All Fields marked with * are mandatory.

Change Request #:	206
Assigned OGC Document #:	12-023
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Document Name/Version:	*Filter Encoding 2.0 Encoding Standard / 2.0
OGC Project Document:	*09-026r1
If this is a revision of a previous submission and you have a Change Request Number, then check here: Enter the CR number here: 203 Enter the Revsion Number that you are revising here: 0	
Title:	*Add support for unit of measure conversions
Source:	*WFS-FES.SWG
Work item code:	
Category:	* B (Addition of feature)
Reason for change:	<pre>* The current WFS standard has no support for unit of measure conversions. Driving usecases: * Get me everything that matches my filter where the literal has units of my choosing * Get some features and portray their properties in a unit of measure of my choosing.</pre>
Summary of change:	<pre>* Add a new filter encoding conformance class 'Unit of measure conversions' which adds the ability to: * Make filter queries that are 'UoM' enabled * Make ad hoc queries that can specify 'desired' units of measure for individual properties WFS will add a new list of 'UoM enabled properties' to FeatureType's in the GetCapabilities response The units of measure are from UCUM</pre>
Consequences if not approved:	Without being aware of how the WFS stores its underlying data, a client must make first make 'exploratory' queries in order to make a best guess at the underlying unit of measure. This must be done before a client can actually make a filter query to get the data they are

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really interested in.
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It's analogous to the server not being able to translate between spatial reference systems, which is strange when spatial transformations are essentially the same class of problem as unit of measure conversions.

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Clauses affected:
                //////// Filter Encoding Specification 2.0
                Page 2 - Table 1 - FE conformance classes
                [add]
                Unit of measure conversions | Implements support for UCUM defined
                units of measure by converting between units with a common base |
                A.16, A.17
                Page 3 - 3 Normative References
                The Unified Code for Units of Measure - Version 1.8.2 -
                http://unitsofmeasure.org/
                Page 10 6.3.1 General Considerations
                [Replace second paragraph]
                An ad hoc query expression is a query expression that contains the
                names of one or more resource types to query, an optional projection
                clause enumerating the properties of the resource to present in the
                response, an option selection clause that constraints the properties
                of those resources types in order to define a result set, an optional
                sorting clause specifying the order in which the result set is
                presented, and an optional unit of measure portrayal clause that
                specifies the units of measure to be used when encoding specific
                properties.
                Page 10 6.3.2 XML encoding
                [add]
                                . . .
                [add]
                Page 11 Table 2 - KVP-encoding for ad hoc query expression
                [add]
                 Unit of Measure Portrayal clause
                 UOM_PROPERTY | 0 | The value of this parameter shall be a
                comma-seperated list of property name XPaths representing the
                properties which should be portrayed using a particular unit of
                measure. There must a 1:1 correspondence between the values in this
                list and the values of the UOM_PORTRAYAL. In order to use this KVP,
                the service must conform to the unit of measure conversion conformance
                class otherwise an exception will be returned. See Table 1 and section
                9.3 for more information.
                | UOM_PORTRAYAL | 0 | The value of this parameter shall be a
                comma-seperated list of UCUM unit of measure symbols. Each item in the
                list should correspond 1:1 with an appropriate property to portray in
                UOM_PROPERTY. In order to use this KVP, the service must conform to
                the unit of measure conversion conformance class otherwise an
                exception will be returned. See Table 1 and section 9.3 for more
                information.
                Page 13
                [add]
                6.3.3.1.8 Unit of measure portrayal clause
                A unit of measure portrayal clause can be used to assert the unit of
                measure used to encode the response of any numerical property. This
                clause can only be included with services that are conformant to the
                unit of measure conversion conformance class otherwise an exception
```

will be returned. See Table 1 and section 9.3 for more information.

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For XML-encoded requests, standards that reference this International
Standard shall use the fes:UomPortrayal element (see Section 9), which
is substitutable for fes:AbstractUomPortrayalClause, to encode the
unit of measure portrayal clause of an ad hoc query expression
For KVP-encoded requests, the keywords UOM PROPERTY and UOM PORTRAYAL
shall be used to encode a unit of measure portrayal clause (see Table
2).
Page 18 - 7.5.2 Encoding
[Replace second paragraph]
The fes:Literal element is used to encode any explicitly stated value.
If the literal value is a geometric value, the value shall be encoded
following the rules of GML (defined in ISO 19136). If the value has a
defined unit of measure and the service conforms to the unit of
measure conversions conformance class (see Table 1 and/or A.16) then a
gml:MeasureType with an appropriate uom attribute may instead be
encoded.
Page 33 - Figure 10
[add]
+ ImplementsUomConversions : Boolean
Page 36 - Table 5 - Names of conformance class constraints
[add]
Unit of measure conversions | ImplementsUomConversions
Page 36 - 7.14.2 EXAMPLE
[add]
   FALSE
Page 43 -
[add]
9 Unit of Measure Portrayals
9.1 General Considerations
The fes:UomPortrayal element (see Figure 19) is an optional part of a
service-specific query and is included in the normative set of Filter
schema files (i.e. "uom.xsd").
The fes:UomPortrayal element is used to specify properties whose
values shall be encoded using a single unit of measure in place of the
native measure. This International Standard requires that the service
be responsible for converting values between from one UCUM defined
unit of measure to another.
The fes:UomPortrayal element is only intended for usage with services
which are conformant to the unit of measure conversion conformance
class. See Table 1 for more information.
Figure 19 - UomPortraval
_____
                UomPortrayal
_____
+ uomPortrayalRequest [1..*] : UomPortrayalRequest
_____
_____
UomPortrayalRequest
_____
+ valueReference : ValueReference
+ portrayalUom : UomSymbol
_____
9.2 Encoding
The XML encoding for uom portrayals is defined by the following XML
Schema fragment:
```

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The fes:UomPortrayal element shall have a minimum of one and an
unbounded number of fes:UomPortrayalRequest child elements.
The fes:UomPortrayalRequest element shall have a single property and
UCUM defined unit of measure.
9.3 Exceptions
In the event that the fes:ValueReference element contains a reference
to a value of an unknown resource type, the service shall raise an InvalidParameterValue (as given in OGC 06-121r3, Table 25)
In the event that the portrayalUom element contains a unit of measure
which the service does not understand or is unable to convert the
referenced value into then the service shall raise an
InvalidParameterValue (as given in OGC 06-121r3, Table 25) exception.
Page 47 -
[add]
A.16 Test cases for unit of measure (UoM) conversions
    a) Test purpose: Verify the correct method of performing UoM
filters.
    b) Test method: Verify that the UoM conformance class is
satisfied. Submit two filter requests, each with a literal containing
a gml:MeasureType where both are expressing the same value but with
different UoM's. The results of both requests should be equivalent and
be encoded with the same unit of measure.
    c) Reference: 7.5.2
    d) Test type: basic test.
[add]
A.17 Test cases for unit of measure (UoM) portrayals
    a) Test purpose: Verify the correct method of performing UoM
portrayals.
   b) Test method: Verify that the UoM conformance class is
satisfied. Submit two requests, each with a different UoM portrayal for the same value. The responses for both requests should be
equivalent but differing in the unit of measure encoded for the
specified value.
    c) Reference: Section 9
    d) Test type: basic test.
Page 74 - C.8 Filter capabilities examples
[add]
. . .
    FALSE
. . .
Page 76 - C.8 Filter capabilities examples
[add]
. . .
   FALSE
. . .
////////////////Web Feature Service 2.0
Page 32 - Figure 8
[Update AdhocQueryExpression to changes in FES made in this change
request]
Page 33 - Table 8
[add rows to indicate additions to Table 2 in FES made in this change
```

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request]
               Page 40 - 7.9.2.5.3.5 Units of measure handling
               [Replace]
               This international standard only supports units of measure if the
               following conditions are met:
                  a) The service has indicated that it supports the Unit of measure
               conformance class as defined by the filter encoding specifications
                 b) The properties of a feature type being queried or portrayed
               with a UoM component have been listed in the GetCapabilities response
               as being 'unit of measure enabled'. See Figure 13.
               Page 45 - 8.3.1 - Figure 13
               [add]
               · · ·
               FeatureType
               + uomEnabledProperty [0..*] : UomEnabledProperty
               _____
               [add]
               _____
               1
                          UomEnabledProperty
               ------
               + valueReference : ValueReference
+ guantityType : HomSymbol //
                + quantityType : UomSymbol //Use the base unit of measure symbol in
               lieu of a quantity type grammar
               + nativeUom : UomSymbol
               _____
               Page 47 - 8.3.4 FeatureTypeList section (example XSD)
               [add]
                      . . .
               Page 65 - Figure 17
               Page 193 - C.2 wfs.xsd
               [add]
               [add]
                      . . .
     Additional
               09-026r1 - OpenGIS Filter Encoding 2.0 Encoding Standard 09-025r1 - Web Feature Service 2.0
     Documents
     affected:
     Supporting
               A thorough overview of the existing problem and (unworkable) workarounds is documented at:
Documentation:
               https://twiki.auscope.org/wiki/Grid/AuscopePortalUOMFilters
   Comments:
      Status:
               Assigned 🗧
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Assigned To:	WFS/FES SWG +
Disposition:	Referred and Posted +