipe)*
wildCard = *"*" / (("a"/"A") ("n"/"N") ("y"/"Y"))*
constraintOperator = *childOf / childOrSelfOf / descendantOrSelfOf / descendantOf / parentOf / parentOrSelfOf / ancestorOrSelfOf / ancestorOf*
descendantOf = *"<" / (("d"/"D") ("e"/"E") ("s"/"S") ("c"/"C") ("e"/"E") ("n"/"N") ("d"/"D") ("a"/"A") ("n"/"N") ("t"/"T") ("o"/"O") ("f"/"F") mws)*
descendantOrSelfOf = *"<<" / (("d"/"D") ("e"/"E") ("s"/"S") ("c"/"C") ("e"/"E") ("n"/"N") ("d"/"D") ("a"/"A") ("n"/"N") ("t"/"T") ("o"/"O") ("r"/"R") ("s"/"S") ("e"/"E") ("l"/"L") ("f"/"F") ("o"/"O") ("f"/"F") mws)*
childOf = *"<!" / (("c"/"C") ("h"/"H") ("i"/"I") ("l"/"L") ("d"/"D") ("o"/"O") ("f"/"F") mws)*
childOrSelfOf = *"<<!" / (("c"/"C") ("h"/"H") ("i"/"I") ("l"/"L") ("d"/"D") ("o"/"O") ("r"/"R") ("s"/"S") ("e"/"E") ("l"/"L") ("f"/"F") ("o"/"O") ("f"/"F") mws)*
ancestorOf = *">" / (("a"/"A") ("n"/"N") ("c"/"C") ("e"/"E") ("s"/"S") ("t"/"T") ("o"/"O") ("r"/"R") ("o"/"O") ("f"/"F") mws)*
ancestorOrSelfOf = *">>" / (("a"/"A") ("n"/"N") ("c"/"C") ("e"/"E") ("s"/"S") ("t"/"T") ("o"/"O") ("r"/"R") ("o"/"O") ("r"/"R") ("s"/"S") ("e"/"E") ("l"/"L") ("f"/"F") ("o"/"O") ("f"/"F") mws)*
parentOf = *">!" / (("p"/"P") ("a"/"A") ("r"/"R") ("e"/"E") ("n"/"N") ("t"/"T") ("o"/"O") ("f"/"F") mws)*
parentOrSelfOf = *">>!" / (("p"/"P") ("a"/"A") ("r"/"R") ("e"/"E") ("n"/"N") ("t"/"T") ("o"/"O") ("r"/"R") ("s"/"S") ("e"/"E") ("l"/"L") ("f"/"F") ("o"/"O") ("f"/"F") mws)*
conjunction = *(("a"/"A") ("n"/"N") ("d"/"D") mws) / ","*
disjunction = *("o"/"O") ("r"/"R") mws*
exclusion = *("m"/"M") ("i"/"I") ("n"/"N") ("u"/"U") ("s"/"S") mws*
eclRefinement = *subRefinement ws [conjunctionRefinementSet / disjunctionRefinementSet]*
conjunctionRefinementSet = *1*(ws conjunction ws subRefinement)*

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[32] http://snomed.org/ecl

disjunctionRefinementSet = 1*(ws disjunction ws subRefinement)
subRefinement = eclAttributeSet / eclAttributeGroup / "(" ws eclRefinement ws ")"
eclAttributeSet = subAttributeSet ws [conjunctionAttributeSet / disjunctionAttributeSet]
conjunctionAttributeSet = 1*(ws conjunction ws subAttributeSet)
disjunctionAttributeSet = 1*(ws disjunction ws subAttributeSet)
subAttributeSet = eclAttribute / "(" ws eclAttributeSet ws ")"
eclAttributeGroup = ["[" cardinality "]" ws] "{" ws eclAttributeSet ws "}"
eclAttribute = ["[" cardinality "]" ws] [reverseFlag ws] eclAttributeName ws (expressionComparisonOperator ws
subExpressionConstraint / numericComparisonOperator ws "#" numericValue / stringComparisonOperator ws QM
stringValue QM / booleanComparisonOperator ws booleanValue)
cardinality = minValue to maxValue
minValue = nonNegativeIntegerValue
to = ".." / (mws ("t"/"T") ("o"/"O") mws)
maxValue = nonNegativeIntegerValue / many
many = "*" / (("m"/"M") ("a"/"A") ("n"/"N") ("y"/"Y"))
reverseFlag = (("r"/"R") ("e"/"E") ("v"/"V") ("e"/"E") ("r"/"R") ("s"/"S") ("e"/"E") ("o"/"O") ("f"/"F")) / "R"
eclAttributeName = subExpressionConstraint
expressionComparisonOperator = "=" / "!=" / ("n"/"N") ("o"/"O") ("t"/"T") ws "=" / "<>"
numericComparisonOperator = "=" / "!=" / ("n"/"N") ("o"/"O") ("t"/"T") ws "=" / "<>" / "<=" / "<" / ">=" / ">"
stringComparisonOperator = "=" / "!=" / ("n"/"N") ("o"/"O") ("t"/"T") ws "=" / "<>"
booleanComparisonOperator = "=" / "!=" / ("n"/"N") ("o"/"O") ("t"/"T") ws "=" / "<>"
filterConstraint = "{{" ws filter *(ws "," ws filter) ws "}}"
filter = termFilter / languageFilter / typeFilter / dialectFilter
termFilter = termKeyword ws booleanComparisonOperator ws (typedSearchTerm / typedSearchTermSet)
termKeyword = ("t"/"T") ("e"/"E") ("r"/"R") ("m"/"M")
typedSearchTerm = ([match ws ":" ws] matchSearchTermSet) / (wild ws ":" ws wildSearchTermSet)
typedSearchTermSet = "(" ws typedSearchTerm *(mws typedSearchTerm) ws ")"
wild = ("w"/"W") ("i"/"I") ("l"/"L") ("d"/"D")
match = ("m"/"M") ("a"/"A") ("t"/"T") ("c"/"C") ("h"/"H")
matchSearchTerm = 1*(nonwsNonEscapedChar / escapedChar)
matchSearchTermSet = QM ws matchSearchTerm *(mws matchSearchTerm) ws QM
wildSearchTerm = 1*(anyNonEscapedChar / escapedWildChar)
wildSearchTermSet = QM wildSearchTerm QM
languageFilter = language ws booleanComparisonOperator ws (languageCode / languageCodeSet)
language = ("l"/"L") ("a"/"A") ("n"/"N") ("g"/"G") ("u"/"U") ("a"/"A") ("g"/"G") ("e"/"E")
languageCode = 2alpha
languageCodeSet = "(" ws languageCode *(mws languageCode) ws ")"
typeFilter = typeIdFilter / typeTokenFilter
typeIdFilter = typeId ws booleanComparisonOperator ws (eclConceptReference / eclConceptReferenceSet)
typeId = ("t"/"T") ("y"/"Y") ("p"/"P") ("e"/"E") ("i"/"I") ("d"/"D")
typeTokenFilter = type ws booleanComparisonOperator ws (typeToken / typeTokenSet)
type = ("t"/"T") ("y"/"Y") ("p"/"P") ("e"/"E")
typeToken = synonym / fullySpecifiedName / definition
typeTokenSet = "(" ws typeToken *(mws typeToken) ws ")"
synonym = ("s"/"S") ("y"/"Y") ("n"/"N") [("o"/"O") ("n"/"N") ("y"/"Y") ("m"/"M")]
fullySpecifiedName = (("f"/"F") ("s"/"S") ("n"/"N")) /
(("f"/"F") ("u"/"U") ("l"/"L") ("l"/"L") ("y"/"Y") ("s"/"S") ("p"/"P") ("e"/"E") ("c"/"C") ("i"/"I") ("f"/"F") ("i"/"I") ("e"/"E")
 ("d"/"D") ("n"/"N") ("a"/"A") ("m"/"M") ("e"/"E"))
definition = ("d"/"D") ("e"/"E") ("f"/"F") [("i"/"I") ("n"/"N") ("i"/"I") ("t"/"T") ("i"/"I") ("o"/"O") ("n"/"N")]
dialectFilter = (dialectIdFilter / dialectAliasFilter) [ws acceptabilitySet]
dialectIdFilter = dialectId ws booleanComparisonOperator ws (eclConceptReference / dialectIdSet)
dialectId = ("d"/"D") ("i"/"I") ("a"/"A") ("l"/"L") ("e"/"E") ("c"/"C") ("t"/"T") ("i"/"I") ("d"/"D")
dialectAliasFilter = dialect ws booleanComparisonOperator ws (dialectAlias / dialectAliasSet)

dialect = ("d"/"D") ("i"/"I") ("a"/"A") ("l"/"L") ("e"/"E") ("c"/"C") ("t"/"T")
dialectAlias = alpha *(dash / alpha / integerValue)
dialectAliasSet = "(" ws dialectAlias [ws acceptabilitySet] *(mws dialectAlias [ws acceptabilitySet]) ws ")"
dialectIdSet = "(" ws eclConceptReference [ws acceptabilitySet] *(mws eclConceptReference [ws acceptabilitySet]) ws ")"
acceptabilitySet = acceptabilityIdSet / acceptabilityTokenSet
acceptabilityIdSet = eclConceptReferenceSet
acceptabilityTokenSet = "(" ws acceptabilityToken *(mws acceptabilityToken) ws ")"
acceptabilityToken = acceptable / preferred
acceptable = ("a"/"A") ("c"/"C") ("c"/"C") ("e"/"E") ("p"/"P") ("t"/"T") [("a"/"A") ("b"/"B") ("l"/"L") ("e"/"E")]
preferred = ("p"/"P") ("r"/"R") ("e"/"E") ("f"/"F") ("e"/"E") ("r"/"R") [("r"/"R") ("e"/"E") ("d"/"D")]
numericValue = ["-"/"+"] (decimalValue / integerValue)
stringValue = 1*(anyNonEscapedChar / escapedChar)
integerValue = digitNonZero *digit / zero
decimalValue = integerValue "." 1*digit
booleanValue = true / false
true = ("t"/"T") ("r"/"R") ("u"/"U") ("e"/"E")
false = ("f"/"F") ("a"/"A") ("l"/"L") ("s"/"S") ("e"/"E")
nonNegativeIntegerValue = (digitNonZero *digit) / zero
sctId = digitNonZero 5*17(digit)
ws = *(SP / HTAB / CR / LF / comment) ; optional white space
mws = 1*(SP / HTAB / CR / LF / comment) ; mandatory white space
comment = "/*" *(nonStarChar / starWithNonFSlash) "*/"
nonStarChar = SP / HTAB / CR / LF / %x21-29 / %x2B-7E /UTF8-2 / UTF8-3 / UTF8-4
starWithNonFSlash = %x2A nonFSlash
nonFSlash = SP / HTAB / CR / LF / %x21-2E / %x30-7E /UTF8-2 / UTF8-3 / UTF8-4
SP = %x20 ; space
HTAB = %x09 ; tab
CR = %x0D ; carriage return
LF = %x0A ; line feed
QM = %x22 ; quotation mark
BS = %x5C ; back slash
star = %x2A ; asterisk
digit = %x30-39
zero = %x30
digitNonZero = %x31-39
nonwsNonPipe = %x21-7B / %x7D-7E / UTF8-2 / UTF8-3 / UTF8-4
anyNonEscapedChar = SP / HTAB / CR / LF / %x20-21 / %x23-5B / %x5D-7E / UTF8-2 / UTF8-3 / UTF8-4
escapedChar = BS QM / BS BS
escapedWildChar = BS QM / BS BS / BS star
nonwsNonEscapedChar = %x21 / %x23-5B / %x5D-7E / UTF8-2 / UTF8-3 / UTF8-4
alpha = %x41-5A / %x61-7A
dash = %x2D
UTF8-2 = %xC2-DF UTF8-tail
UTF8-3 = %xE0 %xA0-BF UTF8-tail / %xE1-EC 2(UTF8-tail) / %xED %x80-9F UTF8-tail / %xEE-EF 2(UTF8-tail)
UTF8-4 = %xF0 %x90-BF 2(UTF8-tail) / %xF1-F3 3(UTF8-tail) / %xF4 %x80-8F 2(UTF8-tail)
UTF8-tail = %x80-BF

5.3 5.3 Informative Comments

This section provides a short description of each ABNF rule listed above. The related brief and long syntax rules are grouped together with the same description. Where the syntaxes are the same, the rule is listed once and preceded

with the text "BS/LS". Where the brief and long syntaxes are different, both rules are listed separately and preceded with "BS" and "LS" respectively.

BS/LS: expressionConstraint = ws (refinedExpressionConstraint / compoundExpressionConstraint / dottedExpressionConstraint / subExpressionConstraint) ws	
	An expression constraint is either a refined expression constraint, a compound expression constraint, a dotted expression constraint, or a sub expression constraint.
BS/LS: refinedExpressionConstraint = subExpressionConstraint ws ":" ws eclRefinement	
	A refined expression constraint includes a subexpression constraint followed by a refinement.
BS/LS: compoundExpressionConstraint = conjunctionExpressionConstraint / disjunctionExpressionConstraint / exclusionExpressionConstraint	
	A compound expression constraint contains two or more expression constraints joined by either a conjunction, disjunction or exclusion. When potential ambiguity in binary operator precedence may occur, round brackets must be used to clearly disambiguate the order in which these operator are applied. Brackets are not required in expression constraints in which all binary operators are conjunctions, or all binary operators are disjunctions. Please note that unary operators (i.e. constraint operators and member of functions) are always applied before binary operators (i.e. conjunction, disjunction and exclusion).
BS/LS: conjunctionExpressionConstraint = subExpressionConstraint 1*(ws conjunction ws subExpressionConstraint)	
	A conjunction expression constraint combines two or more expression constraints with a conjunction ("and") operator. More than one conjunction may be used without brackets. However any compound expression constraint (using a different binary operator) that appears within a conjunction expression constraint must be enclosed by brackets.
BS/LS: disjunctionExpressionConstraint = subExpressionConstraint 1*(ws disjunction ws subExpressionConstraint)	
	A disjunction expression constraint combines two or more expression constraints with a disjunction ("or") operator. More than one disjunction may be used without brackets. However any compound expression constraint (using a different binary operator) that appears within a disjunction expression constraint must be enclosed by brackets.
BS/LS: exclusionExpressionConstraint = subExpressionConstraint ws exclusion ws subExpressionConstraint	

	An exclusion expression constraint combines two expression constrains with an exclusion ("minus") operator. A single exclusion operator may be used without brackets. However when the operands of the exclusion expression constraint are compound, these compound expression constraints must be enclosed by brackets.
BS/LS: dottedExpressionConstraint = subExpressionConstraint 1*(ws dottedExpressionAttribute)	
	A dotted expression constraint contains a sub expression constraint, followed by one or more dotted attributes. When a single dotted attribute is used, the result is the set of attribute values (for the given attribute name) of each concept that results from evaluating the subExpressionConstraint. When more than one dotted attribute is used, each dottedExpressionAttribute is sequentially evaluated (from left to right) against the given result set.
BS/LS: dottedExpressionAttribute = dot ws eclAttributeName	
	A dotted expression attribute consists of a 'dot', followed by an attribute name. Please note that the attribute name may be represented by any sub expression constraint.
BS/LS: subExpressionConstraint = [constraintOperator ws] [memberOf ws] (eclFocusConcept / "(" ws expressionConstraint ws ")") *(ws filterConstraint)	
	A sub expression constraint optionally begins with a constraint operator and/or a memberOf function. It then includes either a single focus concept or an expression constraint (enclosed in brackets). A sub expression constraint may optionally include one or more filter constraints at the end.

Notes: A memberOf function should be used only when the eclFocusConcept or expressionConstraint refers to a reference set concept, a set of reference set concepts, or a wild card. When both a constraintOperator and a memberOf function are used, they are applied from the inside to out (i.e. from right to left) - see 5.4 Operator Precedence(see page 46). Therefore, if a constraintOperator is followed by a memberOf function, then the memberOf function is processed prior to the constraintOperator. |
BS/LS: eclFocusConcept = eclConceptReference / wildCard	
	A focus concept is a concept reference or a wild card.
BS/LS: dot = "."	

	A dot connects an expression constraint with an attribute whose values are included in the result.
BS: memberOf = "^" **LS: memberOf** = "^" / ("m"/"M") ("e"/"E") ("m"/"M") ("b"/"B") ("e"/"E") ("r"/"R") ("o"/"O") ("f"/"F")	
	The 'memberOf' function returns the set of referenced components in the reference set whose concept identifier follows. In the brief syntax, the memberOf function is represented using the "^" symbol. In the long syntax, the text "memberOf " (case insensitive and followed by at least one white space) is also allowed.
BS/LS: eclConceptReference = conceptId [ws "|" ws term ws "|"]	
	A conceptReference is represented by a ConceptId, optionally followed by a term[33] enclosed by a pair of "|" characters. Whitespace before or after the ConceptId is ignored as is any whitespace between the initial "|" characters and the first non-whitespace character in the term[34] or between the last non-whitespace character and before second "|" character.
BS/LS: **eclConceptReferenceSet** = "(" ws eclConceptReference *(mws eclConceptReference) ws ")"	
	A concept reference set includes one or more concept references separated by mandatory white space and enclosed in brackets.
BS/LS: conceptId = sctId	
	The ConceptId must be a valid SNOMED CT identifier[35] for a concept[36]. The initial digit may not be zero. The smallest number of digits is six, and the maximum is 18.
BS/LS: term = 1*nonwsnonpipe *(1*SP 1*nonwsnonpipe)	
	The term[37] must be the term[38] from a SNOMED CT description[39] that is associated with the concept[40] identified by the preceding concept identifier[41]. For example, the

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33 https://confluence.ihtsdotools.org/display/DOCRELFMT/term+(field)
34 https://confluence.ihtsdotools.org/display/DOCRELFMT/term+(field)
35 https://confluence.ihtsdotools.org/display/DOCGLOSS/SNOMED+CT+identifier
36 https://confluence.ihtsdotools.org/display/DOCGLOSS/concept
37 https://confluence.ihtsdotools.org/display/DOCRELFMT/term+(field)
38 https://confluence.ihtsdotools.org/display/DOCRELFMT/term+(field)
39 https://confluence.ihtsdotools.org/display/DOCGLOSS/SNOMED+CT+description
40 https://confluence.ihtsdotools.org/display/DOCGLOSS/concept
41 https://confluence.ihtsdotools.org/display/DOCGLOSS/concept+identifier

term[42] could be the preferred description[43], or the preferred description[44] associated with a particular translation. The term[45] may include valid UTF-8[46] characters except for the pipe "

BS: wildCard = "*"

LS: wildCard = "*" / (("a"/"A") ("n"/"N") ("y"/"Y"))

A wild card represents any concept in the given substrate. In the brief syntax, a wildcard is represented using the "*" symbol. In the long syntax, the text "ANY" (case insensitive) is also allowed.

BS/LS: constraintOperator = childOf / childOrSelfOf / descendantOrSelfOf / descendantOf / parentOf / parentOrSelfOf / ancestorOrSelfOf / ancestorOf

A constraint operator is either 'childOf', 'childOrSelfOf', 'descendantOrSelfOf', 'descendantOf', 'parentOf', 'parentOrSelfOf', 'ancestorOrSelfOf', or 'ancestorOf'.

BS: descendantOf = "<"

LS: descendantOf = "<" / (("d"/"D") ("e"/"E") ("s"/"S") ("c"/"C") ("e"/"E") ("n"/"N") ("d"/"D")("a"/"A") ("n"/"N") ("t"/"T") ("o"/"O")("f"/"F") mws)

The descendantOf operator returns the set of all subtypes of the given concept (or set of concepts). In the brief syntax, the descendantOf operator is represented using the symbol "<". In the long syntax, the text "descendantOf" (case insensitive and followed by at least one white space) is also allowed.

BS: descendantOrSelfOf = "<<"

LS: descendantOrSelfOf = "<<" / (("d"/"D") ("e"/"E") ("s"/"S") ("c"/"C") ("e"/"E") ("n"/"N") ("d"/"D") ("a"/"A") ("n"/"N") ("t"/"T") ("o"/"O")("r"/"R") ("s"/"S")("e"/"E") ("l"/"L") ("f"/"F") ("o"/"O")("f"/"F") mws)

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[42] https://confluence.ihtsdotools.org/display/DOCRELFMT/term+(field)
[43] https://confluence.ihtsdotools.org/display/DOCGLOSS/description
[44] https://confluence.ihtsdotools.org/display/DOCGLOSS/description
[45] https://confluence.ihtsdotools.org/display/DOCRELFMT/term+(field)
[46] https://confluence.ihtsdotools.org/display/DOCRELFMT/UTF-8

	The descendantOrSelfOf operator returns the set of all subtypes of the given concept (or set of concepts), plus the concept (or set of concepts) itself. In the brief syntax, the descendantOrSelfOf operator is represented using the symbols "<<". In the long syntax, the text "descendantOrSelfOf" (case insensitive and followed by at least one white space) is also allowed.
BS: childOf = "<!" **LS: childOf** = "<!" / (("c"/"C") ("h"/"H") ("i"/"I") ("l"/"L") ("d"/"D") ("o"/"O") ("f"/"F") mws)	
	The childOf operator returns the set of all immediate children of the given concept (or set of concepts). In the brief syntax, the childOf operator is represented using the symbols "<!". In the long syntax, the text "childOf" (case insensitive and followed by at least one white space) is also allowed.
BS: childOrSelfOf = "<<!" **LS: childOrSelfOf** = "<<!" / (("c"/"C") ("h"/"H") ("i"/"I") ("l"/"L") ("d"/"D") ("o"/"O")("r"/"R") ("s"/"S")("e"/"E") ("l"/"L") ("f"/"F") ("o"/"O") ("f"/"F") mws)	
	The childOrSelfOf operator returns the set of all immediate children of the given concept (or set of concepts), plus the concept (or set of concepts) itself. In the brief syntax, the childOrSelfOf operator is represented using the symbols "<<!". In the long syntax, the text "childOrSelfOf" (case insensitive and followed by at least one white space) is also allowed.
BS: ancestorOf = ">" **LS: ancestorOf** = ">" / (("a"/"A") ("n"/"N") ("c"/"C") ("e"/"E") ("s"/"S") ("t"/"T") ("o"/"O") ("r"/"R") ("o"/"O") ("f"/"F") mws)	
	The ancestorOf operator returns the set of all supertypes of the given concept (or set of concepts). In the brief syntax, the ancestorOf operator is represented using the symbol ">". In the long syntax, the text "ancestorOf " (case insensitive and followed by at least one white space) is also allowed.

BS: ancestorOrSelfOf = ">>"

LS: ancestorOrSelfOf = ">>" / (("a"/"A") ("n"/"N") ("c"/"C") ("e"/"E") ("s"/"S") ("t"/"T") ("o"/"O") ("r"/"R") ("o"/"O") ("r"/"R") ("s"/"S") ("e"/"E") ("l"/"L" ("f"/"F") ("o"/"O")("f"/"F") mws)

	The ancestorOrSelfOf operator returns the set of all supertypes of the given concept (or set of concepts), plus the concept (or set of concepts) itself. In the brief syntax, the ancestorOrSelfOf operator is represented using the symbols ">>". In the long syntax, the text "ancestorOrSelfOf" (case insensitive and followed by at least one white space) is also allowed.

BS: parentOf = ">!"

LS: parentOf = ">!" / (("p"/"P") ("a"/"A") ("r"/"R") ("e"/"E") ("n"/"N") ("t"/"T") ("o"/"O") ("f"/"F") mws)

	The parentOf operator returns the set of all immediate parents of the given concept (or set of concepts). In the brief syntax, the parentOf operator is represented using the symbols ">!". In the long syntax, the text "parentOf" (case insensitive and followed by at least one white space) is also allowed.

BS: parentOrSelfOf = ">>!"

LS: parentOrSelfOf = ">>!" / (("p"/"P") ("a"/"A") ("r"/"R") ("e"/"E") ("n"/"N") ("t"/"T") ("o"/"O") ("r"/"R") ("s"/"S") ("e"/"E") ("l"/"L" ("f"/"F") ("o"/"O") ("f"/"F") mws)

	The parentOrSelfOf operator returns the set of all immediate parents of the given concept (or set of concepts), plus the concept (or set of concepts) itself. In the brief syntax, the parentOrSelfOf operator is represented using the symbols ">>!". In the long syntax, the text "parentOrSelfOf" (case insensitive and followed by at least one white space) is also allowed.

BS/LS: conjunction = (("a"/"A") ("n"/"N") ("d"/"D") mws) / ","

	A conjunction is represented either by the word "and" (case insensitive and followed by at least one white space), or by a comma.

BS/LS: disjunction = ("o"/"O") ("r"/"R") mws

	A disjunction is represented by the word "or" (case insensitive and followed by at least one white space).

BS/LS: exclusion = ("m"/"M") ("i"/"I") ("n"/"N") ("u"/"U") ("s"/"S") mws	
	The exclusion operator is represented by the word "minus" (case insensitive and followed by at least one white space).
BS/LS: eclRefinement = subRefinement ws [conjunctionRefinementSet / disjunctionRefinementSet]	
	A refinement contains all the grouped and ungrouped attributes that refine the set of clinical meanings satisfied by the expression constraint. Refinements may represent the conjunction or disjunction of two smaller refinements, and may optionally be placed in brackets. Where both conjunction and disjunction are used, brackets are mandatory to disambiguate the intended meaning.
BS/LS: conjunctionRefinementSet = 1*(ws conjunction ws subRefinement)	
	A conjunction refinement set consists of one or more conjunction operators, each followed by a subRefinement.
BS/LS: disjunctionRefinementSet = 1*(ws disjunction ws subRefinement)	
	A disjunction refinement set consists of one or more disjunction operators, each followed by a subRefinement.
BS/LS: subRefinement = eclAttributeSet / eclAttributeGroup / "(" ws eclRefinement ws ")"	
	A subRefinement is either an attribute set, an attribute group or a bracketed refinement.
BS/LS: eclAttributeSet = subAttributeSet ws [conjunctionAttributeSet / disjunctionAttributeSet]	
	An attribute set contains one or more attribute name[47]-value pairs separated by a conjunction or disjunction operator. An attribute set may optionally be placed in brackets.
BS/LS: conjunctionAttributeSet = 1*(ws conjunction ws subAttributeSet)	

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47 https://confluence.ihtsdotools.org/display/DOCGLOSS/attribute+name

	A conjunction attribute set consists of one or more conjunction operators, each followed by a subAttributeSet.
BS/LS: disjunctionAttributeSet = 1*(ws disjunction ws subAttributeSet)	
	A disjunction attribute set consists of one or more disjunction operators, each followed by a subAttributeSet.
BS/LS: subAttributeSet = eclAttribute / "(" ws eclAttributeSet ws ")"	
	A subAttributeSet is either an attribute or a bracketed attribute set.
BS/LS: eclAttributeGroup = ["[" cardinality "]" ws] "{" ws eclAttributeSet ws "}"	
	An attribute group[48] contains a collection of attributes that operate together as part of the refinement[49] of the containing expression[50] constraint. An attribute group may optionally be preceded by a cardinality. An attribute group cardinality indicates the minimum and maximum number of attribute groups that must satisfy the given attributeSet constraint for the expression constraint to be satisfied.
BS/LS: eclAttribute = ["[" cardinality "]" ws] [reverseFlag ws] eclAttributeName ws (expressionComparisonOperator ws subExpressionConstraint / numericComparisonOperator ws "#" numericValue / stringComparisonOperator ws QM stringValue QM / booleanComparisonOperator ws booleanValue)	
	An attribute is a name[51]-value pair expressing a single refinement[52] of the containing expression[53] constraint. Either the attribute value must satisfy (or not) the given expression constraint, the attribute value is compared with a given numeric value (integer or decimal) using a numeric comparison operator, the attribute value must be equal to (or not equal to) the given string or boolean value. The attribute may optionally be preceded by a cardinality constraint and/or a reverse flag.
BS/LS: cardinality = minValue to maxValue	

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48 https://confluence.ihtsdotools.org/display/DOCGLOSS/attribute+group
49 https://confluence.ihtsdotools.org/display/DOCGLOSS/refinement
50 https://confluence.ihtsdotools.org/display/DOCGLOSS/expression
51 https://confluence.ihtsdotools.org/display/DOCGLOSS/attribute+name
52 https://confluence.ihtsdotools.org/display/DOCGLOSS/refinement
53 https://confluence.ihtsdotools.org/display/DOCGLOSS/expression

	The cardinality represents a constraint on the minimum and maximum number of times that the given attribute or attribute group may appear in a matching expression. The cardinality is enclosed in square brackets with the minimum cardinality appearing first, followed by a separator (two dots in the brief syntax), and then the maximum cardinality.
BS/LS: minValue = nonNegativeIntegerValue	
	A value that represents the minimum number of times that an attribute or attribute group may appear. The minimum cardinality must always be less than or equal to the maximum cardinality.
BS: to = ".." **LS: to** = ".." / (mws ("t"/"T") ("o"/"O") mws)	
	In the brief syntax, the minimum and maximum cardinality are separated by two dots (i.e. ".."). In the long syntax, the text "to" (case insensitive with at least one white space before and after) is also allowed between the two cardinalities.
BS/LS: maxValue = nonNegativeIntegerValue / many	
	A value that represents the maximum number of times that an attribute or attribute group may appear. A maximum cardinality of 'many' indicates that there is no limit on the number of times the attribute may appear.
BS: many = "*" **LS: many** = "*" / (("m"/"M") ("a"/"A") ("n"/"N") ("y"/"Y"))	
	In the brief syntax, a cardinality of 'many' is represented using the symbol "*". In the long syntax, the text "many" (case insensitive, with no trailing space) is also allowed.
BS: reverseFlag = "R" **LS: reverseFlag** = (("r"/"R") ("e"/"E") ("v"/"V") ("e"/"E") ("r"/"R") ("s"/"S") ("e"/"E") ("o"/"O") ("f"/"F")) / "R"	

	When a reverse flag is used on an attribute, the matching relationships are traversed in the reverse of the normal direction. This means that the target concept of each relationship must match the focus concept to which the attribute is applied, while the source concept of the relationship must match the attribute value. In the brief syntax, the reverse flag is represented using the character "R" (in uppercase). In the long syntax, the text "reverseOf " (case insensitive) is also allowed.
BS/LS: eclAttributeName = subExpressionConstraint	
	The attribute name is the name of an attribute (or relationship type) to which a value is applied to refine the meaning of a containing expression constraint. The attribute name is represented using a subExpressionConstraint, as defined above.
BS: expressionComparisonOperator = "=" / "!=" **LS: expressionComparisonOperator** = "=" / "!=" / ("n"/"N") ("o"/"O") ("t"/"T") ws "=" / "<>"	
	Attributes whose value is a concept may be compared to an expression constraint using either equals ("=") or not equals ("!="). In the long syntax "<>" and "not =" (case insensitive) are also valid ways to represent not equals.
BS: numericComparisonOperator = "=" / "!=" / "<=" / "<" / ">=" / ">" **LS: numericComparisonOperator** = "=" / "!=" / ("n"/"N") ("o"/"O") ("t"/"T") ws "=" / "<>" / "<=" / "<" / ">=" / ">"	
	Attributes whose value is numeric (i.e. integer or decimal) may be compared to a specific concrete value using a variety of comparison operators, including equals ("="), less than ("<"), less than or equals ("<="), greater than (">"), greater than or equals (">=") and not equals ("!="). In the long syntax "<>" and "not =" (case insensitive) are also valid ways to represent not equals.
BS: stringComparisonOperator = "=" / "!=" **LS: stringComparisonOperator** = "=" / "!=" / ("n"/"N") ("o"/"O") ("t"/"T") ws "=" / "<>"	

	Attributes whose value is a string may be compared to an expression constraint using either equals ("=") or not equals ("!="). In the long syntax "<>" and "not =" (case insensitive) are also valid ways to represent not equals.
BS: booleanComparisonOperator = "=" / "!=" **LS: booleanComparisonOperator** = "=" / "!=" / ("n"/"N") ("o"/"O") ("t"/"T") ws "=" / "<>"	
	Attributes whose value is a boolean may be compared to an expression constraint using either equals ("=") or not equals ("!="). In the long syntax "<>" and "not =" (case insensitive) are also valid ways to represent not equals.
BS/LS: filterConstraint = "{{" ws filter *(ws "," ws filter) ws "}}"	
	A filterConstraint is a constraint used to filter the concepts in the result set, based on the given conditions.
BS/LS: filter = termFilter / languageFilter / typeFilter / dialectFilter	
	A filter is either a term filter, a language filter, a type filter or a dialect filter.
BS/LS: termFilter = termKeyword ws booleanComparisonOperator ws (typedSearchTerm / typedSearchTermSet)	
	A termFilter starts with the 'term' keyword, followed by a boolean comparison operator and either a typed search term or a typed search term set (with optional white space between). For example: term = "respiratory".
BS/LS: termKeyword = ("t"/"T") ("e"/"E") ("r"/"R") ("m"/"M")	
	The 'term' keyword uses the text "TERM" (case insensitive).
BS/LS: typedSearchTerm = ([match ws ":" ws] matchSearchTermSet) / (wild ws ":" ws wildSearchTermSet)	

	A typed search term is either a match search term set or a wild search term set. A match search term set is optionally preceded by the text "match" and a colon. A wild search term set must be preceded by the text "wild" and a colon.
BS/LS: typedSearchTermSet = "(" ws typedSearchTerm *(mws typedSearchTerm) ws ")"	
	A typed search term set consists of one or more typed search terms separated by mandatory white space and enclosed in brackets.
BS/LS: wild = ("w"/"W") ("i"/"I") ("l"/"L") ("d"/"D")	
	A 'wildcard' search type is indicated by the word "wild" (case insensitive).
BS/LS: match = ("m"/"M") ("a"/"A") ("t"/"T") ("c"/"C") ("h"/"H")	
	A 'word prefix any order' search is indicated by the word "match" (case insensitive).
BS/LS: matchSearchTerm = 1*(nonwsNonEscapedChar / escapedChar)	
	A term used in a match search includes one or more of any non-whitespace printable character (other than double quotes or backslash) or an escaped character.
BS/LS: matchSearchTermSet = QM ws matchSearchTerm *(mws matchSearchTerm) ws QM	
	A term set in a match search includes one or more terms separated by mandatory whitespace and enclosed in quotation marks.
BS/LS: wildSearchTerm = 1*(anyNonEscapedChar / escapedWildChar)	
	A term used in a wildcard search includes one or more printable characters (other than double quotes or backslash) or an escaped character.
BS/LS: wildSearchTermSet = QM wildSearchTerm QM	
	A term set in a wildcard search includes a wildcard search term (optionally including whitespace) enclosed in quotation marks.

BS/LS: languageFilter = language ws booleanComparisonOperator ws (languageCode / languageCodeSet)	
	A language filter specifies the languages that a matching description may use. A language filter starts with the 'language' keyword, followed by a boolean comparison operator and either a single language code or a set of language codes.
BS/LS: language = ("l"/"L") ("a"/"A") ("n"/"N") ("g"/"G") ("u"/"U") ("a"/"A") ("g"/"G") ("e"/"E")	
	The 'language' keyword uses the text "LANGUAGE" (case insensitive).
BS/LS: languageCode = 2alpha	
	A language code is a 2 character alphanumeric string.
BS/LS: languageCodeSet = "(" ws languageCode *(mws languageCode) ws ")"	
	A language code set is one or more language codes, separated by mandatory whitespace, and enclosed in brackets.
BS/LS: typeFilter = typeIdFilter / typeTokenFilter	
	A type filter specifies the description types that a matching description may have. A type filter is either a typeId filter or a typeToken filter.
BS/LS: typeIdFilter = typeId ws booleanComparisonOperator ws (eclConceptReference / eclConceptReferenceSet)	
	A typeId filter starts with the 'typeId' keyword, followed by a boolean comparison operator, and either a single concept reference or a set of concept references.
BS/LS: typeId = ("t"/"T") ("y"/"Y") ("p"/"P") ("e"/"E") ("i"/"I") ("d"/"D")	
	The 'typeId' keyword uses the text "TYPEID" (case insensitive).
BS/LS: typeTokenFilter = type ws booleanComparisonOperator ws (typeToken / typeTokenSet)	
	A typeToken filter starts with the 'type' keyword, followed by a boolean comparison operator, and either a single type token or a set of type tokens.
BS/LS: type = ("t"/"T") ("y"/"Y") ("p"/"P") ("e"/"E")	

	The 'type' keyword uses the text "TYPE" (case insensitive).
BS/LS: typeToken = synonym / fullySpecifiedName / definition	
	A type token is either a 'synonym' token, a 'fully specified name' token or a 'definition' token.
BS/LS: typeTokenSet = "(" ws typeToken *(mws typeToken) ws ")"	
	A type token set is one or more type tokens, separated by mandatory whitespace and enclosed in brackets.
BS: synonym = ("s"/"S") ("y"/"Y") ("n"/"N") **LS: synonym** = ("s"/"S") ("y"/"Y") ("n"/"N") [("o"/"O") ("n"/"N") ("y"/"Y") ("m"/"M")]	
	A 'synonym' token uses the text "SYN" (case insensitive). In the long syntax, the text "Synonym" (case insensitive) may be used instead.
BS: fullySpecifiedName = ("f"/"F") ("s"/"S") ("n"/"N") **BS: fullySpecifiedName** = (("f"/"F") ("s"/"S") ("n"/"N")) / (("f"/"F") ("u"/"U") ("l"/"L") ("l"/"L") ("y"/"Y") ("s"/"S") ("p"/"P") ("e"/"E") ("c"/"C") ("i"/"I") ("f"/"F") ("i"/"I") ("e"/"E") ("d"/"D") ("n"/"N") ("a"/"A") ("m"/"M") ("e"/"E"))	
	A 'fully specified name' token uses the text "FSN" (case insensitive). In the long syntax, the text "FullySpecifiedName" (case insensitive) may be used instead.
BS: definition = ("d"/"D") ("e"/"E") ("f"/"F") **LS: definition** = ("d"/"D") ("e"/"E") ("f"/"F") [("i"/"I") ("n"/"N") ("i"/"I") ("t"/"T") ("i"/"I") ("o"/"O") ("n"/"N")]	
	A 'definition' token uses the text "DEF" (case insensitive). In the long syntax, the text "Definition" (case insensitive) may be used instead.
BS/LS: dialectFilter = (dialectIdFilter / dialectAliasFilter) [ws acceptabilitySet]	
	A dialect filter specifies the language reference sets to which a matching description must belong. A dialect filter consists of either a dialectId filter or a dialectAlias filter, optionally followed by a set of acceptability values.
BS/LS: dialectIdFilter = dialectId ws booleanComparisonOperator ws (eclConceptReference / dialectIdSet)	

	A dialectId filter starts with the 'dialectId' keyword, followed by a boolean comparison operator, and either a single concept reference or a set of dialectIds.
BS/LS: dialectId = ("d"/"D") ("i"/"I") ("a"/"A") ("l"/"L") ("e"/"E") ("c"/"C") ("t"/"T") ("i"/"I") ("d"/"D")	
	A 'dialectId' keyword uses the text "DIALECTID" (case insensitive).
BS/LS: dialectAliasFilter = dialect ws booleanComparisonOperator ws (dialectAlias / dialectAliasSet)	
	A dialectAlias filter starts with the 'dialect' keyword, followed by a boolean comparison operator, and either a single dialect alias or a set of dialect aliases.
BS/LS: dialect = ("d"/"D") ("i"/"I") ("a"/"A") ("l"/"L") ("e"/"E") ("c"/"C") ("t"/"T")	
	A 'dialect' keyword uses the text "DIALECT" (case insensitive).
BS/LS: dialectAlias = alpha *(dash / alpha / integerValue)	
	A dialect alias consists of a single alphanumeric character followed by zero or more alphanumeric characters, integer values or dashes.
BS/LS: dialectAliasSet = "(" ws dialectAlias [ws acceptabilitySet] *(mws dialectAlias [ws acceptabilitySet]) ws ")"	
	A dialect alias set is one or more dialect aliases followed by an optional acceptability set, separated by mandatory white space, and enclosed in brackets.
BS/LS: dialectIdSet = "(" ws eclConceptReference [ws acceptabilitySet] *(mws eclConceptReference [ws acceptabilitySet]) ws ")"	
	A dialect id set is one or more concept references followed by an optional acceptability set, separated by mandatory white space, and enclosed in brackets.
BS/LS: acceptabilitySet = acceptabilityIdSet / acceptabilityTokenSet	
	An acceptability set specifies the acceptabilities that a matching description must have in the language reference set specified by the preceding dialect filter. An acceptability set is either an acceptabilityId set or an acceptabilityToken set.

BS/LS: acceptabilityIdSet = eclConceptReferenceSet	
	An acceptabilityId set is a set of concept references.
BS/LS: acceptabilityTokenSet = "(" ws acceptabilityToken *(mws acceptabilityToken) ws ")"	
	An acceptability token set is one or more acceptability tokens, separated by mandatory whitespace, and enclosed in brackets.
BS/LS: acceptabilityToken = acceptable / preferred	
	An acceptability token is either an acceptable token and a preferred token.
BS: acceptable = ("a"/"A") ("c"/"C") ("c"/"C") ("e"/"E") ("p"/"P") ("t"/"T") **LS: acceptable** = ("a"/"A") ("c"/"C") ("c"/"C") ("e"/"E") ("p"/"P") ("t"/"T") [("a"/"A") ("b"/"B") ("l"/"L") ("e"/"E")]	
	An acceptable token uses the text "ACCEPT" (case insensitive). In the long syntax, the text "Acceptable" (case insensitive) may be used instead.
BS: preferred = ("p"/"P") ("r"/"R") ("e"/"E") ("f"/"F") ("e"/"E") ("r"/"R") **LS: preferred** = ("p"/"P") ("r"/"R") ("e"/"E") ("f"/"F") ("e"/"E") ("r"/"R") [("r"/"R") ("e"/"E") ("d"/"D")]	
	A preferred token uses the text "PREFER" (case insensitive). In the long syntax, the text "Preferred" (case insensitive) may be used instead.
BS/LS: numericValue = ["-"/"+"] (decimalValue / integerValue)	
	A numeric value is either an integer or a decimal. Positive numbers optionally start with a plus sign ("+"), while negative integers begin with a minus sign ("-").

BS/LS: **stringValue** = 1*(anyNonEscapedChar / escapedChar)	
	A string value includes one or more of any printable ASCII characters enclosed in quotation marks. Quotes and backslash characters within the string must be preceded by the escape character ("\").
BS/LS: **integerValue** = digitNonZero *digit / zero	
	An integer value is either starts with a non-zero digit followed by zero to many additional digits, or is the integer zero itself.
BS/LS: **decimalValue** = integerValue "." 1*digit	
	A decimal value starts with an integer. This is followed by a decimal point and one to many digits.
BS/LS: **booleanValue** = true / false	
	A boolean value is either true or false.
BS/LS: **true** = ("t"/"T") ("r"/"R") ("u"/"U") ("e"/"E")	
	A boolean value of true is represented by the word "true" (case insensitive).
BS/LS: **false** = ("f"/"F") ("a"/"A") ("l"/"L") ("s"/"S") ("e"/"E")	
	A boolean value of false is represented by the word "false" (case insensitive).
BS/LS: **nonNegativeIntegerValue** = (digitNonZero *digit) / zero	
	A non-negative integer value (i.e. positive integers or zero), without a preceding plus sign ("+").

BS/LS: **sctId** = digitNonZero 5*17(digit)	
	A SNOMED CT id is used to represent an attribute id or a concept[54] id. The initial digit may not be zero. The smallest number of digits is six, and the maximum is 18.
BS/LS: **ws** = *(SP / HTAB / CR / LF / comment)	
	Optional whitespace characters (space, tab, carriage return, linefeed or a comment) are ignored everywhere in the expression[55] except: 1. Whitespace within a conceptId is an error. **Note:** Whitespace before or after the last digit of a valid Identifier[56] is ignored. 2. Non-consecutive spaces within a term are treated as a significant character of the term. **Note:** Whitespace before the first or after the last non-whitespace character of a term[57] is ignored 3. Whitespace within the quotation marks of a concrete value is treated as a significant character.
BS/LS: **mws** = 1*(SP / HTAB / CR / LF / comment)	
	Mandatory whitespace (i.e. space, tab, carriage return, linefeed or a comment) is required after certain keywords, including "And" and "Or".
BS/LS: **comment** = "/*" *(nonStarChar / starWithNonLSlash) "*/"	
	A comment, which provides additional human-readable details about the expression constraint. Comments begin with a forward slash directly followed by a star (i.e. "/*") and end with a star directly followed by a forward slash (i.e. "*/").
BS/LS: **nonStarChar** = SP / HTAB / CR / LF / %x21-29 / %x2B-7E /UTF8-2 / UTF8-3 / UTF8-4	
	A character that is not a star (i.e. not %x2A).
BS/LS: **starWithNonLSlash** = %x2A nonLSlash	

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54 https://confluence.ihtsdotools.org/display/DOCGLOSS/concept
55 https://confluence.ihtsdotools.org/display/DOCGLOSS/expression
56 https://confluence.ihtsdotools.org/display/DOCGLOSS/Identifier
57 https://confluence.ihtsdotools.org/display/DOCRELFMT/term+(field)

	A star (i.e. "*") followed by a character that is not a forward slash (i.e. not "/").
BS/LS: nonLSlash = SP / HTAB / CR / LF / %x21-2E / %x30-7E /UTF8-2 / UTF8-3 / UTF8-4	
	A character that is not a forward slash (i.e. not "/").
BS/LS: SP = %x20	
	Space character.
BS/LS: HTAB = %x09	
	Tab character.
BS/LS: CR = %x0D	
	Carriage return character.
BS/LS: LF = %x0A	
	Line feed character.
BS/LS: QM = %x22	

	Quotation mark character.
BS/LS: BS = %x5C ; back slash	
	BS represents the backslash character "\".
BS/LS: star = %x2A ; asterisk	
	Star represents an asterisk "*".
BS/LS: digit = %x30-39	
	Any digit 0 through 9.
BS/LS: zero = %x30	
	The digit 0.
BS/LS: digitNonZero = %x31-39	
	Digits 1 through 9, but excluding 0. The first character of a concept identifier[58] is constrained to a digit other than zero.
BS/LS: nonwsnonpipe= %x21-7B / %x7D-7E / UTF8-2 / UTF8-3 / UTF8-4	
	Non whitespace (and non pipe) includes printable ASCII characters (these are also valid UTF8 characters encoded as one octet) and also includes all UTF8 characters encoded as 2- 3- or 4-octet sequences. It excludes space (which is %x20) and the pipe character "
BS/LS: anyNonEscapedChar = SP / HTAB / CR / LF / %x20-21 / %x23-5B / %x5D-7E / UTF8-2 / UTF8-3 / UTF8-4	
	anyNonEscapedChar includes any printable ASCII characters which do not need to be preceded by an escape character (i.e. "\"). This includes valid UTF8 characters encoded as one octet and all UTF8 characters encoded as 2, 3 or 4 octet sequences. It does,

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58 https://confluence.ihtsdotools.org/display/DOCGLOSS/concept+identifier

	however, exclude the quotation mark (") and the backslash (). See RFC 3629 (UTF-8[59], a transformation[60] format of ISO[61] 10646 authored by the Network Working Group).
BS/LS: escapedChar = BS QM / BS BS	
	The double quotation mark and the back slash character must both be escaped within a string-based concrete value by preceding them with a back slash.
BS/LS: escapedWildChar = BS QM / BS BS / BS star	
	An escapedWildChar is one of the characters that must be escaped in a wildcard search term (i.e. " or \ or *), preceded by a backslash (i.e. \). The character sequence is therefore either \" or \\ or *.
BS/LS: nonwsNonEscapedChar = %x21 / %x23-5B / %x5D-7E / UTF8-2 / UTF8-3 / UTF8-4	
	A nonwsNonEscapedChar is any printable ASCII, UTF8-2, UTF8-3 or UTF8-4 character, excluding double quotes ("), backslash (\), and space ( ).
BS/LS: alpha = %x41-5A / %x61-7A	
	An alpha is any uppercase or lowercase character from "A" to "Z" (and "a" to "z") inclusive.
BS/LS: dash = %x2D	
	A dash is a hyphen (i.e. "-").
BS/LS: UTF8-2 = %xC2-DF UTF8-tail	
	UTF8 characters encoded as 2-octet sequences.
BS/LS: UTF8-3 = %xE0 %xA0-BF UTF8-tail / %xE1-EC 2(UTF8-tail) / %xED %x80-9F UTF8-tail / %xEE-EF 2(UTF8-tail)	
	UTF8 characters encoded as 3-octet sequences.
BS/LS: UTF8-4 = %xF0 %x90-BF 2(UTF8-tail) / %xF1-F3 3(UTF8-tail) / %xF4 %x80-8F 2(UTF8-tail)	

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59 https://confluence.ihtsdotools.org/display/DOCRELFMT/UTF-8
60 https://confluence.ihtsdotools.org/display/DOCGLOSS/transformation
61 https://confluence.ihtsdotools.org/display/DOCGLOSS/ISO

	UTF8 characters encoded as 4-octet sequences.
BS/LS: UTF8-tail = %x80-BF	
	UTF8 characters encoded as 8-octet sequences.

5.4 5.4 Operator Precedence

5.4.1 Unary Operators

Unary operators (e.g. descendantOf, descendantOrSelfOf, ancestorOf, ancestorOrSelfOf, memberOf) are applied from inside to out (i.e. from right to left). For example, when the following expression constraint is processed, the memberOf operator is applied first to the Example problem list concepts reference set, and then the descendants of the referenced components are determined.

> < ^ 700043003 |Example problem list concepts reference set|[62]

5.4.2 Binary Operators

Whenever potential ambiguity in binary operator precedence may occur, round brackets must be used to clearly disambiguate the order in which these operators are applied. For example, the following expression constraint is not valid:

> < 19829001 |Disorder of lung|[63] OR ^ 700043003 |Example problem list concepts reference set|[64]
>   MINUS ^ 450976002 |Disorders and diseases reference set for GP/FP reason for encounter|[65]

And must be expressed using brackets, as either:

> (< 19829001 |Disorder of lung|[66] OR ^ 700043003 |Example problem list concepts reference set|[67])
>   MINUS ^ 450976002 |Disorders and diseases reference set for GP/FP reason for encounter|[68]

or:

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[62] http://snomed.info/id/700043003
[63] http://snomed.info/id/19829001
[64] http://snomed.info/id/700043003
[65] http://snomed.info/id/450976002
[66] http://snomed.info/id/19829001
[67] http://snomed.info/id/700043003
[68] http://snomed.info/id/450976002

> < 19829001 |Disorder of lung|[69] OR (^ 700043003 |Example problem list concepts reference set|[70]
>   MINUS ^ 450976002 |Disorders and diseases reference set for GP/FP reason for encounter|[71])

When multiple exclusion operators (i.e. 'minus') are applied, brackets are similarly required. For example, the following expression constraint is not valid:

> < 19829001 |Disorder of lung|[72] MINUS ^ 700043003 |Example problem list concepts reference set|[73]
>   MINUS ^ 450976002 |Disorders and diseases reference set for GP/FP reason for encounter|[74]

And must be expressed using brackets, as either:

> (< 19829001 |Disorder of lung|[75] MINUS ^ 700043003 |Example problem list concepts reference set|[76])
>   MINUS ^ 450976002 |Disorders and diseases reference set for GP/FP reason for encounter|[77]

or:

> < 19829001 |Disorder of lung|[78] MINUS (^ 700043003 |Example problem list concepts reference set|[79]
>   MINUS ^ 450976002 |Disorders and diseases reference set for GP/FP reason for encounter|[80])

However, when only a single binary operator is used, or when all binary operators are either conjunction (i.e. 'and') or disjunction (i.e. 'or'), brackets are not required. For example, all of the following expression constraints are valid without brackets:

> < 19829001 |Disorder of lung|[81] AND ^ 700043003 |Example problem list concepts reference set|[82]

---

[69] http://snomed.info/id/19829001
[70] http://snomed.info/id/700043003
[71] http://snomed.info/id/450976002
[72] http://snomed.info/id/19829001
[73] http://snomed.info/id/700043003
[74] http://snomed.info/id/450976002
[75] http://snomed.info/id/19829001
[76] http://snomed.info/id/700043003
[77] http://snomed.info/id/450976002
[78] http://snomed.info/id/19829001
[79] http://snomed.info/id/700043003
[80] http://snomed.info/id/450976002
[81] http://snomed.info/id/19829001
[82] http://snomed.info/id/700043003

< 19829001 |Disorder of lung|[83] OR ^ 700043003 |Example problem list concepts reference set|[84]

< 19829001 |Disorder of lung|[85] MINUS ^ 700043003 |Example problem list concepts reference set|[86]

< 19829001 |Disorder of lung|[87] OR ^ 700043003 |Example problem list concepts reference set|[88]
    OR ^ 450976002 |Disorders and diseases reference set for GP/FP reason for encounter|[89]

< 19829001 |Disorder of lung|[90] AND ^ 700043003 |Example problem list concepts reference set|[91]
    AND ^ 450976002 |Disorders and diseases reference set for GP/FP reason for encounter|[92]

Please note that unary operators are always applied before binary operators.

5.5 5.5 Character Collation for Term Filters

⚠ This page is published as **Draft for Trial Use**. The recommendations on this page will be reviewed and may be updated following feedback from implementation experiences.

To promote consistency between implementations of ECL, the following collation principles are recommended:

- **Search and match** - The default behaviour of a system implementing ECL queries with term filters, is to use locale-specific asymmetric searching at the secondary comparison strength level -as specified in the Unicode Technical Standard #10 - Unicode Collation Algorithm[93]. This means that the search is, by default, case insensitive, with some language-specific character normalization behaviour.
  - *Asymmetric*: Asymmetric searches require characters in the query that are unmarked (i.e. the 'base letters') to match characters in the target that are either *marked* or *unmarked* (with the same base letter). However, a character in the query that is *marked* will only match a character in the target that is *marked* in the same way.

---

83 http://snomed.info/id/19829001
84 http://snomed.info/id/700043003
85 http://snomed.info/id/19829001
86 http://snomed.info/id/700043003
87 http://snomed.info/id/19829001
88 http://snomed.info/id/700043003
89 http://snomed.info/id/450976002
90 http://snomed.info/id/19829001
91 http://snomed.info/id/700043003
92 http://snomed.info/id/450976002
93 http://www.unicode.org/reports/tr10/#Asymmetric_Search_Secondary

- *Secondary strength*: Searches with a strength of secondary will only consider level 1 differences (e.g. "d" vs "e") and level 2 differences (e.g. "e" vs "é" in English). However, level 3 differences (e.g. "e" vs "E") are not considered. This provides the same effect as queries being case insensitive. For example, in English, "e" in the query will match both "e" and "E" in the target; and "E" in the query will similarly match both "e" and "E" in the target.
- **Language customizations** - Locale-based customizations of the standard are specified in the Unicode Common Locale Data Repository (CLDR)[94]. The unicode CLDR specifies the characters that are considered to be 'marked' variants of the base letters, identical base letters, and/or contractions in each specified language. The description terms in the substrate should be indexed separately for each language supported.

For example, the following search behaviour is expected in the locales specified below.

- In **English**, **Swedish** and **Danish**, the following search behaviour is expected:
    Note: No customizations are made in these 3 locales for the characters used in these searches. Therefore, the CLDR root collation order[95] is used.

Search Term	Target Matches	Target does NOT Match
resume	resume, Resume, RESUME, résumé, rèsumè, Résumé, RÉSUMÉ, …	-
Resume	resume, Resume, RESUME, résumé, rèsumè, Résumé, RÉSUMÉ, …	-
résumé	résumé, Résumé, RÉSUMÉ, …	resume, Resume, RESUME, …
Résumé	résumé, Résumé, RÉSUMÉ, …	resume, Resume, RESUME, …

- In **English**, the following search behaviour is expected (based on the CLDR 'en' locale[96], which uses the CLDR root collation order[97]):

Search Term	Target Matches	Target does NOT Match
sjogren	sjogren, Sjogren, SJOGREN, sjögren, Sjögren, SJÖGREN, sjøgren, Sjøgren, SJØGREN, …	-
sjögren	sjögren, Sjögren, SJÖGREN, …	sjogren, Sjogren, SJOGREN, sjøgren, Sjøgren, SJØGREN, …
Angstrom	angstrom, Angstrom, ANGSTROM, ångström, Ångström, ÅNGSTRÖM, ångstrøm, Ångstrøm, ÅNGSTRØM, …	ångstrœm, Ångstrœm, ÅNGSTRŒM, …
Ångström	ångström, Ångström, ÅNGSTRÖM, …	angstrom, Angstrom, ANGSTROM, ångstrøm, Ångstrøm, ÅNGSTRØM, …

---

94 http://cldr.unicode.org/index/cldr-spec/collation-guidelines
95 https://unicode.org/reports/tr35/tr35-collation.html#Root_Collation
96 https://github.com/unicode-org/cldr/blob/master/common/collation/en.xml
97 https://unicode.org/reports/tr35/tr35-collation.html#Root_Collation

Search Term	Target Matches	Target does NOT Match
Ångstrøm	ångstrøm, Ångstrøm, ÅNGSTRØM, ...	angstrom, Angstrom, ANGSTROM, ångström, Ångström, ÅNGSTRÖM, ...
aangstrøm	aangstrøm, Aangstrøm, AANGSTRØM, ...	angstrom, Angstrom, ANGSTROM, ångström, Ångström, ÅNGSTRÖM, ångstrøm, Ångstrøm, ÅNGSTRØM, ångstrœm, Ångstrœm, ÅNGSTRŒM, ...

- In **Swedish**, the following search behaviour is expected (based on the customizations in the CLDR 'sv' locale[98]):

Search Term	Target Matches	Target does NOT Match
sjogren	sjogren, Sjogren, SJOGREN, ...	sjögren, Sjögren, SJÖGREN, sjøgren, Sjøgren, SJØGREN, ...
sjögren	sjögren, Sjögren, SJÖGREN, sjøgren, Sjøgren, SJØGREN, ...	sjogren, Sjogren, SJOGREN , ...
Angstrom	angstrom, Angstrom, ANGSTROM, ...	ångström, Ångström, ÅNGSTRÖM, ångstrøm, Ångstrøm, ÅNGSTRØM, ångstrœm, Ångstrœm, ÅNGSTRŒM, aangström, Aangström, AANGSTRÖM, ...
Ångström	ångström, Ångström, ÅNGSTRÖM, ångstrøm, Ångstrøm, ÅNGSTRØM, ångstrœm, Ångstrœm, ÅNGSTRŒM, ...	angstrom, Angstrom, ANGSTROM, aangström, Aangström, AANGSTRÖM, ...
Ångstrøm	ångstrøm, Ångstrøm, ÅNGSTRØM, ...	angstrom, Angstrom, ANGSTROM, ångström, Ångström, ÅNGSTRÖM, ångstrœm, Ångstrœm, ÅNGSTRŒM, ...
aangstrøm	aangstrøm, Aangstrøm, AANGSTRØM, ...	angstrom, Angstrom, ANGSTROM, ångström, Ångström, ÅNGSTRÖM, ångstrøm, Ångstrøm, ÅNGSTRØM, ångstrœm, Ångstrœm, ÅNGSTRŒM, ...

- And in **Danish**, the following search behaviour is expected (based on the customizations in the CLDR 'da' locale[99]):

---

[98] https://github.com/unicode-org/cldr/blob/master/common/collation/sv.xml
[99] https://github.com/unicode-org/cldr/blob/master/common/collation/da.xml

Search Term	Target Matches	Target does NOT Match
sjogren	sjogren, Sjogren, SJOGREN, …	sjögren, Sjögren, SJÖGREN, sjøgren, Sjøgren, SJØGREN, …
sjögren	sjögren, Sjögren, SJÖGREN, …	sjogren, Sjogren, SJOGREN, sjøgren, Sjøgren, SJØGREN, …
Angstrom	angstrom, Angstrom, ANGSTROM, …	ångström, Ångström, ÅNGSTRÖM, ångstrøm, Ångstrøm, ÅNGSTRØM, ångstrœm, Ångstrœm, ÅNGSTRŒM, aangstrøm, Aangstrøm, AANGSTRØM …
Ångström	ångström, Ångström, ÅNGSTRÖM, aangström, Aangström, AANGSTRÖM, …	angstrom, Angstrom, ANGSTROM, ångstrøm, Ångstrøm, ÅNGSTRØM, ångstrœm, Ångstrœm, ÅNGSTRŒM, …
Ångstrøm	ångstrøm, Ångstrøm, ÅNGSTRØM, ångström, Ångström, ÅNGSTRÖM, aangstrøm, Aangstrøm, AANGSTRØM, aangström, Aangström, AANGSTRÖM, …	angstrom, Angstrom, ANGSTROM, ångstrœm, Ångstrœm, ÅNGSTRŒM, …
aangstrøm	ångstrøm, Ångstrøm, ÅNGSTRØM, ångström, Ångström, ÅNGSTRÖM, aangstrøm, Aangstrøm, AANGSTRØM, aangström, Aangström, AANGSTRÖM, …	angstrom, Angstrom, ANGSTROM, ångstrœm, Ångstrœm, ÅNGSTRŒM, …

6 6. Examples

The examples in this section illustrate the syntaxes proposed in Section 5(see page 20).

6.1 6.1 Simple Expression Constraints

The simplest type of expression constraint contains a single concept optionally preceded by an expression constraint operator and/or membership function. Expression constraint operators (e.g. descendant of) traverse the hierarchical relationships in SNOMED CT to return the set of concepts that are directly or transitively connected to the focus concept. Membership functions return the set of concepts referenced by a reference set.

In this section we consider some of these simple examples.

6.1.1 Self

If no expression constraint operator or membership function is applied, the expression constraint is satisfied only by the specified concept. For example, the expression constraint below is satisfied only by the concept 404684003 | Clinical finding|[100].

```
404684003 |Clinical finding|[101]
```

Please note that this expression constraint is equivalent to an expression that looks the same but is written in SNOMED CT Compositional Grammar[102].

---

[100] http://snomed.info/id/404684003
[101] http://snomed.info/id/404684003
[102] http://snomed.org/scg

6.1.2 Descendant of

A single 'less than' sign (i.e. "<") indicates that the expression constraint is satisfied by all descendants of the specified concept. The expression constraint below evaluates to the set of all subtypes (both direct children and transitive subtypes) of 404684003 |Clinical finding|[103], using the brief syntax.

> < 404684003 |Clinical finding|[104]

Using the long syntax, the above expression constraint may be represented as:

> descendantOf 404684003 |Clinical finding|[105]

The descendantOf function is primarily used on concepts, which serve as the 'grouper' of a set of values (e.g. | Clinical finding (finding)|[106], |Severities (qualifier value)|[107], |Unit (qualifier value)|[108]). The descendantOf function may also be applied to other concepts, or to nested expression constraints (as discussed in 6.7 Nested Expression Constraints(see page 98)).

6.1.3 Descendant or Self of

Two consecutive 'less than' signs (i.e. "<<") indicates that the expression constraint is satisfied by all descendants of the specified concept plus the specified concept itself. The expression constraint below evaluates to the set of descendants of 73211009 |Diabetes mellitus|[109], plus the concept 73211009 |Diabetes mellitus|[110] itself.

> << 73211009 |Diabetes mellitus|[111]

Using the long syntax, the above expression constraint may be represented as:

---

[103] http://snomed.info/id/404684003
[104] http://snomed.info/id/404684003
[105] http://snomed.info/id/404684003
[106] http://snomed.info/id/404684003
[107] http://snomed.info/id/272141005
[108] http://snomed.info/id/258666001
[109] http://snomed.info/id/73211009
[110] http://snomed.info/id/73211009
[111] http://snomed.info/id/73211009

> descendantOrSelfOf 73211009 |Diabetes mellitus|[112]

The descendantOrSelfOf function is primarily used for attribute values, which refer to a specific clinical value (e.g. 73211009 |Diabetes mellitus|[113], 73761001 |Colonoscopy|[114], 385055001 |Tablet dose form|[115]), but any specialization of this value is also acceptable. The descendantOrSelfOf function may also be applied to other concepts, or to nested expression constraints (as discussed in).

6.1.4 Child of

A 'less than' sign directly followed by an exclamation mark (i.e. "<!") indicates that the expression constraint is satisfied by the set of proximal children of the specified concept. The children of a concept are those concepts that are the source of a non-redundant 116680003 |is a|[116] relationship whose target is the given concept. The expression constraint below, represented using the brief syntax, evaluates to the set of immediate children of the concept 404684003 |Clinical finding|[117].

> <! 404684003 |Clinical finding|[118]

Using the long syntax, the above expression constraint may be represented as:

> childOf 404684003 |Clinical finding|[119]

Please note that the childOf function may only be executed against a finite and pre-classified substrate, and that the results of this function are specific to the substrate used. The childOf function may also be applied to nested expression constraints (as discussed in).

6.1.5 Child or Self of

Two consecutive 'less than' signs directly followed by an exclamation mark (i.e. "<<!") indicates that the expression constraint is satisfied by the set of proximal children of the specified concept plus the specified concept itself. The children of a concept are those concepts that are the source of a non-redundant 116680003 |is a|[120] relationship whose target is the given concept. The expression constraint below, represented using the brief syntax, evaluates to the set of immediate children of the concept 404684003 |Clinical finding|[121], plus the concept 404684003 |Clinical finding|[122] itself.

---

[112] http://snomed.info/id/73211009
[113] http://snomed.info/id/73211009
[114] http://snomed.info/id/73761001
[115] http://snomed.info/id/385055001
[116] http://snomed.info/id/116680003
[117] http://snomed.info/id/404684003
[118] http://snomed.info/id/404684003
[119] http://snomed.info/id/404684003
[120] http://snomed.info/id/116680003
[121] http://snomed.info/id/404684003
[122] http://snomed.info/id/404684003

```
<<! 404684003 |Clinical finding|123
```

Using the long syntax, the above expression constraint may be represented as:

```
childOrSelfOf 404684003 |Clinical finding|124
```

Please note that the childOrSelfOf function may only be executed against a finite and pre-classified substrate, and that the results of this function are specific to the substrate used. The childOrSelfOf function may also be applied to nested expression constraints (as discussed in 6.7 Nested Expression Constraints_(see page 98)).

6.1.6 Ancestor of

A single 'greater than' sign (i.e. ">") indicates that the expression constraint is satisfied by all ancestors of the specified concept. The expression constraint below, using the brief syntax, evaluates to the set of all supertypes (both direct parents and transitive supertypes) of 40541001 |Acute pulmonary edema|125:

```
> 40541001 |Acute pulmonary edema|126
```

Using the long syntax, the above expression constraint may be represented as:

```
ancestorOf 40541001 |Acute pulmonary edema|127
```

Please note that the ancestorOf function may also be applied to nested expression constraints (as discussed in 6.7 Nested Expression Constraints_(see page 98)).

6.1.7 Ancestor or Self of

Two consecutive 'greater than' signs (i.e. ">>") indicates that the expression constraint is satisfied by all ancestors of the specified concept plus the specified concept itself. The expression constraint below evaluates to the set of ancestors of 40541001 |Acute pulmonary edema|128, plus the concept 40541001 |Acute pulmonary edema|129.

```
>> 40541001 |Acute pulmonary edema|130
```

---

123 http://snomed.info/id/404684003
124 http://snomed.info/id/404684003
125 http://snomed.info/id/40541001
126 http://snomed.info/id/40541001
127 http://snomed.info/id/40541001
128 http://snomed.info/id/40541001
129 http://snomed.info/id/40541001
130 http://snomed.info/id/40541001

Using the long syntax, the above expression constraint may be represented as:

> ancestorOrSelfOf 40541001 |Acute pulmonary edema|[131]

Please note that the ancestorOrSelfOf function may also be applied to nested expression constraints (as discussed in).

6.1.8 Parent of

A 'greater than' sign directly followed by an exclamation mark (i.e. ">!") indicates that the expression constraint is satisfied by the set of proximal parents of the specified concept. The parents of a concept are those concepts that are the target of a non-redundant |is a|[132] relationship whose source is the given concept. The expression constraint below, represented using the brief syntax, evaluates to the set of immediate parents of the concept 40541001 |Acute pulmonary edema|[133].

> >! 40541001 |Acute pulmonary edema|[134]

Using the long syntax, the above expression constraint may be represented as:

> parentOf 40541001 |Acute pulmonary edema|[135]

Please note that the parentOf function should only be executed against a finite and pre-classified substrate, and that the results of this function are specific to the substrate used. The parentOf function may also be applied to nested expression constraints (as discussed in).

6.1.9 Parent or Self of

Two consecutive 'greater than' signs directly followed by an exclamation mark (i.e. ">>!") indicates that the expression constraint is satisfied by the set of proximal parents of the specified concept plus the specified concept itself. The parents of a concept are those concepts that are the target of a non-redundant |is a|[136] relationship whose source is the given concept. The expression constraint below, represented using the brief syntax, evaluates

---

[131] http://snomed.info/id/40541001
[132] http://snomed.info/id/116680003
[133] http://snomed.info/id/40541001
[134] http://snomed.info/id/40541001
[135] http://snomed.info/id/40541001
[136] http://snomed.info/id/116680003

to the set of immediate parents of the concept 40541001 |Acute pulmonary edema|[137], plus the concept 40541001 | Acute pulmonary edema|[138] itself.

> >! 40541001 |Acute pulmonary edema|[139]

Using the long syntax, the above expression constraint may be represented as:

> parentOrSelfOf 40541001 |Acute pulmonary edema|[140]

Please note that the parentOrSelfOf function should only be executed against a finite and pre-classified substrate, and that the results of this function are specific to the substrate used. The parentOrSelfOf function may also be applied to nested expression constraints (as discussed in 6.7 Nested Expression Constraints).

6.1.10 Member of

The memberOf function evaluates to the set of concepts that are referenced by the given reference set (i.e. the set of referencedComponentIds). Please note that this function may be applied only to reference sets whose referenced components are concepts. The SNOMED CT Expression Constraint Language does not support use of the memberOf function on reference sets whose referencedComponents are not concepts (i.e. descriptions or relationships).

The memberOf function is represented in the brief syntax using a 'caret' character (i.e. "^") and is usually followed by a single concept id for a concept-based reference set. For example, the following expression constraint is satisfied by the set of concepts which are members of 700043003 |Example problem list concepts reference set|[141]:

> ^ 700043003 |Example problem list concepts reference set|[142]

Using the long syntax the expression constraint is represented as:

---

137 http://snomed.info/id/40541001
138 http://snomed.info/id/40541001
139 http://snomed.info/id/40541001
140 http://snomed.info/id/40541001
141 http://snomed.info/id/700043003
142 http://snomed.info/id/700043003

```
memberOf  700043003 |Example problem list concepts reference set|¹⁴³
```

Please note that it is also possible to apply the memberOf function to an expression constraint that returns a set of concept-based reference set concepts. For more information, please refer to 6.7 Nested Expression Constraints.

6.1.11 Any

A single 'star' (i.e. "*") may be used in the place of a concept reference to represent any concept in the substrate. The expression constraint below evaluates to the set of all concepts in the given substrate.

```
*
```

Using the long syntax, the above expression constraint may also be represented as:

```
ANY
```

This wildcard character (or 'ANY' keyword) may be used anywhere within an expression constraint that a concept reference may be used. In many situations, the wildcard is equivalent to the following expression constraint:

```
<<  138875005 |SNOMED CT concept|¹⁴⁴
```

However, some situations exist in which the concept 138875005 |SNOMED CT concept|¹⁴⁵ is not included in the substrate, and therefore cannot be used to determine the full set of concepts available. In other cases, the single character wildcard may serve as a convenient shortcut for the longer expression constraint above.

Please note that the following three expression constraints evaluate to the same set of concepts:

---

¹⁴³ http://snomed.info/id/700043003
¹⁴⁴ http://snomed.info/id/138875005
¹⁴⁵ http://snomed.info/id/138875005

```
*
```

```
<< *
```

```
>> *
```
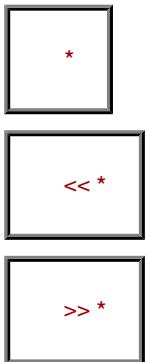
The two expression constraints below evaluate to all concepts in the substrate minus the root concept:

```
< *
```

```
<! *
```
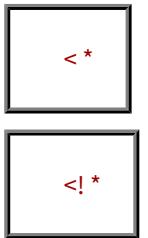
And the two expression constraints below evaluate to all non-leaf concepts in the substrate:

```
> *
```

```
    >! *
```

Finally, the expression constraint below evaluates to all concepts that are referenced by any reference set in the substrate:

```
    ^ *
```

6.2 6.2 Refinements

In this section, we illustrate how the set of matching concepts can be filtered using one or more simple attribute refinements. For more information on applying refinements to nested expression constraints, using nested attribute names and using nested attribute values, please refer to .

6.2.1 Attributes

Adding an attribute refinement to an expression constraint restricts the set of valid clinical meanings to only those whose defining attributes satisfy the given refinement condition. Similarly to SNOMED CT Compositional Grammar[146], attribute refinements are placed after a 'colon' (i.e. ":") in the expression constraint.

The example below is satisfied only by the set of lung disorders, which have an associated morphology that is exactly equal to 79654002 |Edema|[147].

```
<  19829001 |Disorder of lung|[148] :
    116676008 |Associated morphology|[149]  =  79654002 |Edema|[150]
```

Using the long syntax, the above expression is represented as:

```
descendantOf  19829001 |Disorder of lung|[151] :
    116676008 |Associated morphology|[152]  =  79654002 |Edema|[153]
```

In many cases, however, the value of the matching attribute is allowed to be either the concept itself, *or* a descendant of that concept. In these cases, the descendantOrSelfOf operator is used prior to the concept representing the attribute value. For example, the expression constraint below (in brief and long syntaxes respectively) is satisfied only by the set of lung disorders, which have an associated morphology of 79654002 | Edema|[154] or any descendant of 79654002 |Edema|[155].

---

146 http://snomed.org/scg
147 http://snomed.info/id/79654002
148 http://snomed.info/id/19829001
149 http://snomed.info/id/116676008
150 http://snomed.info/id/79654002
151 http://snomed.info/id/19829001
152 http://snomed.info/id/116676008
153 http://snomed.info/id/79654002
154 http://snomed.info/id/79654002
155 http://snomed.info/id/79654002

```
<  19829001 |Disorder of lung|156 :
    116676008 |Associated morphology|157 = << 79654002 |Edema|158
```

```
descendantOf  19829001 |Disorder of lung|159 :
    116676008 |Associated morphology|160 = descendantOrSelfOf  79654002 |Edema|161
```

When more than one attribute is defined in an expression constraint, the attributes are normally separated by a comma. A comma between two attributes indicates a conjunction and implies that both attribute conditions must be true. For example, the expression constraint below, written in brief syntax, is satisfied only by the set of clinical findings, which have both a finding site of 39057004 |Pulmonary valve structure|162 (or a subtype of 39057004 | Pulmonary valve structure|163) and an associated morphology of 'stenosis' (or a subtype of 'stenosis').

```
<  404684003 |Clinical finding|164 :
    363698007 |Finding site|165 = << 39057004 |Pulmonary valve structure|166 ,
    116676008 |Associated morphology|167 = << 415582006 |Stenosis|168
```

Please note that attribute refinements may also be used when the focus concept is '*' (or ANY). The following expression constraint represents any concept that has a 246075003 |Causative agent|169 attribute whose value is 387517004 |Paracetamol|170.

```
* : 246075003 |Causative agent|171 = 387517004 |Paracetamol|172
```

Using the long syntax, the above expression may also be represented as:

---

156 http://snomed.info/id/19829001
157 http://snomed.info/id/116676008
158 http://snomed.info/id/79654002
159 http://snomed.info/id/19829001
160 http://snomed.info/id/116676008
161 http://snomed.info/id/79654002
162 http://snomed.info/id/39057004
163 http://snomed.info/id/39057004
164 http://snomed.info/id/404684003
165 http://snomed.info/id/363698007
166 http://snomed.info/id/39057004
167 http://snomed.info/id/116676008
168 http://snomed.info/id/415582006
169 http://snomed.info/id/246075003
170 http://snomed.info/id/387517004
171 http://snomed.info/id/246075003
172 http://snomed.info/id/387517004

```
ANY :  246075003 |Causative agent|173  =  387517004 |Paracetamol|174
```

6.2.2 Attribute Groups

Similarly to SNOMED CT compositional grammar, expression constraints use curly braces (i.e. "{..}") to indicate that a set of attributes should be grouped together in an attribute group. For example, the expression constraint below is satisfied only by the set of clinical findings with an associated morphology of 'stenosis' (or descendant) at the finding site 'pulmonary valve structure' (or descendant), and also with an associated morphology of 'hypertrophy' (or descendant) at the finding site 'right ventricular structure' (or descendant).

```
< 404684003 |Clinical finding|175 :
   { 363698007 |Finding site|176 = << 39057004 |Pulmonary valve structure|177 ,
      116676008 |Associated morphology|178 = << 415582006 |Stenosis|179 },
   { 363698007 |Finding site|180 = << 53085002 |Right ventricular structure|181 ,
      116676008 |Associated morphology|182 = << 56246009 |Hypertrophy|183 }
```

Using the 'long syntax', the above expression constraint is represented as:

---

173 http://snomed.info/id/246075003
174 http://snomed.info/id/387517004
175 http://snomed.info/id/404684003
176 http://snomed.info/id/363698007
177 http://snomed.info/id/39057004
178 http://snomed.info/id/116676008
179 http://snomed.info/id/415582006
180 http://snomed.info/id/363698007
181 http://snomed.info/id/53085002
182 http://snomed.info/id/116676008
183 http://snomed.info/id/56246009

descendantOf 404684003 |Clinical finding|[184] :
  { 363698007 |Finding site|[185] = descendantOrSelfOf 39057004 |Pulmonary valve structure|[186] ,
    116676008 |Associated morphology|[187] = descendantOrSelfOf 415582006 |Stenosis|[188] },
  { 363698007 |Finding site|[189] = descendantOrSelfOf 53085002 |Right ventricular structure|[190] ,
    116676008 |Associated morphology|[191] = descendantOrSelfOf 56246009 |Hypertrophy|[192] }

6.2.3 Attribute Constraint Operators

In some cases, an attribute concept has subtypes or supertypes in the |Concept model attribute|[193] hierarchy. Where this occurs, it is possible to indicate that an attribute condition may be satisfied by matching one of the subtypes or supertypes of the given attribute. This is done adding a constraint operator directly before the attribute name concept. For example, the expression constraint below will not only match clinical findings that are |Associated with|[194] a type of |Edema|[195], but also those that are |Due to|[196], |After|[197] or the |Causative agent|[198] of a type of |Edema|[199]. This result occurs because the 47429007 |Associated with|[200] attribute concept has three subtypes: 255234002 |After|[201], 246075003 |Causative agent|[202] and 42752001 |Due to|[203].

---

[184] http://snomed.info/id/404684003
[185] http://snomed.info/id/363698007
[186] http://snomed.info/id/39057004
[187] http://snomed.info/id/116676008
[188] http://snomed.info/id/415582006
[189] http://snomed.info/id/363698007
[190] http://snomed.info/id/53085002
[191] http://snomed.info/id/116676008
[192] http://snomed.info/id/56246009
[193] http://snomed.info/id/410662002
[194] http://snomed.info/id/47429007
[195] http://snomed.info/id/267038008
[196] http://snomed.info/id/42752001
[197] http://snomed.info/id/255234002
[198] http://snomed.info/id/246075003
[199] http://snomed.info/id/267038008
[200] http://snomed.info/id/47429007
[201] http://snomed.info/id/255234002
[202] http://snomed.info/id/246075003
[203] http://snomed.info/id/42752001

```
<< 404684003 |Clinical finding|204 :
    << 47429007 |Associated with|205 = << 267038008 |Edema|206
```

This expression constraint is represented in the long syntax as:

```
descendantOrSelfOf 404684003 |Clinical finding|207 :
    descendantOrSelfOf 47429007 |Associated with|208 = descendantOrSelfOf 267038008 |Edema|209
```

Similarly, the expression constraint below will not only match clinical findings that are |Due to|210 a type of |Edema| 211, but also those that have an |Associated with|212 relationship whose value is a type of |Edema|213.

```
<< 404684003 |Clinical finding|214 :
    >> 246075003 |Causative agent|215 = << 267038008 |Edema|216
```

This expression constraint is represented in the long syntax as:

---

204 http://snomed.info/id/404684003
205 http://snomed.info/id/47429007
206 http://snomed.info/id/267038008
207 http://snomed.info/id/404684003
208 http://snomed.info/id/47429007
209 http://snomed.info/id/267038008
210 http://snomed.info/id/42752001
211 http://snomed.info/id/267038008
212 http://snomed.info/id/47429007
213 http://snomed.info/id/267038008
214 http://snomed.info/id/404684003
215 http://snomed.info/id/246075003
216 http://snomed.info/id/267038008

```
descendantOrSelfOf  404684003 |Clinical finding|217 :
    ancestorOrSelfOf  246075003 |Causative agent|218  = descendantOrSelfOf  267038008 |Edema|219
```

6.2.4 Concrete Values

The revised SNOMED CT Compositional Grammar[220] allows attributes to be given concrete values (e.g. Strings, Integers, Decimal, Boolean). The SNOMED CT Expression Constraint Language[221] supports the ability to compare these attribute values with a given concrete value.

When numeric concrete values (i.e. Integers and Decimals) are compared, a set of standard mathematical operators may be used. These mathematical operators are:

Operator	Name
=	Equals
!=	Not equals
<	Less than
<=	Less than or equals

---

217 http://snomed.info/id/404684003
218 http://snomed.info/id/246075003
219 http://snomed.info/id/267038008
220 http://snomed.org/scg
221 http://snomed.org/ecl

>	Greater than
>=	Greater than or equals

Please note that the 'not equals' operator may alternatively be represented as "<>" and "not =" (case insensitive) in the long syntax.

The following expression constraint is satisfied by oral medicinal products, which contain amoxicillin and have a presentation strength greater than or equal to 250 mg.

< 763158003 |Medicinal product (product)|[222] :
   411116001 |Has manufactured dose form (attribute)|[223] = << 385268001 |Oral dose form (dose form)|[224] ,
  { << 127489000 |Has active ingredient (attribute)|[225] = << 372687004 |Amoxicillin (substance)|[226] ,
    1142135004 |Has presentation strength numerator value (attribute)|[227] >= #250,
    732945000 |Has presentation strength numerator unit (attribute)|[228] = 258684004 |milligram (qualifier
value)|[229] }

Please note that, as per SNOMED CT Compositional Grammar, integer and decimal values are preceded by a hash character (e.g. "#500"), while string values are surrounded by double quotes (e.g. "PANADOL").

To find those oral amoxicillin products that have a strength between 250 and 800 mg (inclusive), the following expression constraint may be used:

< 763158003 |Medicinal product (product)|[230] :
   411116001 |Has manufactured dose form (attribute)|[231] = << 385268001 |Oral dose form (dose form)|[232] ,
  { << 127489000 |Has active ingredient (attribute)|[233] = << 372687004 |Amoxicillin (substance)|[234] ,
    1142135004 |Has presentation strength numerator value (attribute)|[235] >= #250,
    1142135004 |Has presentation strength numerator value (attribute)|[236] <= #800,
    732945000 |Has presentation strength numerator unit (attribute)|[237] = 258684004 |milligram (qualifier
value)|[238] }

Concrete values of type string and boolean may also be included in an expression constraint, and compared using an 'equal to' (i.e. "=") or 'not equal to' (i.e. "!=") operator. The following expression constraint is satisfied only by products with a product name equal to "PANADOL" [1] (see page 0) .

---

[222] http://snomed.info/id/763158003
[223] http://snomed.info/id/411116001
[224] http://snomed.info/id/385268001
[225] http://snomed.info/id/127489000
[226] http://snomed.info/id/372687004
[227] http://snomed.info/id/1142135004
[228] http://snomed.info/id/732945000
[229] http://snomed.info/id/258684004
[230] http://snomed.info/id/763158003
[231] http://snomed.info/id/411116001
[232] http://snomed.info/id/385268001
[233] http://snomed.info/id/127489000
[234] http://snomed.info/id/372687004
[235] http://snomed.info/id/1142135004
[236] http://snomed.info/id/1142135004
[237] http://snomed.info/id/732945000
[238] http://snomed.info/id/258684004

```
< 373873005 |Pharmaceutical / biologic product|²³⁹ :
   3460481009 |Has product name|²⁴⁰ = "PANADOL"
```

The following expression constraint is satisfied only by products that are in the national benefit scheme (of the given country) [2](see page 0) .

```
< 373873005 |Pharmaceutical / biologic product|²⁴¹ :
   859999999102 |Is in national benefit scheme|²⁴² = TRUE
```

6.2.5 Reverse Attributes

In most cases, an attribute refinement is satisfied by those concepts, which are the source concept of a defining relationship whose destination concept matches the attribute value. In some cases, however, it may be necessary to select the destination concept of a relationship and constrain the source concept to a given attribute value. To achieve this, an expression constraint indicates that an attribute is to be constrained in the reverse order using a 'reverse flag' [3](see page 0) . In the brief syntax, the reverse flag is represented by preceding the name of the attribute with a capital letter 'R'.

For example, the expression constraint below finds the set of anatomical structures, which are the finding site of a type of bone fracture (e.g. 85050009 |Humerus|²⁴³, 71341001 |Femur|²⁴⁴).

```
< 91723000 |Anatomical structure|²⁴⁵ :
  R 363698007 |Finding site|²⁴⁶ = < 125605004 |Fracture of bone|²⁴⁷
```

The above expression constraint is represented in the long syntax as:

---

239 http://snomed.info/id/373873005
240 http://snomed.info/id/3460481009
241 http://snomed.info/id/373873005
242 http://snomed.org/fictid#859999999102
243 http://snomed.info/id/85050009
244 http://snomed.info/id/71341001
245 http://snomed.info/id/91723000
246 http://snomed.info/id/363698007
247 http://snomed.info/id/125605004

---

descendantOf 91723000 |Anatomical structure|[248] :
   reverseOf 363698007 |Finding site|[249] = descendantOf 125605004 |Fracture of bone|[250]

6.2.6 Dotted Attributes

An alternative way of representing 'reversed attributes' is by applying the *dot notation* to represented them as *dotted attributes*. Using this alternative notation, " < 123456 |X|[251] . 234567 |Y|[252] " represents the set of attribute values (i.e. destination concepts) of the attribute "Y" for descendants or self of concept "X". This is therefore equivalent to " * : R 234567 |Y|[253] = < 123456 |X|[254] " using the reverse flag.

The previous expression constraint (which finds the set of body sites for any subtype of bone fracture) has an equivalent representation using the 'dot notation' of:

< 91723000 |Anatomical structure|[255] AND (< 125605004 |Fracture of bone|[256] . 363698007 |Finding site|[257])

Because all values of 363698007 |Finding site|[258] must be < 91723000 |Anatomical structure|[259] (according to the SNOMED CT concept model[260]), this expression constraint can be further simplified to:

< 125605004 |Fracture of bone|[261] . 363698007 |Finding site|[262]

---

[248] http://snomed.info/id/91723000
[249] http://snomed.info/id/363698007
[250] http://snomed.info/id/125605004
[251] http://snomed.info/id/123456
[252] http://snomed.info/id/234567
[253] http://snomed.info/id/234567
[254] http://snomed.info/id/123456
[255] http://snomed.info/id/91723000
[256] http://snomed.info/id/125605004
[257] http://snomed.info/id/363698007
[258] http://snomed.info/id/363698007
[259] http://snomed.info/id/91723000
[260] https://confluence.ihtsdotools.org/display/DOCGLOSS/SNOMED+CT+concept+model
[261] http://snomed.info/id/125605004
[262] http://snomed.info/id/363698007

The next example finds the set of substances, which are an active ingredient in any product containing amoxicillin.

```
< 105590001 |Substance|263 :
    R << 127489000 |Has active ingredient|264 = < 27658006 |Product containing amoxicillin|265
```

This expression constraint is represented in the long syntax as:

```
descendantOf 105590001 |Substance|266 :
    ReverseOf descendantOrSelfOf 127489000 |Has active ingredient|267 = descendantOf 27658006 |Product
containing amoxicillin|268
```

An equivalent way of representing this constraint, using the 'dot notation' is:

```
< 105590001 |Substance|269 AND ( < 27658006 |Product containing amoxicillin|270 . << 127489000 |Has
active ingredient|271 )
```

or (using the SNOMED CT concept model[272] to simplify):

```
< 27658006 |Product containing amoxicillin|273 . << 127489000 |Has active ingredient|274
```

When more than one dot attribute is used in sequence, the dot notation is evaluated sequentially from left to right. For example, the following expression constraint represents the set of |Finding sites|275 of any concept that is | Associated with|276 a subtype of |Disorder of lung|277.

---

263 http://snomed.info/id/105590001
264 http://snomed.info/id/127489000
265 http://snomed.info/id/27658006
266 http://snomed.info/id/105590001
267 http://snomed.info/id/127489000
268 http://snomed.info/id/27658006
269 http://snomed.info/id/105590001
270 http://snomed.info/id/27658006
271 http://snomed.info/id/127489000
272 https://confluence.ihtsdotools.org/display/DOCGLOSS/SNOMED+CT+concept+model
273 http://snomed.info/id/27658006
274 http://snomed.info/id/127489000
275 http://snomed.info/id/363698007
276 http://snomed.info/id/47429007
277 http://snomed.info/id/19829001

> < 19829001 |Disorder of lung|[278] . < 47429007 |Associated with|[279] . 363698007 |Finding site|[280]

This expression constraint is evaluated by first finding the descendants of |Disorder of lung|[281], then finding the set of attribute values for these concepts (with an attribute type that is any subtype of |Associated with|[282]), and then from these attribute value concepts, finding the value of any |Finding sites|[283] attribute. Please note that the expression constraint above (with no brackets) is equivalent to the one below (with brackets added).

> ((< 19829001 |Disorder of lung|[284]) . < 47429007 |Associated with|[285]) . 363698007 |Finding site|[286]

6.2.7 Any Attribute Name and Value

A single 'star' (i.e. "*") may be used in the place of an attribute name to represent any attribute in the substrate. The expression constraint below evaluates to the set of clinical findings which have any attribute with a value of 79654002 |Edema|[287].

> < 404684003 |Clinical finding|[288] : * = 79654002 |Edema|[289]

Using the long syntax, the above expression constraint may also be represented as:

---

278 http://snomed.info/id/19829001
279 http://snomed.info/id/47429007
280 http://snomed.info/id/363698007
281 http://snomed.info/id/19829001
282 http://snomed.info/id/47429007
283 http://snomed.info/id/363698007
284 http://snomed.info/id/19829001
285 http://snomed.info/id/47429007
286 http://snomed.info/id/363698007
287 http://snomed.info/id/79654002
288 http://snomed.info/id/404684003
289 http://snomed.info/id/79654002

> descendantOf 404684003 |Clinical finding|[290] : ANY = 79654002 |Edema|[291]

The 'star' symbol (i.e. "*") may also be used to represent any attribute value (either with or without refinement). The following expression constraint evaluates to the set of clinical findings which have an associated morphology (with any value).

> < 404684003 |Clinical finding|[292] : 116676008 |Associated morphology|[293] = *

Using the long syntax, the above expression constraint may also be represented as:

> descendantOf 404684003 |Clinical finding|[294] : 116676008 |Associated morphology|[295] = ANY

---

[1] (see page 0) Concrete values of type string are case sensitive and compared using the Unicode Collation Algorithm (http://www.unicode.org/reports/tr10/).

[2] (see page 0) Please note that the concept 859999999102 |Is in national benefit scheme| is a fictitious attribute used here to illustrate boolean values.

[3] (see page 0) It should be noted that using a reversed attribute joined by conjunction with a non-reversed attribute may lead to a nonsensical constraint (e.g. "<<a: {b=c, Rd=e}"). This is because the target concept of the reversed attribute must be matched with the source concept of the non-reversed attribute, which in turn must be the same as the source concept of the reversed attribute (being in the same attribute group). This would require the reversed attribute to be reflexive (i.e. the source and target concept to be the same).

---

290 http://snomed.info/id/404684003
291 http://snomed.info/id/79654002
292 http://snomed.info/id/404684003
293 http://snomed.info/id/116676008
294 http://snomed.info/id/404684003
295 http://snomed.info/id/116676008

6.3 6.3 Cardinality

6.3.1 Attribute cardinality

6.3.1.1 Overview

To support use cases such as the SNOMED CT concept model and terminology binding, expression constraints may constrain the number of times an attribute can be included in an expression or concept definition represented in the SNOMED CT distribution view [1](see page 0) . This is done using a cardinality constraint, which consists of a minimum cardinality and a maximum cardinality (written "[X..Y]"). A minimum cardinality of X constrains the valid clinical meanings to those which have at least (i.e. >=) X non-redundant [2](see page 0) attributes that match the given attribute criteria. A maximum cardinality of Y constrains the valid clinical meanings to those which have at most (i.e. <=) Y non-redundant [2](see page 0) attributes that match the given attribute criteria. For example, a cardinality of "[1..5]" indicates that all clinical meanings that satisfy the given expression constraint must have at least one and at most five attributes that match the given attribute criteria.

The expression constraint below is satisfied only by products with one, two or three active ingredients.

> < 373873005 |Pharmaceutical / biologic product|[296] :
>   [1..3] 127489000 |Has active ingredient|[297] =< 105590001 |Substance|[298]

Using the long syntax, this expression constraint may be represented as:

> descendantOf 373873005 |Pharmaceutical / biologic product|[299] :
>   [1 to 3] 127489000 |Has active ingredient|[300] = descendantOf 105590001 |Substance|[301]

The following expression constraint is satisfied only by products which have exactly one active ingredient:

---

[296] http://snomed.info/id/373873005
[297] http://snomed.info/id/127489000
[298] http://snomed.info/id/105590001
[299] http://snomed.info/id/373873005
[300] http://snomed.info/id/127489000
[301] http://snomed.info/id/105590001

> < 373873005 |Pharmaceutical / biologic product|[302] :
>   [1..1] 127489000 |Has active ingredient|[303] = < 105590001 |Substance|[304]

6.3.1.2 Unconstrained Cardinalities

A minimum cardinality of '0' indicates that there is *no* constraint on the minimum number of attributes that may match the given attribute criteria. For example, the following expression constraint is satisfied only by products with at most one active ingredient (i.e. the maximum cardinality is '1' and the minimum cardinality is unconstrained).

> < 373873005 |Pharmaceutical / biologic product|[305] :
>   [0..1] 127489000 |Has active ingredient|[306] = < 105590001 |Substance|[307]

Using the long syntax, this may be represented as:

> descendantOf 373873005 |Pharmaceutical / biologic product|[308] :
>   [0 to 1] 127489000 |Has active ingredient|[309] = descendantOf 105590001 |Substance|[310]

A maximum cardinality of '*' (or 'many') indicates that there is *no* constraint on the maximum number of attributes that may match the given attribute criteria. For example, the following expression constraint is satisfied only by products that have at least one active ingredient (i.e. the minimum cardinality is '1' and the maximum cardinality is unconstrained).

---

302 http://snomed.info/id/373873005
303 http://snomed.info/id/127489000
304 http://snomed.info/id/105590001
305 http://snomed.info/id/373873005
306 http://snomed.info/id/127489000
307 http://snomed.info/id/105590001
308 http://snomed.info/id/373873005
309 http://snomed.info/id/127489000
310 http://snomed.info/id/105590001

```
< 373873005 |Pharmaceutical / biologic product|311 :
    [1..*] 127489000 |Has active ingredient|312 = < 105590001 |Substance|313
```

Using the long syntax, this may be represented as:

```
descendantOf 373873005 |Pharmaceutical / biologic product|314 :
    [1 to many] 127489000 |Has active ingredient|315 = descendantOf 105590001 |Substance|316
```

A cardinality of [0..*] should therefore never be used as this indicates that the given attribute is not being constrained in any way, and is therefore a redundant part of the expression constraint.

6.3.1.3 Default Cardinalities

The default cardinality of each attribute, where not explicitly stated, is [1..*]. Therefore, the following two expression constraints are equivalent.

```
< 373873005 |Pharmaceutical / biologic product|317 :
    [1..*] 127489000 |Has active ingredient|318 = < 105590001 |Substance|319
```

```
< 373873005 |Pharmaceutical / biologic product|320 :
    127489000 |Has active ingredient|321 = < 105590001 |Substance|322
```

---

311 http://snomed.info/id/373873005
312 http://snomed.info/id/127489000
313 http://snomed.info/id/105590001
314 http://snomed.info/id/373873005
315 http://snomed.info/id/127489000
316 http://snomed.info/id/105590001
317 http://snomed.info/id/373873005
318 http://snomed.info/id/127489000
319 http://snomed.info/id/105590001
320 http://snomed.info/id/373873005
321 http://snomed.info/id/127489000
322 http://snomed.info/id/105590001

6.3.1.4 Non-redundant Attributes

As mentioned above, only non-redundant defining attributes are included in the cardinality count. Therefore, the following postcoordinated expression:

> 404684003 |Clinical finding|[323] :
>   { 116676008 |Associated morphology|[324] = 72704001 |Fracture|[325] ,
>   363698007 |Finding site|[326] = 299701004 |Bone of forearm|[327] ,
>   363698007 |Finding site|[328] = 62413002 |Bone structure of radius|[329] }

will successfully satisfy the expression constraint:

> < 404684003 |Clinical finding|[330] :
>   [1..1] 363698007 |Finding site|[331] = < 91723000 |Anatomical structure|[332]

This is because 299701004 |Bone of forearm|[333] is a supertype of 62413002 |Bone structure of radius|[334] and therefore the attribute " 363698007 |Finding site|[335] = 299701004 |Bone of forearm|[336] " is redundant.

---

[323] http://snomed.info/id/404684003
[324] http://snomed.info/id/116676008
[325] http://snomed.info/id/72704001
[326] http://snomed.info/id/363698007
[327] http://snomed.info/id/299701004
[328] http://snomed.info/id/363698007
[329] http://snomed.info/id/62413002
[330] http://snomed.info/id/404684003
[331] http://snomed.info/id/363698007
[332] http://snomed.info/id/91723000
[333] http://snomed.info/id/299701004
[334] http://snomed.info/id/62413002
[335] http://snomed.info/id/363698007
[336] http://snomed.info/id/299701004

6.3.1.5   Attribute Cardinality in Groups

When the attributes to which cardinality are applied can be grouped, but braces are not used in the expression constraint, the cardinality constrains the number of times the attribute may be included in *any* attribute group. For example, the following expression constraint is satisfied by any clinical finding whose definition has two or more non-redundant finding sites, irrespective of which attribute group they are contained in.

```
< 404684003 |Clinical finding|337 :
   [2..*] 363698007 |Finding site|338 = < 91723000 |Anatomical structure|339
```

In contrast, when braces are placed around an attribute with a given cardinality, there must exist at least one attribute group for which the given cardinality is satisfied by attributes in that group. For example, the following expression constraint is satisfied by any clinical finding whose definition contains an attribute group with two or more non-redundant finding sites.

```
< 404684003 |Clinical finding|340 :
   { [2..*] 363698007 |Finding site|341 = < 91723000 |Anatomical structure|342 }
```

6.3.2   Attribute Group Cardinality

Minimum and maximum cardinalities may also be applied to attribute groups. A minimum attribute group cardinality of X constrains the valid clinical meanings to those which have at least (i.e. >=) X non-redundant attribute groups that match the given attribute group criteria. A maximum cardinality of Y constrains the valid clinical meanings to those which have at most (i.e. <=) Y non-redundant attribute groups that match the given attribute group criteria. For example, a cardinality of "[1..2]" indicates that all clinical meanings that satisfy the given expression constraint must have at least one and at most two attribute groups that match the given attribute group criteria.

The expression constraint below is satisfied only by products with one, two or three attribute groups, which each contain at least one active ingredient relationship.

---

337 http://snomed.info/id/404684003
338 http://snomed.info/id/363698007
339 http://snomed.info/id/91723000
340 http://snomed.info/id/404684003
341 http://snomed.info/id/363698007
342 http://snomed.info/id/91723000

```
< 373873005 |Pharmaceutical / biologic product|343 :
   [1..3] { [1..*] 127489000 |Has active ingredient|344 = < 105590001 |Substance|345 }
```

Please note that the above expression constraint is equivalent to:

```
< 373873005 |Pharmaceutical / biologic product|346 :
   [1..3] { 127489000 |Has active ingredient|347 = < 105590001 |Substance|348 }
```

And may be written using the long syntax as:

```
descendantOf 373873005 |Pharmaceutical / biologic product|349 :
   [1 to 3] { [1 to many] 127489000 |Has active ingredient|350 =
      descendantOf 105590001 |Substance|351 }
```

6.3.2.1 Unconstrained Cardinalities

As with attribute cardinalities, a minimum cardinality of '0' indicates that there is *no* constraint on the minimum number of attribute groups that may match the given attribute group criteria. For example, the following expression constraint is satisfied only by products with at most one attribute group containing an active ingredient relationship (i.e. the maximum attribute group cardinality is '1' and the minimum attribute group cardinality is unconstrained).

---

343 http://snomed.info/id/373873005
344 http://snomed.info/id/127489000
345 http://snomed.info/id/105590001
346 http://snomed.info/id/373873005
347 http://snomed.info/id/127489000
348 http://snomed.info/id/105590001
349 http://snomed.info/id/373873005
350 http://snomed.info/id/127489000
351 http://snomed.info/id/105590001

```
< 373873005 |Pharmaceutical / biologic product|352 :
   [0..1] { 127489000 |Has active ingredient|353 = < 105590001 |Substance|354 }
```

Using the long syntax, this may be represented as:

```
descendantOf 373873005 |Pharmaceutical / biologic product|355 :
   [0 to 1] { 127489000 |Has active ingredient|356 = descendantOf 105590001 |Substance|357 }
```

A maximum cardinality of '*' (or 'many') indicates that there is *no* constraint on the maximum number of attribute groups that may match the given attribute group criteria. For example, the following expression constraint is satisfied only by products that have at least one attribute group containing an active ingredient relationship (i.e. the minimum attribute group cardinality is '1' and the maximum attribute group cardinality is unconstrained).

```
< 373873005 |Pharmaceutical / biologic product|358 :
   [1..*] { 127489000 |Has active ingredient|359 = < 105590001 |Substance|360 }
```

Using the long syntax, this may be represented as:

```
descendantOf 373873005 |Pharmaceutical / biologic product|361 :
   [1 to *] { 127489000 |Has active ingredient|362 = descendantOf 105590001 |Substance|363 }
```

A cardinality of [0..*] should therefore never be used as this indicates that the given attribute group is not being constrained in any way, and is therefore a redundant part of the expression constraint.

---

352 http://snomed.info/id/373873005
353 http://snomed.info/id/127489000
354 http://snomed.info/id/105590001
355 http://snomed.info/id/373873005
356 http://snomed.info/id/127489000
357 http://snomed.info/id/105590001
358 http://snomed.info/id/373873005
359 http://snomed.info/id/127489000
360 http://snomed.info/id/105590001
361 http://snomed.info/id/373873005
362 http://snomed.info/id/127489000
363 http://snomed.info/id/105590001

6.3.2.2 Default Cardinalities

As with attribute cardinality, the default attribute group cardinality, where not explicitly stated, is [1..*]. Therefore, the following four expression constraints are equivalent.

< 373873005 |Pharmaceutical / biologic product|[364] :
  { 127489000 |Has active ingredient|[365] = < 105590001 |Substance|[366] }

< 373873005 |Pharmaceutical / biologic product|[367] :
  { [1..*] 127489000 |Has active ingredient|[368] = < 105590001 |Substance|[369] }

< 373873005 |Pharmaceutical / biologic product|[370] :
  [1..*] { 127489000 |Has active ingredient|[371] = < 105590001 |Substance|[372] }

< 373873005 |Pharmaceutical / biologic product|[373] :
  [1..*] { [1..*] 127489000 |Has active ingredient|[374] = < 105590001 |Substance|[375] }

---

[364] http://snomed.info/id/373873005
[365] http://snomed.info/id/127489000
[366] http://snomed.info/id/105590001
[367] http://snomed.info/id/373873005
[368] http://snomed.info/id/127489000
[369] http://snomed.info/id/105590001
[370] http://snomed.info/id/373873005
[371] http://snomed.info/id/127489000
[372] http://snomed.info/id/105590001
[373] http://snomed.info/id/373873005
[374] http://snomed.info/id/127489000
[375] http://snomed.info/id/105590001

6.3.2.3 Non-redundant Attribute Groups

As mentioned above, only non-redundant defining attributes are included in the cardinality count. Therefore, the following postcoordinated expression:

> < 404684003 |Clinical finding|[376] :
>   { 363698007 |Finding site|[377] = 299701004 |Bone of forearm|[378] },
>   { 363698007 |Finding site|[379] = 62413002 |Bone structure of radius|[380] }

will successfully satisfy the expression constraint:

> < 404684003 |Clinical finding|[381] :
>   [1..1] { 363698007 |Finding site|[382] =< 91723000 |Anatomical structure|[383] }

This is because 299701004 |Bone of forearm|[384] is a supertype of 62413002 |Bone structure of radius|[385] and therefore the attribute group " { 363698007 |Finding site|[386] = 299701004 |Bone of forearm|[387] } " is redundant.

6.3.2.4 Attribute and Attribute Group Cardinalities

Attribute cardinalities and attribute group cardinalities can be used together to achieve a combined effect. For example, to represent the set of clinical findings which have *no* attribute groups that contain two or more finding site attributes (in the same attribute group), the following expression constraint can be used:

---

376 http://snomed.info/id/404684003
377 http://snomed.info/id/363698007
378 http://snomed.info/id/299701004
379 http://snomed.info/id/363698007
380 http://snomed.info/id/62413002
381 http://snomed.info/id/404684003
382 http://snomed.info/id/363698007
383 http://snomed.info/id/91723000
384 http://snomed.info/id/299701004
385 http://snomed.info/id/62413002
386 http://snomed.info/id/363698007
387 http://snomed.info/id/299701004

```
  <  404684003 |Clinical finding|^388 :
    [0..0] { [2..*]  363698007 |Finding site|^389  = <  91723000 |Anatomical structure|^390  }
```

6.3.3 Reverse Cardinalities

When a cardinality constraint is applied to a reversed refinement, it constrains the number of source concepts (matching the given criteria) for which each destination concept may be relevant attribute value.

For example, the following expression constraint represents the substances, which are the active ingredient of exactly three products.

```
  <  105590001 |Substance|^391 : [3..3] R  127489000 |Has active ingredient|^392  = *
```

If this expression constraint was executed against a simplified substrate containing the following seven relationships:

Source concept	Attribute	Destination concept
412458007 |Orphenadrine + aspirin + caffeine|[393]	127489000 |Has active ingredient| [394]	372714007 |Orphenadrine|[395]
412458007 |Orphenadrine + aspirin + caffeine|[396]	127489000 |Has active ingredient| [397]	387458008 |Aspirin|[398]

---

[388] http://snomed.info/id/404684003
[389] http://snomed.info/id/363698007
[390] http://snomed.info/id/91723000
[391] http://snomed.info/id/105590001
[392] http://snomed.info/id/127489000
[393] http://snomed.info/id/412458007
[394] http://snomed.info/id/127489000
[395] http://snomed.info/id/372714007
[396] http://snomed.info/id/412458007
[397] http://snomed.info/id/127489000
[398] http://snomed.info/id/387458008

Source concept	Attribute	Destination concept
412458007 |Orphenadrine + aspirin + caffeine|[399]	127489000 |Has active ingredient| [400]	255641001 |Caffeine|[401]
412096001 |Aspirin + codeine|[402]	127489000 |Has active ingredient| [403]	387458008 |Aspirin|[404]
412096001 |Aspirin + codeine|[405]	127489000 |Has active ingredient| [406]	387494007 |Codeine|[407]
424102008 |Acetaminophen+aspirin|[408]	127489000 |Has active ingredient| [409]	387517004 |Acetaminophen|[410]
424102008 |Acetaminophen+aspirin|[411]	127489000 |Has active ingredient| [412]	387458008 |Aspirin|[413]

then the result would include only the concept 387458008 |Aspirin|[414].

---

[399] http://snomed.info/id/412458007
[400] http://snomed.info/id/127489000
[401] http://snomed.info/id/255641001
[402] http://snomed.info/id/412096001
[403] http://snomed.info/id/127489000
[404] http://snomed.info/id/387458008
[405] http://snomed.info/id/412096001
[406] http://snomed.info/id/127489000
[407] http://snomed.info/id/387494007
[408] http://snomed.info/id/424102008
[409] http://snomed.info/id/127489000
[410] http://snomed.info/id/387517004
[411] http://snomed.info/id/424102008
[412] http://snomed.info/id/127489000
[413] http://snomed.info/id/387458008
[414] http://snomed.info/id/387458008

[1](see page 0) For more information about the SNOMED CT distribution view, please refer to the SNOMED CT Technical Implementation Guide[415]. Please note that full normalization of expressions (as would be performed by a Description Logic classifier) is required prior to evaluation.

[2](see page 0) As defined in the SNOMED CT Technical Implementation Guide[416]. [a(see page 0) b(see page 0)]

6.4 6.4 Conjunction and Disjunction

6.4.1 Compound Expression Constraints

Expression constraints can be built up from smaller parts using conjunction (i.e. AND) and disjunction (i.e. OR). The simplest example of this is where the conjunction or disjunction is used between two simple expressions. For example, the following expression constraint is satisfied only by clinical findings which are *both* a disorder of the lung *and* an edema of the trunk. This gives the same result as a mathematical *intersection* between the set of 19829001 |Disorder of lung|[417] descendants and the set of 301867009 |Edema of trunk|[418] descendants.

```
<  19829001 |Disorder of lung|[419]  AND <  301867009 |Edema of trunk|[420]
```

Please note that all keywords are case insensitive, so the following two expression constraints are equivalent to the above:

```
<  19829001 |Disorder of lung|[421]  and <  301867009 |Edema of trunk|[422]
```

---

415 http://snomed.org/tig
416 http://snomed.org/tig
417 http://snomed.info/id/19829001
418 http://snomed.info/id/301867009
419 http://snomed.info/id/19829001
420 http://snomed.info/id/301867009
421 http://snomed.info/id/19829001
422 http://snomed.info/id/301867009

```
< 19829001 |Disorder of lung|423  And < 301867009 |Edema of trunk|424
```

The next expression constraint is satisfied only by clinical findings which are *either* a disorder of the lung *or* an edema of the trunk. This gives the same result as a mathematical *union* of the set of 19829001 |Disorder of lung| [425] descendants and the set of 301867009 |Edema of trunk| [426] descendants. For this reason, an *OR* operator will usually allow more valid clinical meanings than an *AND* operator.

```
< 19829001 |Disorder of lung|427  OR < 301867009 |Edema of trunk|428
```

Conjunction and disjunction operators may also be combined with the use of the 'member of' function, as shown below:

```
< 19829001 |Disorder of lung|429  AND ^ 700043003 |Example problem list concepts reference set|430
```

This expression constraint is satisfied only by concepts that belong to the 19829001 |Disorder of lung| [431] hierarchy *and* are also members of the 700043003 |Example problem list concepts reference set| [432].

When more than one conjunction or more than one disjunction is used, round brackets can be optionally applied. For example, the following expression constraints are all valid and equivalent to each other:

---

423 http://snomed.info/id/19829001
424 http://snomed.info/id/301867009
425 http://snomed.info/id/19829001
426 http://snomed.info/id/301867009
427 http://snomed.info/id/19829001
428 http://snomed.info/id/301867009
429 http://snomed.info/id/19829001
430 http://snomed.info/id/700043003
431 http://snomed.info/id/19829001
432 http://snomed.info/id/700043003

< 19829001 |Disorder of lung|[433] AND < 301867009 |Edema of trunk|[434] AND
^ 700043003 |Example problem list concepts reference set|[435]

(< 19829001 |Disorder of lung|[436] AND < 301867009 |Edema of trunk|[437]) AND
^ 700043003 |Example problem list concepts reference set|[438]

< 19829001 |Disorder of lung|[439] AND (< 301867009 |Edema of trunk|[440] AND
^ 700043003 |Example problem list concepts reference set|[441])

However, where a conjunction and disjunction are both used together, it is mandatory to use round brackets to disambiguate the meaning of the expression constraint. For example, the following expression constraint is **not** valid:

---

[433] http://snomed.info/id/19829001
[434] http://snomed.info/id/301867009
[435] http://snomed.info/id/700043003
[436] http://snomed.info/id/19829001
[437] http://snomed.info/id/301867009
[438] http://snomed.info/id/700043003
[439] http://snomed.info/id/19829001
[440] http://snomed.info/id/301867009
[441] http://snomed.info/id/700043003

> < 19829001 |Disorder of lung|[442] AND < 301867009 |Edema of trunk|[443] OR
> ^ 700043003 |Example problem list concepts reference set|[444]

And must be expressed (depending on the intended meaning) as either:

> (< 19829001 |Disorder of lung|[445] AND < 301867009 |Edema of trunk|[446]) OR
> ^ 700043003 |Example problem list concepts reference set|[447]

Or as:

> < 19829001 |Disorder of lung|[448] AND (< 301867009 |Edema of trunk|[449] OR
> ^ 700043003 |Example problem list concepts reference set|[450])

6.4.2 Attribute Conjunction and Disjunction

Conjunction and disjunction may be used within refinements in a variety of ways. The most common way of using these operators in a refinement is to define the conjunction or disjunction of individual attributes.

For example, the expression constraint below, in which the comma between the two attributes represents conjunction, is satisfied only by clinical findings which have *both* a finding site of pulmonary valve structure (or subtype) *and* an associated morphology of stenosis (or subtype).

---

442 http://snomed.info/id/19829001
443 http://snomed.info/id/301867009
444 http://snomed.info/id/700043003
445 http://snomed.info/id/19829001
446 http://snomed.info/id/301867009
447 http://snomed.info/id/700043003
448 http://snomed.info/id/19829001
449 http://snomed.info/id/301867009
450 http://snomed.info/id/700043003

```
< 404684003 |Clinical finding|451 :
    363698007 |Finding site|452 = << 39057004 |Pulmonary valve structure|453 ,
    116676008 |Associated morphology|454 = << 415582006 |Stenosis|455
```

This expression constraint can equivalently be expressed as:

```
< 404684003 |Clinical finding|456 :
    363698007 |Finding site|457 = << 39057004 |Pulmonary valve structure|458 AND
    116676008 |Associated morphology|459 = << 415582006 |Stenosis|460
```

The following example uses the disjunction operator (OR) to represent the disjunction of two attributes. This constraint is satisfied only by clinical findings which have *either* an associated morphology of 'infarct' (or subtype) *or* are due to a myocardial infarction (or subtype).

```
< 404684003 |Clinical finding|461 :
    116676008 |Associated morphology|462 = << 55641003 |Infarct|463 OR
    42752001 |Due to|464 = << 22298006 |Myocardial infarction|465
```

When more than one conjunction or more than one disjunction is used in a refinement, round brackets can be optionally applied. For example, the following expression constraints are all valid and equivalent to each other:

---

451 http://snomed.info/id/404684003
452 http://snomed.info/id/363698007
453 http://snomed.info/id/39057004
454 http://snomed.info/id/116676008
455 http://snomed.info/id/415582006
456 http://snomed.info/id/404684003
457 http://snomed.info/id/363698007
458 http://snomed.info/id/39057004
459 http://snomed.info/id/116676008
460 http://snomed.info/id/415582006
461 http://snomed.info/id/404684003
462 http://snomed.info/id/116676008
463 http://snomed.info/id/55641003
464 http://snomed.info/id/42752001
465 http://snomed.info/id/22298006

< 404684003 |Clinical finding|[466] :
    363698007 |Finding site|[467] = << 39057004 |Pulmonary valve structure|[468] AND
    116676008 |Associated morphology|[469] = << 415582006 |Stenosis|[470] AND
    42752001 |Due to|[471] = << 445238008 |Malignant carcinoid tumor|[472]

< 404684003 |Clinical finding|[473] :
    (363698007 |Finding site|[474] = << 39057004 |Pulmonary valve structure|[475] AND
    116676008 |Associated morphology|[476] = << 415582006 |Stenosis|[477]) AND
    42752001 |Due to|[478] = << 445238008 |Malignant carcinoid tumor|[479]

< 404684003 |Clinical finding|[480] :
    363698007 |Finding site|[481] = << 39057004 |Pulmonary valve structure|[482] AND
    (116676008 |Associated morphology|[483] = << 415582006 |Stenosis|[484] AND
    42752001 |Due to|[485] = << 445238008 |Malignant carcinoid tumor|[486])

---

[466] http://snomed.info/id/404684003
[467] http://snomed.info/id/363698007
[468] http://snomed.info/id/39057004
[469] http://snomed.info/id/116676008
[470] http://snomed.info/id/415582006
[471] http://snomed.info/id/42752001
[472] http://snomed.info/id/445238008
[473] http://snomed.info/id/404684003
[474] http://snomed.info/id/363698007
[475] http://snomed.info/id/39057004
[476] http://snomed.info/id/116676008
[477] http://snomed.info/id/415582006
[478] http://snomed.info/id/42752001
[479] http://snomed.info/id/445238008
[480] http://snomed.info/id/404684003
[481] http://snomed.info/id/363698007
[482] http://snomed.info/id/39057004
[483] http://snomed.info/id/116676008
[484] http://snomed.info/id/415582006
[485] http://snomed.info/id/42752001
[486] http://snomed.info/id/445238008

However, where a conjunction and disjunction are both used together in a refinement, it is mandatory to use brackets to disambiguate the meaning of the expression constraint.

For example, the following expression constraint is *__not__* valid:

```
<  404684003 |Clinical finding|487 :
    363698007 |Finding site|488 = << 39057004 |Pulmonary valve structure|489 AND
    116676008 |Associated morphology|490 = << 415582006 |Stenosis|491 OR
    42752001 |Due to|492 = << 445238008 |Malignant carcinoid tumor|493
```

And must be expressed (depending on the intended meaning) as either:

```
<  404684003 |Clinical finding|494 :
    ( 363698007 |Finding site|495 = << 39057004 |Pulmonary valve structure|496 AND
    116676008 |Associated morphology|497 = << 415582006 |Stenosis|498 ) OR
    42752001 |Due to|499 = << 445238008 |Malignant carcinoid tumor|500
```

Or as:

---

487 http://snomed.info/id/404684003
488 http://snomed.info/id/363698007
489 http://snomed.info/id/39057004
490 http://snomed.info/id/116676008
491 http://snomed.info/id/415582006
492 http://snomed.info/id/42752001
493 http://snomed.info/id/445238008
494 http://snomed.info/id/404684003
495 http://snomed.info/id/363698007
496 http://snomed.info/id/39057004
497 http://snomed.info/id/116676008
498 http://snomed.info/id/415582006
499 http://snomed.info/id/42752001
500 http://snomed.info/id/445238008

```
< 404684003 |Clinical finding|501 :
    363698007 |Finding site|502 = << 39057004 |Pulmonary valve structure|503 AND
    ( 116676008 |Associated morphology|504 = << 415582006 |Stenosis|505 OR
      42752001 |Due to|506 = << 445238008 |Malignant carcinoid tumor|507 )
```

6.4.3 Attribute Group Conjunction and Disjunction

Similarly, conjunction and disjunction may be defined between attribute groups. The following expression constraint is satisfied only by clinical findings which *either* have a finding site of pulmonary valve structure (or subtype) and an associated morphology of stenosis (or subtype), *OR* have a finding site of right ventricular structure (or subtype) and an associated morphology of hypertrophy (or subtype).

```
< 404684003 |Clinical finding|508 :
    { 363698007 |Finding site|509 = << 39057004 |Pulmonary valve structure|510 ,
      116676008 |Associated morphology|511 = << 415582006 |Stenosis|512 } OR
    { 363698007 |Finding site|513 = << 53085002 |Right ventricular structure|514 ,
      116676008 |Associated morphology|515 = << 56246009 |Hypertrophy|516 }
```

---

501 http://snomed.info/id/404684003
502 http://snomed.info/id/363698007
503 http://snomed.info/id/39057004
504 http://snomed.info/id/116676008
505 http://snomed.info/id/415582006
506 http://snomed.info/id/42752001
507 http://snomed.info/id/445238008
508 http://snomed.info/id/404684003
509 http://snomed.info/id/363698007
510 http://snomed.info/id/39057004
511 http://snomed.info/id/116676008
512 http://snomed.info/id/415582006
513 http://snomed.info/id/363698007
514 http://snomed.info/id/53085002
515 http://snomed.info/id/116676008
516 http://snomed.info/id/56246009

6.4.4 Attribute Value Conjunction and Disjunction

Conjunction and disjunction can also be applied to attribute values. The example below is satisfied only by members of the adverse drug reactions reference set for GP/FP health issue, which have a causative agent that is *either* a subtype of pharmaceutical / biologic product *or* a subtype of substance.

---

 ^ 450990004 |Adverse drug reactions reference set for GP/FP health issue|[517] :
   246075003 |Causative agent|[518] = (< 373873005 |Pharmaceutical / biologic product|[519] OR < 105590001 |Substance|[520])

Similarly, attribute values can also use conjunction. The following expression constraint is satisfied only by clinical findings with an associated morphology whose value is *both* a subtype (or self) of ulcer *and* a subtype (or self) of hemorrhage.

 < 404684003 |Clinical finding|[521] : 116676008 |Associated morphology|[522] =
   (<< 56208002 |Ulcer|[523] AND << 50960005 |Hemorrhage|[524])

For more information about nested attribute values and nested compound expression constraints, please refer to .

6.5 6.5 Exclusion and Not Equals

6.5.1 Exclusion of Simple Expressions

Exclusion is supported in the SNOMED CT Expression Constraint Language by the binary operator 'MINUS'. Exclusion works in a similar manner to mathematical subtraction. For example, the following expression constraint returns the set of lung disorders which are not a descendant or self of edema of the trunk.

---

[517] http://snomed.info/id/450990004
[518] http://snomed.info/id/246075003
[519] http://snomed.info/id/373873005
[520] http://snomed.info/id/105590001
[521] http://snomed.info/id/404684003
[522] http://snomed.info/id/116676008
[523] http://snomed.info/id/56208002
[524] http://snomed.info/id/50960005

    << 19829001 |Disorder of lung|[525] **MINUS <<** 301867009 |Edema of trunk|[526]

Logically, this expression constraint takes the set of descendants of 'disorder of lung' and subtracts the set of descendants of 'edema of trunk'. Please note that the keyword 'MINUS' is case insensitive.

Exclusion can also be applied to the membership of a reference set. For example, the following expression constraint returns the set of lung disorders which are not members of the cardiology reference set. That is, the set of descendants or self of 'disorder of lung' minus the set of members of the 'cardiology reference set'.

    << 19829001 |Disorder of lung|[527] **MINUS ^** 700043003 |Example problem list concepts reference set|[528]

Please note that when more than one exclusion operator is used, or when an exclusion operator is used together with a conjunction or disjunction, round brackets must be used to disambiguate the intended meaning.

6.5.2 Exclusion of Attribute Values

Attribute values, represented by compound expression constraints, may also contain exclusions. When this occurs, the expression constraint is satisfied by any concept or expression which has at least one attribute (of the given type) whose value is satisfied by the compound constraint defined in the attribute value. For example, the expression constraint below represents the set of clinical findings, which have an associated morphology that is a descendant or self of ulcer and a descendant or self of hemorrhage, but not a descendant or self of obstruction.

---

[525] http://snomed.info/id/19829001
[526] http://snomed.info/id/301867009
[527] http://snomed.info/id/19829001
[528] http://snomed.info/id/700043003

< 404684003 |Clinical finding|[529] : 116676008 |Associated morphology|[530] =
  ((<< 56208002 |Ulcer|[531] AND << 50960005 |Hemorrhage|[532]) MINUS << 26036001 |Obstruction|[533])

6.5.3 Not Equal to Attribute Value

It is also possible to simply state that an attribute value should not fall in a particular range. The example below is satisfied only by clinical findings which have an associated morphology that is not a descendant (or self) of obstruction.

< 404684003 |Clinical finding|[534] :
  116676008 |Associated morphology|[535] != << 26036001 |Obstruction|[536]

Using the long syntax, this expression constraint can be represented as:

---

descendantOf 404684003 |Clinical finding|[537] :
  116676008 |Associated morphology|[538] NOT = descendantOrSelfOf 26036001 |Obstruction|[539]

To prohibit an attribute from having a value in a particular range, a cardinality of [0..0] must be used. For example, the following expression constraint represents the set of clinical findings which have exactly zero (i.e. they do not have any) associated morphologies that are a descendant or self of obstruction.

---

[529] http://snomed.info/id/404684003
[530] http://snomed.info/id/116676008
[531] http://snomed.info/id/56208002
[532] http://snomed.info/id/50960005
[533] http://snomed.info/id/26036001
[534] http://snomed.info/id/404684003
[535] http://snomed.info/id/116676008
[536] http://snomed.info/id/26036001
[537] http://snomed.info/id/404684003
[538] http://snomed.info/id/116676008
[539] http://snomed.info/id/26036001

```
<  404684003 |Clinical finding|540 :
    [0..0]  116676008 |Associated morphology|541  = << 26036001 |Obstruction|542
```

To prohibit an attribute from having a value *outside* a particular range, a cardinality of [0..0] is used in conjunction with the 'not equal to' comparison operator. For example, the following expression constraint represents the set of clinical findings which have exactly zero associated morphologies that are *not* a descendant or self of obstruction. In other words, clinical findings for which *all* associated morphologies (if any exist) are descendants (or self) of obstruction.

```
<  404684003 |Clinical finding|543 :
    [0..0]  116676008 |Associated morphology|544  != << 26036001 |Obstruction|545
```

If we also want to ensure that at least one associated morphology does exist (and all of these have a value which is a descendant or self of obstruction), then the following expression constraint can be used:

```
<  404684003 |Clinical finding|546 :
    [0..0]  116676008 |Associated morphology|547  != << 26036001 |Obstruction|548  and
    [1..*]  116676008 |Associated morphology|549  = << 26036001 |Obstruction|550
```

Note that the cardinality on the second attribute may be omitted, as [1..*] is assumed by default.

---

540 http://snomed.info/id/404684003
541 http://snomed.info/id/116676008
542 http://snomed.info/id/26036001
543 http://snomed.info/id/404684003
544 http://snomed.info/id/116676008
545 http://snomed.info/id/26036001
546 http://snomed.info/id/404684003
547 http://snomed.info/id/116676008
548 http://snomed.info/id/26036001
549 http://snomed.info/id/116676008
550 http://snomed.info/id/26036001

6.6 6.6 Constraint Comments

6.6.1 Comments

SNOMED CT Expression Constraints may also include comments inline within the constraint string to explain, describe or document different aspects of the expression constraints. Each comment begins with a forward slash directly followed by a star (i.e. "/*") and ends with a star directly followed by a forward slash (i.e. "*/"). Comments may be placed anywhere in an expression constraint where whitespace (i.e. "ws") or mandatory whitespace (i.e. "mws") is allowed.

Comments have no effect on the machine processable interpretation of an expression constraint, as they should be ignored during evaluation. For example, the following two expression constraints (the first with comments, and the second without), will evaluate to exactly the same set of concepts:

```
/*  Disorders of lung with edema  */
<  19829001 |Disorder of lung|551 : /*  Descendants of disorder of lung  */
    116676008 |Associated morphology|552 = <<  79654002 |Edema|553
    /*  Where the associated morphology is edema or a subtype  */
```

```
<  19829001 |Disorder of lung|554 :
    116676008 |Associated morphology|555 = <<  79654002 |Edema|556
```

A comment may include both stars and forward slashes. However a star may never be directly followed by a forward slash within the middle of a comment, as this combination denotes the end of the comment.

---

551 http://snomed.info/id/19829001
552 http://snomed.info/id/116676008
553 http://snomed.info/id/79654002
554 http://snomed.info/id/19829001
555 http://snomed.info/id/116676008
556 http://snomed.info/id/79654002

6.7 6.7 Nested Expression Constraints

Expression constraints can be nested in a variety of ways to form nested expression constraints. These nested expression constraints use subexpressions, enclosed in round brackets, in the place of a simple concept reference.

Nested expression constraints can be created by:

- Applying constraint operators to an expression constraint
- Applying the memberOf function to an expression constraint
- Combining expression constraints using binary operators
- Adding dotted attributes to expression constraints
- Adding refinements to expression constraints
- Using expression constraints to represent valid attribute names
- Using expression constraints to represent valid attribute values

In this section, we describe each of these approaches to creating nested expression constraints.

6.7.1 Constraint Operators

When a constraint operator is applied to an expression constraint, the resulting set of matching expressions is the union of applying the constraint operator to each of its members.

For example, the following expression constraint represents all the members of the |Example problem list concepts reference set|[557] plus the union of the descendants of each of these members.

```
<< (^ 700043003 |Example problem list concepts reference set|[558] )
```

Please note that the brackets in the above expression constraint are optional. In this particular case, removing the brackets does not change the meaning of the constraint.

As another example, the following expression constraint represents the set of all descendants of the |Finding site|[559] of |Fracture of bone|[560].

[557] http://snomed.info/id/700043003
[558] http://snomed.info/id/700043003
[559] http://snomed.info/id/363698007
[560] http://snomed.info/id/125605004

< (125605004 |Fracture of bone|[561] . 363698007 |Finding site|[562])

Because the |Finding site|[563] of |Fracture of bone|[564] is 272673000 |Bone structure|[565], the above expression constraint is equivalent to:

< 272673000 |Bone structure|[566]

Please note that this is *not* the same as the expression constraint:

< 125605004 |Fracture of bone|[567] . 363698007 |Finding site|[568]

---

which refers to the set of |Finding site|[569] values for any descendant of |Fracture of bone|[570], and is instead equivalent to:

(< 125605004 |Fracture of bone|[571]). 363698007 |Finding site|[572]

See the subsection below on Dotted Attributes for more information about expression constraints of this form.

6.7.2 MemberOf Function

The memberOf function may also be applied to an expression constraint that returns a set of concept-based reference set concepts. When this is done, the nested expression constraint (to which the memberOf function is applied) must always be enclosed in round brackets.

---

[561] http://snomed.info/id/125605004
[562] http://snomed.info/id/363698007
[563] http://snomed.info/id/363698007
[564] http://snomed.info/id/125605004
[565] http://snomed.info/id/272673000
[566] http://snomed.info/id/272673000
[567] http://snomed.info/id/125605004
[568] http://snomed.info/id/363698007
[569] http://snomed.info/id/363698007
[570] http://snomed.info/id/125605004
[571] http://snomed.info/id/125605004
[572] http://snomed.info/id/363698007

For example, the expression constraint below is satisfied by the set of concepts which are members of any subtype of |GP/FP health issue reference set|[573]. In other words, it represents the union of applying the memberOf function to each of the descendants of |GP/FP health issue reference set|[574].

> **^** (< 450973005 |GP/FP health issue reference set|[575])

The expression constraint above evaluates to the same set of concepts as applying the memberOf function to each individual subtype of 450973005 |GP/FP health issue reference set|[576]and then taking the union of these sets. Therefore, when applied to the 20170131 international edition of SNOMED CT, the above expression constraint evaluates to the same set of concepts as the following expression constraint.

> **^** 450990004 |Adverse drug reactions reference set for GP/FP health issue|[577]
>   OR **^** 450989008 |Allergies reference set for GP/FP health issue|[578]
>   OR **^** 450985002 |Disorders and diseases reference set for GP/FP health issue|[579]
>   OR **^** 450988000 |Family history reference set for GP/FP health issue|[580]
>   OR **^** 450991000 |Processes and procedures reference set for GP/FP health issue|[581]
>   OR **^** 450986001 |Results reference set for GP/FP health issue|[582]
>   OR **^** 450992007 |Social history reference set for GP/FP health issue|[583]
>   OR **^** 450984003 |Symptoms and signs reference set for GP/FP health issue|[584]

6.7.3 Compound Expression Constraints

When conjunction (i.e. AND), disjunction (i.e. OR) or exclusion (i.e. MINUS) are applied to one or more complex subexpression constraints, brackets are usually required to nest the subexpression constraints.

For example, the following expression constraint uses brackets around the first complex operand (< 404684003 | Clinical finding|[585] : 363698007 |Finding site|[586] = << 39057004 |Pulmonary valve structure|[587]) to apply the 'AND' operator to two expression constraints.

---

[573] http://snomed.info/id/450973005
[574] http://snomed.info/id/450973005
[575] http://snomed.info/id/450973005
[576] http://snomed.info/id/450973005
[577] http://snomed.info/id/450990004
[578] http://snomed.info/id/450989008
[579] http://snomed.info/id/450985002
[580] http://snomed.info/id/450988000
[581] http://snomed.info/id/450991000
[582] http://snomed.info/id/450986001
[583] http://snomed.info/id/450992007
[584] http://snomed.info/id/450984003
[585] http://snomed.info/id/404684003
[586] http://snomed.info/id/363698007
[587] http://snomed.info/id/39057004

```
(< 404684003 |Clinical finding|588 :
    363698007 |Finding site|589 = << 39057004 |Pulmonary valve structure|590 )
      AND ^ 700043003 |Example problem list concepts reference set|591
```

An equivalent expression constraint can be achieved by swapping the order of the operands, as shown below.

```
^ 700043003 |Example problem list concepts reference set|592
    AND (< 404684003 |Clinical finding|593 :
      363698007 |Finding site|594 = << 39057004 |Pulmonary valve structure|595 )
```

Similarly, if both sides of the compound expression are complex expression constraints, then brackets may be required on both sides. For example:

```
(< 404684003 |Clinical finding|596 : 363698007 |Finding site|597 = << 39057004 |Pulmonary valve structure|598 )
    AND (< 64572001 |Disease|599 : 116676008 |Associated morphology|600 = << 415582006 |Stenosis|601 )
```

6.7.4 Dotted Attributes

Dotted attributes can also be applied to a nested subexpression constraint. When this is done, the resulting subexpression represents the union of the values of the given dotted attribute for any expression that matches the given nested subexpression constraint.

---

588 http://snomed.info/id/404684003
589 http://snomed.info/id/363698007
590 http://snomed.info/id/39057004
591 http://snomed.info/id/700043003
592 http://snomed.info/id/700043003
593 http://snomed.info/id/404684003
594 http://snomed.info/id/363698007
595 http://snomed.info/id/39057004
596 http://snomed.info/id/404684003
597 http://snomed.info/id/363698007
598 http://snomed.info/id/39057004
599 http://snomed.info/id/64572001
600 http://snomed.info/id/116676008
601 http://snomed.info/id/415582006

For example, the following expression constraint represents the set of all substances that are the |Direct substance| [602] of a |Specimen collection| [603] procedure that is |Using device| [604] equal to a subtype (or self) of |Catheter| [605].

(<< 17636008 |Specimen collection| [606] : 424226004 |Using device| [607] = << 19923001 |Catheter| [608]) . 363701004 |Direct substance| [609]

When executed against the 20170131 international edition of SNOMED CT, the above expression constraint matches the following three concepts:

78014005 |Urine| [610]
87612001 |Blood| [611]
4635002 |Arterial blood| [612]

6.7.5 Refinement

As mentioned in 6.2 Refinements(see page 62), it is possible to apply refinements to nested expression constraints. When a refinement is applied to a complex subexpression constraint, the subexpression constraint must be enclosed in brackets.

---

[602] http://snomed.info/id/363701004
[603] http://snomed.info/id/17636008
[604] http://snomed.info/id/424226004
[605] http://snomed.info/id/19923001
[606] http://snomed.info/id/17636008
[607] http://snomed.info/id/424226004
[608] http://snomed.info/id/19923001
[609] http://snomed.info/id/363701004
[610] http://snomed.info/id/78014005
[611] http://snomed.info/id/87612001
[612] http://snomed.info/id/4635002

For example, the expression constraint below represents the set of all clinical findings and events which occur after some procedure.

```
(<< 404684003 |Clinical finding (finding)|613 OR << 272379006 |Event (event)|614 ):
    255234002 |After|615 = << 71388002 |Procedure (procedure)|616
```

Attribute Names

In some cases, the valid set of attribute names can be represented using an expression constraint. For example, the expression constraint below represents the set of bone fractures that have no additional defining attributes (besides |Finding site|617 and |Associated morphology|618).

```
<< 125605004 |Fracture of bone|619 :
    [0..0] ((<< 410662002 |Concept model attribute|620 MINUS 363698007 |Finding site|621 )
        MINUS 116676008 |Associated morphology|622 ) = *
```

Within this expression constraint, the subexpression:

```
(<< 410662002 |Concept model attribute|623 MINUS 363698007 |Finding site|624 ) MINUS 116676008 |
Associated morphology|625
```

represents the set of attributes that must match the given refinement condition (in this case, these attributes must not appear in the concept definition of matching concepts due to the cardinality of [0..0]).

---

613 http://snomed.info/id/404684003
614 http://snomed.info/id/272379006
615 http://snomed.info/id/255234002
616 http://snomed.info/id/71388002
617 http://snomed.info/id/363698007
618 http://snomed.info/id/116676008
619 http://snomed.info/id/125605004
620 http://snomed.info/id/410662002
621 http://snomed.info/id/363698007
622 http://snomed.info/id/116676008
623 http://snomed.info/id/410662002
624 http://snomed.info/id/363698007
625 http://snomed.info/id/116676008

6.7.6 Attribute Values

Similarly to the SNOMED CT Compositional Grammar, it is also possible to nest expression constraints within an attribute value. Please note that when the attribute value is a simple expression constraint (as per the above examples), brackets are not required around the value. However, when the attribute value is either an expression constraint with a refinement, or a compound expression constraint with a binary operator, then brackets must be placed around the attribute value. For example, the following expression constraint represents the set of clinical findings which are associated with another clinical finding that has an associated morphology of 'infarct' (or subtype).

> < 404684003 |Clinical finding|[626] :
>   47429007 |Associated with|[627] = (< 404684003 |Clinical finding|[628] :
>   116676008 |Associated morphology|[629] = << 55641003 |Infarct|[630])

In this example, brackets are required around the nested attribute value " < 404684003 |Clinical finding| [631] : 116676008 |Associated morphology|[632] = << 55641003 |Infarct|[633] ".

6.8 6.8 Filter Constraints

In this section, we illustrate how filters can be applied to expression constraints to further restrict the matching concepts.

6.8.1 Overview

Filter constraints provide the ability to limit the set of concepts, that satisfy a given expression constraint, based on the descriptions associated with each concept. Only concepts that have at least one matching description for each filter constraint will be included in the set of matching concepts. Descriptions can be filtered based on their term, type, language, and acceptability in a given dialect.

6.8.2 Term Filter

Term filters enable an expression constraint to match on only those concepts with an associated description whose term matches the given search term. For example, the following expression constraint is satisfied by SNOMED CT

---

[626] http://snomed.info/id/404684003
[627] http://snomed.info/id/47429007
[628] http://snomed.info/id/404684003
[629] http://snomed.info/id/116676008
[630] http://snomed.info/id/55641003
[631] http://snomed.info/id/404684003
[632] http://snomed.info/id/116676008
[633] http://snomed.info/id/55641003

concepts with a description matching the search terms "heart" and "att". This expression constraint works like a term search performed in a SNOMED CT browser. * {{ term = "heart att" }} By default, term filters match using a word-prefix-any-order match technique. This means that each string value in the search term must match the start of a word in the concept's description term, but that these words may appear in any order. This word-prefix-any-order match technique can be explicitly specified in the term filter, using the keyword "match:" before the search term. For example, the following four expression constraints are equivalent, and are each satisfied only by diseases with a description term that includes both a word starting with "heart" **and** a word starting with "att" (in any order).

> < 64572001 |Disease|[634] {{ term = "heart att"}}

> < 64572001 |Disease|[635] {{ term = "heart", term = "att"}}

> < 64572001 |Disease|[636] {{ term = match:"heart att"}}

> < 64572001 |Disease|[637] {{ term = "att heart"}}

To indicate that a matching description may match either one search term or another, a search term set may be used.

The example below matches only those diseases with a description term containing **either** a word starting with "heart" **or** a word starting with "card" (or both).

> < 64572001 |Disease|[638] {{ term = ("heart" "card")}}

The other match technique that may be used is a wildcard match. This uses an asterisk ('*') to indicate zero to many characters in the given position, and is specified using the keyword "wild:" before the search term.

---

634 http://snomed.info/id/64572001
635 http://snomed.info/id/64572001
636 http://snomed.info/id/64572001
637 http://snomed.info/id/64572001
638 http://snomed.info/id/64572001

For example, the expression constraint below will match only diseases with a description term starting with "cardi" and ending with "opathy" with any number of characters between. This term filter would therefore match on terms such as "cardiopathy", "cardiomyopathy" and "cardiac channelopathy", but would **not** match on terms like "atrial cardiopathy" or "Cardiomyopathy (disorder)".

> < 64572001 |Disease|[639] {{ term = wild:"cardi*opathy"}}

It is also possible to mix the match techniques in a search term set. For example, the expression constraint below will match those diseases with a description term that either contains a word starting with "gas", or ending with "itis" - e.g. "gastric flu", "gastritis", or "tonsillitis".

> < 64572001 |Disease|[640] {{ term = (match:"gas" wild:"*itis")}}

If more than one filter is applied, then **all** filters (surrounded in double braces) must match at least one description of a concept, for that concept to satisfy the constraint. The descriptions that match each of the filters can either be the same description, or different descriptions on the same concept.

The expression constraint below matches those diseases which have **both** a description that contains a word starting "eye" **and** a description that ends with "itis". For example, this constraint would match the concept 9826008 |Conjunctivitis (disorder)|[641] (with synonyms "Pink eye disease" and "Conjunctivitis") and the concept 15680481000119104 |Viral conjunctivitis of bilateral eyes (disorder)|[642] (with synonyms "Bilateral viral conjunctivitis" and "Viral conjunctivitis of both eyes"), but would **not** match the concept 45261009 |Viral conjunctivitis (disorder)|[643] (which does not have a synonym matching the word prefix "eye").

> < 64572001 |Disease|[644] {{ term = "eye"}} {{ term = wild:"*itis"}}

Please note that filters apply only to the subexpression directly to the left of the filter. For example, the following expression constraint will apply the term filter to only the descendants or self of 415582006 |Stenosis|[645]. This expression constraint will match descendants of 404684003 |Clinical finding|[646] with a finding site that is a descendant or self of 39057004 |Pulmonary valve structure|[647], and an associated morphology that is any descendant or self of 415582006 |Stenosis|[648] which has a description matching the term "insufficiency". Therefore,

---

639 http://snomed.info/id/64572001
640 http://snomed.info/id/64572001
641 http://snomed.info/id/9826008
642 http://snomed.info/id/15680481000119104
643 http://snomed.info/id/45261009
644 http://snomed.info/id/64572001
645 http://snomed.info/id/415582006
646 http://snomed.info/id/404684003
647 http://snomed.info/id/39057004
648 http://snomed.info/id/415582006

the concept 123801008 |Heart valve stenosis and regurgitation (disorder)|[649] will match this expression constraint because it has the associated morphology 708027006 |Valvular stenosis with valvular insufficiency|[650].

```
<  404684003 |Clinical finding|[651] :
    363698007 |Finding site|[652]  = <<  39057004 |Pulmonary valve structure|[653] ,
    116676008 |Associated morphology|[654]  = <<  415582006 |Stenosis|[655] {{ term = "insufficiency" }}
```

To apply a filter to a subexpression, which includes a refinement or binary operators, the subexpression must be enclosed in brackets. For example, the following expression constraint will find all the descendants of clinical finding, with a finding site that is a descendant or self of 39057004 |Pulmonary valve structure|[656] and an associated morphology that is a descendant or self of 415582006 |Stenosis|[657], and will then match only those clinical finding concepts that have a description that matches the term "insufficiency". Therefore, the concept 123801008 |Heart valve stenosis and regurgitation (disorder)|[658] will **not** match this expression constraints, as it does not have a description that matches the term "insufficiency".

```
(<  404684003 |Clinical finding|[659] :
    363698007 |Finding site|[660]  = <<  39057004 |Pulmonary valve structure|[661] ,
    116676008 |Associated morphology|[662]  = <<  415582006 |Stenosis|[663] ) {{ term = "insufficiency" }}
```

6.8.3 Language Filter

Language filters enable an expression constraint to match on only those concepts with a matching description in a specified language. Language filters use the keyword "language", followed by a comparison operator (e.g. "=" or "!="), and the ISO 639-1 two-character language code (in upper or lowercase).

---

[649] http://snomed.info/id/123801008
[650] http://snomed.info/id/708027006
[651] http://snomed.info/id/404684003
[652] http://snomed.info/id/363698007
[653] http://snomed.info/id/39057004
[654] http://snomed.info/id/116676008
[655] http://snomed.info/id/415582006
[656] http://snomed.info/id/39057004
[657] http://snomed.info/id/415582006
[658] http://snomed.info/id/123801008
[659] http://snomed.info/id/404684003
[660] http://snomed.info/id/363698007
[661] http://snomed.info/id/39057004
[662] http://snomed.info/id/116676008
[663] http://snomed.info/id/415582006

The expression constraint below matches only those diseases with a Swedish description containing the word prefix "hjärt" - e.g. 41884003 |hjärtpolyp|[664] from the Swedish Edition (20200531)

```
 < 64572001 |Disease|[665]  {{ term = "hjärt", language = sv }}
```

The expression constraint below matches only those diseases with a Swedish description containing the word prefix "hjärt" and an English description containing the word prefix "heart" - e.g. 84114007 |hjärtsvikt|[666] (with English synonym "Heart failure") from the Swedish Edition (20200531).

```
 < 64572001 |Disease|[667]  {{ term = "hjärt", language = sv }} {{ term = "heart", language = en }}
```

6.8.4 Description Type Filter

Type filters enable an expression constraint to match on only those concepts with a matching description of a specified type. Type filters may either use the keyword "type" with the values "fsn", "syn" or "def", or may use the keyword "typeId" with a concept value that is < 900000000000446008 |Description type|[668] .

The following table lists the valid description type keywords in both the brief and full syntax, and their equivalent concept reference alternatives. Please note that the full syntax accepts both the brief and full syntax keywords. If additional description types are required, these must be specified in a filter using the 'typeId' keyword with the corresponding concept reference.

Type Keyword		TypeId
Brief Syntax	**Full Syntax**	**Concept Reference**
fsn	fullySpecifiedName	900000000000003001 |Fully specified name|
syn	synonym	900000000000013009 |Synonym|
def	definition	900000000000550004 |Definition|

For example, the expression constraint below matches all the subtypes of |Heart disease|[669], that have a fully specified name containing the word prefix "heart".

---

664 http://snomed.info/id/41884003
665 http://snomed.info/id/64572001
666 http://snomed.info/id/84114007
667 http://snomed.info/id/64572001
668 http://snomed.info/id/900000000000446008
669 http://snomed.info/id/56265001

```
<  56265001 |Heart disease|670  {{ term = "heart", type = fsn }}
```

The following two expression constraints are equivalent, and both match only the subtypes of |Heart disease|671, which have a Swedish synonym containing the word prefix "hjärt".

```
<  56265001 |Heart disease|672  {{ term = "hjärt", language = SV, type = syn }}
```

```
<  56265001 |Heart disease|673  {{ term = "hjärta", language = sv, typeId =  900000000000013009 |synonym|674  }}
```

The two equivalent expression constraints below match the subtypes of |Heart disease|675, which either have a synonym containing the word prefix "heart", or a fully specified name containing the word prefix "heart".

```
<  56265001 |Heart disease|676  {{ term = "heart", type = (syn fsn) }}
```

```
<  56265001 |Heart disease|677  {{ term = "heart", typeId = ( 900000000000013009 |Synonym|678
900000000000003001 |Fully specified name|679 ) }}
```

6.8.5 Dialect Filter

Dialect filters enable an expression constraint to match on only those concepts with a matching description in a specified language reference set. Dialect filters may either use the keyword "dialect" with a value that represents a valid alias for a specific language reference set, or may use the keyword "dialectId" with a concept value that is < 900000000000506000 |Language type reference set|680 . Please refer to Appendix C - Dialect Aliases(see page 187) for a selection of valid dialect aliases for known language reference sets.

For example, the two equivalent expression constraints below will match all subtypes of |Disease|681 that have a description in the Australian English language reference set.

```
<  64572001 |Disease|682  {{ dialect = en-au }}
```

---

670 http://snomed.info/id/56265001
671 http://snomed.info/id/56265001
672 http://snomed.info/id/56265001
673 http://snomed.info/id/56265001
674 http://snomed.info/id/900000000000013009
675 http://snomed.info/id/56265001
676 http://snomed.info/id/56265001
677 http://snomed.info/id/56265001
678 http://snomed.info/id/900000000000013009
679 http://snomed.info/id/900000000000003001
680 http://snomed.info/id/900000000000506000
681 http://snomed.info/id/64572001
682 http://snomed.info/id/64572001

< 64572001 |Disease|[683] {{ dialectId = 32570271000036106 |Australian English language reference set|[684] }}

The expression constraint below matches all diseases with a description in the New Zealand English language reference set that has a word starting with "cardio".

< 64572001 |Disease|[685] {{ term = "cardio", dialect = en-nz }}

In some situations, multiple language reference sets need to be used together to identify an appropriate set of concepts. A filter constraint may include a list of dialects to specify that a matching description may belong to any of the given language reference sets.

For example, the following expression constraint matches all diseases that have a description in either the en-nhs-clinical or en-nhs-pharmacy language reference sets, where that description contains a word starting with the prefix "card".

< 64572001 |Disease|[686] {{ term = "card", dialect = (en-nhs-clinical en-nhs-pharmacy) }}

6.8.6 Acceptability Filter

Acceptability filters enable an expression constraint to match on only those concepts with a matching description that has the specified acceptability in the specified language reference set. Acceptability filters must always be applied to a specified dialect. As such, they are represented by placing the required acceptability in brackets after the value of the dialect filter. Acceptabilities can be indicated using either one of the keywords below, or using a concept value that is < 900000000000511003 |Acceptability|[687] . The following table lists the valid acceptability keywords in both the brief and full syntax, and their equivalent concept reference alternatives. Please note that the full syntax accepts both the brief and full syntax keywords.

Acceptability Keyword		AcceptabilityId
Brief Syntax	Full Syntax	Concept Reference
prefer	preferred	900000000000548007 |Preferred|
accept	acceptable	900000000000549004 |Acceptable|

For example, the following two expression constraints both match all descendants of disease with a description that matches the word prefix 'box', has the type 'synonym', and has an acceptability of 'preferred' in the en-us

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[683] http://snomed.info/id/64572001
[684] http://snomed.info/id/32570271000036106
[685] http://snomed.info/id/64572001
[686] http://snomed.info/id/64572001
[687] http://snomed.info/id/900000000000511003

language reference set. In other words, this expression constraint matches diseases with a US English preferred term that uses the word prefix 'box'.

< 64572001 |Disease|[688] {{ term = "box", type = syn, dialect = en-us (prefer) }}

< 64572001 |Disease|[689] {{ term = "box", typeId = 900000000000013009 |Synonym|[690] , dialect = en-us (900000000000548007 |Preferred|[691]) }}

Multiple dialect filters may be used with different acceptabilities applied to each. For example, the expression constraint below matches on diseases, which have a synonym with word prefix "box" that is preferred in the en-nhs-clinical language reference set **and** is acceptable in the en-gb language reference set.

< 64572001 |Disease|[692] {{ term = "box", type = syn, dialect = en-nhs-clinical (prefer), dialect = en-gb (accept) }}

To support alternative acceptabilities in more than one language reference set, a dialect set can be used. For example, the following two equivalent expression constraints match on diseases, which have a synonym with word prefix "box" that is **either** preferred in the en-gb language reference set **or** preferred in the en-nhs-clinical language reference set.

< 64572001 |Disease|[693] {{ term = "box", type = syn, dialect = (en-gb (prefer) en-nhs-clinical (prefer)) }}

< 64572001 |Disease|[694] {{ term = "box", type = syn, dialect = (en-gb en-nhs-clinical) (prefer) }}

6.8.7 Filters with Negation

Filters can use negation in a number of ways. The simplest approach is to use the 'not equal to' comparison operator (e.g. "!=") before the value.

For example, the following expression constraint matches on subtypes of |Fracture of bone|[695] that do not use the word prefix "fracture" in their US English preferred term.

---

688 http://snomed.info/id/64572001
689 http://snomed.info/id/64572001
690 http://snomed.info/id/900000000000013009
691 http://snomed.info/id/900000000000548007
692 http://snomed.info/id/64572001
693 http://snomed.info/id/64572001
694 http://snomed.info/id/64572001
695 http://snomed.info/id/125605004

> < 125605004 |Fracture of bone|[696] {{ term != "fracture", type = syn, dialect = en-us (prefer)}}

If we remove the type and acceptability filters, as shown below, the remaining expression constraint matches on those subtypes of |Fracture of bone|[697] which have any US English description that does not contain the word prefix "fracture". Concepts including 263171005 |Fractured nasal bones|[698] (with synonym "Broken nose") will match the constraint below.

> < 125605004 |Fracture of bone|[699] {{ term != "fracture", dialect = en-us}}

To find the set of concepts, for which **all** descriptions match some specified criteria, the expression constraint must use the MINUS operation to exclude concepts that have a non-matching description. For example, the expression constraint below matches all subtypes of |Fracture of bone|[700], for which **every** description contains the word prefix "fracture". Please note that the filter only applies to the descendants of 125605004 |Fracture of bone|[701] (i.e. the subexpression directly proceeding the filter).

> < 125605004 |Fracture of bone|[702] MINUS < 125605004 |Fracture of bone|[703] {{ term != "fracture"}}

This expression constraint can be simplified to the equivalent one below, using the wildcard character '*' (which represents any concept in the substrate).

> < 125605004 |Fracture of bone|[704] MINUS * {{ term != "fracture"}}

Using a similar principle, the expression constraint below matches all concepts that do not have a preferred term specified in the en-nz language reference set.

> * MINUS * {{ type = syn, dialect = en-nz (prefer) }}

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696 http://snomed.info/id/125605004
697 http://snomed.info/id/125605004
698 http://snomed.info/id/263171005
699 http://snomed.info/id/125605004
700 http://snomed.info/id/125605004
701 http://snomed.info/id/125605004
702 http://snomed.info/id/125605004
703 http://snomed.info/id/125605004
704 http://snomed.info/id/125605004

7 7. Implementation Considerations

When implementing the SNOMED CT Expression Constraint Language, the factors that need to be taken into consideration depend on what tasks are being performed. For example, implementations may require expression constraints to be authored, parsed, validated, executed, stored, displayed or exchanged.

The subsections below look at each of these tasks individually and provide a summary of the factors that should be considered prior to implementation. Please note that the guidance provided below is not a step-by-step how-to manual, but instead provides some general insights that we hope are helpful in implementing this language specification.

7.1 7.1 Authoring

Authoring SNOMED CT Expression Constraints can be performed using two main techniques:

1. *Language-based authoring*: This technique involves the author constructing a SNOMED CT Expression Constraint using one of the syntaxes defined in Chapter 5.

2. *Form-based authoring*: This technique involves the author entering values into separate fields of a form, and the clinical system automatically composing the values together into a syntactically correct SNOMED CT Expression Constraint.

7.1.1 Language-Based Authoring

Language-based authoring is useful for situations in which ad hoc expression constraints must be defined which don't necessarily conform to a consistent structure. For example, some expression constraints (e.g. those that define terminology bindings or predefined queries) may be authored by software developers during the design, development or customization of a clinical application. Other expression constraints (e.g. those used to define intentional reference sets or validation queries) may be defined by terminologists during the process of developing a SNOMED CT extension. Expression constraints may also be authored by users who wish to retrieve or analyse information stored in patient records using SNOMED CT (e.g. for clinical, epidemiological or research queries).

To use language-based authoring, the user must be familiar with the basic features of the Expression Constraint Language syntax. There are, however, a number of ways in which a tool can support the user while creating expression constraints, including:

- Validating the syntactical correctness of the expression constraint as it is authored;
- Checking the expression constraint for conformance against the concept model;
- Automatically populating or correcting the term associated with a concept reference;
- Providing integrated tools to search the SNOMED CT hierarchy for concept references to include in the expression constraint;
- Filtering the concept search to those concepts which are valid to use at the given point in the expression constraint (e.g. only showing attribute concepts, or those within the valid range of the given attribute); and
- Suggesting the set of valid operators or characters that may be used at a given point in the expression constraint;

7.1.2 Form-Based Authoring

Form-based authoring is particularly useful when non-technical users need to create constraints or queries which have a consistent structure. In these situations, it may be useful to either:

- Create an 'expression constraint template' in which the attribute values are populated with the values that the user enters into the associated fields of the form;
- Create a form-driven query tool to support a useful subset of possible query structures.

One scenario in which the first form-based approach may be used is when there is a terminology-based dependency between the values of two fields on a user interface. For example, Figure 4 illustrates a simplified Procedures form in which the coded value entered into the *Procedure Type* field must be a descendant of the coded value entered into the *Procedure Category* field. When a *Procedure Category* of "Surgery" (i.e. 387713003 |Surgical procedure|[705]) is selected, the expression constraint " < 387713003 |Surgical procedure|[706]" is used to populate the value list for the *Procedure Type* field.
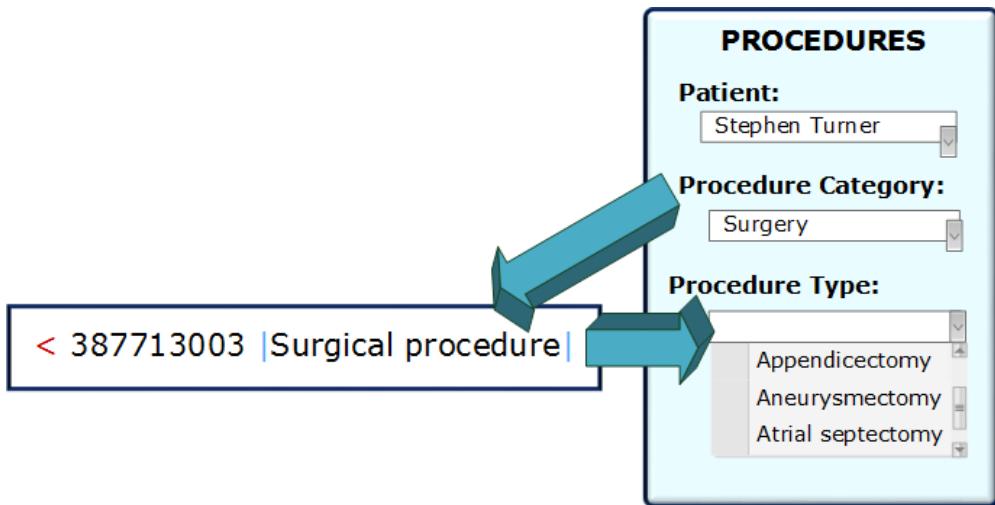
Figure 4: Authoring using expression constraint templates

The second form-based authoring technique mentioned above is a form-driven query tool. Figure 5 below illustrates a very simple form-driven query tool, in which the user selects the required operator (e.g. 'ancestorOf', 'descendantOf', 'memberOf') and operand (e.g. 'Example Problem List') and then defines one or more attribute refinements.

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[705] http://snomed.info/id/387713003
[706] http://snomed.info/id/387713003

Figure 5: Authoring using a form-driven query tool

7.2 7.2 Parsing

Parsing is the process of analysing a string of characters according to the rules of a formal grammar. Parsing a SNOMED CT Expression Constraint involves processing the expression constraint string using one of the ABNF syntax specifications defined in Chapter 5(see page 20), and breaking it into its constituent parts. This creates a representation of the expression constraint that can be further processed. Parsing an expression constraint is

required to perform syntactic validation, concept model validation or execution. It should be noted, when parsing, that all keywords in the language are case insensitive.

A number of parser development tools are available which can generate a parser from a context-free grammar written in ABNF, such as the one defined in this document. These tools include:

- APG
- aParse
- abnfgen

Please note, the ABNF syntax defined in this specification was tested using the APG Parser Generator [1](see page 0) .

Other non-ABNF parser generators are also available which can be used with an alternate syntax representation – for example:

- ANTLR
- XText
- ACE

Some of these tools (e.g. XText and ACE) can also be used to generate authoring environments with features such as syntax highlighting and autocompletion.

Alternatively, an expression constraint parser can be created manually using a programming language such as Perl or C++.

⬜(see page 0) www.coasttocoastresearch.com[707]

7.3 7.3 Validating

SNOMED CT Expression Constraints can be automatically validated to ensure that they conform to a variety of rules, including:

- Expression constraints must conform to one of the syntaxes defined in Chapter 5(see page 20). Syntactic validation can be performed using an expression parser, as described in Section 7.2(see page 118);
- Expression constraints must conform to the concept model. This validation can be performed by comparing the parsed expression constraint against the rules defined in the SNOMED CT concept model;
- All concept references included in the expression constraint must be valid. In most cases this means that the concept references must refer to active concepts in the given version and edition of SNOMED CT;
- All concept references used to refer to attribute names must be a descendant of 246061005 |Attribute|[708];
- All concept references to which a memberOf function is applied must be a descendant of 900000000000455006 |Reference set|[709];
- All concept references to which a memberOf function is applied must contain only referencedComponentIds that refer to concepts.

Please note that some of these rules may not apply in all environments.

7.4 7.4 Executing

SNOMED CT Expression Constraints must be evaluated against a given SNOMED CT substrate in order to instantiate the matching set of concepts or expressions. There are a number of possible implementation strategies for the execution of SNOMED CT Expression Constraints, which depend in part on the storage format of the substrate. For example:

- Store SNOMED CT in a relational database, and translate each SNOMED CT Expression Constraint into one or more SQL statements;
- Store SNOMED CT in an RDF store, and translate each SNOMED CT Expression Constraint into a SPARQL query;
- Store SNOMED CT in an XML database, and translate each SNOMED CT Expression Constraint into one or more XQL statements;
- Write a bespoke query execution engine (e.g. in Java or C++) to return matching concepts or expressions.

Each of these strategies requires that the expression constraints are first parsed (and preferably validated) prior to execution.

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[707] http://www.coasttocoastresearch.com
[708] http://snomed.info/id/246061005
[709] http://snomed.info/id/900000000000455006

7.5 7.5 Storing

Storing SNOMED CT Expression Constraints in an expression constraint library may be done for a variety of purposes, including:

- To enable expression constraints to be re-executed (without re-authoring) after updates are made to the SNOMED CT substrate or the expression constraint itself;
- To provide a library of terminology binding constraints against which record instances will be validated;
- To provide a library of concept model constraints against which terminology artefacts (e.g. extensions, expressions) will be validated;
- To provide a library of predefined queries that may be shared by multiple users;
- To provide a library of terminology binding constraints that may be shared within a standards community.

A library of SNOMED CT Expression Constraints may be implemented using a number of techniques, including:

- Creating a Query specification reference set that records the expression constraint as the 'query';
- Creating a customized RF2 reference set with one or more new attributes that allow the expression constraint string and relevant metadata to be recorded;
- Creating a table in a relational database to store the SNOMED CT Expression Constraint and associated metadata;
- Creating a text file with a consistent structural format to store the SNOMED CT Expression Constraint and associated metadata;

In many cases it is useful to assign a unique identifier to each expression constraint in the library, so that they can be indexed and referenced for faster retrieval.

7.6 7.6 Displaying

A number of options exist for displaying SNOMED CT Expression Constraints, including:

- Displaying the expression constraint using SNOMED CT Expression Constraint Language in its originally authored and stored form;

- Converting the expression constraint to use either all symbols (as per the Brief Syntax), or all human-readable operators (as per alternate text introduced in the Long Syntax);
- Enhancing the expression constraint by adding in terms that may have been omitted, or replacing the existing terms with either local-dialect Preferred Terms or Fully Specified Names;
- Hiding the SNOMED CT identifiers for each concept and displaying only the Preferred Terms;
- Enhancing the display by using different font colors for each different part of the expression constraint (e.g. identifiers, terms, vertical bars, and operators), and by using whitespace in a way that improves the readability of the expression;
- Automatically transforming the expression constraint into a human-readable string using a predefined algorithm. For example, a simple algorithm may convert the symbols to text and remove the concept identifiers – e.g. "Descendants of fracture of bone: Finding site = Descendants or self of arm". More sophisticated algorithms may use pattern matching and predefined templates to construct a more natural string;
- Representing the operators, operands and attribute values of the expression constraint by populating a structured form. This approach is primarily suited to expression constraints with a consistent template, where the form can be pre-designed.

Which of these options is most appropriate to use when displaying expression constraints, will depend on a number of factors, including the type of users that will be viewing the constraints, the scope of the required constraint functionality, and the capabilities of the system implementation.

7.7 7.7 Exchanging

SNOMED CT Expression Constraints can be shared between systems and users via a number of methods, including:

- Exchanging an expression constraint string which conforms to the Brief Syntax of the Expression Constraint Language[710];
- Exchanging an expression constraint identifier, which can be unambiguously interpreted by the receiving system. If this approach is adopted it is recommended that an expression constraint repository is used to ensure that both the sending and receiving systems have a shared and consistent understanding of the meaning of each expression constraint.

Irrespective of the method used, it is recommended that the Brief Syntax of the SNOMED CT Expression Constraint Language[711] be used as the normative syntax for the interoperable sharing of expression constraints.

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[710] http://snomed.org/ecl
[711] http://snomed.org/ecl

8 Appendix A – Examples Of Valid Expressions

This appendix provides examples of expressions (both precoordinated and postcoordinated) which satisfy each of the expression constraints that were introduced in Chapter 6(see page 53). This list of examples is not intended to be exhaustive, but rather to provide a representative sample to help clarify the meaning of each constraint. It is assumed that each particular usage of an expression constraint will clearly identify whether or not postcoordinated expressions are part of the valid substrate. Please refer to the SNOMED CT Languages Github repository[712] for a set of text files containing each of these examples.

8.1 A.1 Simple Expression Constraints - Valid Expressions

Expression Constraint	Valid Expression [1](see page 0)	
	Precoordinated	**Postcoordinated**
404684003 |Clinical finding|[713]	404684003 |Clinical finding|[714]	-

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[712] https://github.com/IHTSDO/SNOMEDCT-Languages
[713] http://snomed.info/id/404684003
[714] http://snomed.info/id/404684003

< 404684003 |Clinical finding|[715]	64572001 |Disease|[716]	404684003 |Clinical finding|[717] : 363698007 |Finding site|[718] = 80891009 |Heart structure|[719]
	56265001 |Heart disease|[720]	
<< 73211009 |Diabetes mellitus|[721]	73211009 |Diabetes mellitus|[722]	73211009 |Diabetes mellitus|[723] : 42752001 |Due to|[724] = 61823004 |Injury of pancreas|[725]
	46635009 |Diabetes mellitus type 1|[726]	
	105401000119101 |Diabetes mellitus due to pancreatic injury|[727]	
<! 404684003 |Clinical finding|[728]	64572001 |Disease|[729]	404684003 |Clinical finding|[730] : 116676008 |Associated morphology|[731] = 79654002 |Edema|[732] [2 (see page 0)]
	267038008 |Edema|[733]	
> 40541001 |Acute pulmonary edema|[734]	111273006 |Acute respiratory disease|[735]	64572001 |Disease|[736] : 116676008 |Associated morphology|[737] = 79654002 |Edema|[738] ,

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[715] http://snomed.info/id/404684003
[716] http://snomed.info/id/64572001
[717] http://snomed.info/id/404684003
[718] http://snomed.info/id/363698007
[719] http://snomed.info/id/80891009
[720] http://snomed.info/id/56265001
[721] http://snomed.info/id/73211009
[722] http://snomed.info/id/73211009
[723] http://snomed.info/id/73211009
[724] http://snomed.info/id/42752001
[725] http://snomed.info/id/61823004
[726] http://snomed.info/id/46635009
[727] http://snomed.info/id/105401000119101
[728] http://snomed.info/id/404684003
[729] http://snomed.info/id/64572001
[730] http://snomed.info/id/404684003
[731] http://snomed.info/id/116676008
[732] http://snomed.info/id/79654002
[733] http://snomed.info/id/267038008
[734] http://snomed.info/id/40541001
[735] http://snomed.info/id/111273006
[736] http://snomed.info/id/64572001
[737] http://snomed.info/id/116676008

	404684003 |Clinical finding|[741]	363698007 |Finding site|[739] = 39607008 |Lung structure|[740]
	138875005 |SNOMED CT concept|[742]	
>> 40541001 |Acute pulmonary edema|[743]	40541001 |Acute pulmonary edema|[744]	64572001 |Disease|[745] : 263502005 |Clinical course|[746] = 424124008 |Sudden onset AND/OR short duration|[747] , { 116676008 |Associated morphology|[748] = 40829002 |Acute edema|[749] , 363698007 |Finding site|[750] = 39607008 |Lung structure|[751] }
	111273006 |Acute respiratory disease|[752]	
	404684003 |Clinical finding|[753]	
	138875005 |SNOMED CT concept|[754]	
>! 40541001 |Acute pulmonary edema|[755]	111273006 |Acute respiratory disease|[756]	19829001 |Disorder of lung|[757] : { 116676008 |Associated morphology|[758] = 79654002 |Edema|[759] , 363698007 |Finding site|[760] =

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[741] http://snomed.info/id/404684003
[739] http://snomed.info/id/363698007
[740] http://snomed.info/id/39607008
[742] http://snomed.info/id/138875005
[743] http://snomed.info/id/40541001
[744] http://snomed.info/id/40541001
[745] http://snomed.info/id/64572001
[746] http://snomed.info/id/263502005
[747] http://snomed.info/id/424124008
[748] http://snomed.info/id/116676008
[749] http://snomed.info/id/40829002
[750] http://snomed.info/id/363698007
[751] http://snomed.info/id/39607008
[752] http://snomed.info/id/111273006
[753] http://snomed.info/id/404684003
[754] http://snomed.info/id/138875005
[755] http://snomed.info/id/40541001
[756] http://snomed.info/id/111273006
[757] http://snomed.info/id/19829001
[758] http://snomed.info/id/116676008
[759] http://snomed.info/id/79654002
[760] http://snomed.info/id/363698007

	19242006 |Pulmonary edema|[762]	39607008 |Lung structure|[761] } [3](see page 0)
^ 700043003 |Example problem list concepts reference set|[763]	394659003 |Acute coronary syndrome|[764]	-
	194828000 |Angina|[765]	
	29857009 |Chest pain|[766]	
*	138875005 |SNOMED CT concept|[767]	404684003 |Clinical finding|[768] : 363698007 |Finding site|[769] = 80891009 |Heart structure|[770]
	404684003 |Clinical finding|[771]	71388002 |Procedure|[772] : 405813007 |Procedure site - Direct|[773] = 66754008 |Appendix structure|[774]
	322236009 |Paracetamol 500mg tablet|[775]	373873005 |Pharmaceutical / biologic product|[776] : { 127489000 |Has active ingredient|[777] = 412031009 |Paracetamol or derivative|[778] }

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[762] http://snomed.info/id/19242006
[761] http://snomed.info/id/39607008
[763] http://snomed.info/id/700043003
[764] http://snomed.info/id/394659003
[765] http://snomed.info/id/194828000
[766] http://snomed.info/id/29857009
[767] http://snomed.info/id/138875005
[768] http://snomed.info/id/404684003
[769] http://snomed.info/id/363698007
[770] http://snomed.info/id/80891009
[771] http://snomed.info/id/404684003
[772] http://snomed.info/id/71388002
[773] http://snomed.info/id/405813007
[774] http://snomed.info/id/66754008
[775] http://snomed.info/id/322236009
[776] http://snomed.info/id/373873005
[777] http://snomed.info/id/127489000
[778] http://snomed.info/id/412031009

[1](see page 0) Where necessary, these examples make some assumptions about the membership of the example reference sets.

[2](see page 0) Please note that this makes the assumption that the given expression constraint is executed against a finite set of expressions that has been pre-classified (e.g. in an expression repository), and that after classification there are no intermediate expressions between this expression and 404684003 |Clinical finding|[779].

[3](see page 0) Please note that this makes the assumption that the given expression constraint is executed against a finite set of expressions that has been pre-classified (e.g. in an expression repository), and that after classification there are no intermediate expressions between 40541001 |Acute pulmonary edema|[780] and this expression.

8.2 A.2 Refinements - Valid Expressions

Expression Constraint	Valid Expression [1](see page 0) [2](see page 0)	
	Precoordinated	**Postcoordinated**
< 19829001 |Disorder of lung|[781] : 116676008 |Associated morphology|[782] = 79654002 |Edema|[783]	11468004	Postoperative pulmonary edema|[784]	210051003 |Injury to heart and lung|[785] : 116676008 |Associated morphology|[786] = 79654002 |Edema|[787]
	276637009	Hemorrhagic pulmonary edema|[788]	

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[779] http://snomed.info/id/404684003
[780] http://snomed.info/id/40541001
[781] http://snomed.info/id/19829001
[782] http://snomed.info/id/116676008
[783] http://snomed.info/id/79654002
[784] http://snomed.info/id/11468004
[785] http://snomed.info/id/210051003
[786] http://snomed.info/id/116676008
[787] http://snomed.info/id/79654002
[788] http://snomed.info/id/276637009

< 19829001 |Disorder of lung|[789] :
   116676008 |Associated morphology|[790] =
     << 79654002 |Edema|[791]
	233709006 |Toxic pulmonary edema|[792]	275504005 |Lung cyst|[793] :
		   116676008 |Associated morphology|[794]
		   = 103619005 |Inflammatory edema|[795]

	233711002 |Oxygen-induced pulmonary edema|[796]	19829001 |Disorder of lung|[797] :
		   116676008 |Associated morphology|[798]
		   = 40829002 |Acute edema|[799]

< 404684003 |Clinical finding|[800] :
   363698007 |Finding site|[801] =
     << 39057004 |Pulmonary valve structure|[802] ,
   116676008 |Associated morphology|[803] =
     << 415582006 |Stenosis|[804]
	56786000 |Pulmonic valve stenosis|[805]	56786000 |Pulmonic valve stenosis|[806] :
		   363698007 |Finding site|[807] = 90318009 |Structure of anulus fibrosus of pulmonary artery|[808] ,
		   116676008 |Associated morphology|[809]
		   = 88015002 |Partial stenosis|[810]

[789] http://snomed.info/id/19829001
[790] http://snomed.info/id/116676008
[791] http://snomed.info/id/79654002
[792] http://snomed.info/id/233709006
[793] http://snomed.info/id/275504005
[794] http://snomed.info/id/116676008
[795] http://snomed.info/id/103619005
[796] http://snomed.info/id/233711002
[797] http://snomed.info/id/19829001
[798] http://snomed.info/id/116676008
[799] http://snomed.info/id/40829002
[800] http://snomed.info/id/404684003
[801] http://snomed.info/id/363698007
[802] http://snomed.info/id/39057004
[803] http://snomed.info/id/116676008
[804] http://snomed.info/id/415582006
[805] http://snomed.info/id/56786000
[806] http://snomed.info/id/56786000
[807] http://snomed.info/id/363698007
[808] http://snomed.info/id/90318009
[809] http://snomed.info/id/116676008
[810] http://snomed.info/id/88015002

	86299006 |Tetralogy of Fallot|[811]	404684003 |Clinical finding|[812] : 363698007 |Finding site|[813] = 39057004 |Pulmonary valve structure|[814] , 116676008 |Associated morphology|[815] = 415582006 |Stenosis|[816]
* : 246075003 |Causative agent|[817] = 387517004 |Paracetamol|[818]	295124009 |Paracetamol overdose|[819]	404684003 |Clinical finding|[820] : 246075003 |Causative agent|[821] = 387517004 |Paracetamol|[822]
	292042007 |Adverse reaction to paracetamol|[823]	

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[811] http://snomed.info/id/86299006
[812] http://snomed.info/id/404684003
[813] http://snomed.info/id/363698007
[814] http://snomed.info/id/39057004
[815] http://snomed.info/id/116676008
[816] http://snomed.info/id/415582006
[817] http://snomed.info/id/246075003
[818] http://snomed.info/id/387517004
[819] http://snomed.info/id/295124009
[820] http://snomed.info/id/404684003
[821] http://snomed.info/id/246075003
[822] http://snomed.info/id/387517004
[823] http://snomed.info/id/292042007

< 404684003 |Clinical finding|[824] : { 363698007 |Finding site|[825] = << 39057004 |Pulmonary valve structure|[826] , 116676008 |Associated morphology|[827] = << 415582006 |Stenosis|[828] }, { 363698007 |Finding site|[829] = << 53085002 |Right ventricular structure|[830] , 116676008 |Associated morphology|[831] = << 56246009 |Hypertrophy|[832] }	86299006 | Tetralogy of Fallot| [833] 204351007 |Fallot's trilogy|[843]	404684003 |Clinical finding|[834] : { 363698007 |Finding site|[835] = 31689007 |Structure of cusp of pulmonic valve|[836] , 116676008 |Associated morphology|[837] = 415582006 |Stenosis|[838] }, { 363698007 |Finding site|[839] = 53085002 | Right ventricular structure|[840] , 116676008 |Associated morphology|[841] = 125521000 |Acute hypertrophy|[842] }
<< 404684003 |Clinical finding|[844] : << 47429007 |Associated with|[845] = << 267038008 |Edema|[846]	230580009 | Myxedema neuropathy|[847]	95356008 |Mucosal ulcer|[848] : 42752001 |Due to|[849] = 19242006 | Pulmonary edema|[850]

[824] http://snomed.info/id/404684003
[825] http://snomed.info/id/363698007
[826] http://snomed.info/id/39057004
[827] http://snomed.info/id/116676008
[828] http://snomed.info/id/415582006
[829] http://snomed.info/id/363698007
[830] http://snomed.info/id/53085002
[831] http://snomed.info/id/116676008
[832] http://snomed.info/id/56246009
[833] http://snomed.info/id/86299006
[834] http://snomed.info/id/404684003
[835] http://snomed.info/id/363698007
[836] http://snomed.info/id/31689007
[837] http://snomed.info/id/116676008
[838] http://snomed.info/id/415582006
[839] http://snomed.info/id/363698007
[840] http://snomed.info/id/53085002
[841] http://snomed.info/id/116676008
[842] http://snomed.info/id/125521000
[843] http://snomed.info/id/204351007
[844] http://snomed.info/id/404684003
[845] http://snomed.info/id/47429007
[846] http://snomed.info/id/267038008
[847] http://snomed.info/id/230580009
[848] http://snomed.info/id/95356008
[849] http://snomed.info/id/42752001
[850] http://snomed.info/id/19242006

< 27658006 |Amoxicillin|[851] :
411116001 |Has dose form|[852] =
  << 385055001 |Tablet dose form|[853] ,
{ 179999999100 |Has basis of strength|[854] =
  (219999999102 |Amoxicillin only|[855] :
  189999999103 |Has strength magnitude|[856] >= #200,
  199999999101 |Has strength unit|[857] = 258684004 |mg|[858])}
	374644001 |
	Amoxicillin
	trihydrate 200 mg
	tablet|[859]
		27658006 |Amoxicillin|[860] :
		  411116001 |Has dose form|[861] =
		421026006 |Oral tablet|[862] ,
		{ 127489000 |Has active ingredient|[863] =
		96068000 |Amoxicillin trihydrate|[864] ,
		  179999999100 |Has basis of strength|[865]
		= (219999999102 |Amoxicillin only|[866] :
		  189999999103 |Has strength magnitude|[867] = #500,
		  199999999101 |Has strength unit|[868] =
		258684004 |mg|[869])}

< 27658006 |Amoxicillin|[870] :
411116001 |Has dose form|[871] =
  << 385055001 |Tablet dose form|[872] ,
{ 179999999100 |Has basis of strength|[873] = (219999999102 |Amoxicillin only|
	374646004 |
	Amoxicillin 500 mg
	tablet|[879]
		27658006 |Amoxicillin|[880] :
		  411116001 |Has dose form|[881] =
		421026006 |Oral tablet|[882] ,
		{ 179999999100 |Has basis of strength|[883]
		= (219999999102 |Amoxicillin only|[884] :
		  189999999103 |Has strength magnitude|[885] = #750,

851 http://snomed.info/id/27658006
852 http://snomed.info/id/411116001
853 http://snomed.info/id/385055001
854 http://snomed.org/fictid#179999999100
855 http://snomed.org/fictid#219999999102
856 http://snomed.org/fictid#189999999103
857 http://snomed.org/fictid#199999999101
858 http://snomed.info/id/258684004
859 http://snomed.info/id/374644001
860 http://snomed.info/id/27658006
861 http://snomed.info/id/411116001
862 http://snomed.info/id/421026006
863 http://snomed.info/id/127489000
864 http://snomed.info/id/96068000
865 http://snomed.org/fictid#179999999100
866 http://snomed.org/fictid#219999999102
867 http://snomed.org/fictid#189999999103
868 http://snomed.org/fictid#199999999101
869 http://snomed.info/id/258684004
870 http://snomed.info/id/27658006
871 http://snomed.info/id/411116001
872 http://snomed.info/id/385055001
873 http://snomed.org/fictid#179999999100
879 http://snomed.info/id/374646004
880 http://snomed.info/id/27658006
881 http://snomed.info/id/411116001
882 http://snomed.info/id/421026006
883 http://snomed.org/fictid#179999999100
884 http://snomed.org/fictid#219999999102
885 http://snomed.org/fictid#189999999103

<table>
<tr>
<td>

[874] :
   189999999103 |Has strength magnitude|[875] >= #500,
   189999999103 |Has strength magnitude|[876] <= #800,
   199999999101 |Has strength unit|[877] = 258684004 |mg|[878])}

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<td>

   199999999101 |Has strength unit|[886] = 258684004 |mg|[887])}

</td>
</tr>
<tr>
<td>

< 373873005 |Pharmaceutical / biologic product|[888] :
   209999999104 |Has trade name|[889] = "PANADOL"

</td>
<td>

259999999103 | PANADOL [paracetamol] tablet|[890]

</td>
<td>

373873005 |Pharmaceutical / biologic product|[891] :
 { 127489000 |Has active ingredient|[892] = 412031009 |Paracetamol or derivative|[893] },
   209999999104 |Has trade name|[894] = "PANADOL"

</td>
</tr>
</table>

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874 http://snomed.org/fictid#219999999102
875 http://snomed.org/fictid#189999999103
876 http://snomed.org/fictid#189999999103
877 http://snomed.org/fictid#199999999101
878 http://snomed.info/id/258684004
886 http://snomed.org/fictid#199999999101
887 http://snomed.info/id/258684004
888 http://snomed.info/id/373873005
889 http://snomed.org/fictid#209999999104
890 http://snomed.org/fictid#259999999103
891 http://snomed.info/id/373873005
892 http://snomed.info/id/127489000
893 http://snomed.info/id/412031009
894 http://snomed.org/fictid#209999999104

< 91723000 |Anatomical structure|[895] :
  R 363698007 |Finding site|[896] =
    < 125605004 |Fracture of bone|[897]
	85050009 |Humerus|[898]	85050009 |Humerus|[899] :
		  272741003 |Laterality|[900] = 7771000 |Left|[901]

	71341001 |Femur|[902]	71341001 |Femur|[903] : 272741003 |Laterality|[904] = 24028007 |Right|[905]
	< 125605004 |Fracture of bone|[906] . 363698007 |Finding site|[907]	85050009 |Humerus|[908]

85050009 \|Humerus\|[909] :

27 27 41 00 3 \|La te

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[895] http://snomed.info/id/91723000
[896] http://snomed.info/id/363698007
[897] http://snomed.info/id/125605004
[898] http://snomed.info/id/85050009
[899] http://snomed.info/id/85050009
[900] http://snomed.info/id/272741003
[901] http://snomed.info/id/7771000
[902] http://snomed.info/id/71341001
[903] http://snomed.info/id/71341001
[904] http://snomed.info/id/272741003
[905] http://snomed.info/id/24028007
[906] http://snomed.info/id/125605004
[907] http://snomed.info/id/363698007
[908] http://snomed.info/id/85050009
[909] http://snomed.info/id/85050009

		ra lit y| [910] = 77 71 00 0 | Le ft| [911]
	71341001 |Femur|[912]	71 34 10 01 | Fe m ur | [913] : 27 27 41 00 3 | La te ra lit y| [914] = 24 02 80 07 | Ri gh t

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[910] http://snomed.info/id/272741003
[911] http://snomed.info/id/7771000
[912] http://snomed.info/id/71341001
[913] http://snomed.info/id/71341001
[914] http://snomed.info/id/272741003

		t| [915]
		395938000	Clavulanate potassium	[919]	-
< 105590001	Substance| [916] : R << 127489000	Has active ingredient| [917] = < 27658006	Product containing amoxicillin| [918]	387137007 |Omeprazole| [920]	
	395938000 |Clavulanate potassium| [923]	-
< 27658006	Product containing amoxicillin| [921] . << 127489000	Has active ingredient| [922]	387137007 |Omeprazole| [924]	
	19242006 |Pulmonary edema| [927]	40 46 84 00 3	Cli ni ca l fi n di ng	
< 404684003	Clinical finding| [925] : * = 79654002	Edema| [926]		

[915] http://snomed.info/id/24028007
[916] http://snomed.info/id/105590001
[917] http://snomed.info/id/127489000
[918] http://snomed.info/id/27658006
[919] http://snomed.info/id/395938000
[920] http://snomed.info/id/387137007
[921] http://snomed.info/id/27658006
[922] http://snomed.info/id/127489000
[923] http://snomed.info/id/395938000
[924] http://snomed.info/id/387137007
[925] http://snomed.info/id/404684003
[926] http://snomed.info/id/79654002
[927] http://snomed.info/id/19242006

	97341000119105 Proliferative retinopathy with retinal edema due to type	928 : 116676008 |Associated morphology|[929] = 79654002 |Edema|[930]
< 404684003 |Clinical finding|[931] : 116676008 |Associated morphology|[932] = *	19242006 |Pulmonary edema|[933]	404684003 |Clinical fin

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[928] http://snomed.info/id/404684003
[929] http://snomed.info/id/116676008
[930] http://snomed.info/id/79654002
[931] http://snomed.info/id/404684003
[932] http://snomed.info/id/116676008
[933] http://snomed.info/id/19242006

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934 http://snomed.info/id/404684003
935 http://snomed.info/id/116676008
936 http://snomed.info/id/79654002

263225007 |Hip fracture|[937]

4046840003 |Clinical finding|[938] : 116676008 |Associated morphology|[939] = 72704001 |

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[937] http://snomed.info/id/263225007
[938] http://snomed.info/id/404684003
[939] http://snomed.info/id/116676008

			Fr ac tu re | 940

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[1](see page 0) Please note that some of these examples are based on a hypothetical drug concept model. These examples are not intended to reflect any specific drug model.

[2](see page 0) SNOMED CT identifiers with the '9999999' namespace were created for example only, and should not be used in a production environment.

8.3 A.3 Cardinality - Valid Expressions

Expression Constraint	**Valid Expression** [1](see page 0)	
	Precoordinated	**Postcoordinated**
< 373873005 |Pharmaceutical / biologic product|[941] : [1..3] 127489000 |Has active ingredient|[942] =< 105590001 |Substance|[943]	322236009 |Paracetamol 500mg tablet|[944]	373873005 |Pharmaceutical / biologic product|[945] : { 127489000 |Has active ingredient|[946] = 412031009 |Paracetamol or derivative|[947] }
	404826002 |Benzocaine + butamben + tetracaine hydrochloride|[948]	373873005 |Pharmaceutical / biologic product|[949] : { 127489000 |Has active ingredient|[950] = 412031009 |Paracetamol or derivative|[951] }, { 127489000 |Has active ingredient|

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940 http://snomed.info/id/72704001
941 http://snomed.info/id/373873005
942 http://snomed.info/id/127489000
943 http://snomed.info/id/105590001
944 http://snomed.info/id/322236009
945 http://snomed.info/id/373873005
946 http://snomed.info/id/127489000
947 http://snomed.info/id/412031009
948 http://snomed.info/id/404826002
949 http://snomed.info/id/373873005
950 http://snomed.info/id/127489000
951 http://snomed.info/id/412031009

	952 = 387494007 |Codeine|[953] }
< 373873005 |Pharmaceutical / biologic product|[954] : [1..1] 127489000 |Has active ingredient|[955] = < 105590001 |Substance|[956]	370166004 |Aspirin 325mg tablet|[957]	373873005 |Pharmaceutical / biologic product|[958] : { 127489000 |Has active ingredient|[959] = 412031009 |Paracetamol or derivative|[960] }
< 373873005 |Pharmaceutical / biologic product|[961] : [0..1] 127489000 |Has active ingredient|[962] = < 105590001 |Substance|[963]	279999999108 |Inert tablet|[964] 370166004 |Aspirin 325mg tablet|[968]	373873005 |Pharmaceutical / biologic product|[965] : { 127489000 |Has active ingredient|[966] = 412031009 |Paracetamol or derivative|[967] }
< 373873005 |Pharmaceutical / biologic product|[969] : [1..*] 127489000 |Has active ingredient|[970] = < 105590001 |Substance|[971]	7947003 |Aspirin|[972]	373873005 |Pharmaceutical / biologic product|[973] : { 127489000 |Has active ingredient|[974] = 412031009 |Paracetamol or derivative|[975] }, { 127489000 |Has active ingredient|[976] = 255641001 |Caffeine|[977] },

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[952] http://snomed.info/id/127489000
[953] http://snomed.info/id/387494007
[954] http://snomed.info/id/373873005
[955] http://snomed.info/id/127489000
[956] http://snomed.info/id/105590001
[957] http://snomed.info/id/370166004
[958] http://snomed.info/id/373873005
[959] http://snomed.info/id/127489000
[960] http://snomed.info/id/412031009
[961] http://snomed.info/id/373873005
[962] http://snomed.info/id/127489000
[963] http://snomed.info/id/105590001
[964] http://snomed.org/fictid#279999999108
[965] http://snomed.info/id/373873005
[966] http://snomed.info/id/127489000
[967] http://snomed.info/id/412031009
[968] http://snomed.info/id/370166004
[969] http://snomed.info/id/373873005
[970] http://snomed.info/id/127489000
[971] http://snomed.info/id/105590001
[972] http://snomed.info/id/7947003
[973] http://snomed.info/id/373873005
[974] http://snomed.info/id/127489000
[975] http://snomed.info/id/412031009
[976] http://snomed.info/id/127489000

	437867004 |Chlorphenamine + dextromethorphan + paracetamol + pseudoephedrine|[980]	{ 127489000 |Has active ingredient|[978] = 387458008 |Aspirin|[979] }
< 404684003 |Clinical finding|[981] : [1..1] 363698007 |Finding site|[982] = < 91723000 |Anatomical structure|[983]	125596004 |Injury of elbow|[984]	404684003 |Clinical finding|[985] : { 116676008 |Associated morphology|[986] = 72704001 |Fracture|[987] , 363698007 |Finding site|[988] = 299701004 |Bone of forearm|[989] , 363698007 |Finding site|[990] = 62413002 |Bone structure of radius |[991] } 2 (see page 0)
< 404684003 |Clinical finding|[992] : [2..*] 363698007 |Finding site|[993] = < 91723000 |Anatomical structure|[994]	86299006 |Tetralogy of Fallot|[995]	404684003 |Clinical finding|[996] : { 116676008 |Associated morphology|[997] = 72704001 |Fracture|[998] , 363698007 |Finding site|[999] = 299701004 |Bone of forearm|[1000] }, { 116676008 |Associated morphology|[1001] = 72704001 |Fracture|[1002] , 363698007 |Finding site|[1003] =

[980] http://snomed.info/id/437867004
[978] http://snomed.info/id/127489000
[979] http://snomed.info/id/387458008
[981] http://snomed.info/id/404684003
[982] http://snomed.info/id/363698007
[983] http://snomed.info/id/91723000
[984] http://snomed.info/id/125596004
[985] http://snomed.info/id/404684003
[986] http://snomed.info/id/116676008
[987] http://snomed.info/id/72704001
[988] http://snomed.info/id/363698007
[989] http://snomed.info/id/299701004
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[991] http://snomed.info/id/62413002
[992] http://snomed.info/id/404684003
[993] http://snomed.info/id/363698007
[994] http://snomed.info/id/91723000
[995] http://snomed.info/id/86299006
[996] http://snomed.info/id/404684003
[997] http://snomed.info/id/116676008
[998] http://snomed.info/id/72704001
[999] http://snomed.info/id/363698007
[1000] http://snomed.info/id/299701004
[1001] http://snomed.info/id/116676008
[1002] http://snomed.info/id/72704001
[1003] http://snomed.info/id/363698007

		702468001 |Bone structure of lower leg|[1004] }
< 404684003 |Clinical finding|[1005] : { [2..*] 363698007 |finding site|[1006] = < 91723000 |Anatomical structure|[1007] }	-	64572001 |Disease|[1008] : { 116676008 |Associated morphology|[1009] = 396351009 |Congenital septal defect|[1010] , 363698007 |Finding site|[1011] = 25943004 |Structure of atrioventricular node|[1012] , 363698007 |Finding site|[1013] = 113262008 |Thoracic aorta structure|[1014] } { 116676008 |Associated morphology|[1015] = 90141005 |Congenital hypertrophy|[1016] , 363698007 |Finding site|[1017] = 244384009 |Entire right ventricle|[1018] }

[1004] http://snomed.info/id/702468001
[1005] http://snomed.info/id/404684003
[1006] http://snomed.info/id/363698007
[1007] http://snomed.info/id/91723000
[1008] http://snomed.info/id/64572001
[1009] http://snomed.info/id/116676008
[1010] http://snomed.info/id/396351009
[1011] http://snomed.info/id/363698007
[1012] http://snomed.info/id/25943004
[1013] http://snomed.info/id/363698007
[1014] http://snomed.info/id/113262008
[1015] http://snomed.info/id/116676008
[1016] http://snomed.info/id/90141005
[1017] http://snomed.info/id/363698007
[1018] http://snomed.info/id/244384009

< 373873005 |Pharmaceutical / biologic product|[1019] : [1..3] { [1..*] 127489000 |Has active ingredient|[1020] = < 105590001 |Substance|[1021] }	322236009 |Paracetamol 500mg tablet|[1022]	373873005 |Pharmaceutical / biologic product|[1023] : { 127489000 |Has active ingredient|[1024] = 412031009 |Paracetamol or derivative|[1025] }
	404826002 |Benzocaine + butamben + tetracaine hydrochloride|[1026]	373873005 |Pharmaceutical / biologic product|[1027] : { 127489000 |Has active ingredient|[1028] = 412031009 |Paracetamol or derivative|[1029] }, { 127489000 |Has active ingredient|[1030] = 387494007 |Codeine|[1031] }
< 373873005 |Pharmaceutical / biologic product|[1032] : [0..1] { 127489000 |Has active ingredient|	111115279999999108 |Inert tablet|[1035]	373873005 |Pharmaceutical / biologic product|[1036] : { 127489000 |Has active ingredient|[1037] = 412031009 |Paracetamol or derivative|[1038] }

[1019] http://snomed.info/id/373873005
[1020] http://snomed.info/id/127489000
[1021] http://snomed.info/id/105590001
[1022] http://snomed.info/id/322236009
[1023] http://snomed.info/id/373873005
[1024] http://snomed.info/id/127489000
[1025] http://snomed.info/id/412031009
[1026] http://snomed.info/id/404826002
[1027] http://snomed.info/id/373873005
[1028] http://snomed.info/id/127489000
[1029] http://snomed.info/id/412031009
[1030] http://snomed.info/id/127489000
[1031] http://snomed.info/id/387494007
[1032] http://snomed.info/id/373873005
[1035] http://snomed.org/fictid#111115279999999108
[1036] http://snomed.info/id/373873005
[1037] http://snomed.info/id/127489000
[1038] http://snomed.info/id/412031009

[1033] = < 105590001 |Substance|[1034] }	370166004 |Aspirin 325mg tablet| [1039]	
< 373873005 |Pharmaceutical / biologic product|[1040] : [1..*] { 127489000 |Has active ingredient| [1041] = < 105590001 |Substance|[1042] }	370166004 |Aspirin 325mg tablet| [1043]	373873005 |Pharmaceutical / biologic product|[1044] : { 127489000 |Has active ingredient| [1045] = 412031009 |Paracetamol or derivative|[1046] }, { 127489000 |Has active ingredient| [1047] = 387494007 |Codeine|[1048] }

[1033] http://snomed.info/id/127489000
[1034] http://snomed.info/id/105590001
[1039] http://snomed.info/id/370166004
[1040] http://snomed.info/id/373873005
[1041] http://snomed.info/id/127489000
[1042] http://snomed.info/id/105590001
[1043] http://snomed.info/id/370166004
[1044] http://snomed.info/id/373873005
[1045] http://snomed.info/id/127489000
[1046] http://snomed.info/id/412031009
[1047] http://snomed.info/id/127489000
[1048] http://snomed.info/id/387494007

< 404684003 |Clinical finding|[1049] : [1..1] { 363698007 |Finding site|[1050] = < 91723000 |Anatomical structure|[1051] }	125596004 |Injury of elbow|[1052]	404684003 |Clinical finding|[1053] : { 363698007 |Finding site|[1054] = 299701004 |Bone of forearm|[1055] }, { 363698007 |Finding site|[1056] = 62413002 |Bone structure of radius |[1057] }
< 404684003 |Clinical finding|[1058] : [0..0] { [2..*] 363698007 |Finding site|[1059] = < 91723000 |Anatomical structure|[1060] }	86299006 |Tetralogy of Fallot|[1061]	404684003 |Clinical finding|[1062] : 363698007 |Finding site|[1063] = 39057004 |Pulmonary valve structure|[1064] , 116676008 |Associated morphology|[1065] = 415582006 |Stenosis|[1066]

[1](see page 0) The SNOMED CT identifiers created with the '9999999' namespace are for example only, and should not be used in a production environment.

[2](see page 0) As mentioned earlier, only non-redundant defining attributes are included in the cardinality count. Because 62413002 \|Bone structure of radius\|[1067] is a subtype of 299701004 \|Bone of forearm\|[1068], the refinement " 363698007 \|Finding site\|[1069] = 299701004 \|Bone of forearm\|[1070]" is redundant.

1049 http://snomed.info/id/404684003
1050 http://snomed.info/id/363698007
1051 http://snomed.info/id/91723000
1052 http://snomed.info/id/125596004
1053 http://snomed.info/id/404684003
1054 http://snomed.info/id/363698007
1055 http://snomed.info/id/299701004
1056 http://snomed.info/id/363698007
1057 http://snomed.info/id/62413002
1058 http://snomed.info/id/404684003
1059 http://snomed.info/id/363698007
1060 http://snomed.info/id/91723000
1061 http://snomed.info/id/86299006
1062 http://snomed.info/id/404684003
1063 http://snomed.info/id/363698007
1064 http://snomed.info/id/39057004
1065 http://snomed.info/id/116676008
1066 http://snomed.info/id/415582006
1067 http://snomed.info/id/62413002
1068 http://snomed.info/id/299701004
1069 http://snomed.info/id/363698007
1070 http://snomed.info/id/299701004

8.4 A.4 Conjunction and Disjunction - Valid Expressions

Expression Constraint	Valid Expression [1](see page 0)		
	Precoordi nated	**Postcoordinated**	
< 19829001 |Disorder of lung|[1071] AND < 301867009 |Edema of trunk|[1072]	233709006 |Toxic pulmonary edema|[1073]	233709006 |Toxic pulmonary edema|[1074] : 116676008 |Associated morphology|[1075] = 40829002 |Acute edema|[1076] , 363698007 |Finding site|[1077] = 278985004 |Fissure of right lung|[1078]	
	61233003 |Silo-fillers' disease|[1079]		
< 19829001 |Disorder of lung|[1080] OR < 301867009 |Edema of trunk|[1081]	363358000 |Malignant tumour of lung|[1082]	233709006 |Toxic pulmonary edema|[1083] : 116676008 |Associated morphology|[1084] = 40829002 |Acute edema|[1085]	
	19242006 |Pulmonary edema|[1086]		
< 19829001 |Disorder of lung|[1087] AND	100100011 9102 |Pulmonary		

1071 http://snomed.info/id/19829001
1072 http://snomed.info/id/301867009
1073 http://snomed.info/id/233709006
1074 http://snomed.info/id/233709006
1075 http://snomed.info/id/116676008
1076 http://snomed.info/id/40829002
1077 http://snomed.info/id/363698007
1078 http://snomed.info/id/278985004
1079 http://snomed.info/id/61233003
1080 http://snomed.info/id/19829001
1081 http://snomed.info/id/301867009
1082 http://snomed.info/id/363358000
1083 http://snomed.info/id/233709006
1084 http://snomed.info/id/116676008
1085 http://snomed.info/id/40829002
1086 http://snomed.info/id/19242006

^ 700043003 |Example problem list concepts reference set|[1088]	embolism with pulmonary infarction|[1089]	
< 404684003 |Clinical finding|[1090] : 363698007 |Finding site|[1091] = << 39057004 |Pulmonary valve structure|[1092] AND 116676008 |Associated morphology|[1093] = << 415582006 |Stenosis|[1094]	91442002 |Rheumatic pulmonary valve stenosis|[1095]	56786000 |Pulmonic valve stenosis|[1096] : 363698007 |Finding site|[1097] = 90318009 |Structure of anulus fibrosus of pulmonary artery|[1098] , 116676008 |Associated morphology|[1099] = 88015002 |Partial stenosis|[1100]
	86299006 |Tetralogy of Fallot|[1101]	
< 404684003 |Clinical finding|[1102] : 116676008 |	45456005 |Renal infarct|[1107]	95281009 |Sudden cardiac death|[1108] : 42752001 |Due to|[1109] = 22298006 |Myocardial infarction|[1110]

[1088] http://snomed.info/id/700043003
[1089] http://snomed.info/id/1001000119102
[1090] http://snomed.info/id/404684003
[1091] http://snomed.info/id/363698007
[1092] http://snomed.info/id/39057004
[1093] http://snomed.info/id/116676008
[1094] http://snomed.info/id/415582006
[1095] http://snomed.info/id/91442002
[1096] http://snomed.info/id/56786000
[1097] http://snomed.info/id/363698007
[1098] http://snomed.info/id/90318009
[1099] http://snomed.info/id/116676008
[1100] http://snomed.info/id/88015002
[1101] http://snomed.info/id/86299006
[1102] http://snomed.info/id/404684003
[1107] http://snomed.info/id/45456005
[1108] http://snomed.info/id/95281009
[1109] http://snomed.info/id/42752001
[1110] http://snomed.info/id/22298006

Associated morphology|[1103] = << 55641003 |Infarct|[1104] OR 42752001 |Due to|[1105] = << 22298006 |Myocardial infarction|[1106]	703326006 |Mitral regurgitation due to acute myocardial infarction|[1111]	
< 404684003 |Clinical finding|[1112] : {363698007 |Finding site|[1113] = << 39057004 |Pulmonary valve structure|[1114] , 116676008 |Associated morphology|[1115] = << 415582006 |Stenosis|[1116] } OR {363698007 |	85971001 |Rheumatic pulmonary valve stenosis with insufficiency|[1121]	56786000 |Pulmonic valve stenosis|[1122] : 363698007 |Finding site|[1123] = 90318009 |Structure of anulus fibrosus of pulmonary artery|[1124] , 116676008 |Associated morphology|[1125] = 88015002 |Partial stenosis|[1126]

1103 http://snomed.info/id/116676008
1104 http://snomed.info/id/55641003
1105 http://snomed.info/id/42752001
1106 http://snomed.info/id/22298006
1111 http://snomed.info/id/703326006
1112 http://snomed.info/id/404684003
1113 http://snomed.info/id/363698007
1114 http://snomed.info/id/39057004
1115 http://snomed.info/id/116676008
1116 http://snomed.info/id/415582006
1121 http://snomed.info/id/85971001
1122 http://snomed.info/id/56786000
1123 http://snomed.info/id/363698007
1124 http://snomed.info/id/90318009
1125 http://snomed.info/id/116676008
1126 http://snomed.info/id/88015002

Finding site[1117] = << 53085002 | Right ventricular structure[1118] , 116676008 | Associated morphology[1119] = << 56246009 | Hypertrophy[1120] }	86299006 | Tetralogy of Fallot|[1127]
^ 450990004 | Adverse drug reactions reference set for GP/FP health issue[1128] : 246075003 | Causative agent|[1129] = (< 373873005 | Pharmaceutical / biologic product|[1130] OR < 105590001 | Substance|[1131])	294811002 | Corticotrophic hormone allergy|[1132]
	293584003 | Paracetamol allergy|[1133]
	293585002 |Salicylate allergy|[1134]

(third column, row 2: -)

1117 http://snomed.info/id/363698007
1118 http://snomed.info/id/53085002
1119 http://snomed.info/id/116676008
1120 http://snomed.info/id/56246009
1127 http://snomed.info/id/86299006
1128 http://snomed.info/id/450990004
1129 http://snomed.info/id/246075003
1130 http://snomed.info/id/373873005
1131 http://snomed.info/id/105590001
1132 http://snomed.info/id/294811002
1133 http://snomed.info/id/293584003
1134 http://snomed.info/id/293585002

< 404684003 |Clinical finding|[1135] :
  116676008 |Associated morphology|[1136]
  =
  (<< 56208002 |Ulcer|[1137]
  AND << 50960005 |Hemorrhage|[1138])
	12847006 |Acute duodenal ulcer with hemorrhage|[1139]	64572001 |Disease|[1140] :
		{ 116676008 |Associated morphology|[1141] = 55075001 |Bleeding ulcer|[1142] ,
		  363698007 |Finding site|[1143] = 14374004 |Structure of lymphatic vessel of oesophagus|[1144] }

[1](see page 0) Where necessary, these examples make some assumptions about the membership of the example reference sets.

1135 http://snomed.info/id/404684003
1136 http://snomed.info/id/116676008
1137 http://snomed.info/id/56208002
1138 http://snomed.info/id/50960005
1139 http://snomed.info/id/12847006
1140 http://snomed.info/id/64572001
1141 http://snomed.info/id/116676008
1142 http://snomed.info/id/55075001
1143 http://snomed.info/id/363698007
1144 http://snomed.info/id/14374004

8.5 A.5 Exclusion and Not Equals - Valid Expressions

Expression Constraint	Valid Expression [1](see page 0)	
	Precoordinated	**Postcoordinated**
<< 19829001 |Disorder of lung|[1145] MINUS << 301867009 |Edema of trunk|[1146]	372146004 |Acute chest syndrome|[1147]	27819004 |Pulmonary ossification|[1148] : { 116676008 |Associated morphology|[1149] = 18115005 |Pathologic calcification|[1150] , 363698007 |Finding site|[1151] = 31094006 |Structure of lobe of lung|[1152] }
	413839001 |Chronic lung disease|[1153]	
<< 19829001 |Disorder of lung|[1154] MINUS ^ 700043003 |Example problem list concepts reference set|[1155]	233613009 |Fungal pneumonia|[1156]	27819004 |Pulmonary ossification|[1157] : { 116676008 |Associated morphology|[1158] = 18115005 |Pathologic calcification|[1159] , 363698007 |Finding site|[1160] = 31094006 |Structure of lobe of lung|[1161] }

[1145] http://snomed.info/id/19829001
[1146] http://snomed.info/id/301867009
[1147] http://snomed.info/id/372146004
[1148] http://snomed.info/id/27819004
[1149] http://snomed.info/id/116676008
[1150] http://snomed.info/id/18115005
[1151] http://snomed.info/id/363698007
[1152] http://snomed.info/id/31094006
[1153] http://snomed.info/id/413839001
[1154] http://snomed.info/id/19829001
[1155] http://snomed.info/id/700043003
[1156] http://snomed.info/id/233613009
[1157] http://snomed.info/id/27819004
[1158] http://snomed.info/id/116676008
[1159] http://snomed.info/id/18115005
[1160] http://snomed.info/id/363698007
[1161] http://snomed.info/id/31094006

< 404684003 |Clinical finding|[1162] :
  116676008 |Associated
morphology|[1163] =
  ((<< 56208002 |Ulcer|[1164] AND
  << 50960005 |Hemorrhage|[1165]
) MINUS
  << 26036001 |Obstruction|[1166])
	15902003 |Gastric ulcer with
	hemorrhage|[1167]
		64572001 |Disease|[1168] :
		  { 116676008 |Associated
		morphology|[1169] =
		  55075001 |Bleeding ulcer|[1170] ,
		  363698007 |Finding site|[1171] =
		  14374004 |Structure of lymphatic
		vessel of esophagus|[1172] }

[1162] http://snomed.info/id/404684003
[1163] http://snomed.info/id/116676008
[1164] http://snomed.info/id/56208002
[1165] http://snomed.info/id/50960005
[1166] http://snomed.info/id/26036001
[1167] http://snomed.info/id/15902003
[1168] http://snomed.info/id/64572001
[1169] http://snomed.info/id/116676008
[1170] http://snomed.info/id/55075001
[1171] http://snomed.info/id/363698007
[1172] http://snomed.info/id/14374004

< 404684003 |Clinical finding|[1173] : 116676008 |Associated morphology|[1174] != << 26036001 |Obstruction|[1175]	233613009 |Fungal pneumonia| [1176]	64572001 |Disease|[1177] : { 116676008 |Associated morphology|[1178] = 26036001 |Obstruction|[1179] , 363698007 |Finding site|[1180] = 422897007 |Vascular structure of stomach|[1181] } { 116676008 |Associated morphology|[1182] = 45771005 |Acute bleeding ulcer| [1183] , 363698007 |Finding site|[1184] = 422897007 |Vascular structure of stomach|[1185] }
	46708007 |Acute gastric ulcer with hemorrhage AND obstruction|[1186]	
< 404684003 |Clinical finding|[1187] : [0..0] 116676008 |Associated morphology|[1188] = << 26036001 |Obstruction|[1189]	233613009 |Fungal pneumonia| [1190]	64572001 |Disease|[1191] : { 116676008 |Associated morphology|[1192] = 55075001 |Bleeding ulcer|[1193] , 363698007 |Finding site|[1194] = 14374004 |Structure of lymphatic vessel of oesophagus|[1195] }
	15902003 |Gastric ulcer with hemorrhage|[1196]	

1173 http://snomed.info/id/404684003
1174 http://snomed.info/id/116676008
1175 http://snomed.info/id/26036001
1176 http://snomed.info/id/233613009
1177 http://snomed.info/id/64572001
1178 http://snomed.info/id/116676008
1179 http://snomed.info/id/26036001
1180 http://snomed.info/id/363698007
1181 http://snomed.info/id/422897007
1182 http://snomed.info/id/116676008
1183 http://snomed.info/id/45771005
1184 http://snomed.info/id/363698007
1185 http://snomed.info/id/422897007
1186 http://snomed.info/id/46708007
1187 http://snomed.info/id/404684003
1188 http://snomed.info/id/116676008
1189 http://snomed.info/id/26036001
1190 http://snomed.info/id/233613009
1191 http://snomed.info/id/64572001
1192 http://snomed.info/id/116676008
1193 http://snomed.info/id/55075001
1194 http://snomed.info/id/363698007
1195 http://snomed.info/id/14374004
1196 http://snomed.info/id/15902003

< 404684003 |Clinical finding|[1197] : [0..0]
    116676008 |Associated morphology|[1198] !=
    << 26036001 |Obstruction|[1199]
	244815007 |Pyloric obstruction|[1200]
	
	84906002 |Local cyanosis|[1206]
		64572001 |Disease|[1201] :
		    { 116676008 |Associated morphology|[1202] =
		    26036001 |Obstruction|[1203] ,
		    363698007 |Finding site|[1204] =
		    314600001 |Choledochoenterostomy stoma|[1205] }

< 404684003 |Clinical finding|[1207] :
    [0..0] 116676008 |Associated morphology|[1208]
    != << 26036001 |Obstruction|[1209]
  AND
    [1..*] 116676008 |Associated morphology|[1210]
    = << 26036001 |Obstruction|[1211]
	244815007 |Pyloric obstruction|[1212]	64572001 |Disease|[1213] :
		    { 116676008 |Associated morphology|[1214] =
		    26036001 |Obstruction|[1215] ,
		    363698007 |Finding site|[1216] =
		    314600001 |Choledochoenterostomy stoma|[1217] }

[1](see page 0) Where necessary, these examples make some assumptions about the membership of the example reference sets.

1197 http://snomed.info/id/404684003
1198 http://snomed.info/id/116676008
1199 http://snomed.info/id/26036001
1200 http://snomed.info/id/244815007
1201 http://snomed.info/id/64572001
1202 http://snomed.info/id/116676008
1203 http://snomed.info/id/26036001
1204 http://snomed.info/id/363698007
1205 http://snomed.info/id/314600001
1206 http://snomed.info/id/84906002
1207 http://snomed.info/id/404684003
1208 http://snomed.info/id/116676008
1209 http://snomed.info/id/26036001
1210 http://snomed.info/id/116676008
1211 http://snomed.info/id/26036001
1212 http://snomed.info/id/244815007
1213 http://snomed.info/id/64572001
1214 http://snomed.info/id/116676008
1215 http://snomed.info/id/26036001
1216 http://snomed.info/id/363698007
1217 http://snomed.info/id/314600001

8.6 A.6 Nested Expression Constraints - Valid Expressions

Expression Constraint	Valid Expression [1](see page 0)	
	Precoordinated	**Postcoordinated**
<< (^ 700043003 |Example problem list concepts reference set|[1218])	394659003 |Acute coronary syndrome|[1219]	194828000 |Angina|[1220] : 255234002 |After|[1221] = 22298006 |Myocardial infarction|[1222]
	194828000 |Angina|[1223]	
	371807002 |Atypical angina|[1224]	
^ (< 450973005 |GP/FP health issue reference set|[1225])	140004 |Chronic pharyngitis|[1226]	-

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1218 http://snomed.info/id/700043003
1219 http://snomed.info/id/394659003
1220 http://snomed.info/id/194828000
1221 http://snomed.info/id/255234002
1222 http://snomed.info/id/22298006
1223 http://snomed.info/id/194828000
1224 http://snomed.info/id/371807002
1225 http://snomed.info/id/450973005
1226 http://snomed.info/id/140004

	297009 |Acute myringitis|[1227]	
(< 404684003 |Clinical finding|[1228] : 363698007 |Finding site|[1229] =<< 39057004 |Pulmonary valve structure|[1230]) AND ^ 700043003 |Example problem list concepts reference set|[1231]	204351007 |Fallot's trilogy|[1232]	-
	457652006 |Calcification of pulmonary valve|[1233]	
(< 404684003 |Clinical finding|[1234] : 363698007 |Finding site|[1235] =<< 39057004 |Pulmonary valve structure|[1236]) AND (< 64572001 |Disease|[1237] : 116676008 |Associated morphology|[1238] =<< 415582006 |Stenosis|[1239])	204351007 |Fallot's trilogy|[1240]	19 03 60 04	Rh eu ma tic he art val ve ste no sis|[1241] : { 36 36 98 00

[1227] http://snomed.info/id/297009
[1228] http://snomed.info/id/404684003
[1229] http://snomed.info/id/363698007
[1230] http://snomed.info/id/39057004
[1231] http://snomed.info/id/700043003
[1232] http://snomed.info/id/204351007
[1233] http://snomed.info/id/457652006
[1234] http://snomed.info/id/404684003
[1235] http://snomed.info/id/363698007
[1236] http://snomed.info/id/39057004
[1237] http://snomed.info/id/64572001
[1238] http://snomed.info/id/116676008
[1239] http://snomed.info/id/415582006
[1240] http://snomed.info/id/204351007
[1241] http://snomed.info/id/19036004

56786000 |Pulmonic valve stenosis|
1246

7 |Finding site| 1242

= 390570 04 |Pulmonary valve structure| 1243

, 116676008 |Associated morphology| 1244

= 415582006 |Stenosis|

1246 http://snomed.info/id/56786000
1242 http://snomed.info/id/363698007
1243 http://snomed.info/id/39057004
1244 http://snomed.info/id/116676008

		1245 }

	78014005 |Urine|[1251]	-

(<< 17636008 |Specimen collection|[1247] :
   424226004 |Using device|[1248]
= << 19923001 |Catheter|[1249])
  . 363701004 |Direct substance|[1250]
	87612001 |Blood|[1252]	

(<< 404684003 |Clinical finding (finding)|[1253] OR << 272379006	Event (event)|[1254]):
	  255234002 |After|[1255] = <<
	71388002 |Procedure (procedure)|[1256]
		235948002 |Postoperative acute pancreatitis|[1257]	64572001 |Disease|[1258] :
			 { 370135005 |Pathological process|[1259] = 441862004
				Infectious process|[1260] ,
				  255234002 |After|[1261] = 387713003 |Surgical procedure|[1262] ,
				  116676008 |Associated morphology|[1263] = 112633009 |Surgical would|[1264] }

	441795000 |Infected seroma after surgical procedure|[1265]	

1245 http://snomed.info/id/415582006
1247 http://snomed.info/id/17636008
1248 http://snomed.info/id/424226004
1249 http://snomed.info/id/19923001
1250 http://snomed.info/id/363701004
1251 http://snomed.info/id/78014005
1252 http://snomed.info/id/87612001
1253 http://snomed.info/id/404684003
1254 http://snomed.info/id/272379006
1255 http://snomed.info/id/255234002
1256 http://snomed.info/id/71388002
1257 http://snomed.info/id/235948002
1258 http://snomed.info/id/64572001
1259 http://snomed.info/id/370135005
1260 http://snomed.info/id/441862004
1261 http://snomed.info/id/255234002
1262 http://snomed.info/id/387713003
1263 http://snomed.info/id/116676008
1264 http://snomed.info/id/112633009
1265 http://snomed.info/id/441795000

<< 125605004 |Fracture of bone| [1266] : [0..0] ((<< 410662002 |Concept model attribute| [1267] MINUS 363698007 |Finding site| [1268]) MINUS 116676008 |Associated morphology| [1269]) = *	125605004 |Fracture of bone| [1270] 439987009 |Open fracture of bone| [1276]	64572001 |Disease| [1271] : { 363698007 |Finding site| [1272] = 71341001 |Bone structure of femur| [1273] , 116676008 |Associated morphology| [1274] = 20946005 |Fracture, closed| [1275] }
< 404684003 |Clinical finding| [1277] : 47429007 |Associated with| [1278] = (< 404684003 |Clinical finding| [1279] : 116676008 |Associated morphology| [1280] = << 55641003 |Infarct| [1281])	71023004 |Pericarditis secondary to acute myocardial infarction| [1282]	3238004 |Pericarditis (disorder)| [1283] : 47429007 |Associated with| [1284] = 57054005 |Acute myocardial infarction| [1285]

[1] (see page 0) Where necessary, these examples make some assumptions about the membership of the example reference sets.

1266 http://snomed.info/id/125605004
1267 http://snomed.info/id/410662002
1268 http://snomed.info/id/363698007
1269 http://snomed.info/id/116676008
1270 http://snomed.info/id/125605004
1271 http://snomed.info/id/64572001
1272 http://snomed.info/id/363698007
1273 http://snomed.info/id/71341001
1274 http://snomed.info/id/116676008
1275 http://snomed.info/id/20946005
1276 http://snomed.info/id/439987009
1277 http://snomed.info/id/404684003
1278 http://snomed.info/id/47429007
1279 http://snomed.info/id/404684003
1280 http://snomed.info/id/116676008
1281 http://snomed.info/id/55641003
1282 http://snomed.info/id/71023004
1283 http://snomed.info/id/3238004
1284 http://snomed.info/id/47429007
1285 http://snomed.info/id/57054005

9 Appendix B – Examples Of Invalid Expressions

This appendix provides examples of expressions (both precoordinated and postcoordinated) which **do not** satisfy the given expression constraints from Chapter 6(see page 53). This list of examples is not intended to be exhaustive, but rather to provide a useful sample to help clarify the meaning of these constraint. Please refer to the SNOMED CT Languages Github repository[1286] for a set of text files containing each of these examples.

9.1 B.1 Simple Expression Constraints - Invalid Expressions

Expression Constraint	INVALID Expression [1](see page 0)	
	Precoordinated	**Postcoordinated**
404684003 |Clinical finding|[1287]	56265001 |Heart disease|[1288]	404684003 |Clinical finding|[1289] : 363698007 |Finding site|[1290] = 80891009 |Heart structure|[1291]
	71388002 |Procedure|[1292]	
< 404684003 |Clinical finding|[1293]	404684003 |Clinical finding|[1294]	71388002 |Procedure|[1295] : 405813007 |Procedure site - Direct|[1296] = 80891009 |Heart structure|[1297]
	71388002 |Procedure|[1298]	

1286 https://github.com/IHTSDO/SNOMEDCT-Languages
1287 http://snomed.info/id/404684003
1288 http://snomed.info/id/56265001
1289 http://snomed.info/id/404684003
1290 http://snomed.info/id/363698007
1291 http://snomed.info/id/80891009
1292 http://snomed.info/id/71388002
1293 http://snomed.info/id/404684003
1294 http://snomed.info/id/404684003
1295 http://snomed.info/id/71388002
1296 http://snomed.info/id/405813007
1297 http://snomed.info/id/80891009
1298 http://snomed.info/id/71388002

<< 73211009 |Diabetes mellitus|[1299]	71388002 |Procedure|[1300]	404684003 |Clinical finding|[1301] : 363698007 |Finding site|[1302] = 113331007 |Structure of endocrine system|[1303]
	362969004 |Disorder of endocrine system|[1304]	
<! 404684003 |Clinical finding|[1305]	404684003 |Clinical finding| [1306]	404684003 |Clinical finding|[1307] : 116676008 |Associated morphology|[1308] = 79654002 |Edema|[1309] , 363698007 |Finding site|[1310] = 80891009 |Heart structure| [1311] 2(see page 0)
	233709006 |Toxic pulmonary edema|[1312]	
> 40541001 |Acute pulmonary edema| [1313]	40541001 |Acute pulmonary edema|[1314]	40541001 |Acute pulmonary edema| [1315] : 246112005 |Severity|[1316] = 24484000 |Severe|[1317]
	233709006 |Toxic pulmonary edema|[1318]	

[1299] http://snomed.info/id/73211009
[1300] http://snomed.info/id/71388002
[1301] http://snomed.info/id/404684003
[1302] http://snomed.info/id/363698007
[1303] http://snomed.info/id/113331007
[1304] http://snomed.info/id/362969004
[1305] http://snomed.info/id/404684003
[1306] http://snomed.info/id/404684003
[1307] http://snomed.info/id/404684003
[1308] http://snomed.info/id/116676008
[1309] http://snomed.info/id/79654002
[1310] http://snomed.info/id/363698007
[1311] http://snomed.info/id/80891009
[1312] http://snomed.info/id/233709006
[1313] http://snomed.info/id/40541001
[1314] http://snomed.info/id/40541001
[1315] http://snomed.info/id/40541001
[1316] http://snomed.info/id/246112005
[1317] http://snomed.info/id/24484000
[1318] http://snomed.info/id/233709006

	304527002 |Acute asthma|[1319]	
>> 40541001 |Acute pulmonary edema|[1320]	233709006 |Toxic pulmonary edema|[1321]	40541001 |Acute pulmonary edema|[1322] : 246112005 |Severity|[1323] = 24484000 |Severe|[1324]
	304527002 |Acute asthma|[1325]	
>! 40541001 |Acute pulmonary edema|[1326]	404684003 |Clinical finding|[1327]	64572001 |Disease|[1328] : 263502005 |Clinical course|[1329] = 424124008 |Sudden onset AND/OR short duration|[1330] 3 (see page 0)
	267038008 |Edema|[1331]	
^ 700043003 |Example problem list concepts reference set|[1332]	6143009 |Diabetic education|[1333]	71388002 |Procedure|[1334] : 405813007 |Procedure site - Direct|[1335] = 80891009 |Heart structure|[1336]
	75367002 |Blood pressure|[1337]	
*	-	-
	-	-
	-	-

[1319] http://snomed.info/id/304527002
[1320] http://snomed.info/id/40541001
[1321] http://snomed.info/id/233709006
[1322] http://snomed.info/id/40541001
[1323] http://snomed.info/id/246112005
[1324] http://snomed.info/id/24484000
[1325] http://snomed.info/id/304527002
[1326] http://snomed.info/id/40541001
[1327] http://snomed.info/id/404684003
[1328] http://snomed.info/id/64572001
[1329] http://snomed.info/id/263502005
[1330] http://snomed.info/id/424124008
[1331] http://snomed.info/id/267038008
[1332] http://snomed.info/id/700043003
[1333] http://snomed.info/id/6143009
[1334] http://snomed.info/id/71388002
[1335] http://snomed.info/id/405813007
[1336] http://snomed.info/id/80891009
[1337] http://snomed.info/id/75367002

[1](see page 0) Where necessary, these examples make some assumptions about the membership of the example reference sets.

[2](see page 0) Please note that this makes the assumption that the given expression constraint is executed against a finite set of expressions that has been pre-classified (e.g. in an expression repository), and that after classification there is at least one intermediate expression between this expression and 404684003 |Clinical finding|[1338].

[3](see page 0) Please note that this makes the assumption that the given expression constraint is executed against a finite set of expressions that has been pre-classified (e.g. in an expression repository), and that after classification there is at least one intermediate expression between 40541001 |Acute pulmonary edema|[1339] and this expression.

9.2 B.2 Refinements - Invalid Expressions

Expression Constraint	INVALID Expression [1](see page 0) [2](see page 0)	
	Precoordinated	**Postcoordinated**
< 19829001 |Disorder of lung|[1340] : 116676008 |Associated morphology|[1341] = 79654002 |Edema|[1342]	19829001 |Disorder of lung|[1343]	19829001 |Disorder of lung|[1344] : 116676008 |Associated morphology|[1345] = 44132006 |Abscess|[1346]
	73452002 |Abscess of lung|[1347]	19829001 |Disorder of lung|[1348] : 116676008 |Associated morphology|[1349] = 40829002 |Acute edema|[1350]
	233711002 |Oxygen-induced pulmonary edema|[1351]	

[1338] http://snomed.info/id/404684003

[1339] http://snomed.info/id/40541001

[1340] http://snomed.info/id/19829001

[1341] http://snomed.info/id/116676008

[1342] http://snomed.info/id/79654002

[1343] http://snomed.info/id/19829001

[1344] http://snomed.info/id/19829001

[1345] http://snomed.info/id/116676008

[1346] http://snomed.info/id/44132006

[1347] http://snomed.info/id/73452002

[1348] http://snomed.info/id/19829001

[1349] http://snomed.info/id/116676008

[1350] http://snomed.info/id/40829002

[1351] http://snomed.info/id/233711002

< 19829001 |Disorder of lung|[1352] : 116676008 |Associated morphology|[1353] = << 79654002 |Edema|[1354]	19829001 |Disorder of lung|[1355]	6141006 |Retinal edema|[1356] : 116676008 |Associated morphology|[1357] = 103619005 |Inflammatory edema|[1358]
	73452002 |Abscess of lung|[1359]	19829001 |Disorder of lung|[1360] : 116676008 |Associated morphology|[1361] = 44132006 |Abscess|[1362]
	6141006 |Retinal edema|[1363]	
< 404684003 |Clinical finding|[1364] : 363698007 |Finding site|[1365] = << 39057004 |Pulmonary valve structure|[1366] , 116676008 |Associated morphology|[1367] = << 415582006 |Stenosis|[1368]	404684003 |Clinical finding|[1369]	448643005 |Abnormality of pulmonary valve|[1370] : 116676008 |Associated morphology|[1371] = 44132006 |Abscess|[1372]
	448643005 |Abnormality of pulmonary valve|[1373]	404684003 |Clinical finding|[1374] : 363698007 |Finding site|[1375] = 61853006 |Spinal canal structure|[1376] , 116676008 |Associated morphology|[1377] = 415582006 |Stenosis|[1378]

1352 http://snomed.info/id/19829001
1353 http://snomed.info/id/116676008
1354 http://snomed.info/id/79654002
1355 http://snomed.info/id/19829001
1356 http://snomed.info/id/6141006
1357 http://snomed.info/id/116676008
1358 http://snomed.info/id/103619005
1359 http://snomed.info/id/73452002
1360 http://snomed.info/id/19829001
1361 http://snomed.info/id/116676008
1362 http://snomed.info/id/44132006
1363 http://snomed.info/id/6141006
1364 http://snomed.info/id/404684003
1365 http://snomed.info/id/363698007
1366 http://snomed.info/id/39057004
1367 http://snomed.info/id/116676008
1368 http://snomed.info/id/415582006
1369 http://snomed.info/id/404684003
1370 http://snomed.info/id/448643005
1371 http://snomed.info/id/116676008
1372 http://snomed.info/id/44132006
1373 http://snomed.info/id/448643005
1374 http://snomed.info/id/404684003
1375 http://snomed.info/id/363698007
1376 http://snomed.info/id/61853006
1377 http://snomed.info/id/116676008
1378 http://snomed.info/id/415582006

	431238002 |Abscess of pulmonary valve|[1379]	
*: 246075003 |Causative agent|[1380] = 387517004 |Paracetamol|[1381]	46093004 |Paracetamol measurement|[1382]	404684003 |Clinical finding|[1383] : 246075003 |Causative agent|[1384] = 372687004 |Amoxicillin|[1385]

[1379] http://snomed.info/id/431238002
[1380] http://snomed.info/id/246075003
[1381] http://snomed.info/id/387517004
[1382] http://snomed.info/id/46093004
[1383] http://snomed.info/id/404684003
[1384] http://snomed.info/id/246075003
[1385] http://snomed.info/id/372687004

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< 404684003 |Clinical finding|[1386] : { 363698007 |Finding site|[1387] = << 39057004 |Pulmonary valve structure|[1388] , 116676008 |Associated morphology|[1389] = << 415582006 |Stenosis|[1390] }, { 363698007 |Finding site|[1391] = << 53085002 |Right ventricular	404684003 |Clinical finding|[1395]	404684003 |Clinical finding|[1396] : { 363698007 |Finding site|[1397] = 39057004 |Pulmonary valve structure|[1398] , 116676008 |Associated morphology|[1399] = 56246009 |Hypertrophy|[1400] }, { 363698007 |Finding site|[1401] = 53085002 |Right ventricular structure|[1402] , 116676008 |Associated morphology|[1403] = 415582006 |Stenosis|[1404] }

[1386] http://snomed.info/id/404684003
[1387] http://snomed.info/id/363698007
[1388] http://snomed.info/id/39057004
[1389] http://snomed.info/id/116676008
[1390] http://snomed.info/id/415582006
[1391] http://snomed.info/id/363698007
[1395] http://snomed.info/id/404684003
[1396] http://snomed.info/id/404684003
[1397] http://snomed.info/id/363698007
[1398] http://snomed.info/id/39057004
[1399] http://snomed.info/id/116676008
[1400] http://snomed.info/id/56246009
[1401] http://snomed.info/id/363698007
[1402] http://snomed.info/id/53085002
[1403] http://snomed.info/id/116676008
[1404] http://snomed.info/id/415582006

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structure|[1392], 116676008 |Associated morphology|[1393] = << 56246009 |Hypertrophy|[1394] }	56786000 |Pulmonary valve stenosis|[1405]	
<< 404684003 |Clinical finding|[1406] : << 47429007 |Associated with|[1407] = << 267038008 |Edema|[1408]	404684003 |Clinical finding|[1409]	95356008 |Mucosal ulcer|[1410] : 42752001 |Due to|[1411] = 59901004 |Cheek biting|[1412]

[1392] http://snomed.info/id/53085002
[1393] http://snomed.info/id/116676008
[1394] http://snomed.info/id/56246009
[1405] http://snomed.info/id/56786000
[1406] http://snomed.info/id/404684003
[1407] http://snomed.info/id/47429007
[1408] http://snomed.info/id/267038008
[1409] http://snomed.info/id/404684003
[1410] http://snomed.info/id/95356008
[1411] http://snomed.info/id/42752001
[1412] http://snomed.info/id/59901004

< 27658006 |Amoxicillin|[1413] :
    411116001 |Has dose form|[1414]
  = <<
385055001 |Tablet dose form|[1415] ,
  {
179999999100 |Has basis of strength|[1416] =
  (
219999999102 |Amoxicillin only|[1417] :
 	
189999999103 |Has strength magnitude|[1418] >= #200,
 	
199999999101 |Has strength unit|[1419] =
258684004 |mg|[1420])}
	269999999100 |Amoxicillin capsule|[1421]
	
	374233002 |Amoxicillin trihydrate 125 mg chewable tablet|[1430]
		27658006 |Amoxicillin|[1422] :
		    411116001 |Has dose form|[1423] =
		    421026006 |Oral tablet|[1424] ,
		  { 179999999100 |Has basis of strength|[1425] =
		  (219999999102 |Amoxicillin only|[1426] :
		    189999999103 |Has strength magnitude|[1427] = 175,
		  199999999101 |Has strength unit|[1428] =
		258684004 |mg|[1429])}

1413 http://snomed.info/id/27658006
1414 http://snomed.info/id/411116001
1415 http://snomed.info/id/385055001
1416 http://snomed.org/fictid#179999999100
1417 http://snomed.org/fictid#219999999102
1418 http://snomed.org/fictid#189999999103
1419 http://snomed.org/fictid#199999999101
1420 http://snomed.info/id/258684004
1421 http://snomed.org/fictid#269999999100
1422 http://snomed.info/id/27658006
1423 http://snomed.info/id/411116001
1424 http://snomed.info/id/421026006
1425 http://snomed.org/fictid#179999999100
1426 http://snomed.org/fictid#219999999102
1427 http://snomed.org/fictid#189999999103
1428 http://snomed.org/fictid#199999999101
1429 http://snomed.info/id/258684004
1430 http://snomed.info/id/374233002

< 27658006 |Amoxicillin|[1431] :
    411116001 |Has dose form|[1432]
 = << 385055001 |Tablet dose form|[1433] ,
 { 179999999100 |Has basis of strength|[1434] = (
21999999102 |Amoxicillin only|[1435] :

18999999103 |Has strength magnitude|[1436] >= #500,

18999999103 |Has strength magnitude|[1437] <= #800,

19999999101 |Has strength unit|[1438] =

258684004 |mg|[1439])}

269999999100 |Amoxicillin capsule|[1440]

27658006 |Amoxicillin|[1441] :
    411116001 |Has dose form|[1442] =
    421026006 |Oral tablet|[1443] ,
    { 179999999100 |Has basis of strength|[1444] =
    (219999999102 |Amoxicillin only|[1445] :
    189999999103 |Has strength magnitude|[1446]
    = #850,
    199999999101 |Has strength unit|[1447] =
    258684004 |mg|[1448])}

[1431] http://snomed.info/id/27658006
[1432] http://snomed.info/id/411116001
[1433] http://snomed.info/id/385055001
[1434] http://snomed.org/fictid#179999999100
[1435] http://snomed.org/fictid#219999999102
[1436] http://snomed.org/fictid#189999999103
[1437] http://snomed.org/fictid#189999999103
[1438] http://snomed.org/fictid#199999999101
[1439] http://snomed.info/id/258684004
[1440] http://snomed.org/fictid#269999999100
[1441] http://snomed.info/id/27658006
[1442] http://snomed.info/id/411116001
[1443] http://snomed.info/id/421026006
[1444] http://snomed.org/fictid#179999999100
[1445] http://snomed.org/fictid#219999999102
[1446] http://snomed.org/fictid#189999999103
[1447] http://snomed.org/fictid#199999999101
[1448] http://snomed.info/id/258684004

	374647008 |Amoxicillin 875 mg tablet|[1449]	
< 373873005 |Pharmaceutical / biologic product|[1450] : 209999999104 |Has trade name|[1451] = "PANADOL"	373873005 |Pharmaceutical / biologic product|[1452]	373873005 |Pharmaceutical / biologic product|[1453] : { 127489000 |Has active ingredient|[1454] = 412031009 |Paracetamol or derivative|[1455] , 209999999104 |Has trade name|[1456] = "PANADEINE"}
	322236009 |Paracetamol 500mg tablet|[1457]	
< 91723000 |Anatomical structure|[1458] : R 363698007 |Finding site|[1459] = < 125605004 |Fracture of bone|[1460]	34080009 |Malleus structure|[1461]	34080009 |Malleus structure|[1462] : 272741003 |Laterality|[1463] = 7771000 |Left|[1464]
	10200004 |Liver structure|[1465]	10200004 |Liver structure|[1466] : 272741003 |Laterality|[1467] = 24028007 |Right|[1468]

[1449] http://snomed.info/id/374647008
[1450] http://snomed.info/id/373873005
[1451] http://snomed.org/fictid#209999999104
[1452] http://snomed.info/id/373873005
[1453] http://snomed.info/id/373873005
[1454] http://snomed.info/id/127489000
[1455] http://snomed.info/id/412031009
[1456] http://snomed.org/fictid#209999999104
[1457] http://snomed.info/id/322236009
[1458] http://snomed.info/id/91723000
[1459] http://snomed.info/id/363698007
[1460] http://snomed.info/id/125605004
[1461] http://snomed.info/id/34080009
[1462] http://snomed.info/id/34080009
[1463] http://snomed.info/id/272741003
[1464] http://snomed.info/id/7771000
[1465] http://snomed.info/id/10200004
[1466] http://snomed.info/id/10200004
[1467] http://snomed.info/id/272741003
[1468] http://snomed.info/id/24028007

< 125605004 |Fracture of bone|[1469] . 363698007 |Finding site|[1470]	34080009 |Malleus structure|[1471]	34080009 |Malleus structure|[1472] : 272741003 |Laterality|[1473] = 7771000 |Left|[1474]
	10200004 |Liver structure|[1475]	10200004 |Liver structure|[1476] : 272741003 |Laterality|[1477] = 24028007 |Right|[1478]
< 105590001 |Substance|[1479] : R << 127489000 |Has active ingredient|[1480] = < 27658006 |Product containing amoxicillin|[1481]	105590001 |Substance|[1482]	373873005 |Pharmaceutical / biologic product|[1483] : 127489000 |Has active ingredient|[1484] = 372687004 |Amoxicillin|[1485]
	387517004 |Paracetamol|[1486]	

[1469] http://snomed.info/id/125605004
[1470] http://snomed.info/id/363698007
[1471] http://snomed.info/id/34080009
[1472] http://snomed.info/id/34080009
[1473] http://snomed.info/id/272741003
[1474] http://snomed.info/id/7771000
[1475] http://snomed.info/id/10200004
[1476] http://snomed.info/id/10200004
[1477] http://snomed.info/id/272741003
[1478] http://snomed.info/id/24028007
[1479] http://snomed.info/id/105590001
[1480] http://snomed.info/id/127489000
[1481] http://snomed.info/id/27658006
[1482] http://snomed.info/id/105590001
[1483] http://snomed.info/id/373873005
[1484] http://snomed.info/id/127489000
[1485] http://snomed.info/id/372687004
[1486] http://snomed.info/id/387517004

24999999910 1 |TRIPHASIL tablet|[1487] . 127489000 | Has active ingredient| [1488]	105590001 | Substance| [1489]	373873005 |Pharmaceutical / biologic product|[1490] : 127489000 |Has active ingredient|[1491] = 126109000 |Levonorgestrel|[1492]
	387517004 | Paracetamo l|[1493]	
< 404684003 | Clinical finding|[1494] : * = 79654002 |Edema|[1495]	263225007 | Hip fracture |[1496]	404684003 |Clinical finding|[1497] : 116676008 |Associated morphology|[1498] = 72704001 |Fracture|[1499]
	385933006 | Edema control education| 1500	
< 404684003 | Clinical	195967001 | Asthma|[1503]	404684003 |Clinical finding|[1504] : 363698007 |Finding site|[1505] = 80891009 |Heart structure|[1506]

[1487] http://snomed.org/fictid#249999999101
[1488] http://snomed.info/id/127489000
[1489] http://snomed.info/id/105590001
[1490] http://snomed.info/id/373873005
[1491] http://snomed.info/id/127489000
[1492] http://snomed.info/id/126109000
[1493] http://snomed.info/id/387517004
[1494] http://snomed.info/id/404684003
[1495] http://snomed.info/id/79654002
[1496] http://snomed.info/id/263225007
[1497] http://snomed.info/id/404684003
[1498] http://snomed.info/id/116676008
[1499] http://snomed.info/id/72704001
[1500] http://snomed.info/id/385933006
[1503] http://snomed.info/id/195967001
[1504] http://snomed.info/id/404684003
[1505] http://snomed.info/id/363698007
[1506] http://snomed.info/id/80891009

finding|[1501] :
116676008 |
Associated
morphology|
[1502] = *
	73211009 |
	Diabetes
	mellitus|[1507]
		404684003 |Clinical finding|[1508] :
		    246075003 |Causative agent|[1509] =
		    372687004 |Amoxicillin|[1510]

[1](see page 0) Please note that some of these examples are based on a hypothetical drug concept model.

[2](see page 0) The SNOMED CT identifiers created with the '9999999' namespace are for example only, and should not be used in a production environment.

9.3 B.3 Cardinality - Invalid Expressions

Expression Constraint	INVALID Expression [1](see page 0)	
	Precoordinated	**Postcoordinated**

[1501] http://snomed.info/id/404684003
[1502] http://snomed.info/id/116676008
[1507] http://snomed.info/id/73211009
[1508] http://snomed.info/id/404684003
[1509] http://snomed.info/id/246075003
[1510] http://snomed.info/id/372687004

< 373873005 |Pharmaceutical / biologic product|[1511] :
   [1..3] 127489000 |Has active ingredient|[1512] =
     < 105590001 |Substance|[1513]
	279999999108 |Inert tablet|[1514]
	
	437867004 |Chlorphenamine + dextromethorphan + paracetamol + pseudoephedrine|[1524]
		373873005 |Pharmaceutical / biologic product|[1515] :
		   { 127489000 |Has active ingredient|[1516] =
		     412031009 |Paracetamol or derivative|[1517] },
		   { 127489000 |Has active ingredient|[1518] =
		     387494007 |Codeine|[1519] },
		   { 127489000 |Has active ingredient|[1520] =
		     255641001 |Caffeine|[1521] },
		   { 127489000 |Has active ingredient|[1522] =
		     44068004 |Doxylamine|[1523] }

< 373873005 |Pharmaceutical / biologic product|[1525] :
   [1..1] 127489000 |Has active ingredient|[1526] =
     < 105590001 |Substance|[1527]
	279999999108 |Inert tablet|[1528]
	
	412556009 |Paracetamol + codeine|[1534]
		373873005 |Pharmaceutical / biologic product|[1529] :
		   { 127489000 |Has active ingredient|[1530] =
		     412031009 |Paracetamol or derivative|[1531] },
		   { 127489000 |Has active ingredient|[1532] =
		     387494007 |Codeine|[1533] }

[1511] http://snomed.info/id/373873005
[1512] http://snomed.info/id/127489000
[1513] http://snomed.info/id/105590001
[1514] http://snomed.org/fictid#279999999108
[1515] http://snomed.info/id/373873005
[1516] http://snomed.info/id/127489000
[1517] http://snomed.info/id/412031009
[1518] http://snomed.info/id/127489000
[1519] http://snomed.info/id/387494007
[1520] http://snomed.info/id/127489000
[1521] http://snomed.info/id/255641001
[1522] http://snomed.info/id/127489000
[1523] http://snomed.info/id/44068004
[1524] http://snomed.info/id/437867004
[1525] http://snomed.info/id/373873005
[1526] http://snomed.info/id/127489000
[1527] http://snomed.info/id/105590001
[1528] http://snomed.org/fictid#279999999108
[1529] http://snomed.info/id/373873005
[1530] http://snomed.info/id/127489000
[1531] http://snomed.info/id/412031009
[1532] http://snomed.info/id/127489000
[1533] http://snomed.info/id/387494007
[1534] http://snomed.info/id/412556009

< 373873005 |Pharmaceutical / biologic product|[1535] :
  [0..1] 127489000 |Has active ingredient|[1536] =
    < 105590001 |Substance|[1537]
	412556009 |Paracetamol + codeine|[1538]	373873005 |Pharmaceutical / biologic product|[1539] :
		    { 127489000 |Has active ingredient|[1540] =
		      412031009 |Paracetamol or derivative|[1541] },
		    { 127489000 |Has active ingredient|[1542] =
		      387494007 |Codeine|[1543] }

< 373873005 |Pharmaceutical / biologic product|[1544] :
  [1..*] 127489000 |Has active ingredient|[1545] =
    < 105590001 |Substance|[1546]
	279999999108 |Inert tablet|[1547]	373873005 |Pharmaceutical / biologic product|[1548] :
		    411116001 |Has dose form|[1549] =
		    385055001 |Tablet|[1550]

< 404684003 |Clinical finding|[1551] :
  [1..1] 363698007 |Finding site|[1552] =
    < 91723000 |Anatomical structure|[1553]
	75857000 |Fracture of radius and ulna|[1554]	404684003 |Clinical finding|[1555] :
		    { 116676008 |Associated morphology|[1556] =
		      72704001 |Fracture|[1557] ,
		      363698007 |Finding site|[1558] =
		      62413002 |Bone structure of

1535 http://snomed.info/id/373873005
1536 http://snomed.info/id/127489000
1537 http://snomed.info/id/105590001
1538 http://snomed.info/id/412556009
1539 http://snomed.info/id/373873005
1540 http://snomed.info/id/127489000
1541 http://snomed.info/id/412031009
1542 http://snomed.info/id/127489000
1543 http://snomed.info/id/387494007
1544 http://snomed.info/id/373873005
1545 http://snomed.info/id/127489000
1546 http://snomed.info/id/105590001
1547 http://snomed.org/fictid#279999999108
1548 http://snomed.info/id/373873005
1549 http://snomed.info/id/411116001
1550 http://snomed.info/id/385055001
1551 http://snomed.info/id/404684003
1552 http://snomed.info/id/363698007
1553 http://snomed.info/id/91723000
1554 http://snomed.info/id/75857000
1555 http://snomed.info/id/404684003
1556 http://snomed.info/id/116676008
1557 http://snomed.info/id/72704001
1558 http://snomed.info/id/363698007

	40733004 |Infectious disease|[1562]	radius|[1559] ,
		    363698007 |Finding site|[1560] =
		    23416004 |Bone structure of ulna|[1561] }

< 404684003 |Clinical finding|[1563] :
    [2..*] 363698007 |Finding site|[1564] =
    < 91723000 |Anatomical structure|[1565]
	23406007 |Arm fracture|[1566]	404684003 |Clinical finding|[1567] :
		    { 116676008 |Associated morphology|[1568] =
		    72704001 |Fracture|[1569] ,
		    363698007 |Finding site|[1570] =
		    702468001 |Bone structure of lower leg|[1571] }

	40733004 |Infectious disease|[1572]	

[1562] http://snomed.info/id/40733004
[1559] http://snomed.info/id/62413002
[1560] http://snomed.info/id/363698007
[1561] http://snomed.info/id/23416004
[1563] http://snomed.info/id/404684003
[1564] http://snomed.info/id/363698007
[1565] http://snomed.info/id/91723000
[1566] http://snomed.info/id/23406007
[1567] http://snomed.info/id/404684003
[1568] http://snomed.info/id/116676008
[1569] http://snomed.info/id/72704001
[1570] http://snomed.info/id/363698007
[1571] http://snomed.info/id/702468001
[1572] http://snomed.info/id/40733004

< 404684003 |Clinical finding|[1573] :
  { [2..*] 363698007 |Finding site|[1574] =
  < 91723000 |Anatomical structure|[1575] }

75857000 |Fracture of radius and ulna|[1576]

64572001 |Disease|[1577] :
  { 116676008 |Associated morphology|[1578] =
    396351009 |Congenital septal defect|[1579] ,
    363698007 |Finding site|[1580] =
    113262008 |Thoracic aorta structure|[1581] }
  { 116676008 |Associated morphology|[1582] =
    90141005 |Congenital hypertrophy|[1583] ,
    363698007 |Finding site|[1584] =
    244384009 |Entire right ventricle|[1585] }

< 373873005 |Pharmaceutical / biologic product|[1586] :
  [1..3] { [1..*] 127489000 |Has active ingredient|[1587] =
  < 105590001 |Substance|[1588] }

279999999108 |Inert tablet|[1589]

373873005 |Pharmaceutical / biologic product|[1590] :
  { 127489000 |Has active ingredient|[1591] =
    412031009 |Paracetamol or derivative|[1592] },
  { 127489000 |Has active ingredient|[1593] =
    387494007 |Codeine|[1594] },
  { 127489000 |Has active ingredient|[1595] =
    255641001 |Caffeine|[1596] },

1573 http://snomed.info/id/404684003
1574 http://snomed.info/id/363698007
1575 http://snomed.info/id/91723000
1576 http://snomed.info/id/75857000
1577 http://snomed.info/id/64572001
1578 http://snomed.info/id/116676008
1579 http://snomed.info/id/396351009
1580 http://snomed.info/id/363698007
1581 http://snomed.info/id/113262008
1582 http://snomed.info/id/116676008
1583 http://snomed.info/id/90141005
1584 http://snomed.info/id/363698007
1585 http://snomed.info/id/244384009
1586 http://snomed.info/id/373873005
1587 http://snomed.info/id/127489000
1588 http://snomed.info/id/105590001
1589 http://snomed.org/fictid#279999999108
1590 http://snomed.info/id/373873005
1591 http://snomed.info/id/127489000
1592 http://snomed.info/id/412031009
1593 http://snomed.info/id/127489000
1594 http://snomed.info/id/387494007
1595 http://snomed.info/id/127489000

	437867004 |Chlorphenamine + dextromethorphan + paracetamol + pseudoephedrine|[1599]	{ 127489000 |Has active ingredient|[1597] = 44068004 |Doxylamine|[1598] }
< 373873005 |Pharmaceutical / biologic product|[1600] : [0..1] { 127489000 |Has active ingredient|[1601] = < 105590001 |Substance|[1602] }	412556009 |Paracetamol + codeine|[1603]	373873005 |Pharmaceutical / biologic product|[1604] : { 127489000 |Has active ingredient|[1605] = 412031009 |Paracetamol or derivative|[1606] }, { 127489000 |Has active ingredient|[1607] = 387494007 |Codeine|[1608] }
< 373873005 |Pharmaceutical / biologic product|[1609] : [1..*] { 127489000 |Has active ingredient|[1610] = < 105590001 |Substance|[1611] }	279999999108 |Inert tablet|[1612]	373873005 |Pharmaceutical / biologic product|[1613] : 411116001 |Has dose form|[1614] = 385055001 |Tablet|[1615]

[1599] http://snomed.info/id/437867004
[1597] http://snomed.info/id/127489000
[1598] http://snomed.info/id/44068004
[1600] http://snomed.info/id/373873005
[1601] http://snomed.info/id/127489000
[1602] http://snomed.info/id/105590001
[1603] http://snomed.info/id/412556009
[1604] http://snomed.info/id/373873005
[1605] http://snomed.info/id/127489000
[1606] http://snomed.info/id/412031009
[1607] http://snomed.info/id/127489000
[1608] http://snomed.info/id/387494007
[1609] http://snomed.info/id/373873005
[1610] http://snomed.info/id/127489000
[1611] http://snomed.info/id/105590001
[1612] http://snomed.org/fictid#279999999108
[1613] http://snomed.info/id/373873005
[1614] http://snomed.info/id/411116001
[1615] http://snomed.info/id/385055001

< 404684003 |Clinical finding|[1616] : [1..1] { 363698007 |Finding site|[1617] = < 91723000 |Anatomical structure|[1618] }	75857000 |Fracture of radius and ulna|[1619]	404684003 |Clinical finding|[1620] : { 116676008 |Associated morphology|[1621] = 72704001 |Fracture|[1622] , 363698007 |Finding site|[1623] = 62413002 |Bone structure of radius|[1624] }, { 116676008 |Associated morphology|[1625] = 72704001 |Fracture|[1626] , 363698007 |Finding site|[1627] = 23416004 |Bone structure of ulna|[1628] }
	40733004 |Infectious disease|[1629]	
< 404684003 |Clinical finding|[1630] : [0..0] { [2..*] 363698007 |Finding site|[1631] = < 91723000 |Anatomical structure|[1632] }	-	64572001 |Disease|[1633] : { 116676008 |Associated morphology|[1634] = 396351009 |Congenital septal defect|[1635] , 363698007 |Finding site|[1636] = 25943004 |Structure of atrioventricular node|[1637] , 363698007 |Finding site|[1638] = 113262008 |Thoracic aorta structure|[1639] } { 116676008 |Associated morphology|[1640] = 90141005 |Congenital

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[1616] http://snomed.info/id/404684003
[1617] http://snomed.info/id/363698007
[1618] http://snomed.info/id/91723000
[1619] http://snomed.info/id/75857000
[1620] http://snomed.info/id/404684003
[1621] http://snomed.info/id/116676008
[1622] http://snomed.info/id/72704001
[1623] http://snomed.info/id/363698007
[1624] http://snomed.info/id/62413002
[1625] http://snomed.info/id/116676008
[1626] http://snomed.info/id/72704001
[1627] http://snomed.info/id/363698007
[1628] http://snomed.info/id/23416004
[1629] http://snomed.info/id/40733004
[1630] http://snomed.info/id/404684003
[1631] http://snomed.info/id/363698007
[1632] http://snomed.info/id/91723000
[1633] http://snomed.info/id/64572001
[1634] http://snomed.info/id/116676008
[1635] http://snomed.info/id/396351009
[1636] http://snomed.info/id/363698007
[1637] http://snomed.info/id/25943004
[1638] http://snomed.info/id/363698007
[1639] http://snomed.info/id/113262008
[1640] http://snomed.info/id/116676008

		hypertrophy|[1641] ,
		   363698007 |Finding site|[1642] =
		   244384009 |entire right ventricle|
		[1643] }

[1](see page 0) The SNOMED CT identifiers created with the '9999999' namespace are for example only, and should not be used in a production environment.

9.4 B.4 Conjunction and Disjunction - Invalid Expressions

Expression Constraint	INVALID Expression [1](see page 0)	
	Precoordinated	**Postcoordinated**

< 19829001 |Disorder of lung|[1644] **AND**
  < 301867009 |Edema of trunk|[1645]
	73452002 |Abscess of lung|[1646]	248508001 |Abdominal wall edema|[1647] :
		  116676008 |Associated morphology|[1648] =
		   40829002 |Acute edema|[1649]

	248508001 |Abdominal wall edema |[1650]	

[1641] http://snomed.info/id/90141005
[1642] http://snomed.info/id/363698007
[1643] http://snomed.info/id/244384009
[1644] http://snomed.info/id/19829001
[1645] http://snomed.info/id/301867009
[1646] http://snomed.info/id/73452002
[1647] http://snomed.info/id/248508001
[1648] http://snomed.info/id/116676008
[1649] http://snomed.info/id/40829002
[1650] http://snomed.info/id/248508001

< 19829001 |Disorder of lung|[1651] OR < 301867009 |Edema of trunk|[1652]	19829001 |Disorder of lung|[1653]	128121009 |Disorder of trunk|[1654] : 116676008 |Associated morphology|[1655] = 44132006 |Abscess|[1656]
	301867009 |Edema of trunk|[1657]	
	128121009 |Disorder of trunk|[1658]	
< 19829001 |Disorder of lung|[1659] AND ^ 700043003 |Example problem list concepts reference set|[1660]	73452002 |Abscess of lung|[1661]	19829001 |Disorder of lung|[1662] : 116676008 |Associated morphology|[1663] = 44132006 |Abscess|[1664]

[1651] http://snomed.info/id/19829001
[1652] http://snomed.info/id/301867009
[1653] http://snomed.info/id/19829001
[1654] http://snomed.info/id/128121009
[1655] http://snomed.info/id/116676008
[1656] http://snomed.info/id/44132006
[1657] http://snomed.info/id/301867009
[1658] http://snomed.info/id/128121009
[1659] http://snomed.info/id/19829001
[1660] http://snomed.info/id/700043003
[1661] http://snomed.info/id/73452002
[1662] http://snomed.info/id/19829001
[1663] http://snomed.info/id/116676008
[1664] http://snomed.info/id/44132006

< 404684003 |Clinical finding|[1665] : 363698007 |Finding site|[1666] = << 39057004 |Pulmonary valve structure|[1667] AND 116676008 |Associated morphology|[1668] = << 415582006 |Stenosis|[1669]	301104003 |Pulmonary valve finding|[1670]	404684003 |Clinical finding|[1671] : 116676008 |Associated morphology|[1672] = 88015002 |Partial stenosis|[1673]
	60573004 |Aortic valve stenosis|[1674]	
< 404684003 |Clinical finding|[1675] : 116676008 |Associated morphology|[1676] = << 55641003 |Infarct|[1677] OR 42752001 |Due to|[1678] = << 22298006 |Myocardial infarction|[1679]	368009 |Heart valve disorder|[1680]	95281009 |Sudden cardiac death|[1681] : 42752001 |Due to|[1682] = 10633002 |Acute congestive heart failure|[1683]
	461089003 |Cardiac abnormality due to heart abscess|[1684]	

[1665] http://snomed.info/id/404684003
[1666] http://snomed.info/id/363698007
[1667] http://snomed.info/id/39057004
[1668] http://snomed.info/id/116676008
[1669] http://snomed.info/id/415582006
[1670] http://snomed.info/id/301104003
[1671] http://snomed.info/id/404684003
[1672] http://snomed.info/id/116676008
[1673] http://snomed.info/id/88015002
[1674] http://snomed.info/id/60573004
[1675] http://snomed.info/id/404684003
[1676] http://snomed.info/id/116676008
[1677] http://snomed.info/id/55641003
[1678] http://snomed.info/id/42752001
[1679] http://snomed.info/id/22298006
[1680] http://snomed.info/id/368009
[1681] http://snomed.info/id/95281009
[1682] http://snomed.info/id/42752001
[1683] http://snomed.info/id/10633002
[1684] http://snomed.info/id/461089003

< 404684003 |Clinical finding|[1685] :
{ 363698007 |Finding site|[1686] = <<
39057004 |Pulmonary valve structure|
[1687] ,
    116676008 |Associated morphology|
[1688] = << 415582006 |Stenosis|[1689] } OR
{ 363698007 |Finding site|[1690] = <<
53085002 |Right ventricular structure|
[1691] ,
    116676008 |Associated morphology|
[1692] = << 56246009 |Hypertrophy|[1693] }
	93075009 |Congenital hypertrophy of pulmonary valve|[1694]
	
	204370002 |Stenosis of infundibulum of right ventricle|[1700]
		404684003 |Clinical finding|[1695]
		:
		    363698007 |Finding site|[1696]
		    =
		    39057004 |Pulmonary valve structure|[1697] ,
		    116676008 |Associated morphology|[1698] =
		    56246009 |Hypertrophy|[1699]

^ 450990004 |Adverse drug reactions reference set for GP/FP health issue|[1701]
:
    246075003 |Causative agent|[1702] =
    (< 373873005 |Pharmaceutical / biologic product|[1703]
    OR < 105590001 |Substance|[1704])
	87628006 |Bacterial infectious disease|[1705]
	
	609328004 |Allergic disposition|
	[1709]
	
	10629471000119106 |Allergic rhinitis caused by mould|[1710]
		609328004 |Allergic disposition|
		[1706] :
		    246075003 |Causative agent|
		[1707] =
		    84489001 |Mold|[1708]

[1685] http://snomed.info/id/404684003
[1686] http://snomed.info/id/363698007
[1687] http://snomed.info/id/39057004
[1688] http://snomed.info/id/116676008
[1689] http://snomed.info/id/415582006
[1690] http://snomed.info/id/363698007
[1691] http://snomed.info/id/53085002
[1692] http://snomed.info/id/116676008
[1693] http://snomed.info/id/56246009
[1694] http://snomed.info/id/93075009
[1695] http://snomed.info/id/404684003
[1696] http://snomed.info/id/363698007
[1697] http://snomed.info/id/39057004
[1698] http://snomed.info/id/116676008
[1699] http://snomed.info/id/56246009
[1700] http://snomed.info/id/204370002
[1701] http://snomed.info/id/450990004
[1702] http://snomed.info/id/246075003
[1703] http://snomed.info/id/373873005
[1704] http://snomed.info/id/105590001
[1705] http://snomed.info/id/87628006
[1706] http://snomed.info/id/609328004
[1707] http://snomed.info/id/246075003
[1708] http://snomed.info/id/84489001
[1709] http://snomed.info/id/609328004
[1710] http://snomed.info/id/10629471000119106

< 404684003 |Clinical finding|[1711] : 116676008 |Associated morphology|[1712] = (<< 56208002 |Ulcer|[1713] AND << 50960005 |Hemorrhage|[1714])	196652006 |Acute duodenal ulcer|[1715] 74474003 |Gastrointestinal haemorrhage|[1719]	64572001 |Disease|[1716] : 116676008 |Associated morphology|[1717] = 405719001 |Chronic ulcer|[1718]

[1](see page 0) Where necessary, these examples make some assumptions about the membership of the example reference sets.

9.5 B.5 Exclusion and Not Equals - Invalid Expressions

Expression Constraint	INVALID Expression	
	Precoordinated	Postcoordinated
<< 19829001 |Disorder of lung|[1720] MINUS << 301867009 |Edema of trunk|[1721]	27719009 |Acute gastrointestinal hemorrhage|[1722] 19242006 |Pulmonary edema|[1728]	19829001 |Disorder of lung|[1723] : { 116676008 |Associated morphology|[1724] = 40829002 |Acute edema|[1725] , 363698007 |Finding site|[1726] = 22943007 |Trunk structure|[1727] }

1711 http://snomed.info/id/404684003
1712 http://snomed.info/id/116676008
1713 http://snomed.info/id/56208002
1714 http://snomed.info/id/50960005
1715 http://snomed.info/id/196652006
1716 http://snomed.info/id/64572001
1717 http://snomed.info/id/116676008
1718 http://snomed.info/id/405719001
1719 http://snomed.info/id/74474003
1720 http://snomed.info/id/19829001
1721 http://snomed.info/id/301867009
1722 http://snomed.info/id/27719009
1723 http://snomed.info/id/19829001
1724 http://snomed.info/id/116676008
1725 http://snomed.info/id/40829002
1726 http://snomed.info/id/363698007
1727 http://snomed.info/id/22943007
1728 http://snomed.info/id/19242006

<< 19829001 |Disorder of lung|[1729] MINUS ^ 700043003 |Example problem list concepts reference set|[1730]	67599009 |Pulmonary congestion|[1731]	67599009 |Pulmonary congestion|[1732] : 363698007 |Finding site|[1733] = 3341006 |Right lung structure|[1734]
< 404684003 |Clinical finding|[1735] : 116676008 |Associated morphology|[1736] = ((<< 56208002 |Ulcer|[1737] AND << 50960005 |Hemorrhage|[1738]) MINUS << 26036001 |Obstruction|[1739])	397825006 |Gastric ulcer|[1740] 235670001 |Gastric stomal obstruction|[1744]	64572001 |Disease|[1741] : 116676008 |Associated morphology|[1742] = 26036001 | Obstruction|[1743]
< 404684003 |Clinical finding|[1745] : 116676008 |Associated morphology|[1746] != << 26036001 |Obstruction|[1747]	81060008 |Intestinal obstruction |[1748] 56265001 |Heart disease|[1754]	64572001 |Disease|[1749] : 116676008 |Associated morphology|[1750] = 26036001 |Obstruction|[1751] , 363698007 |Finding site|[1752] = 422897007 |Vascular structure of stomach|[1753]

[1729] http://snomed.info/id/19829001
[1730] http://snomed.info/id/700043003
[1731] http://snomed.info/id/67599009
[1732] http://snomed.info/id/67599009
[1733] http://snomed.info/id/363698007
[1734] http://snomed.info/id/3341006
[1735] http://snomed.info/id/404684003
[1736] http://snomed.info/id/116676008
[1737] http://snomed.info/id/56208002
[1738] http://snomed.info/id/50960005
[1739] http://snomed.info/id/26036001
[1740] http://snomed.info/id/397825006
[1741] http://snomed.info/id/64572001
[1742] http://snomed.info/id/116676008
[1743] http://snomed.info/id/26036001
[1744] http://snomed.info/id/235670001
[1745] http://snomed.info/id/404684003
[1746] http://snomed.info/id/116676008
[1747] http://snomed.info/id/26036001
[1748] http://snomed.info/id/81060008
[1749] http://snomed.info/id/64572001
[1750] http://snomed.info/id/116676008
[1751] http://snomed.info/id/26036001
[1752] http://snomed.info/id/363698007
[1753] http://snomed.info/id/422897007
[1754] http://snomed.info/id/56265001

< 404684003 |Clinical finding|[1755] :
  [0..0] 116676008 |Associated morphology|[1756] =
  << 26036001 |Obstruction|[1757]
	81060008 |Intestinal obstruction |[1758]
	
	234059001 |Venous stenosis|[1768]
		64572001 |Disease|[1759] :
		  { 116676008 |Associated morphology|[1760] =
		    26036001 |Obstruction|[1761] ,
		    363698007 |Finding site|[1762] =
		    422897007 |Vascular structure of stomach|[1763] }
		  { 116676008 |Associated morphology|[1764] =
		    45771005 |Acute bleeding ulcer|[1765] ,
		    363698007 |Finding site|[1766] =
		    422897007 |Vascular structure of stomach|[1767] }

< 404684003 |Clinical finding|[1769] :
  [0..0] 116676008 |Associated morphology|[1770]
  != << 26036001 |Obstruction|[1771]
	196652006 |Acute duodenal ulcer|[1772]	64572001 |Disease|[1773] :
		  { 116676008 |Associated morphology|[1774] =
		    26036001 |Obstruction|[1775] ,
		    363698007 |Finding site|[1776] =
		    422897007 |Vascular structure of stomach|[1777] }
		  { 116676008 |Associated morphology|[1778] =
		    45771005 |Acute bleeding ulcer|[1779] ,

[1755] http://snomed.info/id/404684003
[1756] http://snomed.info/id/116676008
[1757] http://snomed.info/id/26036001
[1758] http://snomed.info/id/81060008
[1759] http://snomed.info/id/64572001
[1760] http://snomed.info/id/116676008
[1761] http://snomed.info/id/26036001
[1762] http://snomed.info/id/363698007
[1763] http://snomed.info/id/422897007
[1764] http://snomed.info/id/116676008
[1765] http://snomed.info/id/45771005
[1766] http://snomed.info/id/363698007
[1767] http://snomed.info/id/422897007
[1768] http://snomed.info/id/234059001
[1769] http://snomed.info/id/404684003
[1770] http://snomed.info/id/116676008
[1771] http://snomed.info/id/26036001
[1772] http://snomed.info/id/196652006
[1773] http://snomed.info/id/64572001
[1774] http://snomed.info/id/116676008
[1775] http://snomed.info/id/26036001
[1776] http://snomed.info/id/363698007
[1777] http://snomed.info/id/422897007
[1778] http://snomed.info/id/116676008

	8377001 |Hernia, with obstruction|[1782]	= 363698007 |Finding site|[1780] 422897007 |Vascular structure of stomach|[1781] }
< 404684003 |Clinical finding|[1783] : [0..0] 116676008 |Associated morphology|[1784] != << 26036001 |Obstruction|[1785] AND [1..*] 116676008 |Associated morphology|[1786] = << 26036001 |Obstruction|[1787]	196652006 |Acute duodenal ulcer|[1788]	64572001 |Disease|[1789] : { 116676008 |Associated morphology|[1790] = 26036001 |Obstruction|[1791] , 363698007 |Finding site|[1792] = 422897007 |Vascular structure of stomach|[1793] } { 116676008 |Associated morphology|[1794] = 45771005 |Acute bleeding ulcer|[1795] , 363698007 |Finding site|[1796] = 422897007 |vascular structure of stomach|[1797] } 8377001 |Hernia, with obstruction|[1798]
	64572001 |Disease|[1799] : { 116676008 |Associated morphology|[1800] = 45771005 |Acute bleeding ulcer|[1801] , 363698007 |Finding site|[1802] =	

[1782] http://snomed.info/id/8377001
[1780] http://snomed.info/id/363698007
[1781] http://snomed.info/id/422897007
[1783] http://snomed.info/id/404684003
[1784] http://snomed.info/id/116676008
[1785] http://snomed.info/id/26036001
[1786] http://snomed.info/id/116676008
[1787] http://snomed.info/id/26036001
[1788] http://snomed.info/id/196652006
[1789] http://snomed.info/id/64572001
[1790] http://snomed.info/id/116676008
[1791] http://snomed.info/id/26036001
[1792] http://snomed.info/id/363698007
[1793] http://snomed.info/id/422897007
[1794] http://snomed.info/id/116676008
[1795] http://snomed.info/id/45771005
[1796] http://snomed.info/id/363698007
[1797] http://snomed.info/id/422897007
[1798] http://snomed.info/id/8377001
[1799] http://snomed.info/id/64572001
[1800] http://snomed.info/id/116676008
[1801] http://snomed.info/id/45771005
[1802] http://snomed.info/id/363698007

422897007 |Vascular structure of stomach|[1803]

56265001 |Heart disease|[1804] }

[1803] http://snomed.info/id/422897007

[1804] http://snomed.info/id/56265001

9.6 B.6 Nested Expression Constraints - Invalid Expressions

Expression Constraint	Valid Expression [1](see page 0)	
	Precoordinated	**Postcoordinated**
<< (^ 700043003 |Example problem list concepts reference set|[1805])	6143009 |Diabetic education|[1806]	71388002 |Procedure|[1807] : 405813007 |Procedure site - Direct|[1808] = 80891009 |Heart structure|[1809]
	75367002 |Blood pressure|[1810]	
^ (< 450973005 |GP/FP health issue reference set|[1811])	80146002 |Appendectomy|[1812]	-
	305342007 |Admission to ward|[1813]	

[1805] http://snomed.info/id/700043003
[1806] http://snomed.info/id/6143009
[1807] http://snomed.info/id/71388002
[1808] http://snomed.info/id/405813007
[1809] http://snomed.info/id/80891009
[1810] http://snomed.info/id/75367002
[1811] http://snomed.info/id/450973005
[1812] http://snomed.info/id/80146002
[1813] http://snomed.info/id/305342007

(< 404684003 |Clinical finding|[1814] : 363698007 |Finding site|[1815] = << 39057004 |Pulmonary valve structure|[1816]) AND ^ 700043003 |Example problem list concepts reference set|[1817]	125605004 |Fracture of bone|[1818]	404684003 |Clinical finding|[1819] : 363698007 |Finding site|[1820] = 17401000 |Cardiac valve structure|[1821]
	195967001 |Asthma|[1822]	
(< 404684003 |Clinical finding|[1823] : 363698007 |Finding site|[1824] = << 39057004 |Pulmonary valve structure|[1825]) AND (< 64572001 |Disease|[1826] : 116676008 |Associated morphology|[1827] = << 415582006 |Stenosis|[1828])	301104003 |Pulmonary valve finding|[1829]	404684003 |Clinical finding|[1830] : 363698007 |Finding site|[1831] = 39057004 |Pulmonary valve structure|[1832]
	76107001 |Spinal stenosis|[1833]	64572001 |Disease|[1834] : 116676008 |Associated morphology|[1835] = 415582006 |Stenosis|[1836]

[1814] http://snomed.info/id/404684003
[1815] http://snomed.info/id/363698007
[1816] http://snomed.info/id/39057004
[1817] http://snomed.info/id/700043003
[1818] http://snomed.info/id/125605004
[1819] http://snomed.info/id/404684003
[1820] http://snomed.info/id/363698007
[1821] http://snomed.info/id/17401000
[1822] http://snomed.info/id/195967001
[1823] http://snomed.info/id/404684003
[1824] http://snomed.info/id/363698007
[1825] http://snomed.info/id/39057004
[1826] http://snomed.info/id/64572001
[1827] http://snomed.info/id/116676008
[1828] http://snomed.info/id/415582006
[1829] http://snomed.info/id/301104003
[1830] http://snomed.info/id/404684003
[1831] http://snomed.info/id/363698007
[1832] http://snomed.info/id/39057004
[1833] http://snomed.info/id/76107001
[1834] http://snomed.info/id/64572001
[1835] http://snomed.info/id/116676008
[1836] http://snomed.info/id/415582006

(<< 17636008 |Specimen collection|[1837] : 424226004 |Using device|[1838] = << 19923001 |Catheter|[1839]) . 363701004 |Direct substance|[1840]	57617002 |Urine specimen collection|[1841]	17636008 |Specimen collection|[1842] : 424226004 |Using device|[1843] = 19923001 |Catheter|[1844]
	122575003 |Urine specimen|[1845]	
(<< 404684003 |Clinical finding (finding)|[1846] OR << 272379006 |Event (event)|[1847]): 255234002 |After|[1848] = << 71388002 |Procedure (procedure)|[1849]	293690005 |Peppermint oil allergy|[1850]	404684003 |Clinical finding|[1851] : 255234002 |After|[1852] = 417163006 |Injury|[1853]
	82510005 |Posttraumatic vertigo|[1854]	
<< 125605004 |Fracture of bone|[1855] : [0..0] ((<< 410662002 |Concept model attribute|[1856] MINUS 363698007 |Finding site|[1857]) MINUS 116676008 |Associated morphology|[1858]) = *	704333004 |Pathological fracture of hand due to osteoporosis|[1859]	125605004 |Fracture of bone|[1860] : 42752001 |Due to|[1861] = 417163006 |Injury|[1862]

[1837] http://snomed.info/id/17636008
[1838] http://snomed.info/id/424226004
[1839] http://snomed.info/id/19923001
[1840] http://snomed.info/id/363701004
[1841] http://snomed.info/id/57617002
[1842] http://snomed.info/id/17636008
[1843] http://snomed.info/id/424226004
[1844] http://snomed.info/id/19923001
[1845] http://snomed.info/id/122575003
[1846] http://snomed.info/id/404684003
[1847] http://snomed.info/id/272379006
[1848] http://snomed.info/id/255234002
[1849] http://snomed.info/id/71388002
[1850] http://snomed.info/id/293690005
[1851] http://snomed.info/id/404684003
[1852] http://snomed.info/id/255234002
[1853] http://snomed.info/id/417163006
[1854] http://snomed.info/id/82510005
[1855] http://snomed.info/id/125605004
[1856] http://snomed.info/id/410662002
[1857] http://snomed.info/id/363698007
[1858] http://snomed.info/id/116676008
[1859] http://snomed.info/id/704333004
[1860] http://snomed.info/id/125605004
[1861] http://snomed.info/id/42752001
[1862] http://snomed.info/id/417163006

	722571004 |Linear fracture of skull due to birth trauma|[1863]	
< 404684003 |Clinical finding|[1864] : 47429007 |Associated with|[1865] = (< 404684003 |Clinical finding|[1866] : 116676008 |Associated morphology|[1867] = << 55641003 |Infarct|[1868])	3238004 |Pericarditis|[1869]	64572001 |Disease|[1870] : 47429007 |Associated with|[1871] = (404684003 |Clinical finding|[1872] : 363698007 |Finding site|[1873] = 277712000 |Cardiac internal structure|[1874])

[1] (see page 0) Where necessary, these examples make some assumptions about the membership of the example reference sets.

[1863] http://snomed.info/id/722571004
[1864] http://snomed.info/id/404684003
[1865] http://snomed.info/id/47429007
[1866] http://snomed.info/id/404684003
[1867] http://snomed.info/id/116676008
[1868] http://snomed.info/id/55641003
[1869] http://snomed.info/id/3238004
[1870] http://snomed.info/id/64572001
[1871] http://snomed.info/id/47429007
[1872] http://snomed.info/id/404684003
[1873] http://snomed.info/id/363698007
[1874] http://snomed.info/id/277712000

10 Appendix C - Dialect Aliases

This appendix provides a list of example aliases that may be used to specify a particular dialect in an ECL filter constraint. Please refer to the 'Dialect Filter' section on 6.8 Filter Constraints(see page 106) for more information.

The table below lists the valid 'dialect' filter values and their equivalent 'dialectId' filter values, for a selection of known language reference sets. The dialect aliases shown below use the following format (defined using ABNF):

dialectAlias = language ["-" realm ["-" useCase]]

language = alpha alpha   ; conforms to ISO 639-1 2 character language codes

realm = alpha *alpha   ; if realm is a country then conforms to ISO 3166-1 2 character country codes

useCase = alpha *(alpha / integerValue)   ; the clinical scope or context of use

dialect	dialectId
da-dk	554461000005103 |Danish language reference set|
en-au	32570271000036106 |Australian English language reference set|
en-ca	19491000087109 |Canada English language reference set|
en-gb	900000000000508004 |Great Britain English language reference set|
en-ie	21000220103 |Irish language reference set|
en-nz	271000210107 |New Zealand English language reference set|
en-us	900000000000509007 |United States of America English language reference set|
en-int-gmdn	608771002 |GMDN language reference set|
en-nhs-clinical	999001261000000100 |National Health Service realm language reference set (clinical part)|
en-nhs-dmd	999000671000001103 |National Health Service dictionary of medicines and devices realm language reference set|

dialect	dialectId
en-nhs-pharmacy	999000691000001104 |National Health Service realm language reference set (pharmacy part)|
en-uk-drug	999000681000001101 |United Kingdom Drug Extension Great Britain English language reference set|
en-uk-ext	999001251000000103 |United Kingdom Extension Great Britain English language reference set|
es	448879004 |Spanish language reference set|
es-ar	450828004 |Conjunto de referencias de lenguaje castellano para América Latina|
es-uy	5641000179103 |Conjunto de referencias de lenguaje castellano para Uruguay|
et-ee	71000181105 |Estonian language reference set|
de	722130004 |German language reference set|
fr	722131000 |French language reference set|
fr-be	21000172104 |Belgian French language reference set|
fr-ca	20581000087109 |Canada French language reference set|
ja	722129009 | Japanese language reference set|
nl-be	31000172101 |Belgian Dutch language reference set|
nl-nl	31000146106 |Netherlands Dutch language reference set|
nb-no	61000202103 |Norwegian Bokmål language reference set|

dialect	dialectId
nn-no	91000202106 |Norwegian Nynorsk language reference set|
sv-se	46011000052107 |Swedish language reference set|
zh	722128001 |Chinese language reference set|

11 Appendix D - ECL Quick reference

This section provides a quick reference to the key syntax features of the Expression Constraint Language.

11.1 Syntax Overview

The following table summarises the key symbols used in the Expression Constraint Language's brief syntax.

Symbol	Name	Notes
|	Pipe	Used on either side of a concept's term for human readability
*	Any	Retrieves all concepts in the substrate
^	Member of	Retrieves all (active) members of a reference set identified by a specified reference set concept
<	Descendant of	Retrieves all descendants (subtypes) of the specified concept *excluding* the concept itself
<<	Descendant or self of	Retrieves all descendants (subtypes) of the specified concept *including* the concept itself
<!	Child of	Retrieves all children (immediate subtypes) of the specified concept *excluding* the concept itself
<<!	Child or self of	Retrieves all children (immediate subtypes) of the specified concept *including* the concept itself
>	Ancestor of	Retrieves all ancestors (supertypes) of the specified concept *excluding* the concept itself
>>	Ancestor or self of	Retrieves all ancestors (supertypes) of the specified concept *including* the concept itself
>!	Parent of	Retrieves all parents (immediate supertypes) of the specified concept *excluding* the concept itself
>>!	Parent or self of	Retrieves all parents (immediate supertypes) of the specified concept *including* the concept itself
AND	Conjunction	Retrieves the intersection of the results of each sub-expressions
OR	Disjunction	Retrieves the union of the results of each sub-expressions

Symbol	Name	Notes
MINUS	Exclusion	Retrieves the members of the first expression and excludes the members returned by the second expression
:	Refinement	Used before one or more attribute-value pairs to refine the set of concepts retrieved
[1..3]	Cardinality	Used to indicate the minimum and maximum number of occurrences of attributes or relationship groups
R	Reverse flag	Retrieves the set of attribute values (i.e. destination concepts) of a specified attribute for a specified set of concepts
.	Dot notation	Retrieves the set of attribute values (i.e. destination concepts) of a specified attribute for a specified set of concepts

11.2 Examples

The following table provides some examples of each of the key syntax features of the Expression Constraint Language.

Notes:

1. In the table above:
    - '**id**' represents a single SNOMED CT concept identifier,
    - '**term**' represents a term associated with the concept identified by '**id**',
    - '**x**', '**y**' and '**v**' each represent either a single concept or a set of concepts defined using an expression constraint,
    - '**z**' represents either a single concept or a set of concepts that are a subtype of 900000000000455006 | Reference set|[1875],
    - '**a**' and '**b**' each represent either a single concept or a set of concepts that are a subtype of 410662002 |Concept model attribute|[1876], and
    - '**min**' and '**max**' are two numeric values that represent the minimum and maximum cardinality allowed.
2. The default substrate, to which expression constraints are applied, includes all concepts, active relationships, active descriptions and active reference set members of a chosen SNOMED CT versioned edition.

Simple expression constraints			
Syntax	**Evaluation Notes**	**Example**	**Example Expansion Concepts**

[1875] http://snomed.info/id/900000000000455006
[1876] http://snomed.info/id/410662002

id | term |	Only the concept with the identifier 'id'	128477000 |Abscess|[1877]	128477000 |Abscess|[1878]
*	All concepts in the given substrate	*	*Any concept in the given substrate*
^ z	The set of concepts which are members of the reference sets in z	^ 723264001 |Lateralizable body structure reference set|[1879]	181216001 |Entire lung|[1880] 65784005 |Structure of fundus of eye|[1881]
< x	The set of all descendants (both direct and indirect) of x	< 73211009 |Diabetes mellitus|[1882] < 73211009 |Diabetes mellitus)|	46635009 |Diabetes mellitus type 1|[1883] 8801005 |Secondary diabetes mellitus|[1884]

1877 http://snomed.info/id/128477000
1878 http://snomed.info/id/128477000
1879 http://snomed.info/id/723264001
1880 http://snomed.info/id/181216001
1881 http://snomed.info/id/65784005
1882 http://snomed.info/id/73211009
1883 http://snomed.info/id/46635009
1884 http://snomed.info/id/8801005

<< x	The set of all descendants (both direct and indirect) of x, plus x itself	**<<** 73211009 |Diabetes mellitus|[1885]	73211009 |Diabetes mellitus|[1886] 46635009 |Diabetes mellitus type 1|[1887] 8801005 |Secondary diabetes mellitus|[1888]
<! x	The set of all immediate children of x	**<!** 362965005 |Disorder of body system|[1889]	49601007 |Disorder of cardiovascular system|[1890] 362969004 |Disorder of endocrine system|[1891]

[1885] http://snomed.info/id/73211009
[1886] http://snomed.info/id/73211009
[1887] http://snomed.info/id/46635009
[1888] http://snomed.info/id/8801005
[1889] http://snomed.info/id/362965005
[1890] http://snomed.info/id/49601007
[1891] http://snomed.info/id/362969004

<<! x	The set of all immediate children of x, plus x itself	**<<!** 362965005 |Disorder of body system|[1892]	362965005 |Disorder of body system|[1893] 49601007 |Disorder of cardiovascular system|[1894] 362969004 |Disorder of endocrine system|[1895]
> x	The set of all ancestors (both direct and indirect) of x	**>** 279420009 |Hematoma of skin|[1896]	106076001 |Skin finding|[1897] 297968009 |Bleeding skin|[1898]
>> x	The set of all ancestors (both direct and indirect) of x, plus x itself	**>>** 279420009 |Hematoma of skin|[1899]	106076001 |Skin finding|[1900] 297968009 |Bleeding skin|[1901] 279420009 |Hematoma of skin|[1902]
>! x	The set of all immediate parents of x	**>!** 22298006 |Myocardial infarction|[1903]	57809008 |Myocardial disease|[1904] 251061000 |Myocardial necrosis|[1905]

[1892] http://snomed.info/id/362965005
[1893] http://snomed.info/id/362965005
[1894] http://snomed.info/id/49601007
[1895] http://snomed.info/id/362969004
[1896] http://snomed.info/id/279420009
[1897] http://snomed.info/id/106076001
[1898] http://snomed.info/id/297968009
[1899] http://snomed.info/id/279420009
[1900] http://snomed.info/id/106076001
[1901] http://snomed.info/id/297968009
[1902] http://snomed.info/id/279420009
[1903] http://snomed.info/id/22298006
[1904] http://snomed.info/id/57809008
[1905] http://snomed.info/id/251061000

>>! x	The set of all immediate parents of x, plus x itself	>>! 22298006 |Myocardial infarction| [1906]	22298006 |Myocardial infarction| [1907] 57809008 |Myocardial disease| [1908] 251061000 |Myocardial necrosis| [1909]

Conjunction, Disjunction and Exclusion

Syntax	Evaluation Notes	Example	Example Expansion Concepts
x **AND** y	The set of concepts that are both in x and in y (i.e. the intersection of x and y)	< 19829001 |Disorder of lung| [1910] AND < 87628006 |Bacterial infectious disease| [1911]	430395005 |Pneumonia caused by Gram negative bacteria| [1912] 154283005 |Pulmonary tuberculosis| [1913]
x **OR** y	The set of concepts that are either in x or in y (i.e. the union of x and y)	< 73452002 |Abscess of lung| [1914] OR < 275504005 |Cyst of lung| [1915]	446543007 |Tuberculous abscess of lung| [1916] 87119009 |Congenital cystic lung| [1917]

[1906] http://snomed.info/id/22298006
[1907] http://snomed.info/id/22298006
[1908] http://snomed.info/id/57809008
[1909] http://snomed.info/id/251061000
[1910] http://snomed.info/id/19829001
[1911] http://snomed.info/id/87628006
[1912] http://snomed.info/id/430395005
[1913] http://snomed.info/id/154283005
[1914] http://snomed.info/id/73452002
[1915] http://snomed.info/id/275504005
[1916] http://snomed.info/id/446543007
[1917] http://snomed.info/id/87119009

x **MINUS** y	The set of concepts that are in x but are not in y (i.e. x excluding concepts in y)	< 29303009 |Electrocardiographic procedure|[1918] MINUS < 75444003 | Fetal electrocardiogram|[1919]	447114004 |12 lead electrocardiogram during exercise|[1920] 252417001 |24 Hour electrocardiogram|[1921]

Refinement			
Syntax	**Evaluation Notes**	**Example**	**Example Expansion Concepts**
x **:** a **=** y	The set of concepts in **x**, which have a necessary relationship with an attribute in **a** and a value in **y**	< 385494008 |Hematoma|[1922] : << 370135005 |Pathological process|[1923] = << 441862004 |Infectious process|[1924]	698573001 |Infected hematoma|[1925] 444109008 |Infection of wound hematoma|[1926]
x **:** a **=** y**,** b **=** v	The set of concepts in **x**, which have both a necessary relationship with an attribute in **a** and a value in **y**, and also have a necessary relationship (either the same one or a different one) with an attribute in **b** and a value in **v**	< 71388002 |Procedure|[1927] : << 363704007 |Procedure site|[1928] = << 69695003 |Stomach structure|[1929] , << 405815000 |Procedure device|[1930] = << 86174004 |Laparoscope|[1931]	708987006 |Laparoscopic total gastrectomy|[1932] 57922004 |Laparoscopic pyloromyotomy|[1933]

[1918] http://snomed.info/id/29303009
[1919] http://snomed.info/id/75444003
[1920] http://snomed.info/id/447114004
[1921] http://snomed.info/id/252417001
[1922] http://snomed.info/id/385494008
[1923] http://snomed.info/id/370135005
[1924] http://snomed.info/id/441862004
[1925] http://snomed.info/id/698573001
[1926] http://snomed.info/id/444109008
[1927] http://snomed.info/id/71388002
[1928] http://snomed.info/id/363704007
[1929] http://snomed.info/id/69695003
[1930] http://snomed.info/id/405815000
[1931] http://snomed.info/id/86174004
[1932] http://snomed.info/id/708987006
[1933] http://snomed.info/id/57922004

| x : { a = y, b = v } | The set of concepts in **x**, which have a role group that contains both a necessary relationship with an attribute in **a** and a value in **y**, and also have a necessary relationship (either the same one or a different one) with an attribute in **b** and a value in **v** | < 71388002 \|Procedure (procedure)\|[1934] : { 405813007 \|Procedure site - Direct\|[1935] = << 10200004 \|Liver structure\|[1936] , 260686004 \|Method\|[1937] = << 129433002 \|Inspection - action\|[1938] } | 773252007 \|Diagnostic laparoscopy of liver\|[1939]

20933000 \|Endoscopy of liver\|[1940] |

Cardinality			
Syntax	**Evaluation Notes**	**Example**	**Example Expansion Concepts**
x : [min .. max] a = y	The set of concepts in **x**, which have between **min** and **max** necessary relationships with an attribute in **a** and a value in **y**	< 373873005 |Pharmaceutical / biologic product|[1941] : [3..*] 127489000 |Has active ingredient|[1942] = < 105590001 | Substance|[1943]	786732006 |Product containing only brompheniramine and codeine and phenylpropanolamine|[1944] 787979009 |Product containing cyanocobalamin and folic acid and pyridoxine|[1945]

[1934] http://snomed.info/id/71388002
[1935] http://snomed.info/id/405813007
[1936] http://snomed.info/id/10200004
[1937] http://snomed.info/id/260686004
[1938] http://snomed.info/id/129433002
[1939] http://snomed.info/id/773252007
[1940] http://snomed.info/id/20933000
[1941] http://snomed.info/id/373873005
[1942] http://snomed.info/id/127489000
[1943] http://snomed.info/id/105590001
[1944] http://snomed.info/id/786732006
[1945] http://snomed.info/id/787979009

| x **: [min .. max]** **{** a = y **}** | The set of concepts in **x**, which have between **min** and **max** role groups that contain a necessary relationship with an attribute in **a** and a value in **y** | < 404684003 \|Clinical finding\|[1946] : [2..3]{ 363698007 \|Finding site\|[1947] = *, 116676008 \|Associated morphology \|[1948] = 72704001 \|Fracture\|[1949] } | 271577005 \|Fracture of shaft of tibia and fibula\|[1950]

 75857000 \|Fracture of radius AND ulna\|[1951] |

Reversed Attributes

Syntax	Evaluation Notes	Example	Example Expansion Concepts
y **: R** a **=** x	The set of concepts in y, which are the destination (ie attribute value) of a necessary relationship on a source concept in **x** with an attribute in **a**	< 91723000 |Anatomical structure|[1952] : R 363698007 |Finding site|[1953] = < 445945000 |Infectious disease associated with acquired immune deficiency syndrome|[1954]	280369009 |Brain tissue structure|[1955] 39607008 |Lung structure|[1956] 395939008 |Clavulanic acid (substance)|
x **.** a	The set of attribute values (ie destination concepts) of all necessary relationships on a source concept in **x** with an attribute in **a**	< 27658006 |Product containing amoxicillin|[1957] . 127489000 |Has active ingredient|[1958]	372687004 |Amoxicillin|[1959] 395939008 |Clavulanic acid|[1960]

[1946] http://snomed.info/id/404684003
[1947] http://snomed.info/id/363698007
[1948] http://snomed.info/id/116676008
[1949] http://snomed.info/id/72704001
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[1952] http://snomed.info/id/91723000
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[1957] http://snomed.info/id/27658006
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13 Previous Versions

> ⓘ This page provides access to downloadable PDF copies of the current and previous versions of this document.
>
> The most recent version should also be available via a link on the front page of the document.

13.0.1 Summary of Version Updates

13.0.1.1 Version 1.3

A new version was published in mid 2017 in response to a range of implementation feedback, and to support the publication of the Machine Readable Concept Model (MRCM) in the 20170731 international release. In particular, a refinement can now be applied to any subexpression constraint, the parsing of dottedExpressionConstraints is simplified, a subexpression constraint can now be used in place of an attribute name, and the rule *conceptReference* has been renamed to *eclConceptReference* to avoid overlap with the corresponding rule from SNOMED CT Compositional Grammar (when used together in the Template Syntax). These changes were reflected in the updated brief syntax ABNF rules:

refinedExpressionConstraint = subExpressionConstraint ws ":" ws eclRefinement

~~simpleExpressionConstraint~~ = ~~[constraintOperator ws] [memberOf ws] eclFocusConcept~~

dottedExpressionConstraint = subExpressionConstraint 1*(ws dottedExpressionAttribute)

dottedExpressionAttribute = dot ws eclAttributeName

eclFocusConcept = eclConceptReference / wildCard

eclConceptReference = conceptId [ws "|" ws term ws "|"]

eclAttribute = ["[" cardinality "]" ws] [reverseFlag ws] eclAttributeName ws (expressionComparisonOperator ws subExpressionConstraint / numericComparisonOperator ws "#" numericValue / stringComparisonOperator ws QM stringValue QM)

~~attributeOperator = childOf / descendantOrSelfOf / descendantOf~~

eclAttributeName = subExpressionConstraint

13.0.1.2 Version 1.2

A new version, published in early 2017, which included an additional feature requested by implementers - namely the ability for the 'memberOf' function to be applied to a set of reference set concepts defined using an expression constraint.This change was reflected in the brief syntax ABNF rule:

subExpressionConstraint = [constraintOperator ws] [memberOf ws] (eclFocusConcept / "(" ws expressionConstraint ws ")")

13.0.1.3   Version 1.1.1

A minor update, published in 2016, which corrected the definition of numericValue to allow negative decimal values to be fully supported. This change was reflected in the updated brief syntax ABNF rules:

numericValue = ["-"/"+"] (decimalValue / integerValue)

integerValue = digitNonZero *digit / zero

decimalValue = integerValue "." 1*digit

13.0.1.4   Version 1.1

An update, published in 2016, to incorporate some additional features requested by implementers of the language. These updates included:

- Two new operators 'childOf' and 'parentOf' were added to support querying immediate children and immediate parents of a concept during user interface design;
- A new 'dot notation' was introduced (as an alternative to the Reverse flag) to refer to an attribute value for a concept or expression;
- The ability for a constraint operator (e.g. 'descendantOf') to be applied to a nested expression constraint was added;
- The ability to add comments within the text of an expression constraint was added;
- Additional optional brackets were allowed around subexpressions; and
- The non-normative syntax (previously named the 'Full Syntax') was renamed to the 'Long Syntax'.

13.0.1.5   Version 1.0

First official version of the SNOMED CT Expression Constraint Language - version 1.0, 2014.

14 Recent Updates

14.1 The most recently updated pages in this document are listed below

- 6.2 Refinements(see page 62)
  3 minutes ago • updated by Linda Bird[1961] • view change[1962]
- Appendix D - ECL Quick reference(see page 196)
  2020-Dec-03 • updated by Linda Bird[1963] • view change[1964]
- Expression Constraint Language - Specification and Guide(see page 6)
  2020-Sep-30 • updated by Linda Bird[1965] • view change[1966]
- 1. Introduction(see page 7)
  2020-Sep-30 • updated by Linda Bird[1967] • view change[1968]
- B.2 Refinements - Invalid Expressions(see page 163)
  2020-Sep-13 • updated by Linda Bird[1969] • view change[1970]
- A.2 Refinements - Valid Expressions(see page 127)
  2020-Sep-13 • updated by Linda Bird[1971] • view change[1972]
- 6.8 Filter Constraints(see page 106)
  2020-Sep-10 • created by Anne Randorff Højen[1973]
- Appendix C - Dialect Aliases(see page 193)
  2020-Sep-08 • created by Linda Bird[1974]
- 5.5 Character Collation for Term Filters(see page 49)
  2020-Aug-27 • created by Linda Bird[1975]
- 4. Logical Model(see page 17)
  2020-Aug-27 • updated by Linda Bird[1976] • view change[1977]
- 5.3 Informative Comments(see page 25)

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- 📄 5.1 Brief Syntax (Normative)(see page 20)

2020-Aug-13 • updated by Linda Bird[1980] • view change[1981]

- 📄 5.2 Long Syntax (Informative)(see page 23)

2020-Aug-13 • updated by Linda Bird[1982] • view change[1983]

- 📄 4.1 Details(see page 18)

2020-Aug-07 • updated by Linda Bird[1984] • view change[1985]

- 📄 3.2 Expression Constraint and Query Requirements(see page 13)

2020-Jul-28 • updated by Linda Bird[1986] • view change[1987]

- 📄 6.1 Simple Expression Constraints(see page 53)

2020-Jun-17 • updated by Linda Bird[1988] • view change[1989]

- 📄 3.3 Concept Model Requirements(see page 15)

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