

*Dimensional Metrology
Standards Consortium*

DMSC

Quality Information Framework (QIF) – An Integrated Model for Manufacturing Quality Information

Part 5: QIF Resources Information Model and XML Schema File Version 2.0



QIF Version 2.0

ANSI/QIF Part 5–2014

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Foreword

The Dimensional Metrology Standards Consortium (DMSC, Inc.) is an American National Standards Institute (ANSI) accredited standards developing organization, as well as an A-Liaison to the International Organization for Standardization (ISO). The mission of the DMSC is to identify urgently needed standards in the field of dimensional metrology, and to promote, foster, and encourage the development and interoperability of these standards, along with related and supporting standards that will benefit the industry as a whole. More information about the DMSC can be found at www.dmisstandard.org.

The Quality Information Framework (QIF) information model was developed by domain experts from the manufacturing quality (that is metrology) community representing a wide variety of industries and quality measurement needs. Specifically for the QIF Resources work, contributors include:

Main:

- Metrosage LLC
- National Institute of Standards and Technology
- Mitutoyo America Corporation
- Rolls-Royce plc
- The Manufacturing Technology Centre

Support:

- Honeywell Federal Manufacturing & Technology
- Origin International, Inc.
- Lockheed Martin

More information about DMSC's QIF effort can be found at www.qifstandards.org.

The bulk of the work on this document was performed by the QIF Resources Working Group, approved and revised as needed by the Quality Information Framework (QIF) Working Group, and given final approval for ANSI balloting by the DMSC's Quality Measurement Standards (QMS) Committee.

Version 2.0 of QIF consists of the following parts, under the general title *Quality Information Framework (QIF) — An Integrated Model for Manufacturing Quality Information*:

Part 1: Overview and Fundamental Principles Version 2.0

Part 2: QIF Library Information Model and XML Schema Files Version 2.0

Part 3: QIF Model Based Definition (QIF MBD) Information Model and XML Schema File Version 2.0

Part 4: QIF Plans Information Model and XML Schema File Version 2.0

Part 5: QIF Resources Information Model and XML Schema File Version 2.0

Part 6: QIF Rules Information Model and XML Schema File Version 2.0

Part 7: QIF Results Information Model and XML Schema File Version 2.0

Part 8: QIF Statistics Information Model and XML Schema File Version 2.0

The inaugural QIF standard, version 1.0, was published in 2013. This document is a component of the second release of the QIF suite of standards, denoted version 2.0. Each major release of the QIF standard is composed of several *Parts* documents. QIF version 2.0 includes revisions of the version 1.0, Parts 1, 2, 3 and 4, and 4 new *Parts* documents that did not exist in version 1.0. Individual *Parts* documents of the QIF suite are designated with the version number of the major QIF revision, even when the document may be new. QIF version 2.0 cancels and replaces all documents of version 1.0. QIF version 2.0 is solely a product of the DMSC and its committees and working groups.

HTML-based data model viewer

The DMSC will make available an html-file based data dictionary for the entire QIF information model as an aid to understanding QIF. This data dictionary is non-normative material, but describes the normative content of the QIF data model. The html files facilitate viewing the complete data model, including all six application areas and Library content, using pictures and text. A user has the ability, through an internet browser, to follow navigation links forward and backward through the data model description using mouse clicks.

Introduction

An essential part of any dimensional measurement planning process is an adequate description of the measurement devices, tools, and auxiliary equipment available for possible application to the measurement task at hand. The measurement planner will then have the information necessary to make appropriate selections of measurement facilities for the inspection task at hand.

The QIF Resources document is intended to supply a uniformly detailed set of this information. In addition to obviously required information, such as dimensional measuring equipment (DME) nomenclature, description and location and availability, characterization of the DME capabilities, sufficient to support high-level decisions about DME capabilities and applicability is required. Examples of pertinent information are: achievable accuracy, measurement speed, workpiece size and mass capacity, etc. Additionally, historical information, such as calibration history and maintenance records, may be useful to downstream processes to establish measurement traceability and validity. Finally, information about associated auxiliary equipment (e.g. sensors, fixtures, etc.) may be required to determine fitness of the DME system for a particular measurement task.

This present model of QIF Resources focuses its attention on coordinate measuring machines (CMMs) of Cartesian geometry, a few examples of 1-D measuring instruments, and comparator devices. In the case of CMMs an auxiliary rotary axis is also supported. However, the Working Group has attempted to structure this document so that its scope can be easily expanded to include other types of DME and to provide greater detail that might be required for development of lower-level inspection process plans.

Quality Information Framework (QIF) — An Integrated Model for Manufacturing Quality Information

Part 5: QIF Resources Information Model and XML Schema File Version 2.0

1 Scope

This document specifies the description and documentation of dimensional measurement resources, sufficient for use in generating a high level measurement plan for product certification, acceptance, or any other common application of dimensional measurement data.

The current version of the document emphasizes technology and terminology relevant to Cartesian CMMs, but also contains information relevant to 1-D devices such as micrometers and calipers, and devices used in comparator mode. In the case of CMMs, it also specifies information on auxiliary rotary axes.

1.1 Contents of this document

This standard defines an information model for a portion of the QIF manufacturing quality information model designated QIF Resources. As described in Part 1, an XML data file conforming to an XML schema model is called an instance file. The root of every QIF instance file is a QIFDocument, but different QIF instance files may focus on different QIF applications. A QIFDocument containing a Resources element may be regarded as a QIF Resources instance file.

As applicable, this document covers the following topics:

- general descriptive information,
- sensors and sensor hardware,
- system calibration,
- system performance tests,
- workpiece capacity,
- geometric characteristics, and
- mechanical characteristics.

The information model consists of definitions for data types, elements, the logical relationships between them, and the semantics of the quality information. The information model, defined using the XML Schema definition language (XSDL), is scoped to be a digital data exchange mechanism that can be easily incorporated in application software developed by commercial solution vendors that implement manufacturing quality systems.

XSDL also supports the definition of rules and checks for validation of QIF instance files.

The QIFResources.xsd schema file defines the top level information model for resources. QIF Resources also draws from elements in the QIFLibrary, particularly those in the

GenericExpressions.xsd and Expressions.xsd schema files. The types and relationships of information contained in a QIF Resources instance file are governed by the schema. The way in which data is formatted for QIF Rules instance files is prescribed by the rules of XML and the rules for how instance files conform to schema files. All QIF XML schema files are a normative part of the QIF standard and are bundled into a single compressed folder file called “QIF_2.0_XMLSchemaFiles.zip” which can be downloaded at www.qifstandards.org.

Annex C is a detailed data dictionary for QIFResources.xsd.

1.2 QIF Information Model Application Architecture

Figure 1 – QIF Information Model Application Architecture shows a high level view of the current QIF Applications information models. The QIF foundation is its suite of information model definitions. At the core is the reusable QIF Library which contains components that are referenced throughout the comprehensive quality information model thereby ensuring interoperability and extensibility. Around the QIF Library are the QIF application area data models. This document describes the QIF Resources information model. The QIF Resources information model transfers digital inspection results data using information items in the QIF Library (for example, feature, characteristic, and product).

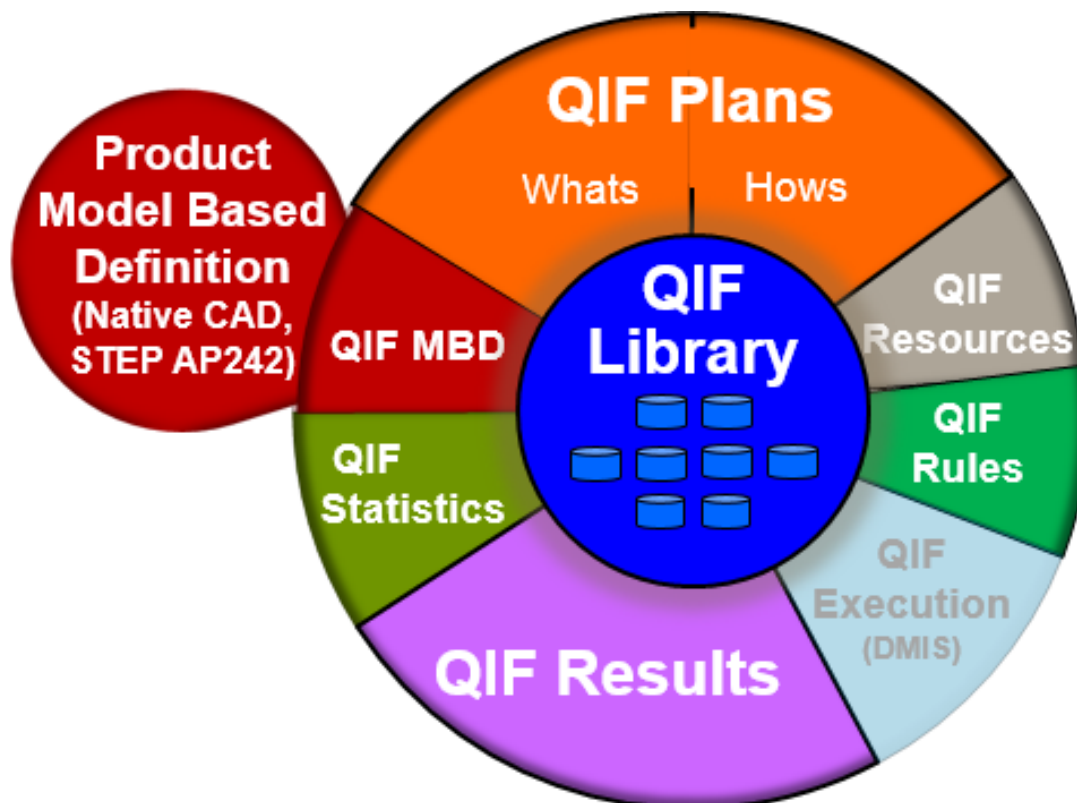


Figure 1 – QIF Information Model Application Architecture

2 Conformance

Software products that implement this specification to write QIF Resources XML instance files must:

- follow the rules of XML when writing QIF Resources instance files
- generate instance files that validate against the QIF Resources schema
- employ semantics of the information written that complies with the referenced standards and with the data dictionary in this specification.

Software products that implement this specification to read QIF Resources files must:

- be able to read any valid QIF Resources XML instance file and extract all numerical and semantic data correctly.

3 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ANSI/DMIS 105.2, Part 1-2009, *Dimensional Measuring Interface Standard, DMIS 5.2 Standard, Part 1*. Also available as ISO 22093:2011 *Industrial automation systems and integration -- Physical device control -- Dimensional Measuring Interface Standard (DMIS)*

ASME Y14.5M-1994 (reaffirmed 2004), *Dimensioning and Tolerancing - Engineering Drawing and Related Documentation Practices*

ASME Y14.5-2009, *Dimensioning and Tolerancing - Engineering Drawing and Related Documentation Practices*

ASME Y14.41 (2003), *Digital Product Definition Data Practices*

Extensible Markup Language (XML) 1.0 (Fifth Edition), W3C Recommendation 26 November 2008

ISO/IEC Guide 99:2007 (E/F) – *International vocabulary of metrology – Basic and general concepts and associated terms* (VIM)

XML Schema Part 1: Structures Second Edition, W3C Recommendation 28 October 2004

XML Schema Part 2: Datatypes Second Edition, W3C Recommendation 28 October 2004

4 Terms and Definitions

For the purposes of this document, the following terms and definitions apply. All terms are defined in the Part 1 specification document. The first group is general QIF terms. The second group is terms defined to describe the information in the QIF Resources application area.

4.1 General QIF terms referenced in the QIF Resources application area

The following general terms are referenced by the QIF Resources application area and defined in the QIF Part 1 document.

calibration

workpiece

4.2 Terms defined for the QIF Resources application area

The following terms are introduced by the QIF Resources application area and defined in the QIF Part 1 document. The definitions are repeated here for the convenience of the reader.

4.2.1 measurement resource

a measurement resource is an item of hardware that can be employed as part of the total measurement system

4.2.2 carriage

a carriage is a mechanical element of a measurement device, generally a CMM, that functions as part of the sensor-carrying structure

4.2.3 fixture

a fixture is a device used for workpiece positioning and holding

4.2.4 measurement device

a measurement device is a measurement resource that determines a dimensional characteristic of a workpiece

4.2.6 sensor

a sensor is a measurement resource that detects a surface or measurement feature of a workpiece

4.2.7 tool

a tool is a measurement resource that mounts one or more sensors to a measurement device

4.2.8 comparator

a comparator is a measurement device that is used to compare one artifact to another

4.2.9 qualification

a qualification is an accuracy specification for a measurement device

4.2.10 touch probe

a touch probe is a sensor that is actuated by physical contact with a workpiece

4.2.11 gage

a gage is a measurement device that is used to measure one or more dimensions of a workpiece

NOTE It may be a general purpose device, e.g. a ring gage, or it may be specially designed hardware dedicated to measuring a specific workpiece or family of workpieces.

4.2.12 accuracy test

an accuracy test is a process for determining the accuracy of a measurement device

5 Symbols and abbreviated terms

ANSI	American National Standards Institute
ASCII	American Standard Code for Information Interchange
ASME	American Society of Mechanical Engineers
CAD	Computer-Aided Design
CAIPP	Computer-Aided Inspection Process Planning
CAM	Computer-Aided Machining or Computer-Aided Manufacturing
CMM	Coordinate Measuring Machine
COTS	Commercial Off-The-Shelf
DME	Dimensional Measuring Equipment
DMIS	Dimensional Measuring Interface Standard
DMSC	Dimensional Metrology Standards Consortium
DRF	Datum Reference Frame
ERP	Enterprise Resource Planning
GD&T	Geometric Dimensioning and Tolerancing
GPS	Geometrical Product Specifications

GUID	Globally Unique Identifier
ISO	International Organization for Standardization
MES	Manufacturing Execution Systems
MRI	Measurement Resources Information
MRP	Materials Resource Planning
MSA	Measurement Systems Analysis
PDPMI	Product Definition with Product Manufacturing Information
PMI	Product Manufacturing Information
QIF	Quality Information Framework
QMS	Quality Measurement Standards (a DMSC committee)
QPIId	QIF Persistent Identifier
R&R	Repeatability and Reproducibility
SI	The International Systems of Units
SPC	Statistical Process Control
SQC	Statistical Quality Control
STEP	Standard for the Exchange of Product model data (ISO 10303)
UUID	Universally Unique Identifier
XML	eXtensible Markup Language
XSDL	XML Schema Definition Language

6 The QIF Resources data model

6.1 Design principles of QIF Resources

This section describes the highest level elements of the QIF Resources information model.

QIF Resources consists of definitions of several sub-types belonging to the general measurement resources type. Presently, the specific major sub-types defined are:

- Carriages,
- Fixtures,
- Measurement devices,
- Sensors, and

- Tools.

Each of these terms is defined in Section 4.2 above.

6.2 QIF Resources schema files

The QIF Resources schema model includes the information items from the QIFMeasurementResources.xsd schema file and several of the schema files from the QIF Library.

6.3 QIF Resources data types

This section describes the major elements and types in the QIF Resources model.

6.3.1 MeasurementResourceBaseType

The hierarchy of derived types of **MeasurementResourceBaseType** defined in the MeasurementResources.xsd schema file is shown in Figure 2.

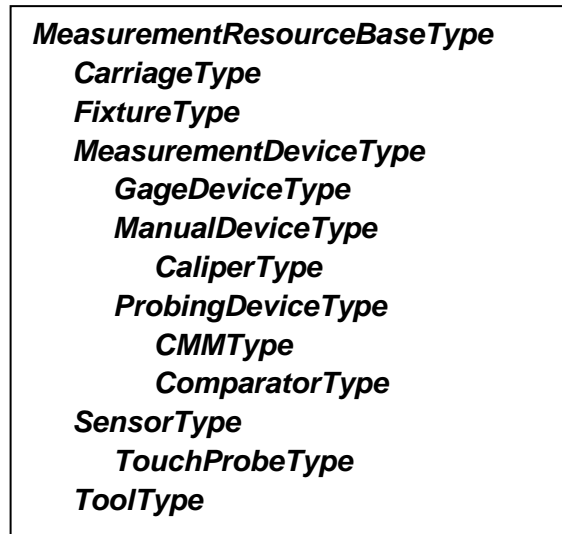


Figure 2 – Hierarchy of Measurement Resource Types

The **MeasurementDeviceType** includes all components needed for making measurements. Carriages, sensors, and tools are components of measurement devices.

The MeasurementResources.xsd schema file also defines types dealing with:

- accuracy,
- calibration,
- CMM details (scales, speeds, geometry, rotary tables, test methods, working volume),
- qualification,
- resolution, and
- lists of sensors, tools, and carriages.

6.3.2 MeasurementResourcesType

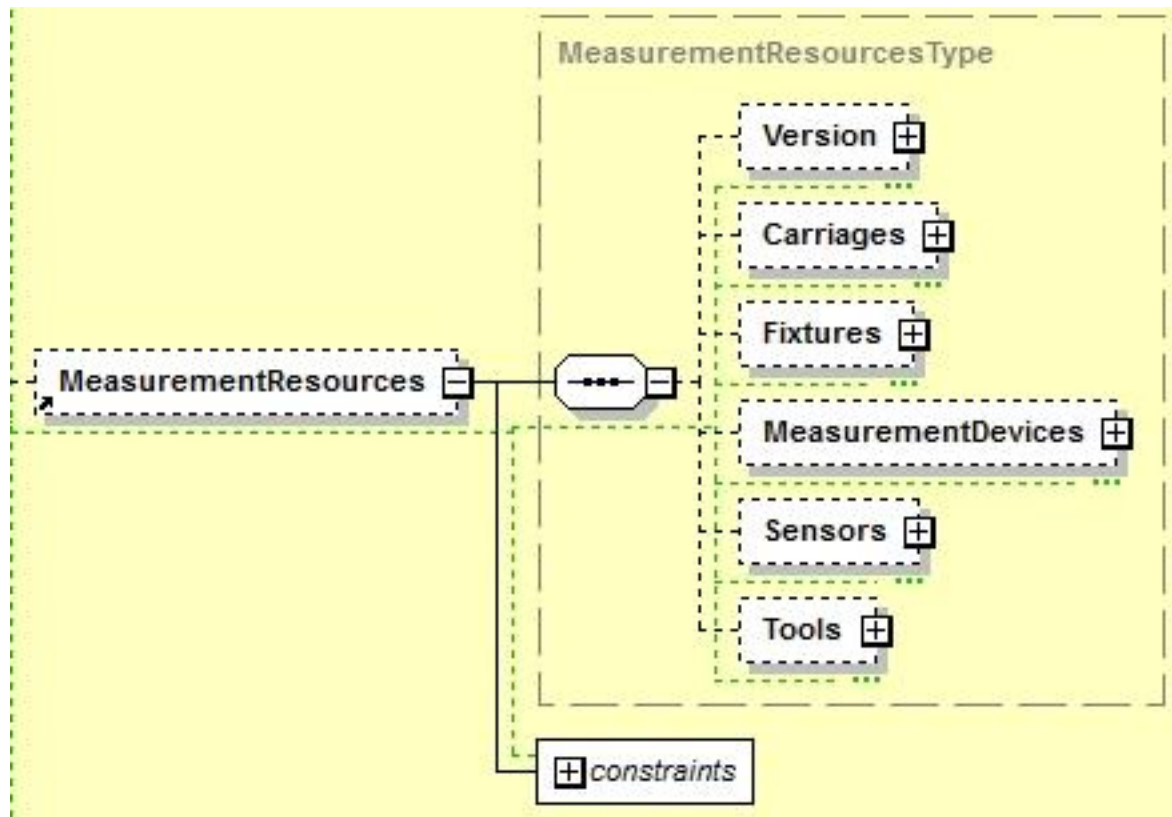


Figure 3 – MeasurementResourcesType

The top-level data object in a QIF Resources instance file is a **MeasurementResources** *element* of **MeasurementResourcesType**, as shown in Figure 3. The **MeasurementResources** *element*, which can be used in the QIF Plans and QIF Results schemas, may contain *elements* describing **Version**, **Carriages**, **Fixtures**, **MeasurementDevices**, **Sensors**, and **Tools**.

6.3.3 CarriagesType element

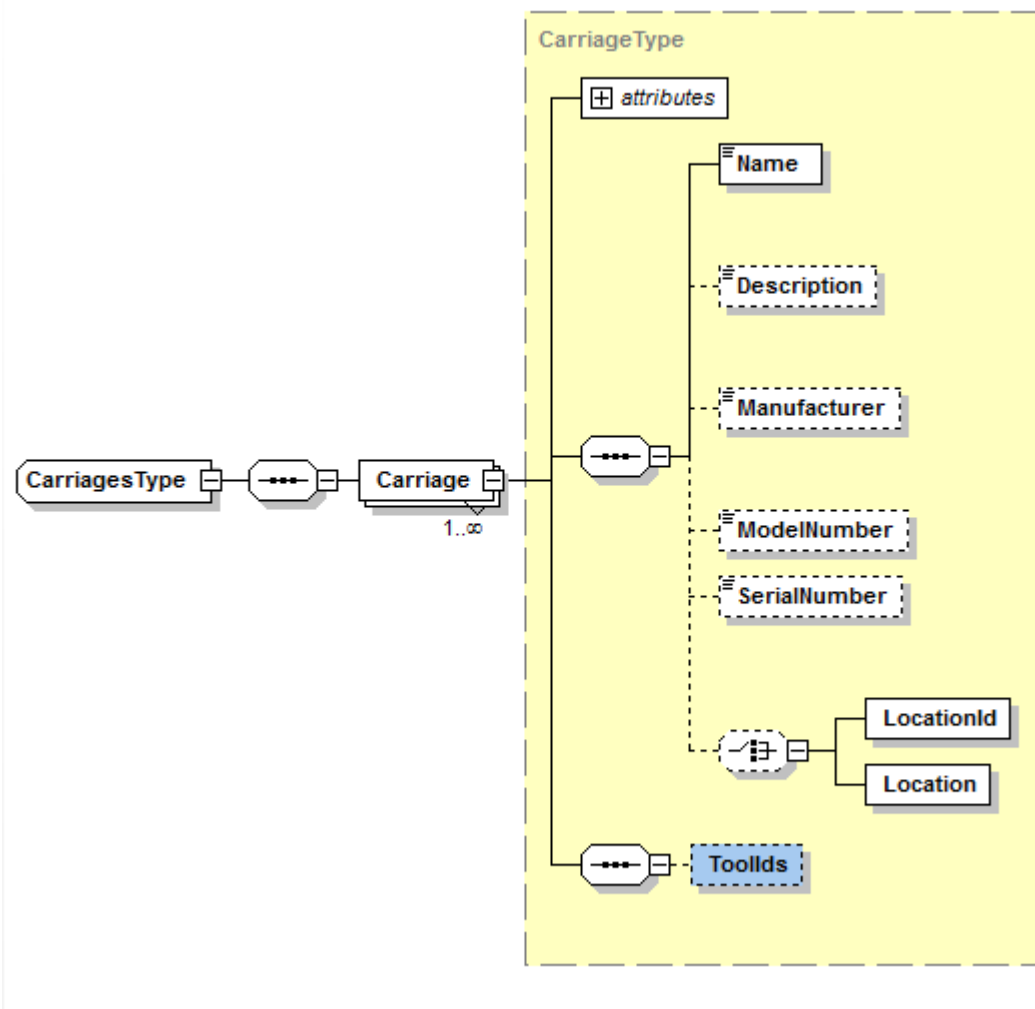


Figure 4 – CarriagesType element

The **CarriagesType** element models a collection of carriages, generally components of a CMM. It contains the *elements* defined in **MeasurementResourcesType**.

6.3.4 FixturesType element

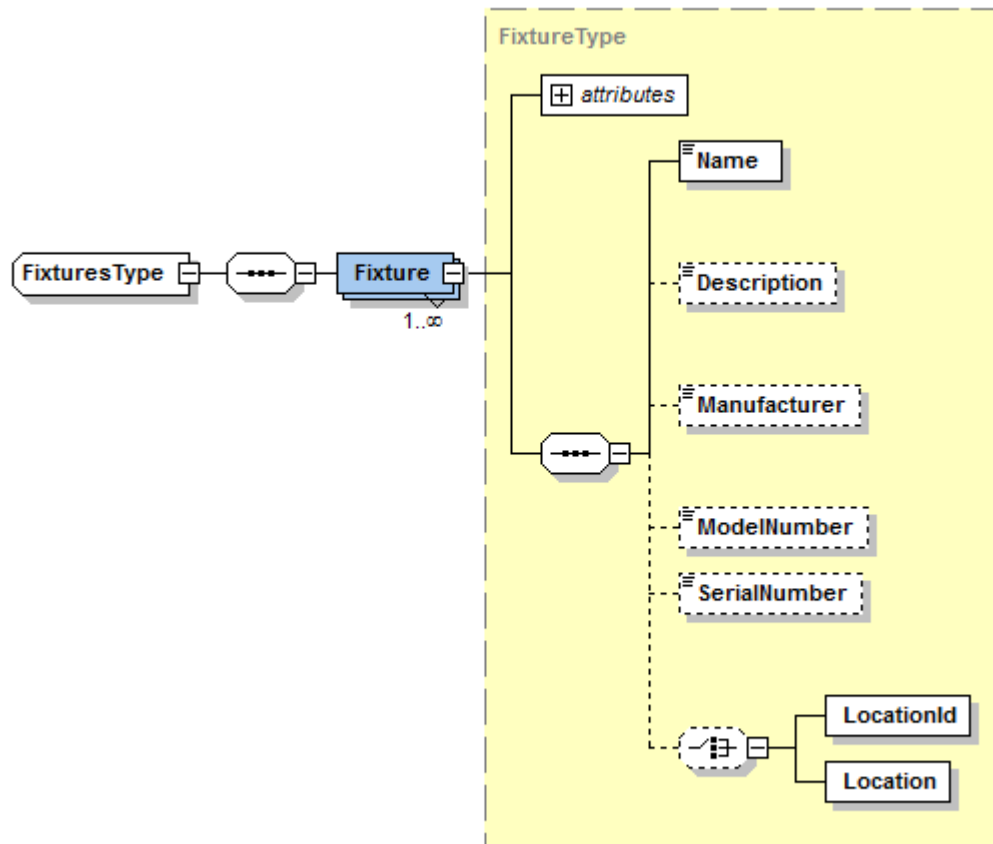


Figure 5 – FixturesType element

The **FixturesType** element models a collection of fixtures, generally used for workpiece positioning and holding. It contains the elements defined in **MeasurementResourcesType**.

6.3.5 MeasurementDevicesType

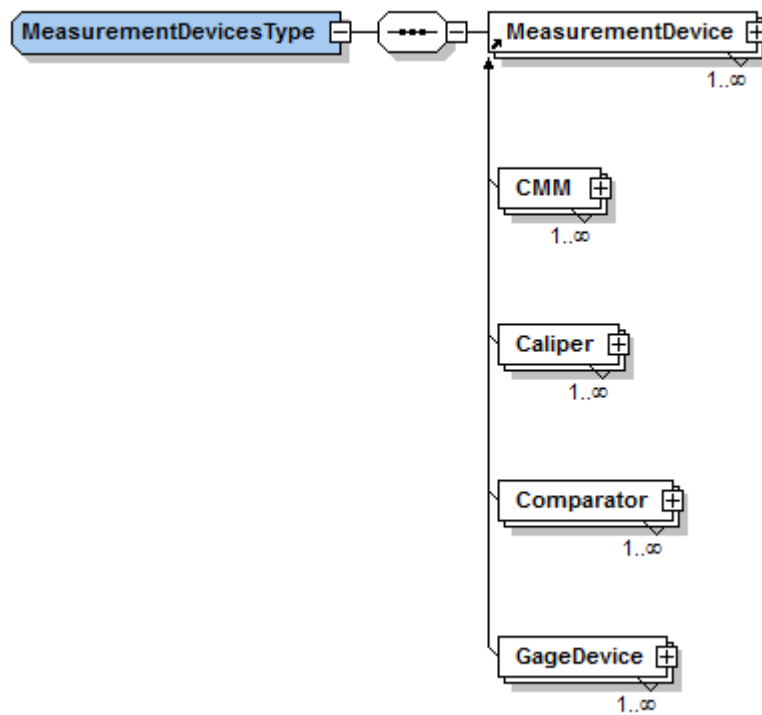


Figure 6 – *MeasurementDevicesType*

The ***MeasurementDevicesType*** models a collection of measurement devices, which may be **MeasurementDevice**, **CMM**, **Caliper**, **Comparator** or **GageDevice** *elements*.

6.3.6 *MeasurementDeviceType*

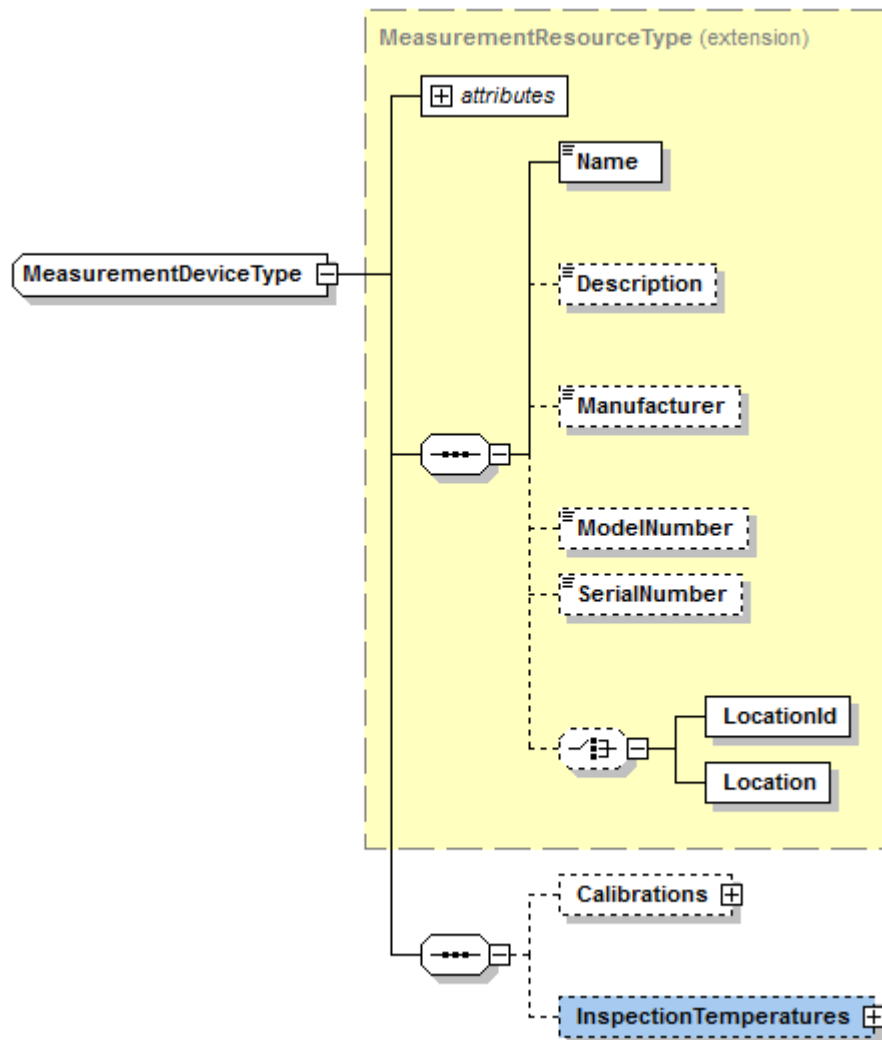


Figure 7 – *MeasurementDeviceType*

The ***MeasurementDeviceType*** is derived from ***MeasurementResourceType*** and describes a generalized measurement device.

6.3.7 The CMM *element*

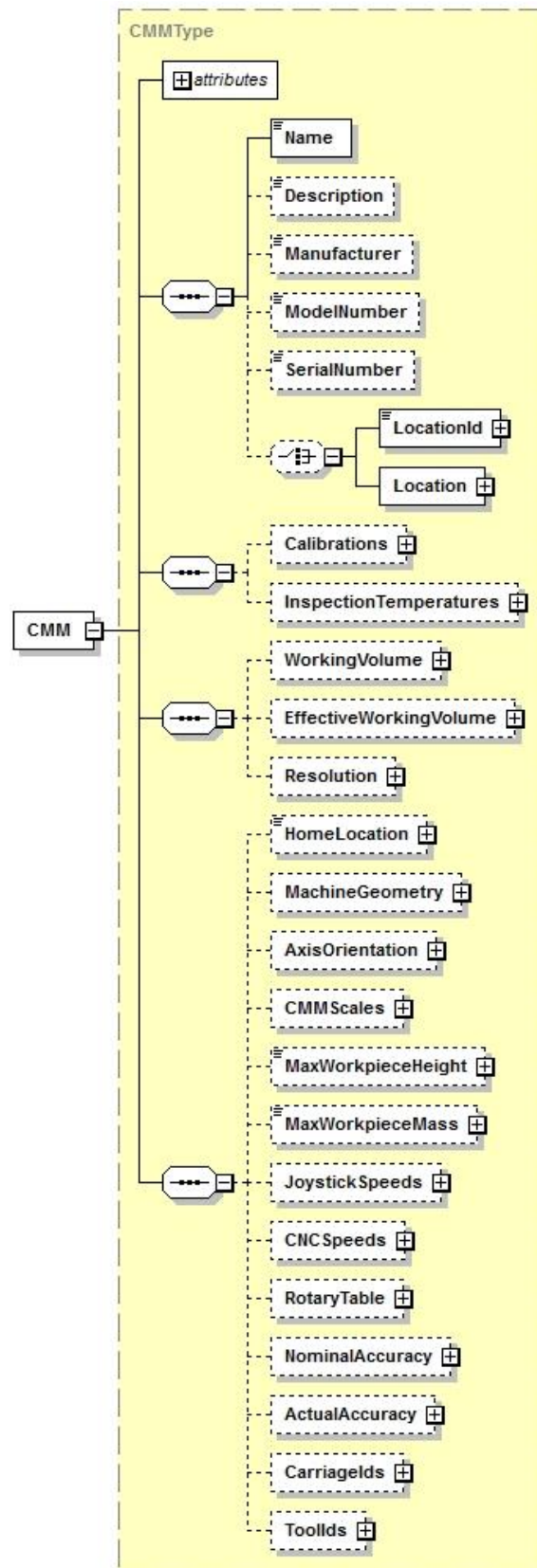


Figure 8 – CMM *element*

The **CMM *element*** is derived from **CMMType** and defines a CMM measurement resource.

6.3.8 Caliper *element*

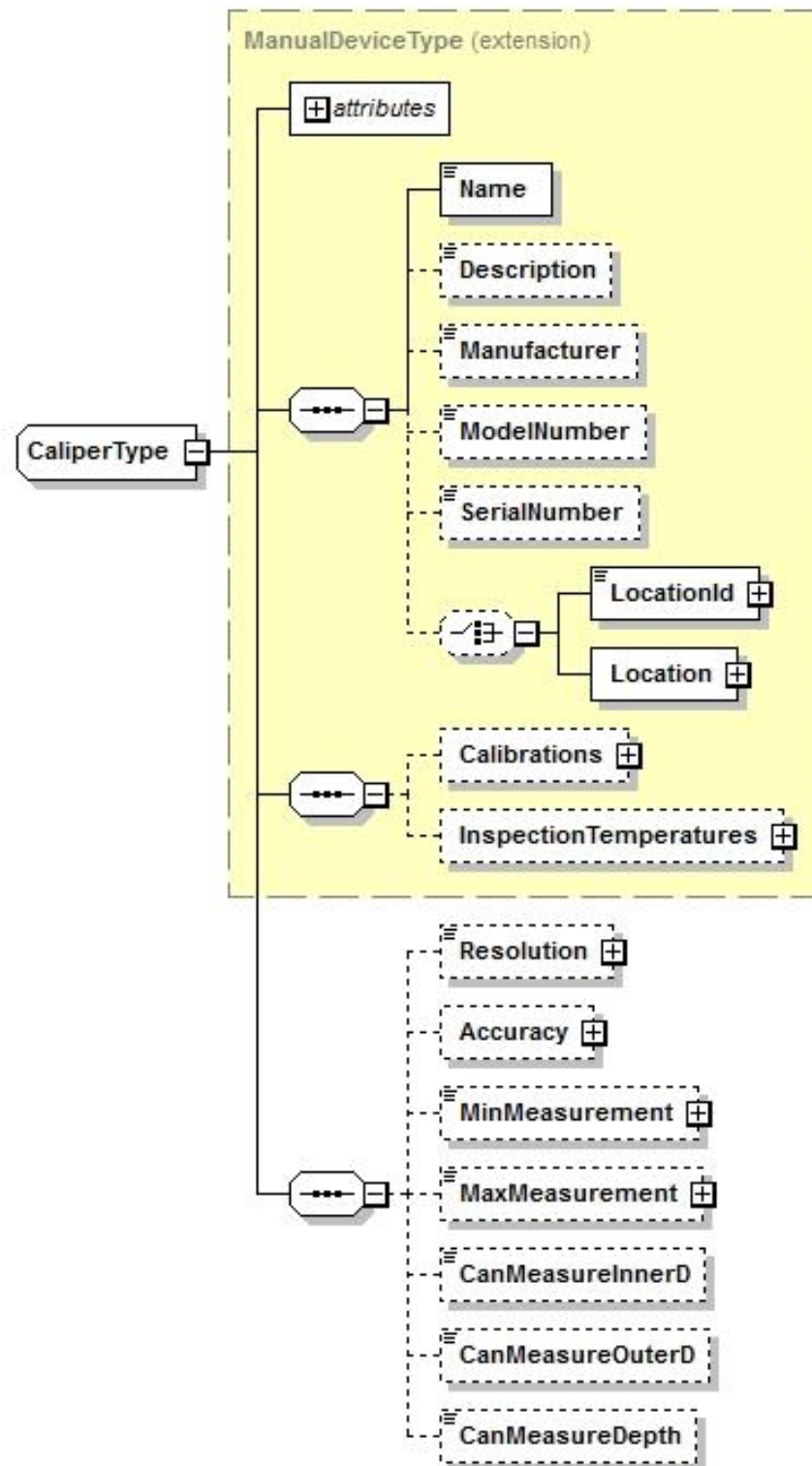


Figure 9 – The **Caliper** *element*

The **Caliper** *element* is derived from **CaliperType** and defines a caliper measurement resource.

6.3.9 Comparator *element*

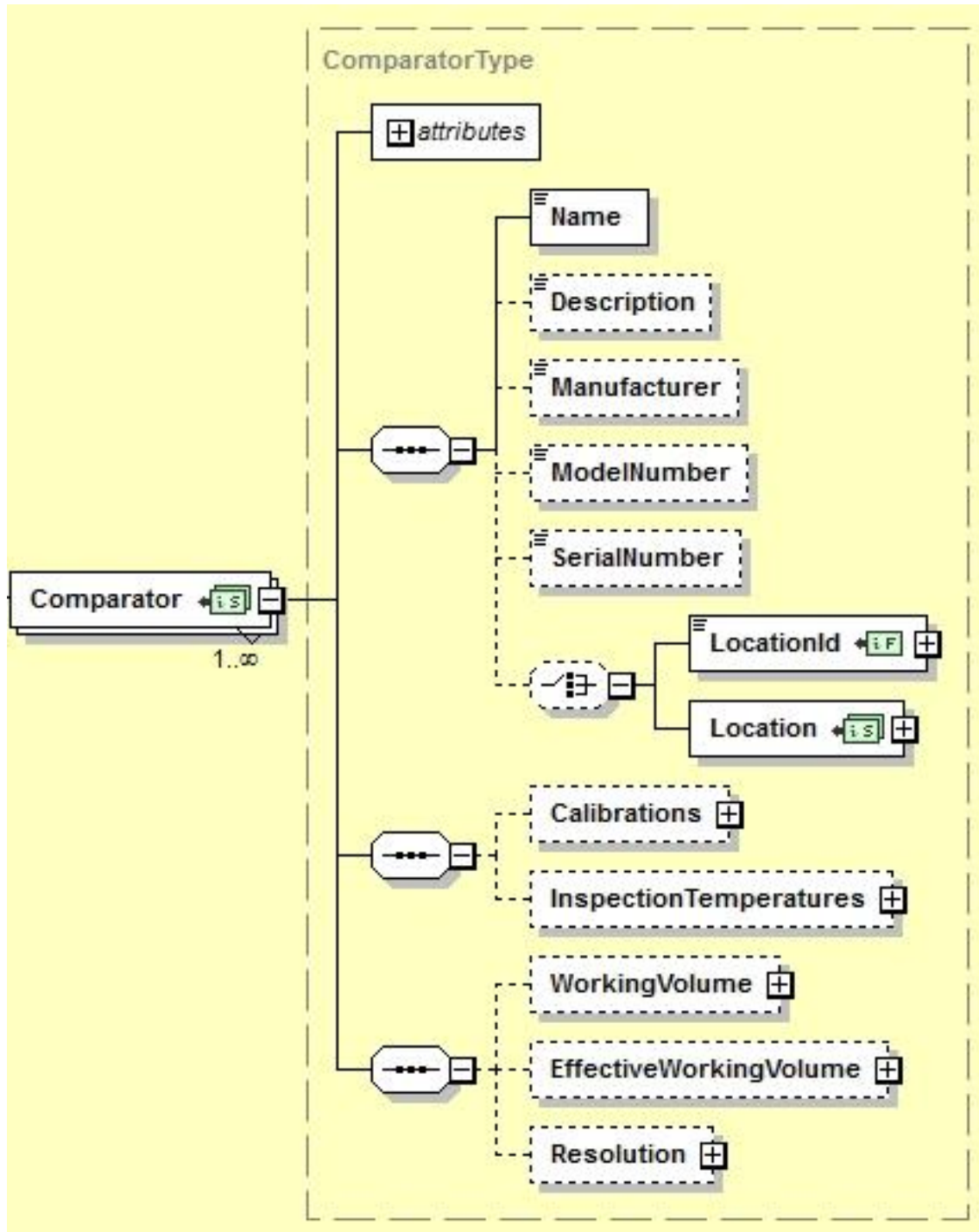


Figure 10 – The Comparator *element*

The **Comparator** *element* is derived from **ComparatorType** and defines a measurement resource used to compare one artifact to another.

6.3.10 GageDevice *element*

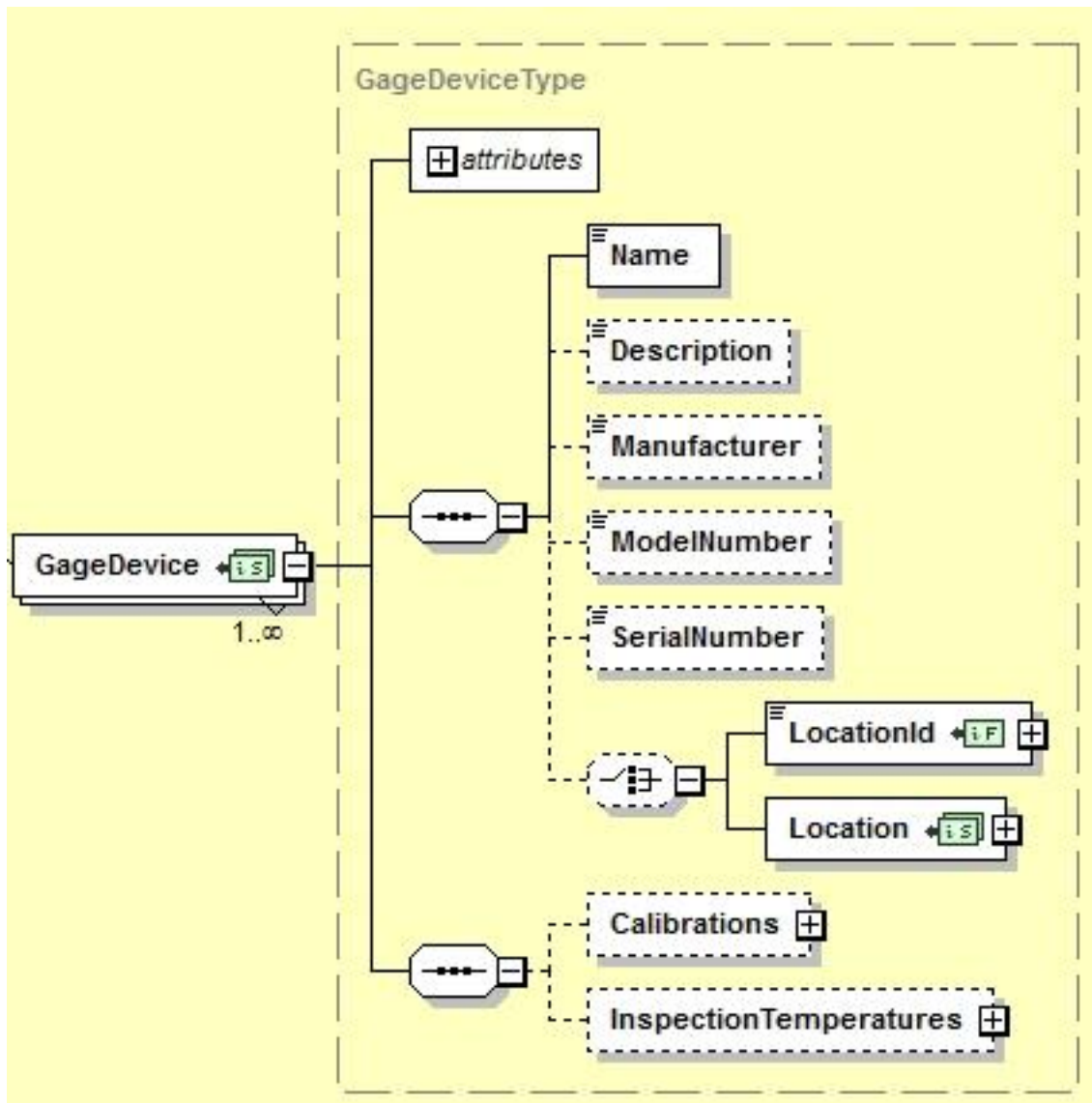


Figure 11 – GageDevice *element*

The **GageDevice** *element* is derived from **GageDeviceType** and defines a gage measurement resource.

7 Data dictionary for QIFMeasurementResources.xsd

QIFMeasurementResources.xsd is a single XML schema file that describes the QIF Resources information model. It defines several data types that are unique to the Resources application area, and, in keeping with QIF design guidelines; it reuses definitions from the QIF library whenever possible. For the description of the QIF Resources data dictionary, refer to Annex C – QIF Measurement Resources data dictionary.

Annex A – Location of QIFMeasurementResources.xsd schema file

The QIF Resources information model is expressed in XML schema definition language in the file “QIFMeasurementResources.xsd”. All QIF XML schema files are normative and are bundled into a single compressed folder file called “QIF_2.0_XMLSchemaFiles.zip” which is available for download at www.qifstandards.org.

Annex B – Graphical conventions of the data dictionary

(informative)

This section describes the graphical conventions used in the QIF data dictionaries. The data dictionaries describe the structure of the information models and the manufacturing quality semantics of the data types.

The rules of encoding QIF instance files are primarily defined in the XML schema files, but the data dictionaries express many of the same requirements via the pictures and table entries.

Data type definitions are indicated by a box with beveled corners on the left side, as in Figure B.1.

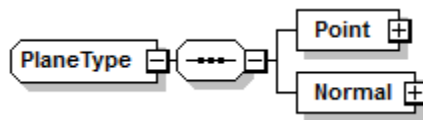


Figure B.1 – Notation for a type definition, *PlaneType*.

Rectangular boxes indicate data *elements*. A solid rectangle indicates a required *element*, whereas a dotted rectangle indicates an optional *element*. If an object is not designated optional, then it is required by default. Small boxes on the right hand end of *element* boxes, containing either "-" or "+" are used to indicate one of the following conditions exist:

- a "+" indicates that the additional structures or *elements* below this node have been hidden in this diagram.
- a "-" indicates that additional structures or *elements* below this node exist and are visible on the diagram.

The absence of any box at the right hand end of an *element* box indicates that the type of the *element* is a primitive type without any substructure, e.g., xs:decimal. In this case, there will also be three bars in the upper left corner of the *element* box. The beveled box with 3 dots on a line represents the XSDL *sequence* operator. It indicates that the object to the left is composed of all of the *elements* to the right, in that specified order.

Type definitions can be reused to generate data *elements*, as shown by a yellow box in dotted lines, with the name of the type definition at the top. Figure B.2 shows that **ZonePlane** is an *element* of type ***PlaneType***.

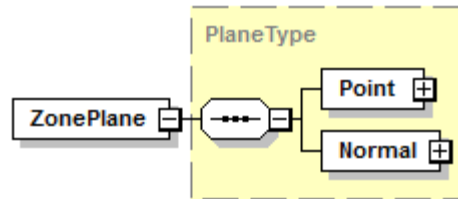


Figure B.2 – Reuse of the type definition *PlaneType* to generate element *ZonePlane*.

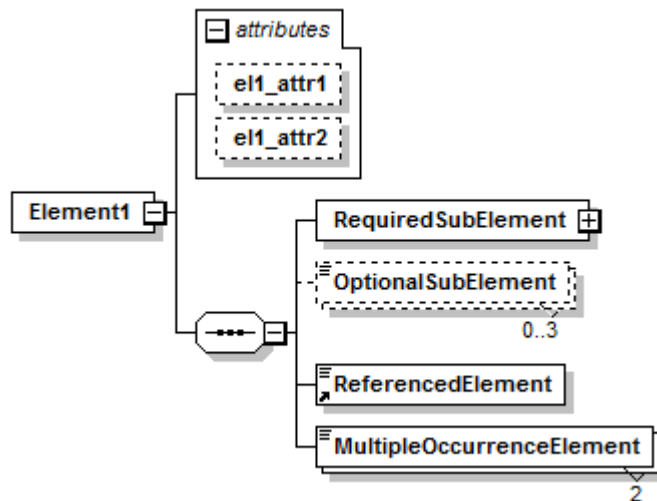


Figure B.3 – Notation for *elements*, *sub-elements*, and *attributes*.

Figure B.3 contains examples of numerous information modeling notations. *Element* definitions in XML schema files can be reused by "reference", indicated by an arrow in the lower left corner of the **ReferencedElement** box. *Elements* may appear in an XML instance document more than once. Figure B.3. shows the **OptionalSubElement** notated with two numerals separated by an ellipsis, "0..3", that indicates the number of occurrences as an inclusive range. The **OptionalSubElement** may occur zero, 1, 2, or 3 times as sub-*elements* of **Element1**. Where there is a single cardinality numeral, the *element* must occur exactly that number of times in the instance file. For example, the *element* **MultipleOccurrenceElement** must occur exactly two times as sub-*elements* of **Element1**. Information items can be instantiated in XSDL as *elements* or *attributes*. An *element's attributes* are shown in the data dictionaries as solid-lined boxes that are explicitly labeled *attributes*, as shown at the top of the diagram.

Figure B.4 shows an example *element* definition where exactly one of the three sub-*element* choices must be given. The beveled box with three square dots and a "switch" line (⎓) indicate the XSDL *choice* structure. When **Element2** is instantiated in an XML instance file, it must have exactly one sub-*element* chosen among the three sub-*elements* shown.

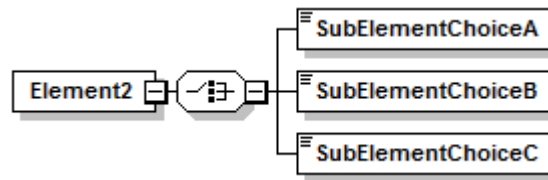


Figure B.4 – The *choice* notation.

The data dictionaries are grouped by XML schema file. It is characteristic of QIF definitions to use types declared in other XML schema files. The sharing of definitions specified in other files is indicated by the XML schema file directive *include*.

Annex C – QIF Measurement Resources data dictionary

(normative)

schema location: ..\QIFApplications\QIFMeasurementResources.xsd
 attributeFormDefault: unqualified
 elementFormDefault: qualified
 targetNamespace: http://qifstandards.org/xsd/qif2

Complex types

[AngleFunctionDiscreteType](#)
[B89TestType](#)
[CalibrationMasterType](#)
[CalibrationsType](#)
[CalibrationType](#)
[CaliperType](#)
[CarriagesType](#)
[CarriageType](#)
[CMMAccuracyTestBaseType](#)
[CMMAccuracyType](#)
[CMMAxisDirectionsType](#)
[CMMGeometryType](#)
[CMMScalableType](#)
[CMMScaleType](#)
[CMMSpeedsType](#)
[CMMType](#)
[ComparatorType](#)
[EffectiveWorkingVolumeType](#)
[FixturesType](#)
[FixtureType](#)
[FPSTestType](#)
[FunctionDiscreteType](#)
[GageDeviceType](#)
[ISO10360TestType](#)
[LengthFunctionDiscreteType](#)
[LesserErrorType](#)
[LinearErrorType](#)
[ManualDeviceType](#)
[MeasurementDeviceAccuracyBaseType](#)
[MeasurementDevicesType](#)
[MeasurementDeviceType](#)
[MeasurementResourceBaseType](#)
[MeasurementResourcesType](#)
[NumericalLengthAccuracyType](#)
[PointAccuracyTestType](#)
[ProbingDeviceType](#)
[QualificationsType](#)
[QualificationType](#)
[ResolutionType](#)
[RotaryTableType](#)
[SensorsType](#)
[SensorType](#)
[TableErrorsType](#)
[TemperaturesType](#)

Simple types

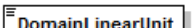
[CMMDirectionEnumType](#)
[CMMGeometryEnumType](#)

[TemperatureType](#)
[ToolsType](#)
[ToolType](#)
[TouchProbeType](#)
[WorkingVolumeType](#)
[XYZResolutionType](#)

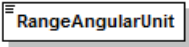
C.1 complexType AngleFunctionDiscreteType

diagram						
type	extension of FunctionDiscreteType					
properties	base FunctionDiscreteType					
children	DomainValues RangeValues DomainLinearUnit RangeAngularUnit					
used by	elements FPSTestType/XAxisPitch FPSTestType/XAxisRoll FPSTestType/XAxisYaw FPSTestType/YAxisPitch FPSTestType/YAxisRoll FPSTestType/YAxisYaw FPSTestType/ZAxisPitch FPSTestType/ZAxisRoll FPSTestType/ZAxisYaw					
attributes	Name	Type	Use	Default	Fixed	Annotation
	N	NaturalType	required			documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The AngleFunctionDiscreteType describes a discrete function whose domain is an array of values representing distances and whose range is an array of values representing angles.					

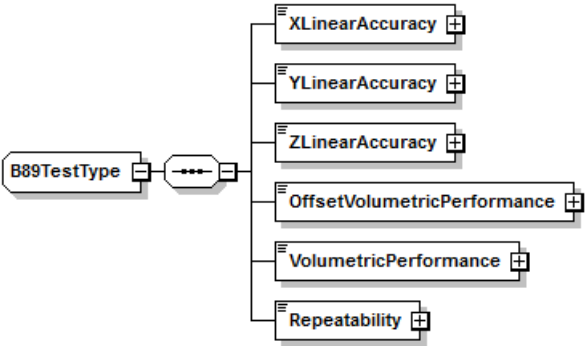
C.2 element AngleFunctionDiscreteType/DomainLinearUnit

diagram	
type	xs:token
properties	content simple
annotation	documentation The DomainLinearUnit element gives the name of the linear unit for the domain. This must be the name of a defined linear unit.

C.3 element AngleFunctionDiscreteType/RangeAngularUnit

diagram	
type	xs:token
properties	content simple
annotation	documentation The RangeAngularUnit element gives the name of the angular unit for the range. This must be the name of a defined angular unit.

C.4 complexType B89TestType

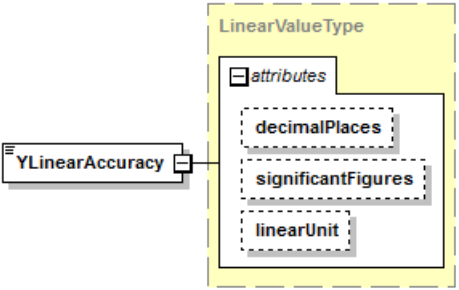
diagram	
type	extension of CMMAccuracyTestBaseType
properties	base CMMAccuracyTestBaseType
children	XLinearAccuracy YLinearAccuracy ZLinearAccuracy OffsetVolumetricPerformance VolumetricPerformance Repeatability
used by	element B89Test
annotation	documentation The B89TestType is the CMM accuracy test specified in ASME B89.4.1

C.5 element B89TestType/XLinearAccuracy

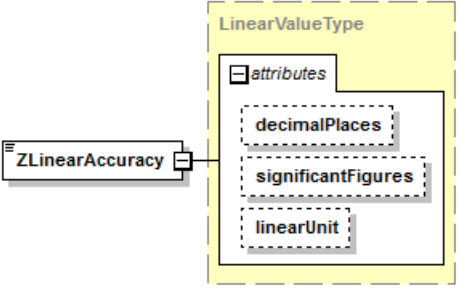
diagram													
type	LinearValueType												
properties	content complex												
attributes	<table><thead><tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>Annotation</th></tr></thead><tbody><tr><td>decimalPlaces</td><td>xs:nonNegativeInteger</td><td></td><td></td><td></td><td>documentation</td></tr></tbody></table>	Name	Type	Use	Default	Fixed	Annotation	decimalPlaces	xs:nonNegativeInteger				documentation
Name	Type	Use	Default	Fixed	Annotation								
decimalPlaces	xs:nonNegativeInteger				documentation								

	<p>significantFigures xs:nonNegativeInteger</p> <p>linearUnit xs:token</p>	<p>See documentation of SpecifiedDecimalType. documentation</p> <p>See documentation of SpecifiedDecimalType. documentation</p> <p>The optional linearUnit attribute defines the UnitName for the LinearValueType.</p>
annotation	<p>documentation</p> <p>The XLinearAccuracy element is the maximum error along the X axis.</p>	

C.6 element B89TestType/YLinearAccuracy

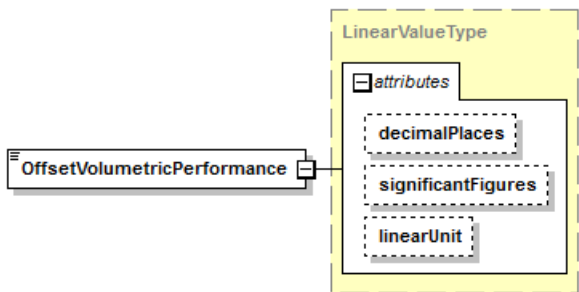
diagram						
type	LinearValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	<p>documentation</p> <p>The YLinearAccuracy is the maximum error along the Y axis.</p>					

C.7 element B89TestType/ZLinearAccuracy

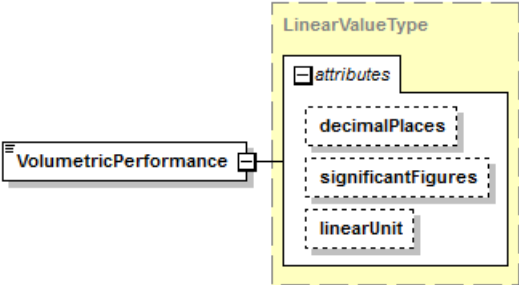
diagram						
type	LinearValueType					

properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The ZLinearAccuracy is the maximum error along the Z axis.					

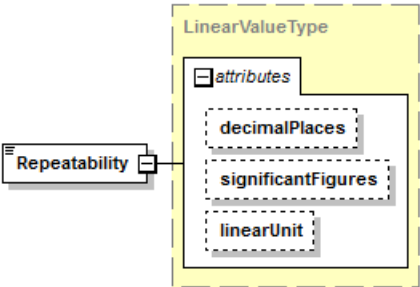
C.8 element B89TestType/OffsetVolumetricPerformance

diagram						
type	LinearValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The OffsetVolumetricPerformance is the maximum error in all directions that were tested when measured with a probe offset at right angles to a ball bar artifact.					

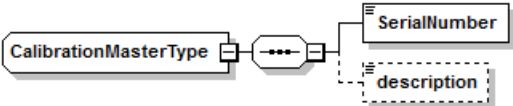
C.9 element B89TestType/VolumetricPerformance

diagram						
type	LinearValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The VolumetricPerformance is the maximum error in all directions that were tested.					

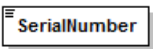
C.10 element B89TestType/Repeatability

diagram						
type	LinearValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The Repeatability element is the difference between the largest and smallest of multiple measurements of the position of a fixed ball.					

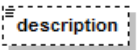
C.11 complexType CalibrationMasterType

diagram	
children	SerialNumber description
used by	element CalibrationType/CalibrationMaster
annotation	documentation The CalibrationMasterType defines a calibration master.

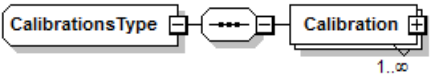
C.12 element CalibrationMasterType/SerialNumber

diagram	
type	xs:string
properties	content simple
annotation	documentation The SerialNumber element is the serial number of a calibration master.

C.13 element CalibrationMasterType/description

diagram	
type	xs:string
properties	minOcc 0 maxOcc 1 content simple
annotation	documentation The optional description element is the description of a calibration master.

C.14 complexType CalibrationsType

diagram	
children	Calibration
used by	element MeasurementDeviceType/Calibrations
annotation	documentation The CalibrationsType defines a list of calibrations.

C.15 element CalibrationsType/Calibration

diagram	
type	CalibrationType
properties	minOcc 1 maxOcc unbounded content complex
children	CalibrationMaster Temperatures Time Stamp
annotation	documentation Each Calibration element gives information about a calibration.

C.16 complexType CalibrationType

diagram	
children	CalibrationMaster Temperatures Time Stamp
used by	element CalibrationsType/Calibration
annotation	documentation The CalibrationType defines information about a calibration.

C.17 element CalibrationType/CalibrationMaster

diagram	
type	CalibrationMasterType
properties	minOcc 0 maxOcc 1 content complex
children	SerialNumber description
annotation	documentation The optional CalibrationMaster element gives information about the calibration master.

C.18 element CalibrationType/Temperatures

diagram	
type	TemperaturesType
properties	content complex
children	Temperature
annotation	documentation The Temperatures element is a list of temperatures noted for the calibration.

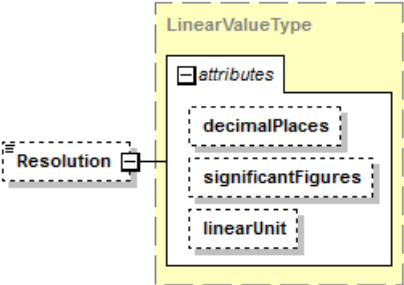
C.19 element CalibrationType/TimeStamp

diagram	
type	xs:dateTime
properties	content simple
annotation	documentation The TimeStamp element gives a date and time for the calibration.

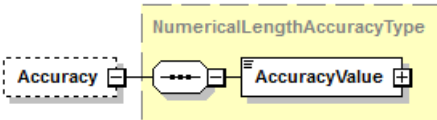
C.20 complexType CaliperType

diagram						
type	extension of ManualDeviceType					
properties	base ManualDeviceType					
children	Name Description Manufacturer ModelNumber SerialNumber LocationId Location Calibrations InspectionTemperatures Resolution Accuracy MinMeasurement MaxMeasurement CanMeasureInnerD CanMeasureOuterD CanMeasureDepth					
used by	element Caliper					
attributes	Name id	Type QIFIdType	Use required	Default	Fixed	Annotation documentation The id attribute is the QIF id of the measurement resource, used for referencing.
annotation	documentation The CaliperType defines a caliper measurement device.					

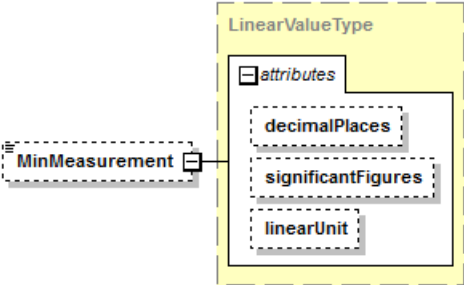
C.21 element CaliperType/Resolution

diagram						
type	LinearValueType					
properties	minOcc	0				
	maxOcc	1				
	content	complex				
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The optional Resolution element is the resolution of the caliper.					

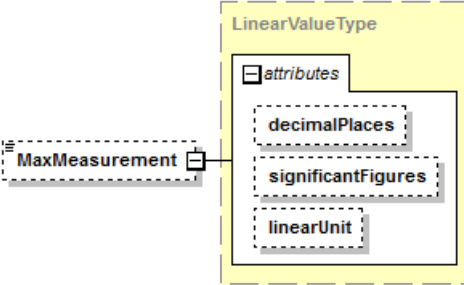
C.22 element CaliperType/Accuracy

diagram	
type	<u>NumericalLengthAccuracyType</u>
properties	minOcc 0 maxOcc 1 content complex
children	<u>AccuracyValue</u>
annotation	documentation The optional Accuracy element is the accuracy of the caliper.

C.23 element CaliperType/MinMeasurement

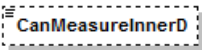
diagram						
type	LinearValueType					
properties	minOcc	0				
	maxOcc	1				
	content	complex				
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The optional MinMeasurement element is the smallest distance the caliper can measure.					

C.24 element CaliperType/MaxMeasurement

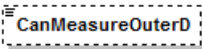
diagram						
type	LinearValueType					
properties	minOcc	0				
	maxOcc	1				
	content	complex				
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.

annotation	documentation The optional MaxMeasurement element is the largest distance the caliper can measure.
------------	---

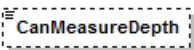
C.25 element CaliperType/CanMeasureInnerD

diagram	
type	xs:boolean
properties	minOcc 0 maxOcc 1 content simple
annotation	documentation The optional CanMeasureInnerD element indicates whether the caliper can measure an inner diameter. If present and set to true, the caliper can measure an inner diameter. If omitted or set to false the caliper cannot measure an inner diameter.

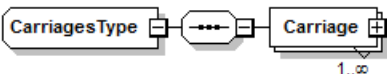
C.26 element CaliperType/CanMeasureOuterD

diagram	
type	xs:boolean
properties	minOcc 0 maxOcc 1 content simple
annotation	documentation The optional CanMeasureOuterD element indicates whether the caliper can measure an outer diameter. If present and set to true, the caliper can measure an outer diameter. If omitted or set to false the caliper cannot measure an outer diameter.

C.27 element CaliperType/CanMeasureDepth

diagram	
type	xs:boolean
properties	minOcc 0 maxOcc 1 content simple
annotation	documentation The optional CanMeasureDepth element indicates whether the caliper can measure the depth of a hole. If present and set to true, the caliper can measure the depth of a hole. If omitted or set to false the caliper cannot measure the depth of a hole.

C.28 complexType CarriagesType

diagram	
children	Carriage

used by	element MeasurementResourcesType/Carriages
annotation	documentation The CarriagesType defines a list of carriages (CMM carriages).

C.29 element CarriagesType/Carriage

diagram						
type	CarriageType					
properties	minOcc	1	maxOcc	unbounded	content	complex
children	Name Description Manufacturer ModelNumber SerialNumber LocationId Location ToolIds					
attributes	Name id	Type QIFIdType	Use required	Default	Fixed	Annotation documentation The id attribute is the QIF id of the measurement resource, used for referencing.
annotation	documentation Each Carriage element gives information about a CMM carriage.					

C.30 complexType CarriageType

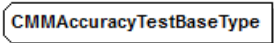
diagram	<p>The diagram illustrates the CarriageType complex type as an extension of MeasurementResourceBaseType. The CarriageType is shown as a box with a small square icon. It is connected to a dashed box labeled "MeasurementResourceBaseType (extension)". Inside this dashed box, there is an "attributes" box containing an "id" box. Below the "id" box, there is a choice box (indicated by a circle with three dots) containing several elements: "Name", "Description", "Manufacturer", "ModelNumber", "SerialNumber", and a group box containing "LocationId" and "Location". Below the choice box, there is another choice box containing "ToolIds".</p>												
type	extension of MeasurementResourceBaseType												
properties	base MeasurementResourceBaseType												
children	Name Description Manufacturer ModelNumber SerialNumber LocationId Location ToolIds												
used by	element CarriagesType/Carriage												
attributes	<table><thead><tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>Annotation</th></tr></thead><tbody><tr><td>id</td><td>QIFIdType</td><td>required</td><td></td><td></td><td>documentation The id attribute is the QIF id of the measurement resource, used for referencing.</td></tr></tbody></table>	Name	Type	Use	Default	Fixed	Annotation	id	QIFIdType	required			documentation The id attribute is the QIF id of the measurement resource, used for referencing.
Name	Type	Use	Default	Fixed	Annotation								
id	QIFIdType	required			documentation The id attribute is the QIF id of the measurement resource, used for referencing.								
annotation	documentation The CarriageType defines a CMM carriage.												

C.31 element CarriageType/ToolIds

diagram							
type	ArrayReferenceFullType						
properties	<table border="1"> <tbody> <tr> <td>minOcc</td> <td>0</td> </tr> <tr> <td>maxOcc</td> <td>1</td> </tr> <tr> <td>content</td> <td>complex</td> </tr> </tbody> </table>	minOcc	0	maxOcc	1	content	complex
minOcc	0						
maxOcc	1						
content	complex						
children	Id						

attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The required N attribute shows how many Id elements are present in this array.
annotation	documentation The optional ToolIds element is a list of the QIF ids of CMM measurement tools associated with the carriage.					

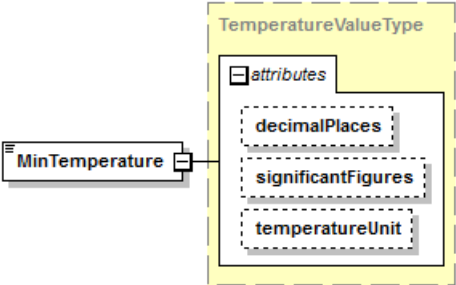
C.32 complexType CMMAccuracyTestBaseType

diagram	
properties	abstract true
used by	element CMMAccuracyTest complexTypes B89TestType FPSTestType ISO10360TestType PointAccuracyTestType
annotation	documentation The CMMAccuracyTestBaseType is the base type for CMM accuracy tests.

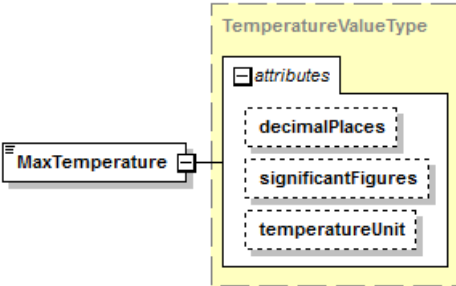
C.33 complexType CMMAccuracyType

diagram	
type	extension of MeasurementDeviceAccuracyBaseType
properties	base MeasurementDeviceAccuracyBaseType
children	MinTemperature MaxTemperature CMMAccuracyTest
used by	elements CMMType/ActualAccuracy CMMType/NominalAccuracy
annotation	documentation The CMMAccuracyType describes the accuracy of a CMM.

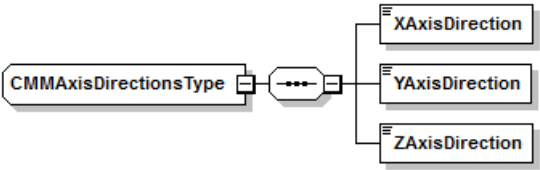
C.34 element CMMAccuracyType/MinTemperature

diagram						
type	TemperatureValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	temperatureUnit	xs:token				documentation The optional temperatureUnit attribute defines the UnitName for the TemperatureValueType.
annotation	documentation The MinTemperature element is the minimum temperature at which the accuracy description is valid.					


C.35 element CMMAccuracyType/MaxTemperature

diagram						
type	TemperatureValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	temperatureUnit	xs:token				documentation The optional temperatureUnit attribute defines the UnitName for the TemperatureValueType.
annotation	documentation The MaxTemperature element is the maximum temperature at which the accuracy description is valid.					


C.36 complexType CMMAxisDirectionsType

diagram	
children	XAxisDirection YAxisDirection ZAxisDirection
used by	element CMMType/AxisOrientation
annotation	documentation The CMMAxisDirectionsType defines how the coordinate axes point with respect to the machine. The axis directions must form a right-handed 3D Cartesian coordinate system.

C.37 element CMMAxisDirectionsType/XAxisDirection


diagram			
type	CMMDirectionEnumType		
properties	content	simple	
facets	Kind	Value	Annotation
	enumeration	RIGHT	
	enumeration	LEFT	
	enumeration	FRONT	
	enumeration	BACK	
	enumeration	UP	
	enumeration	DOWN	
annotation	documentation The XAxisDirection element gives the direction of the positive X axis with respect to the machine.		

C.38 element CMMAxisDirectionsType/YAxisDirection

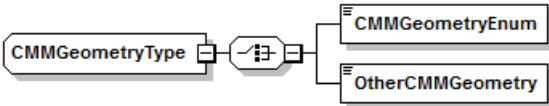
diagram			
type	CMMDirectionEnumType		
properties	content	simple	
facets	Kind	Value	Annotation
	enumeration	RIGHT	
	enumeration	LEFT	
	enumeration	FRONT	
	enumeration	BACK	
	enumeration	UP	
	enumeration	DOWN	

annotation	documentation The YAxisDirection element gives the direction of the positive Y axis with respect to the machine.
------------	---


C.39 element CMMAxisDirectionsType/ZAxisDirection

diagram			
type	CMMDirectionEnumType		
properties	content simple		
facets	Kind	Value	Annotation
	enumeration	RIGHT	
	enumeration	LEFT	
	enumeration	FRONT	
	enumeration	BACK	
	enumeration	UP	
	enumeration	DOWN	
annotation	documentation The ZAxisDirection element gives the direction of the positive Z axis with respect to the machine.		

C.40 complexType CMMGeometryType

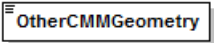
diagram	
children	CMMGeometryEnum OtherCMMGeometry
used by	element CMMType/MachineGeometry
annotation	documentation The CMMGeometryType defines a type of construction of a CMM.

C.41 element CMMGeometryType/CMMGeometryEnum

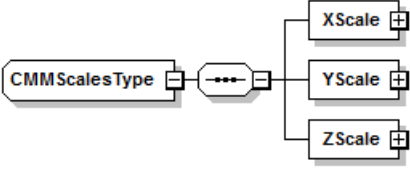
diagram			
type	CMMGeometryEnumType		
properties	content simple		
facets	Kind	Value	Annotation
	enumeration	CANTILEVER	
	enumeration	BRIDGEMOVINGBRIDGE	
	enumeration	BRIDGEMOVINGTABLE	
	enumeration	COLUMN	
	enumeration	GANTRY	
	enumeration	HORIZONTALARMMOVINGARM	
	enumeration	HORIZONTALARMMOVINGTABLE	

	enumeration ARTICULATEDARM
annotation	documentation The CMMGeometryEnum element describes an often-used type of CMM construction.

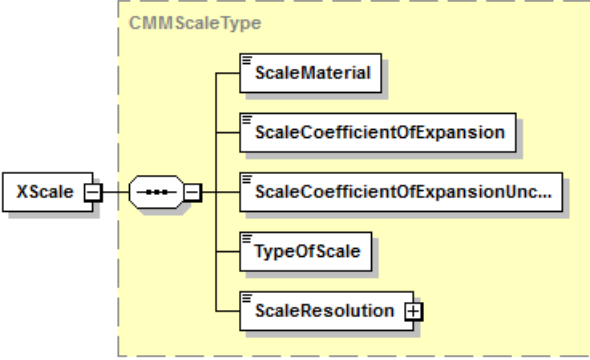
C.42 element CMMGeometryType/OtherCMMGeometry

diagram	 A rectangular box labeled "OtherCMMGeometry" with a small square icon in the top-left corner.
type	xs:string
properties	content simple
annotation	documentation The OtherCMMGeometry element describes the CMM construction type in natural language.

C.43 complexType CMM ScalesType

diagram	 A diagram showing a box labeled "CMM ScalesType" connected to a container box. Inside the container box are three separate boxes labeled "XScale", "YScale", and "ZScale".
children	XScale YScale ZScale
used by	element CMMType/CMM Scales
annotation	documentation The CMM ScalesType describes the scales on the CMM.

C.44 element CMM ScalesType/XScale

diagram	 A diagram showing a box labeled "XScale" connected to a container box. Inside the container box are five separate boxes labeled "ScaleMaterial", "ScaleCoefficientOfExpansion", "ScaleCoefficientOfExpansionUncertainty", "TypeOfScale", and "ScaleResolution". The container box is highlighted with a yellow dashed border and labeled "CMMScaleType" at the top.
type	CMMScaleType
properties	content complex
children	ScaleMaterial ScaleCoefficientOfExpansion ScaleCoefficientOfExpansionUncertainty TypeOfScale ScaleResolution
annotation	documentation The XScale element describes the scale used for measuring along the X axis.

C.45 element CMMScaleType/YScale

diagram	
type	CMMScaleType
properties	content complex
children	ScaleMaterial ScaleCoefficientOfExpansion ScaleCoefficientOfExpansionUncertainty TypeOfScale ScaleResolution
annotation	documentation The YScale element describes the scale used for measuring along the Y axis.

C.46 element CMMScaleType/ZScale

diagram	
type	CMMScaleType
properties	content complex
children	ScaleMaterial ScaleCoefficientOfExpansion ScaleCoefficientOfExpansionUncertainty TypeOfScale ScaleResolution
annotation	documentation The ZScale element describes the scale used for measuring along the Z axis.

C.47 complexType CMMScaleType

diagram	
children	ScaleMaterial ScaleCoefficientOfExpansion ScaleCoefficientOfExpansionUncertainty TypeOfScale ScaleResolution
used by	elements CMMScalesType/XScale CMMScalesType/YScale CMMScalesType/ZScale
annotation	documentation The CMMScaleType describes a CMM scale.

C.48 element CMMScaleType/ScaleMaterial

diagram	
type	xs:string
properties	content simple
annotation	documentation The ScaleMaterial element describes the material from which the scale is made.

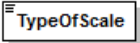
C.49 element CMMScaleType/ScaleCoefficientOfExpansion

diagram	
type	xs:decimal
properties	content simple
annotation	documentation The ScaleCoefficientOfExpansion element is the coefficient of expansion per degree Celsius of the scale.

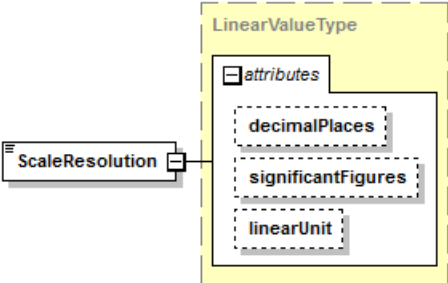
C.50 element CMMScaleType/ScaleCoefficientOfExpansionUncertainty

diagram	
type	xs:decimal
properties	content simple
annotation	documentation The ScaleCoefficientOfExpansionUncertainty element is the uncertainty of the coefficient of expansion per degree Celsius of the scale.

C.51 element CMMScaleType/TypeOfScale

diagram	
type	xs:string
properties	content simple
annotation	documentation The TypeOfScale element describes the type of the scale.

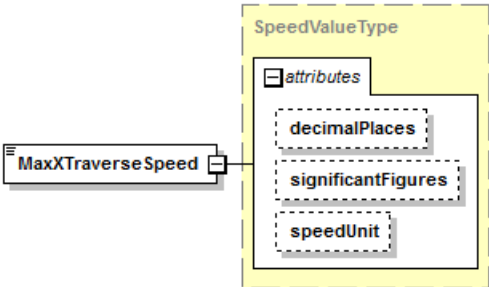
C.52 element CMMScaleType/ScaleResolution

diagram						
type	LinearValueType					
properties	content complex					
attributes	Name decimalPlaces	Type xs:nonNegativeInteger	Use	Default	Fixed	Annotation documentation See documentation of SpecifiedDecimalType. documentation See documentation of SpecifiedDecimalType. documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
	significantFigures	xs:nonNegativeInteger				
	linearUnit	xs:token				
annotation	documentation The ScaleResolution element is the resolution of the scale.					

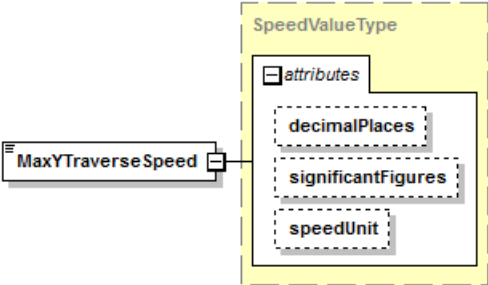
C.53 complexType CMMSpeedsType

diagram	
children	MaxXTraverseSpeed MaxYTraverseSpeed MaxZTraverseSpeed MaxXProbingSpeed MaxYProbingSpeed MaxZProbingSpeed
used by	elements CMMType/CNCSpeeds CMMType/JoystickSpeeds
annotation	documentation The CMMSpeedsType gives the maximum probing and traversing speeds of a CMM.

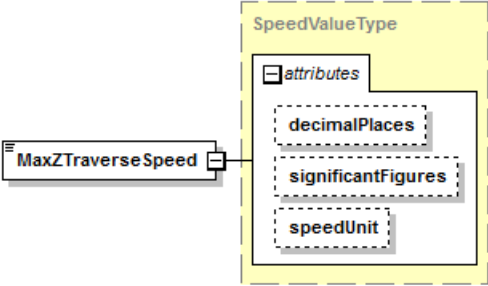
C.54 element CMMSpeedsType/MaxXTraverseSpeed

diagram						
type	SpeedValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	speedUnit	xs:token				documentation The optional speedUnit attribute defines the UnitName for the SpeedValueType.
annotation	documentation The MaxXTraverseSpeed element gives the maximum traverse speed along the X axis.					

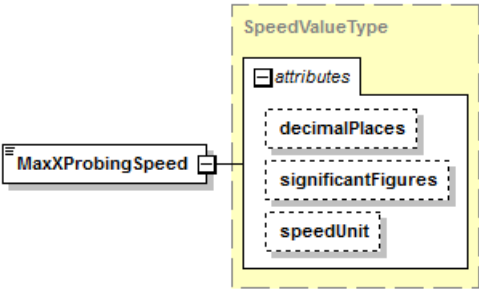
C.55 element CMMSpeedsType/MaxYTraverseSpeed

diagram						
type	SpeedValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	speedUnit	xs:token				documentation The optional speedUnit attribute defines the UnitName for the SpeedValueType.
annotation	documentation The MaxYTraverseSpeed element gives the maximum traverse speed along the Y axis.					

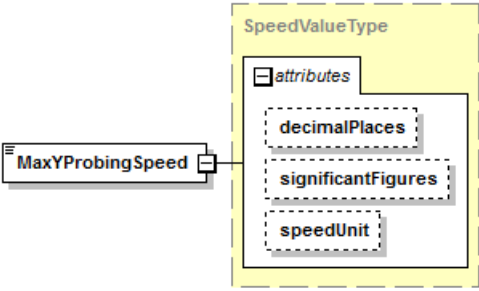
C.56 element CMMSpeedsType/MaxZTraverseSpeed

diagram						
type	SpeedValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	speedUnit	xs:token				documentation The optional speedUnit attribute defines the UnitName for the SpeedValueType.
annotation	documentation The MaxZTraverseSpeed element gives the maximum traverse speed along the Z axis.					

C.57 element CMMSpeedsType/MaxXProbingSpeed

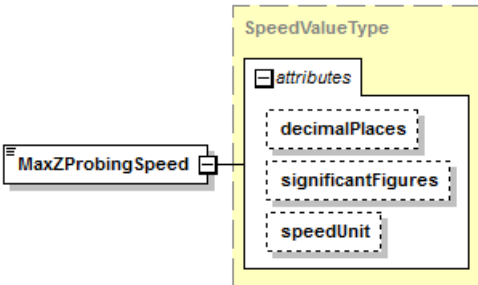
diagram						
type	SpeedValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	speedUnit	xs:token				documentation The optional speedUnit attribute defines the UnitName for the SpeedValueType.
annotation	documentation The MaxXProbingSpeed element gives the maximum probing speed along the X axis.					

C.58 element CMMSpeedsType/MaxYProbingSpeed

diagram						
type	SpeedValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	speedUnit	xs:token				documentation The optional speedUnit attribute defines the UnitName for the

	SpeedValueType.
annotation	documentation The MaxYProbingSpeed element gives the maximum probing speed along the Y axis.

C.59 element CMMSpeedsType/MaxZProbingSpeed

diagram						
type	SpeedValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	speedUnit	xs:token				documentation The optional speedUnit attribute defines the UnitName for the SpeedValueType.
annotation	documentation The MaxZProbingSpeed element gives the maximum probing speed along the Z axis.					

C.60 complexType CMMType

diagram						
type	extension of ProbingDeviceType					
properties	base ProbingDeviceType					
children	Name Description Manufacturer ModelNumber SerialNumber LocationId Location Calibrations InspectionTemperatures WorkingVolume EffectiveWorkingVolume Resolution HomeLocation MachineGeometry AxisOrientation CMM Scales MaxWorkpieceHeight MaxWorkpieceMass JoystickSpeeds CNC Speeds RotaryTable NominalAccuracy ActualAccuracy CarriageIds ToolIds					
used by	element CMM					
attributes	Name id	Type QIFIdType	Use required	Default	Fixed	Annotation documentation

		The id attribute is the QIF id of the measurement resource, used for referencing.
annotation	documentation The CMMType defines a CMM with zero or one rotary table, zero to many tools, and zero to many carriages. A CMM is assumed to have a fixed native 3D Cartesian coordinate system.	

C.61 element CMMType/HomeLocation

diagram						
type	PointType					
properties	minOcc	0	maxOcc	1	content	complex
facets	Kind	Value	Annotation	length	3	
attributes	Name	Type	Use	Default	Fixed	Annotation
	linearUnit	xs:token				
	decimalPlaces	xs:nonNegativeInteger				
	significantFigures	xs:nonNegativeInteger				
	validity	ValidityEnumType				
	xDecimalPlaces	xs:nonNegativeInteger				
	xSignificantFigures	xs:nonNegativeInteger				
	xValidity	ValidityEnumType				
	yDecimalPlaces	xs:nonNegativeInteger				
	ySignificantFigures	xs:nonNegativeInteger				
	yValidity	ValidityEnumType				

	zDecimalPlaces xs:nonNegativeInteger zSignificantFigures xs:nonNegativeInteger zValidity ValidityEnumType
annotation	documentation The optional HomeLocation element gives the HomeLocation of the tool mount point of the CMM in the coordinate system of the CMM.

C.62 element CMMType/MachineGeometry

diagram	
type	CMMGeometryType
properties	minOcc 0 maxOcc 1 content complex
children	CMMGeometryEnum OtherCMMGeometry
annotation	documentation The optional MachineGeometry element gives the type of construction of the CMM.

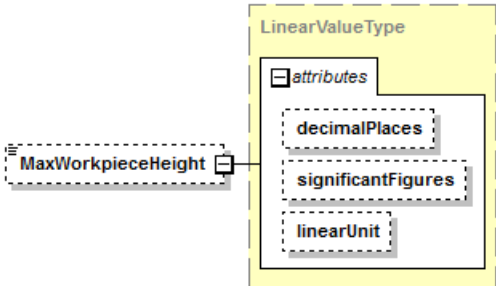
C.63 element CMMType/AxisOrientation

diagram	
type	CMMAxisDirectionsType
properties	minOcc 0 maxOcc 1 content complex
children	XAxisDirection YAxisDirection ZAxisDirection
annotation	documentation The optional AxisOrientation element gives the orientation of the axes of the coordinate system of the CMM with respect to the machine.

C.64 element CMMType/CMM Scales

diagram	
type	CMM Scales Type
properties	minOcc 0 maxOcc 1 content complex
children	X Scale Y Scale Z Scale
annotation	documentation The optional CMM Scales element describes the scales used on the CMM.

C.65 element CMMType/MaxWorkpieceHeight

diagram																									
type	LinearValueType																								
properties	minOcc 0 maxOcc 1 content complex																								
attributes	<table><thead><tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>Annotation</th></tr></thead><tbody><tr><td>decimalPlaces</td><td>xs:nonNegativeInteger</td><td></td><td></td><td></td><td>documentation See documentation of SpecifiedDecimalType.</td></tr><tr><td>significantFigures</td><td>xs:nonNegativeInteger</td><td></td><td></td><td></td><td>documentation See documentation of SpecifiedDecimalType.</td></tr><tr><td>linearUnit</td><td>xs:token</td><td></td><td></td><td></td><td>documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.</td></tr></tbody></table>	Name	Type	Use	Default	Fixed	Annotation	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
Name	Type	Use	Default	Fixed	Annotation																				
decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.																				
significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.																				
linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.																				
annotation	documentation The optional MaxWorkpieceHeight element gives the maximum height (vertical extent) of an object to be measured when the object is placed on the bed of the CMM in the desired orientation.																								

C.66 element CMMType/MaxWorkpieceMass

diagram						
type	MassValueType					
properties	minOcc	0				
	maxOcc	1				
	content	complex				
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	massUnit	xs:token				documentation The optional massUnit attribute defines the UnitName for the MassValueType.
annotation	documentation The optional MaxWorkpieceMass element gives the maximum mass of an object to be measured.					

C.67 element CMMType/JoystickSpeeds

diagram						
type	CMMSpeedsType					
properties	minOcc	0				
	maxOcc	1				
	content	complex				
children	MaxXTraverseSpeed MaxYTraverseSpeed MaxZTraverseSpeed MaxXProbingSpeed MaxYProbingSpeed MaxZProbingSpeed					
annotation	documentation The optional JoystickSpeeds element describes the maximum speed in joystick mode of each axis for traversing and probing.					

C.68 element CMMType/CNCSpeeds

diagram	
type	CMMSpeedsType
properties	minOcc 0 maxOcc 1 content complex
children	MaxXTraverseSpeed MaxYTraverseSpeed MaxZTraverseSpeed MaxXProbingSpeed MaxYProbingSpeed MaxZProbingSpeed
annotation	documentation The optional CNCSpeeds element describes the maximum speed in CNC mode of each axis for traversing and probing.

C.69 element CMMType/RotaryTable

diagram	
type	RotaryTableType
properties	minOcc 0 maxOcc 1 content complex
children	LocationOnCMM AxisDirection ZeroIndexDirection TableRadius TableErrors
annotation	documentation The optional RotaryTable element describes a rotary table attached to the CMM.

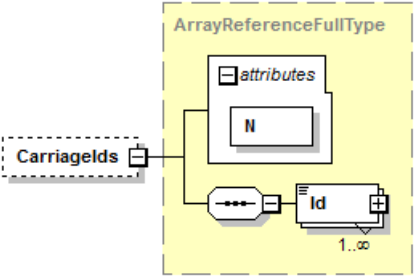
C.70 element CMMType/NominalAccuracy

diagram	
type	CMMAccuracyType
properties	minOcc 0 maxOcc 1 content complex
children	MinTemperature MaxTemperature CMMAccuracyTest
annotation	documentation The optional NominalAccuracy element gives the accuracy of the CMM ascribed to it by a CMM vendor.

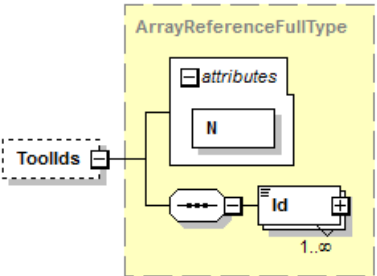
C.71 element CMMType/ActualAccuracy

diagram	
type	CMMAccuracyType
properties	minOcc 0 maxOcc 1 content complex
children	MinTemperature MaxTemperature CMMAccuracyTest
annotation	documentation The optional ActualAccuracy element gives the accuracy of the CMM as measured by the user of the CMM or by a competent third party.

C.72 element CMMType/Carriagelds

diagram						
type	ArrayReferenceFullType					
properties	minOcc	0	maxOcc	1	content	complex
children	Id					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The required N attribute shows how many Id elements are present in this array.
annotation	documentation The optional Carriagelds element is a list of the QIF ids of CMM carriages for the CMM.					

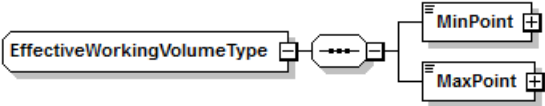
C.73 element CMMType/Toollds

diagram						
type	ArrayReferenceFullType					
properties	minOcc	0	maxOcc	1	content	complex
children	Id					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The required N attribute shows how many Id elements are present in this array.
annotation	documentation The optional Toollds element is a list of the QIF ids of CMM measurement tools associated with the CMM but not associated with a particular carriage.					

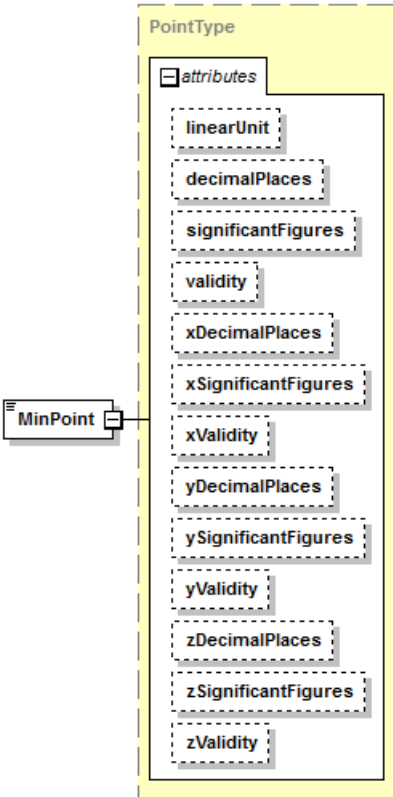
C.74 complexType ComparatorType

diagram						
type	extension of ProbingDeviceType					
properties	base ProbingDeviceType					
children	Name Description Manufacturer ModelNumber SerialNumber LocationId Location Calibrations InspectionTemperatures WorkingVolume EffectiveWorkingVolume Resolution					
used by	element Comparator					
attributes	Name id	Type QIFIdType	Use required	Default	Fixed	Annotation documentation The id attribute is the QIF id of the measurement resource, used for referencing.
annotation	documentation The ComparatorType defines a probing device that requires measuring both an object being evaluated and an ideal object of the same design in order to produce useful results. documentation Maybe add NominalAccuracy and ActualAccuracy elements. Need to define ComparatorAccuracy to do that. documentation Maybe add ToolIds element.					

C.75 complexType EffectiveWorkingVolumeType

diagram	
children	MinPoint MaxPoint
used by	element ProbingDeviceType/EffectiveWorkingVolume
annotation	documentation The WorkingVolumeType defines the size and location of a box-shaped working volume whose sides are aligned with the axes of a 3D Cartesian coordinate coordinate system. The box is described by giving the points at diagonally opposite corners of the box, one with minimum XYZ values, the other with maximum XYZ values.

C.76 element EffectiveWorkingVolumeType/MinPoint

diagram																															
type	PointType																														
properties	content complex																														
facets	<table><tr><td>Kind</td><td>Value</td><td>Annotation</td></tr><tr><td>length</td><td>3</td><td></td></tr></table>	Kind	Value	Annotation	length	3																									
Kind	Value	Annotation																													
length	3																														
attributes	<table><tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>Annotation</td></tr><tr><td>linearUnit</td><td>xs:token</td><td></td><td></td><td></td><td></td></tr><tr><td>decimalPlaces</td><td>xs:nonNegativeInteger</td><td></td><td></td><td></td><td></td></tr><tr><td>significantFigures</td><td>xs:nonNegativeInteger</td><td></td><td></td><td></td><td></td></tr><tr><td>validity</td><td>ValidityEnumType</td><td></td><td></td><td></td><td></td></tr></table>	Name	Type	Use	Default	Fixed	Annotation	linearUnit	xs:token					decimalPlaces	xs:nonNegativeInteger					significantFigures	xs:nonNegativeInteger					validity	ValidityEnumType				
Name	Type	Use	Default	Fixed	Annotation																										
linearUnit	xs:token																														
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significantFigures	xs:nonNegativeInteger																														
validity	ValidityEnumType																														

	xDecimalPlaces xs:nonNegativeInteger xSignificantFigures xs:nonNegativeInteger xValidity ValidityEnumType yDecimalPlaces xs:nonNegativeInteger ySignificantFigures xs:nonNegativeInteger yValidity ValidityEnumType zDecimalPlaces xs:nonNegativeInteger zSignificantFigures xs:nonNegativeInteger zValidity ValidityEnumType
annotation	documentation The MinPoint element is the minimum corner of the working volume.

C.77 element EffectiveWorkingVolumeType/MaxPoint

diagram						
type	PointType					
properties	content complex					
facets	Kind	Value	Annotation			
	length	3				
attributes	Name	Type	Use	Default	Fixed	Annotation
	linearUnit	xs:token				
	decimalPlaces	xs:nonNegativeInteger				
	significantFigures	xs:nonNegativeInteger				
	validity	ValidityEnumType				

	xDecimalPlaces xs:nonNegativeInteger xSignificantFigures xs:nonNegativeInteger xValidity ValidityEnumType yDecimalPlaces xs:nonNegativeInteger ySignificantFigures xs:nonNegativeInteger yValidity ValidityEnumType zDecimalPlaces xs:nonNegativeInteger zSignificantFigures xs:nonNegativeInteger zValidity ValidityEnumType
annotation	documentation The XAxisMax element is the maximum corner of the working volume.

C.78 complexType FixturesType

diagram	
children	Fixture
used by	element MeasurementResourcesType/Fixtures
annotation	documentation The FixturesType defines a set of fixtures.

C.79 element FixturesType/Fixture

diagram	
type	FixtureType
properties	minOcc 1 maxOcc unbounded content complex

children	Name Description Manufacturer ModelNumber SerialNumber LocationId Location
attributes	<div> <div>Name</div> <div>id</div> </div> <div> <div>Type</div> <div>QIFIdType</div> </div> <div> <div>Use</div> <div>required</div> </div> <div> <div>Default</div> <div></div> </div> <div> <div>Fixed</div> <div></div> </div> <div> <div>Annotation</div> <div>documentation</div> <div>The id attribute is the QIF id of the measurement resource, used for referencing.</div> </div>
annotation	<div>documentation</div> <div>Each Fixture element gives information about a fixture.</div>

C.80 complexType FixtureType

diagram	
type	extension of MeasurementResourceBaseType
properties	base MeasurementResourceBaseType
children	Name Description Manufacturer ModelNumber SerialNumber LocationId Location
used by	element FixturesType/Fixture
attributes	<div> <div>Name</div> <div>id</div> </div> <div> <div>Type</div> <div>QIFIdType</div> </div> <div> <div>Use</div> <div>required</div> </div> <div> <div>Default</div> <div></div> </div> <div> <div>Fixed</div> <div></div> </div> <div> <div>Annotation</div> <div>documentation</div> <div>The id attribute is the QIF id of the measurement resource, used for referencing.</div> </div>
annotation	<div>documentation</div> <div>The FixtureType defines a fixture measurement resource.</div>

C.81 complexType FPSTestType

diagram	<pre> classDiagram class FPSTestType { XLinearity YLinearity ZLinearity XAxisRoll XAxisPitch XAxisYaw YAxisRoll YAxisPitch YAxisYaw ZAxisRoll ZAxisPitch ZAxisYaw XAxisStraightnessY XAxisStraightnessZ YAxisStraightnessX YAxisStraightnessZ ZAxisStraightnessX ZAxisStraightnessY XYSquareness XZSquareness YZSquareness } </pre>
type	extension of CMMAccuracyTestBaseType
properties	base CMMAccuracyTestBaseType
children	XLinearity YLinearity ZLinearity XAxisRoll XAxisPitch XAxisYaw YAxisRoll YAxisPitch YAxisYaw ZAxisRoll ZAxisPitch ZAxisYaw XAxisStraightnessY XAxisStraightnessZ YAxisStraightnessX YAxisStraightnessZ ZAxisStraightnessX ZAxisStraightnessY XYSquareness XZSquareness YZSquareness
used by	element FPSTest
annotation	<p>documentation</p> <p>The FPSTestType defines a full parametric specification of the accuracy of a CMM. The value of each element other than the squareness elements is a function of the reported value of one of the three axes. The value of the function is the error at that point on the axis.</p>

C.82 element FPSTestType/XLinearity

diagram						
type	LengthFunctionDiscreteType					
properties	content complex					
children	DomainValues RangeValues DomainLinearUnit RangeLinearUnit					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The XLinearity element is the linearity of the machine X axis. Each value in the range represents a displacement along the X axis of a point on the X axis. The value is the value measured by high-accuracy methods minus the value reported by the CMM.					

C.83 element FPSTestType/YLinearity

diagram						
type	LengthFunctionDiscreteType					
properties	content complex					
children	DomainValues RangeValues DomainLinearUnit RangeLinearUnit					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.

annotation	<p>documentation</p> <p>The YLinearity element is the linearity of the machine Y axis. Each value in the range represents a displacement along the Y axis of a point on the Y axis. The value is the value measured by high-accuracy methods minus the value reported by the CMM.</p>
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C.84 element FPSTestType/ZLinearity

diagram						
type	LengthFunctionDiscreteType					
properties	content complex					
children	DomainValues RangeValues DomainLinearUnit RangeLinearUnit					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	<p>documentation</p> <p>The ZLinearity element is the linearity of the machine Z axis. Each value in the range represents a displacement along the Z axis of a point on the Z axis. The value is the value measured by high-accuracy methods minus the value reported by the CMM.</p>					

C.85 element FPSTestType/XAxisRoll

diagram						
type	AngleFunctionDiscreteType					

properties	content	complex
children	DomainValues RangeValues DomainLinearUnit RangeAngularUnit	
attributes	Name N	Type NaturalType Use required Default Fixed Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The XRoll element gives the local roll of the machine X axis with respect to the nominal coordinate system of the CMM.	

C.86 element FPSTestType/XAxisPitch

diagram		
type	AngleFunctionDiscreteType	
properties	content	complex
children	DomainValues RangeValues DomainLinearUnit RangeAngularUnit	
attributes	Name N	Type NaturalType Use required Default Fixed Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The XPitch element gives the local pitch of the machine X axis with respect to the nominal coordinate system of the CMM.	

C.87 element FPSTestType/XAxisYaw

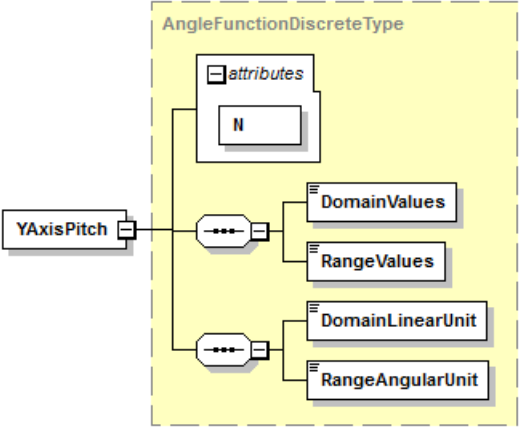
diagram						
type	AngleFunctionDiscreteType					
properties	content complex					
children	DomainValues RangeValues DomainLinearUnit RangeAngularUnit					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The XYaw element gives the local yaw of the machine X axis with respect to the nominal coordinate system of the CMM.					

C.88 element FPSTestType/YAxisRoll

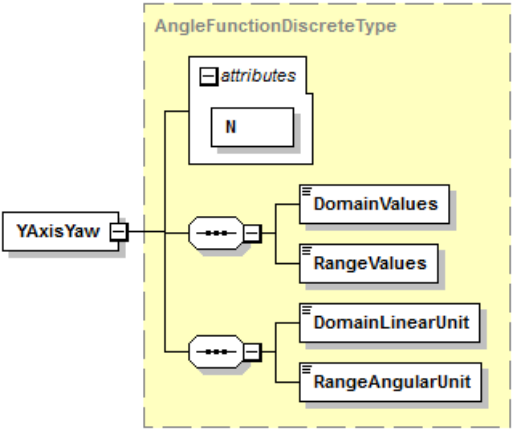
diagram						
type	AngleFunctionDiscreteType					
properties	content complex					
children	DomainValues RangeValues DomainLinearUnit RangeAngularUnit					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.

annotation	documentation The YRoll element gives the local roll of the machine Y axis with respect to the nominal coordinate system of the CMM.
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C.89 element FPSTestType/YAxisPitch

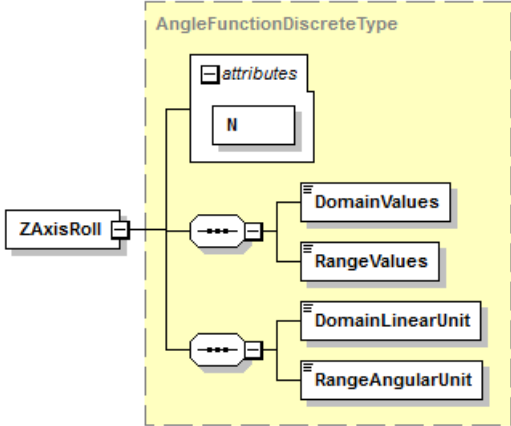
diagram						
type	AngleFunctionDiscreteType					
properties	content complex					
children	DomainValues RangeValues DomainLinearUnit RangeAngularUnit					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The YPitch element gives the local pitch of the machine Y axis with respect to the nominal coordinate system of the CMM.					

C.90 element FPSTestType/YAxisYaw

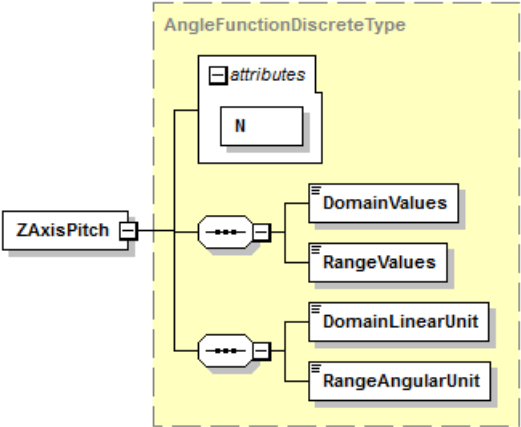
diagram						
type	AngleFunctionDiscreteType					
properties	content complex					

children	DomainValues RangeValues DomainLinearUnit RangeAngularUnit					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The YYaw element gives the local yaw of the machine Y axis with respect to the nominal coordinate system of the CMM.					

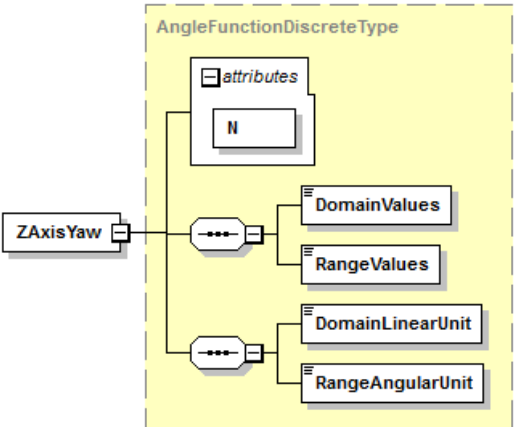
C.91 element FPSTestType/ZAxisRoll

diagram						
type	AngleFunctionDiscreteType					
properties	content	complex				
children	DomainValues RangeValues DomainLinearUnit RangeAngularUnit					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The ZRoll element gives the local roll of the machine Z axis with respect to the nominal coordinate system of the CMM.					

C.92 element FPSTestType/ZAxisPitch

diagram						
type	AngleFunctionDiscreteType					
properties	content complex					
children	DomainValues RangeValues DomainLinearUnit RangeAngularUnit					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The ZPitch element gives the local pitch of the machine Z axis with respect to the nominal coordinate system of the CMM.					

C.93 element FPSTestType/ZAxisYaw

diagram						
type	AngleFunctionDiscreteType					
properties	content complex					
children	DomainValues RangeValues DomainLinearUnit RangeAngularUnit					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The ZYaw element gives the local yaw of the machine Z axis with respect to the nominal coordinate system of the					

	CMM.
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C.94 element FPSTestType/XAxisStraightnessY

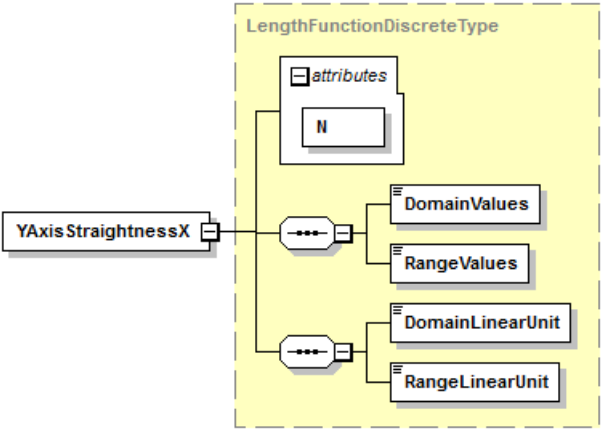
diagram						
type	LengthFunctionDiscreteType					
properties	content complex					
children	DomainValues RangeValues DomainLinearUnit RangeLinearUnit					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The XAxisStraightnessY element gives the deviation from the nominal X axis in the Y direction of measured points on the machine X axis.					

C.95 element FPSTestType/XAxisStraightnessZ

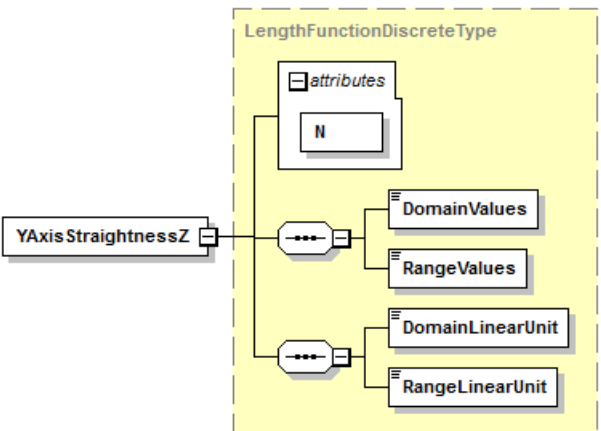
diagram						
type	LengthFunctionDiscreteType					
properties	content complex					
children	DomainValues RangeValues DomainLinearUnit RangeLinearUnit					

attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The XAxisStraightnessZ element gives the deviation from the nominal X axis in the Z direction of measured points on the machine X axis.					

C.96 element FPSTestType/YAxisStraightnessX

diagram						
type	LengthFunctionDiscreteType					
properties	content complex					
children	DomainValues RangeValues DomainLinearUnit RangeLinearUnit					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The YAxisStraightnessX element gives the deviation from the nominal Y axis in the X direction of measured points on the machine Y axis.					

C.97 element FPSTestType/YAxisStraightnessZ

diagram						
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type	LengthFunctionDiscreteType					
properties	content complex					
children	DomainValues RangeValues DomainLinearUnit RangeLinearUnit					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The YAxisStraightnessZ element gives the deviation from the nominal Y axis in the Z direction of measured points on the machine Y axis.					

C.98 element FPSTestType/ZAxisStraightnessX

diagram						
type	LengthFunctionDiscreteType					
properties	content complex					
children	DomainValues RangeValues DomainLinearUnit RangeLinearUnit					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The ZAxisStraightnessX element gives the deviation from the nominal Z axis in the X direction of measured points on the machine Z axis.					

C.99 element FPSTestType/ZAxisStraightnessY

diagram						
type	LengthFunctionDiscreteType					
properties	content complex					
children	DomainValues RangeValues DomainLinearUnit RangeLinearUnit					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The ZAxisStraightnessY element gives the deviation from the nominal Z axis in the Y direction of measured points on the machine Z axis.					

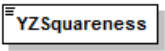
C.100 element FPSTestType/XYSquareness

diagram						
type	xs:double					
properties	content simple					
annotation	documentation The XYSquareness element is the rate of offset in the XY plane of a point on the best fit Y axis from the nominal Y axis. The amount of deviation of any point on the Y axis is the XYSquareness times the Y value of the point. A positive value means the angle is greater than a right angle. A negative value means the angle is less than a right angle.					

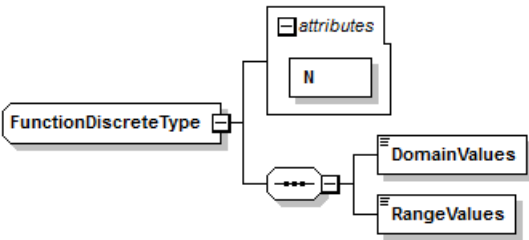
C.101 element FPSTestType/XZSquareness

diagram						
type	xs:double					
properties	content simple					
annotation	documentation The XZSquareness element is the rate of offset in the XZ plane of a point on the best fit Z axis from the nominal Z axis. The amount of deviation of any point on the Z axis is the XZSquareness times the Z value of the point. A positive value means the angle is greater than a right angle. A negative value means the angle is less than a right angle.					

C.102 element FPSTestType/YZSquareness

diagram	
type	xs:double
properties	content simple
annotation	documentation The YZSquareness element is the rate of offset in the YZ plane of a point on the best fit Z axis from the nominal Z axis. The amount of deviation of any point on the Z axis is the YZSquareness times the Z value of the point. A positive value means the angle is greater than a right angle. A negative value means the angle is less than a right angle.


C.103 complexType FunctionDiscreteType

diagram						
children	DomainValues RangeValues					
used by	complexType AngleFunctionDiscreteType LengthFunctionDiscreteType					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The FunctionDiscreteType describes a mathematical function whose domain and range are arrays of double values. The function is represented by matching pairs of values from the domain and range.					

C.104 attribute FunctionDiscreteType/@N


type	NaturalType		
properties	use	required	
facets	Kind minInclusive	Value 1	Annotation
annotation	documentation The N attribute gives the number of values in the domain and range.		

C.105 element FunctionDiscreteType/DomainValues

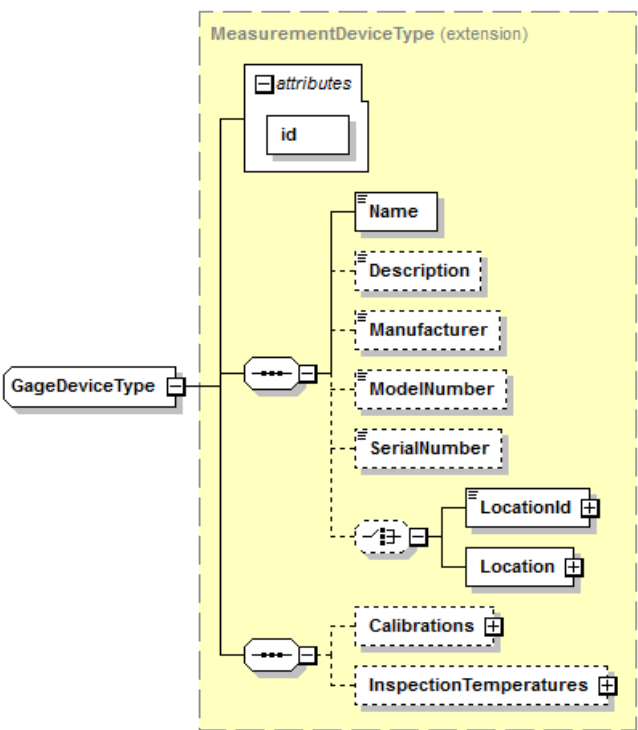
diagram	
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type	ListDoubleType
properties	content simple
annotation	documentation The DomainValues element gives the values in the domain.

C.106 element FunctionDiscreteType/RangeValues

diagram	
type	ListDoubleType
properties	content simple
annotation	documentation The RangeValues element gives the values in the range.

C.107 complexType GageDeviceType

diagram						
type	extension of MeasurementDeviceType					
properties	base MeasurementDeviceType					
children	Name Description Manufacturer ModelNumber SerialNumber LocationId Location Calibrations InspectionTemperatures					
used by	element GageDevice					
attributes	Name id	Type QIFIdType	Use required	Default	Fixed	Annotation documentation The id attribute is the QIF id of the measurement resource, used for

	referencing.
annotation	documentation The GageDeviceType defines a gage measurement device.

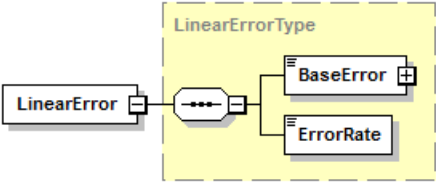
C.108 complexType ISO10360TestType

diagram	<pre> graph LR ISO10360TestType[ISO10360TestType] --- MaxErrorConstant[MaxErrorConstant] ISO10360TestType --- LinearError[LinearError] ISO10360TestType --- LesserError[LesserError] </pre>
type	extension of CMMAccuracyTestBaseType
properties	base CMMAccuracyTestBaseType
children	MaxErrorConstant LinearError LesserError
used by	element ISO10360Test
annotation	documentation The ISO10360TestType is the CMM volumetric accuracy test specified by ISO 10360-2.

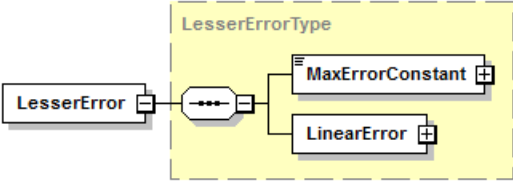
C.109 element ISO10360TestType/MaxErrorConstant

diagram	<pre>graph LR subgraph LinearValueType [LinearValueType] direction TB decimalPlaces[decimalPlaces] significantFigures[significantFigures] linearUnit[linearUnit] end MaxErrorConstant[MaxErrorConstant] --- LinearValueType</pre>																								
type	LinearValueType																								
properties	content complex																								
attributes	<table><thead><tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>Annotation</th></tr></thead><tbody><tr><td>decimalPlaces</td><td>xs:nonNegativeInteger</td><td></td><td></td><td></td><td>documentation See documentation of SpecifiedDecimalType.</td></tr><tr><td>significantFigures</td><td>xs:nonNegativeInteger</td><td></td><td></td><td></td><td>documentation See documentation of SpecifiedDecimalType.</td></tr><tr><td>linearUnit</td><td>xs:token</td><td></td><td></td><td></td><td>documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.</td></tr></tbody></table>	Name	Type	Use	Default	Fixed	Annotation	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
Name	Type	Use	Default	Fixed	Annotation																				
decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.																				
significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.																				
linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.																				
annotation	documentation The MaxErrorConstant element gives the maximum error in measuring a distance as a constant.																								

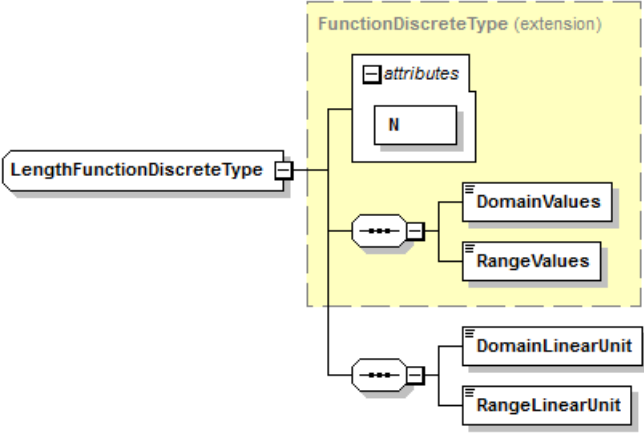
C.110 element ISO10360TestType/LinearError

diagram	 <p>The diagram shows a LinearError element connected to a dashed box labeled LinearErrorType. Inside this box, the LinearError element is connected to a choice connector (a circle with three dots) which branches into two elements: BaseError and ErrorRate.</p>
type	LinearErrorType
properties	content complex
children	BaseError ErrorRate
annotation	<p>documentation</p> <p>The LinearError element gives the maximum error in measuring a distance as a linear function of the distance measured.</p>

C.111 element ISO10360TestType/LesserError

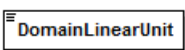
diagram	 <p>The diagram shows a LesserError element connected to a dashed box labeled LesserErrorType. Inside this box, the LesserError element is connected to a choice connector (a circle with three dots) which branches into two elements: MaxErrorConstant and LinearError.</p>
type	LesserErrorType
properties	content complex
children	MaxErrorConstant LinearError
annotation	<p>documentation</p> <p>The LesserError element gives the maximum error in measuring a distance as the lesser of a constant and the value of a linear function of the distance measured.</p>

C.112 complexType LengthFunctionDiscreteType


diagram	 <p>The diagram shows a LengthFunctionDiscreteType element connected to a dashed box labeled FunctionDiscreteType (extension). Inside this box, the LengthFunctionDiscreteType element is connected to a choice connector (a circle with three dots) which branches into three elements: DomainValues, RangeValues, and DomainLinearUnit. The DomainLinearUnit element is further connected to a choice connector (a circle with three dots) which branches into two elements: DomainLinearUnit and RangeLinearUnit.</p>
type	extension of FunctionDiscreteType

properties	base FunctionDiscreteType					
children	DomainValues RangeValues DomainLinearUnit RangeLinearUnit					
used by	elements	FPSTestType/XAxisStraightnessY FPSTestType/XAxisStraightnessZ FPSTestType/XLinearity FPSTestType/YAxisStraightnessX FPSTestType/YAxisStraightnessZ FPSTestType/YLinearity FPSTestType/ZAxisStraightnessX FPSTestType/ZAxisStraightnessY FPSTestType/ZLinearity				
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The N attribute gives the number of values in the domain and range.
annotation	documentation The LengthFunctionDiscreteType describes a discrete function whose domain is an array of values representing distances and whose range is an array of values representing distances.					

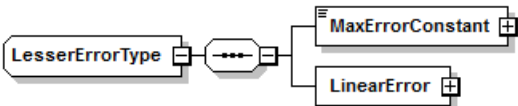
C.113 element LengthFunctionDiscreteType/DomainLinearUnit

diagram	
type	xs:token
properties	content simple
annotation	documentation The DomainLinearUnit element gives the name of the linear unit for the domain. This must be the name of a defined linear unit.

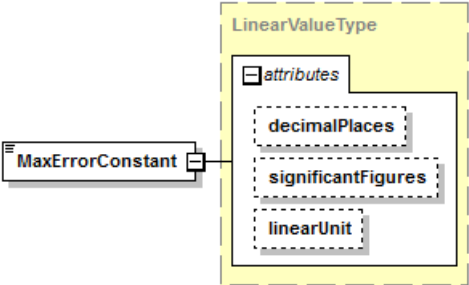
C.114 element LengthFunctionDiscreteType/RangeLinearUnit

diagram	
type	xs:token
properties	content simple
annotation	documentation The RangeLinearUnit element gives the name of the linear unit for the range. This must be the name of a defined linear unit.

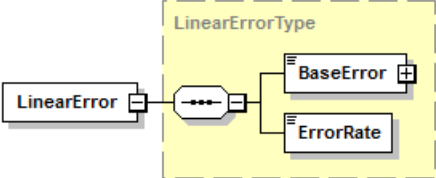
C.115 complexType LesserErrorType

diagram	
children	MaxErrorConstant LinearError
used by	element ISO10360TestType/LesserError
annotation	documentation The LesserErrorType defines a maximum error that is the lesser of a constant error or a linear error.

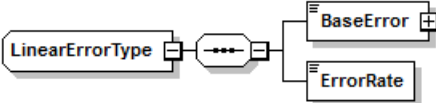
C.116 element LesserErrorType/MaxErrorConstant

diagram	 <p>The diagram shows a box labeled 'MaxErrorConstant' connected to a larger box labeled 'LinearValueType'. Inside 'LinearValueType', there is a dashed box labeled 'attributes' containing three sub-elements: 'decimalPlaces', 'significantFigures', and 'linearUnit'.</p>					
type	LinearValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The MaxErrorConstant element gives the maximum error in measuring a distance as a constant.					

C.117 element LesserErrorType/LinearError

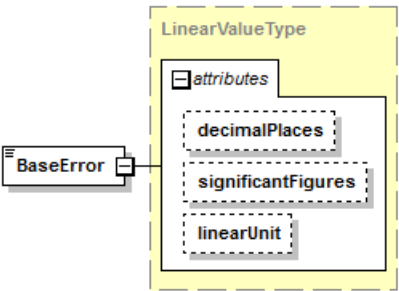
diagram	 <p>The diagram shows a box labeled 'LinearError' connected to a dashed box labeled 'LinearErrorType'. Inside 'LinearErrorType', there are two sub-elements: 'BaseError' and 'ErrorRate'.</p>					
type	<u>LinearErrorType</u>					
properties	content complex					
children	<u>BaseError</u> <u>ErrorRate</u>					
annotation	documentation The LinearError element gives the maximum error in measuring a distance as a linear function of the distance measured.					

C.118 complexType LinearErrorType

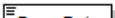
diagram	 <p>The diagram shows a box labeled 'LinearErrorType' connected to a dashed box. Inside the dashed box, there are two sub-elements: 'BaseError' and 'ErrorRate'.</p>					
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children	BaseError ErrorRate
used by	elements ISO10360TestType/LinearError LesserErrorType/LinearError
annotation	documentation The LinearErrorType defines a maximum error that increases linearly with the distance measured. To compute the error, add the BaseError to the ErrorRate times the distance measured. The units for distance measured must be the same as those of the BaseError.

C.119 element LinearErrorType/BaseError

diagram						
type	LinearValueType					
properties	content	complex				
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The BaseError element gives the constant to add.					

C.120 element LinearErrorType/ErrorRate

diagram	
type	xs:decimal
properties	content simple
annotation	<div>documentation</div> <div>The ErrorRate element gives the rate of increase with distance of the error.</div>

C.121 complexType ManualDeviceType

diagram						
type	extension of MeasurementDeviceType					
properties	base MeasurementDeviceType					
children	Name Description Manufacturer ModelNumber SerialNumber LocationId Location Calibrations InspectionTemperatures					
used by	complexType CaliperType					
attributes	Name id	Type QIFIdType	Use required	Default	Fixed	Annotation documentation The id attribute is the QIF id of the measurement resource, used for referencing.
annotation	documentation The ManualDeviceType defines a manual measurement device.					

C.122 complexType MeasurementDeviceAccuracyBaseType

diagram						
properties	abstract true					
used by	complexType CMMAccuracyType NumericalLengthAccuracyType					
annotation	documentation The MeasurementDeviceAccuracyBaseType is the abstract base type for more specific types of measurement device accuracy.					

C.123 complexType MeasurementDevicesType

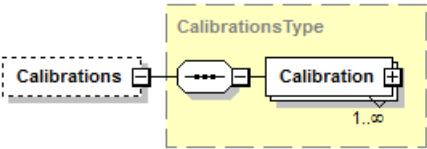
diagram	
children	MeasurementDevice
used by	element MeasurementResourcesType/MeasurementDevices
annotation	documentation The MeasurementDevicesType defines a list of measurement devices.

C.124 complexType MeasurementDeviceType

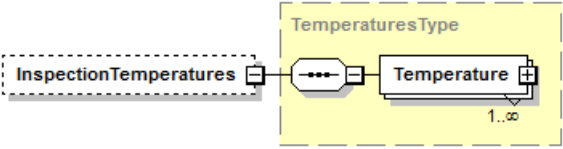
diagram	
type	extension of MeasurementResourceBaseType

properties	base MeasurementResourceBaseType					
children	Name Description Manufacturer ModelNumber SerialNumber LocationId Location Calibrations InspectionTemperatures					
used by	element complexType	MeasurementDevice GageDeviceType ManualDeviceType ProbingDeviceType				
attributes	Name id	Type QIFIdType	Use required	Default	Fixed	Annotation documentation The id attribute is the QIF id of the measurement resource, used for referencing.
annotation	documentation The MeasurementDeviceType defines a measurement device. A MeasurementDevice includes all components needed for making measurements.					

C.125 element MeasurementDeviceType/Calibrations

diagram						
type	CalibrationsType					
properties	minOcc	0	maxOcc	1	content	complex
children	Calibration					
annotation	documentation The optional Calibrations element is a list of calibrations for a measurement device.					

C.126 element MeasurementDeviceType/InspectionTemperatures

diagram						
type	TemperaturesType					
properties	minOcc	0	maxOcc	1	content	complex
children	Temperature					
annotation	documentation The optional InspectionTemperatures element is a list of inspection temperatures for the measurement device. These are temperatures at which the device may be used for producing usable measurements.					

C.127 complexType MeasurementResourceBaseType

diagram						
properties	abstract true					
children	Name Description Manufacturer ModelNumber SerialNumber LocationId Location					
used by	complexType CarriageType FixtureType MeasurementDeviceType SensorType ToolType					
attributes	Name id	Type QIFIdType	Use required	Default	Fixed	Annotation documentation The id attribute is the QIF id of the measurement resource, used for referencing.
annotation	documentation The abstract MeasurementResourceType is the base type for measurement resources that may be required by an action, used by a method, or referenced. Resource types can be a fixture, a carriage, a measurement device, a tool, or a sensor.					

C.128 attribute MeasurementResourceBaseType/@id


type	QIFIdType
properties	use required
annotation	documentation The id attribute is the QIF id of the measurement resource, used for referencing.

C.129 element MeasurementResourceBaseType/Name

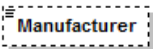
diagram	
type	xs:token
properties	content simple

annotation	documentation The Name element is the name of the measurement resource.
------------	--

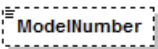
C.130 element MeasurementResourceBaseType/Description

diagram	
type	xs:string
properties	minOcc 0 maxOcc 1 content simple
annotation	documentation The optional Description element is a description of the measurement resource.

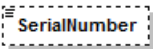
C.131 element MeasurementResourceBaseType/Manufacturer

diagram	
type	xs:string
properties	minOcc 0 maxOcc 1 content simple
annotation	documentation The optional Manufacturer element is the manufacturer of the measurement resource.

C.132 element MeasurementResourceBaseType/ModelNumber

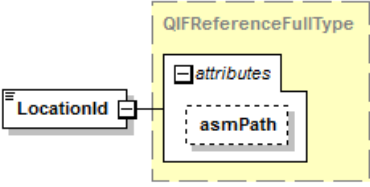
diagram	
type	xs:string
properties	minOcc 0 maxOcc 1 content simple
annotation	documentation The optional ModelNumber element is the identifier of a very specific type of measurement resource. There may be many measurement resources with the same ModelNumber, but they should all be identical (or nearly so).

C.133 element MeasurementResourceBaseType/SerialNumber

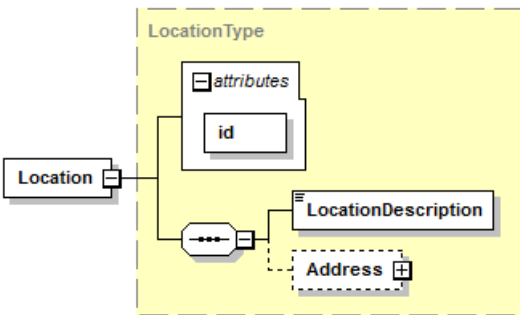
diagram	
type	xs:string
properties	minOcc 0 maxOcc 1 content simple
annotation	documentation The optional SerialNumber element is the serial number of the measurement resource. Measurement resources with the same ModelNumber have different SerialNumbers. The combination of ModelNumber and SerialNumber

	should differentiate a given measurement resource from all other measurement resources in a QIF application instance file.
--	--

C.134 element MeasurementResourceBaseType/LocationId

diagram						
type	QIFReferenceFullType					
properties	content	complex				
attributes	Name asmPath	Type QIFIdType	Use	Default	Fixed	Annotation documentation The optional asmPath attribute is an id which must be used for locating of the assembly path within the AsmPaths. The assembly path (instantiation chain) unambiguously identifies a model entity within an assembly.
annotation	documentation The LocationId element is the QIF id of the location of the measurement device. This element is in an optional choice.					

C.135 element MeasurementResourceBaseType/Location

diagram						
type	LocationType					
properties	content	complex				
children	LocationDescription Address					
attributes	Name id	Type QIFIdType	Use required	Default	Fixed	Annotation documentation The id attribute is the QIF id of the location, used for referencing.
annotation	documentation The Location element gives information about the location of the measurement resource. This element is in an					

	optional choice.
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C.136 complexType MeasurementResourcesType

diagram	
children	Version Carriages Fixtures MeasurementDevices Sensors Tools
used by	element MeasurementResources
annotation	documentation The MeasurementResourcesType defines a set of measurement resources.

C.137 element MeasurementResourcesType/Version

diagram	
type	VersionType
properties	minOcc 0 maxOcc 1 content complex
children	TimeCreated SignOffs ThisInstanceQPid
annotation	documentation The optional Version element gives version information about the measurement resources.

C.138 element MeasurementResourcesType/Carriages

diagram	
type	CarriagesType

properties	minOcc 0 maxOcc 1 content complex
children	Carriage
annotation	documentation The optional Carriages element is a list of carriages.

C.139 element MeasurementResourcesType/Fixtures

diagram	
type	FixturesType
properties	minOcc 0 maxOcc 1 content complex
children	Fixture
annotation	documentation The optional Fixtures element is a list of fixtures.

C.140 element MeasurementResourcesType/MeasurementDevices

diagram	
type	MeasurementDevicesType
properties	minOcc 0 maxOcc 1 content complex
children	MeasurementDevice
annotation	documentation The optional MeasurementDevices element is a list of measurement devices.

C.141 element MeasurementResourcesType/Sensors

diagram	
type	SensorsType
properties	minOcc 0 maxOcc 1 content complex
children	Sensor
annotation	documentation The optional Sensors element is a list of sensors.

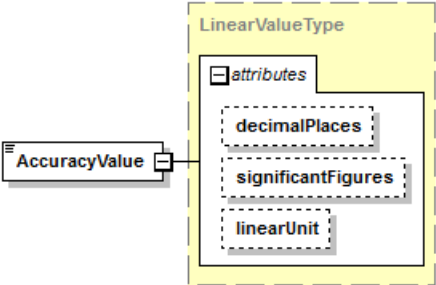
C.142 element MeasurementResourcesType/Tools

diagram	
type	ToolsType
properties	minOcc 0 maxOcc 1 content complex
children	Tool
annotation	documentation The optional Tools element is a list of tools.

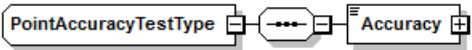
C.143 complexType NumericalLengthAccuracyType

diagram	
type	extension of MeasurementDeviceAccuracyBaseType
properties	base MeasurementDeviceAccuracyBaseType
children	AccuracyValue
used by	element CaliperType/Accuracy
annotation	documentation The NumericalLengthAccuracyType defines the accuracy of a length or point measurement device.

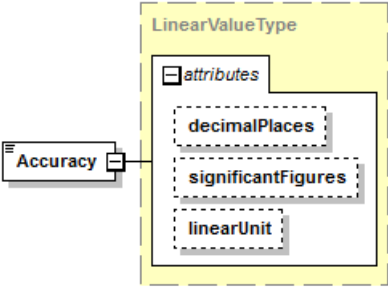
C.144 element NumericalLengthAccuracyType/AccuracyValue

diagram						
type	LinearValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The AccuracyValue element is the accuracy.					

C.145 complexType PointAccuracyTestType

diagram						
type	extension of CMMAccuracyTestBaseType					
properties	base CMMAccuracyTestBaseType					
children	Accuracy					
used by	element PointAccuracyTest					
annotation	documentation The PointAccuracyTestType gives CMM accuracy as the maximum deviation of a measured point location from its actual location throughout the CMM's working volume.					

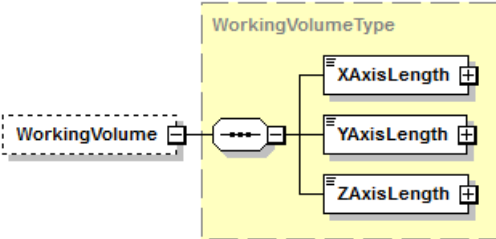
C.146 element PointAccuracyTestType/Accuracy

diagram						
type	LinearValueType					
properties	content	complex				
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The Accuracy element gives the maximum deviation.					

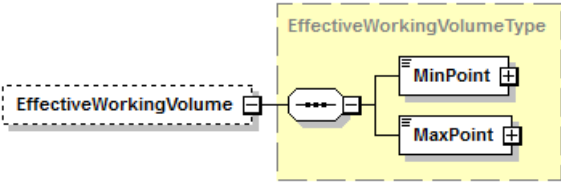
C.147 complexType ProbingDeviceType

diagram													
type	extension of MeasurementDeviceType												
properties	<table><tr><td>base</td><td>MeasurementDeviceType</td></tr><tr><td>abstract</td><td>true</td></tr></table>	base	MeasurementDeviceType	abstract	true								
base	MeasurementDeviceType												
abstract	true												
children	Name Description Manufacturer ModelNumber SerialNumber LocationId Location Calibrations InspectionTemperatures WorkingVolume EffectiveWorkingVolume Resolution												
used by	complexTypes CMMType ComparatorType												
attributes	<table><tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>Annotation</th></tr><tr><td>id</td><td>QIFIdType</td><td>required</td><td></td><td></td><td>documentation The id attribute is the QIF id of the measurement resource, used for referencing.</td></tr></table>	Name	Type	Use	Default	Fixed	Annotation	id	QIFIdType	required			documentation The id attribute is the QIF id of the measurement resource, used for referencing.
Name	Type	Use	Default	Fixed	Annotation								
id	QIFIdType	required			documentation The id attribute is the QIF id of the measurement resource, used for referencing.								
annotation	documentation The ProbingDeviceType defines a device that uses a probe to measure parts.												

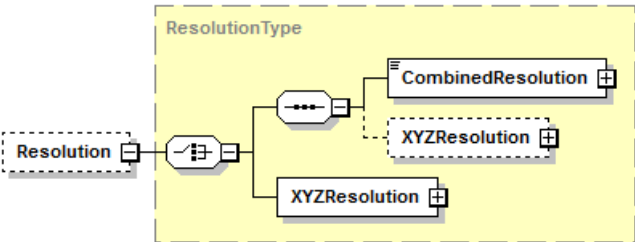
C.148 element ProbingDeviceType/WorkingVolume

diagram	 <p>The diagram shows a dashed box labeled 'WorkingVolume' connected to a solid box labeled 'WorkingVolumeType'. Inside 'WorkingVolumeType', there is a connector box with three lines leading to three separate boxes: 'XAxisLength', 'YAxisLength', and 'ZAxisLength'.</p>
type	WorkingVolumeType
properties	minOcc 0 maxOcc 1 content complex
children	XAxisLength YAxisLength ZAxisLength
annotation	documentation The optional WorkingVolume element gives the maximum working volume of the probing device, ignoring any removable objects such as a tool rack.

C.149 element ProbingDeviceType/EffectiveWorkingVolume

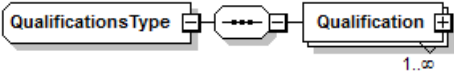
diagram	 <p>The diagram shows a dashed box labeled 'EffectiveWorkingVolume' connected to a solid box labeled 'EffectiveWorkingVolumeType'. Inside 'EffectiveWorkingVolumeType', there is a connector box with two lines leading to two separate boxes: 'MinPoint' and 'MaxPoint'.</p>
type	EffectiveWorkingVolumeType
properties	minOcc 0 maxOcc 1 content complex
children	MinPoint MaxPoint
annotation	documentation The optional EffectiveWorkingVolume element gives the usable working volume of the probing device in which there are no obstacles.

C.150 element ProbingDeviceType/Resolution

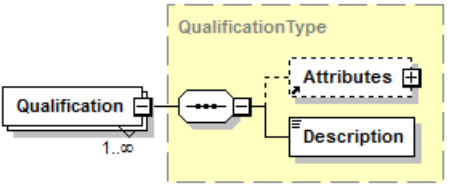
diagram	 <p>The diagram shows a dashed box labeled 'Resolution' connected to a solid box labeled 'ResolutionType'. Inside 'ResolutionType', there is a connector box with two lines. One line leads to a box labeled 'CombinedResolution'. The other line leads to a dashed box labeled 'XYZResolution', which is then connected to a solid box labeled 'XYZResolution'.</p>
type	ResolutionType
properties	minOcc 0 maxOcc 1 content complex

children	CombinedResolution XYZResolution XYZResolution
annotation	documentation The optional Resolution element is the resolution of the probing device.

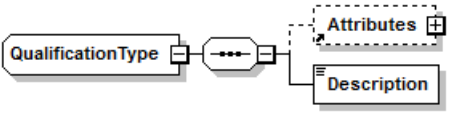
C.151 complexType QualificationsType

diagram	
children	Qualification
used by	element SensorType/Qualifications
annotation	documentation The QualificationsType defines a list of sensor qualifications.


C.152 element QualificationsType/Qualification

diagram	
type	QualificationType
properties	minOcc 1 maxOcc unbounded content complex
children	Attributes Description
annotation	documentation Each Qualification element gives information about a sensor qualification.

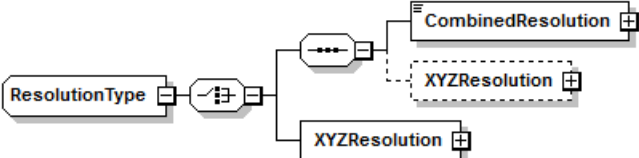
C.153 complexType QualificationType

diagram	
children	Attributes Description
used by	element QualificationsType/Qualification
annotation	documentation The QualificationType defines how a measurement device has been qualified.

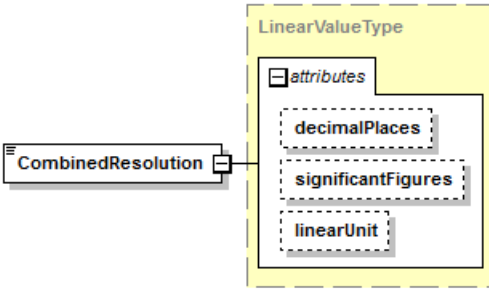
C.154 element QualificationType/Description

diagram	
type	xs:string
properties	content simple
annotation	documentation The Description element is a description of the qualification.

C.155 complexType ResolutionType

diagram	
children	CombinedResolution XYZResolution XYZResolution
used by	element ProbingDeviceType/Resolution
annotation	documentation The ResolutionType gives the resolution of a CMM (or other device with 3D Cartesian coordinates) as an overall resolution, or as a sequence of X, Y, and Z axis resolutions, or both.

C.156 element ResolutionType/CombinedResolution

diagram																									
type	LinearValueType																								
properties	content complex																								
attributes	<table><thead><tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>Annotation</th></tr></thead><tbody><tr><td>decimalPlaces</td><td>xs:nonNegativeInteger</td><td></td><td></td><td></td><td>documentation See documentation of SpecifiedDecimalType.</td></tr><tr><td>significantFigures</td><td>xs:nonNegativeInteger</td><td></td><td></td><td></td><td>documentation See documentation of SpecifiedDecimalType.</td></tr><tr><td>linearUnit</td><td>xs:token</td><td></td><td></td><td></td><td>documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.</td></tr></tbody></table>	Name	Type	Use	Default	Fixed	Annotation	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
Name	Type	Use	Default	Fixed	Annotation																				
decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.																				
significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.																				
linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.																				
annotation	documentation The CombinedResolution element is the resolution of the device.																								

C.157 element ResolutionType/XYZResolution

diagram	
type	XYZResolutionType
properties	minOcc 0 maxOcc 1 content complex
children	XResolution YResolution ZResolution
annotation	documentation The XYZResolution element gives the resolution of the device along each of the three coordinate axes.

C.158 element ResolutionType/XYZResolution

diagram	
type	XYZResolutionType
properties	content complex
children	XResolution YResolution ZResolution
annotation	documentation The XYZResolution element gives the resolution of the device along each of the three coordinate axes.

C.159 complexType RotaryTableType

diagram	
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children	LocationOnCMM AxisDirection ZeroIndexDirection TableRadius TableErrors
used by	element CMMType/RotaryTable
annotation	documentation The RotaryTableType describes a rotary table attached to a CMM.

C.160 element RotaryTableType/LocationOnCMM

diagram						
type	PointType					
properties	content	complex				
facets	Kind	Value	Annotation			
	length	3				
attributes	Name	Type	Use	Default	Fixed	Annotation
	linearUnit	xs:token				
	decimalPlaces	xs:nonNegativeInteger				
	significantFigures	xs:nonNegativeInteger				
	validity	ValidityEnumType				
	xDecimalPlaces	xs:nonNegativeInteger				
	xSignificantFigures	xs:nonNegativeInteger				
	xValidity	ValidityEnumType				
	yDecimalPlaces	xs:nonNegativeInteger				
	ySignificantFigures	xs:nonNegativeInteger				
	yValidity	ValidityEnumType				
	zDecimalPlaces	xs:nonNegativeInteger				

	zSignificantFigures xs:nonNegativeInteger zValidity ValidityEnumType
annotation	documentation The LocationOnCMM element is the point in the CMM coordinate system at which the center of the rotary table is located.

C.161 element RotaryTableType/AxisDirection

diagram						
type	UnitVectorType					
properties	content complex					
facets	Kind	Value	Annotation			
	length	3				
attributes	Name	Type	Use	Default	Fixed	Annotation
	linearUnit	xs:token				
	decimalPlaces	xs:nonNegativeInteger				
	significantFigures	xs:nonNegativeInteger				
	validity	ValidityEnumType				
	xDecimalPlaces	xs:nonNegativeInteger				
	xSignificantFigures	xs:nonNegativeInteger				
	xValidity	ValidityEnumType				
	yDecimalPlaces	xs:nonNegativeInteger				
	ySignificantFigures	xs:nonNegativeInteger				
	yValidity	ValidityEnumType				
	zDecimalPlaces	xs:nonNegativeInteger				
	zSignificantFigures	xs:nonNegativeInteger				
	zValidity	ValidityEnumType				

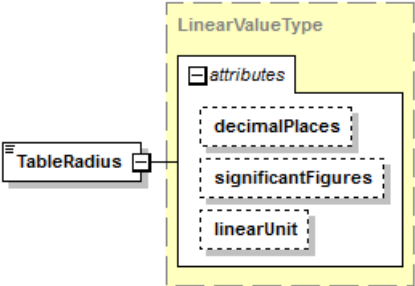
	zDecimalPlaces xs:nonNegativeInteger zSignificantFigures xs:nonNegativeInteger zValidity ValidityEnumType
annotation	documentation The AxisDirection element is the direction of the axis of the rotary table in the CMM coordinate system.

C.162 element RotaryTableType/ZeroIndexDirection

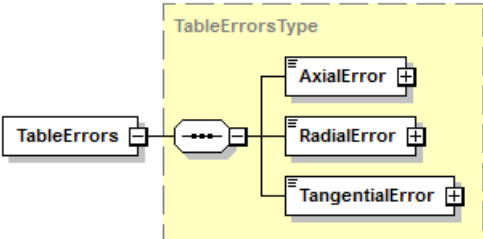
diagram						
type	UnitVectorType					
properties	content	complex				
facets	Kind	Value	Annotation			
	length	3				
attributes	Name	Type	Use	Default	Fixed	Annotation
	linearUnit	xs:token				
	decimalPlaces	xs:nonNegativeInteger				
	significantFigures	xs:nonNegativeInteger				
	validity	ValidityEnumType				
	xDecimalPlaces	xs:nonNegativeInteger				
	xSignificantFigures	xs:nonNegativeInteger				
	xValidity	ValidityEnumType				
	yDecimalPlaces	xs:nonNegativeInteger				
	ySignificantFigures	xs:nonNegativeInteger				
	yValidity	ValidityEnumType				
	zDecimalPlaces	xs:nonNegativeInteger				
	zSignificantFigures	xs:nonNegativeInteger				
	zValidity	ValidityEnumType				

	zDecimalPlaces xs:nonNegativeInteger zSignificantFigures xs:nonNegativeInteger zValidity ValidityEnumType
annotation	documentation The ZeroIndexDirection element is the direction of the zero index of the rotary table in the CMM coordinate system. The ZeroIndexDirection must be normal to the AxisDirection.

C.163 element RotaryTableType/TableRadius

diagram						
type	LinearValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The TableRadius element is the radius of the table.					

C.164 element RotaryTableType/TableErrors

diagram						
type	<u>TableErrorsType</u>					
properties	content complex					
children	<u>AxialError</u> <u>RadialError</u> <u>TangentialError</u>					
annotation	documentation The TableErrors element gives the table errors.					

C.165 complexType SensorsType

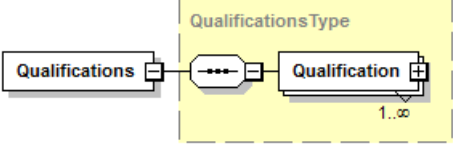
diagram	
children	Sensor
used by	element MeasurementResourceType/Sensors
annotation	documentation The SensorsType defines a list of CMM tips.

C.166 complexType SensorType

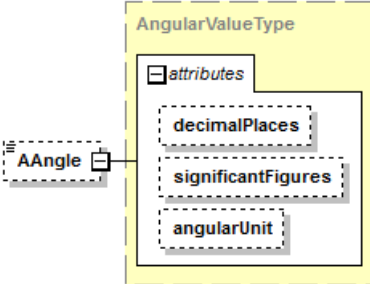
diagram	
type	extension of MeasurementResourceBaseType
properties	base MeasurementResourceBaseType
children	Name Description Manufacturer ModelNumber SerialNumber LocationId Location Qualifications AAngle BAngle
used by	element Sensor complexType TouchProbeType
attributes	Name Type Use Default Fixed Annotation

	id	QIFIdType	required	documentation The id attribute is the QIF id of the measurement resource, used for referencing.
annotation	documentation The SensorType defines a CMM sensor. NOTE: Future release of the QIF will extend types of sensors.			

C.167 element SensorType/Qualifications

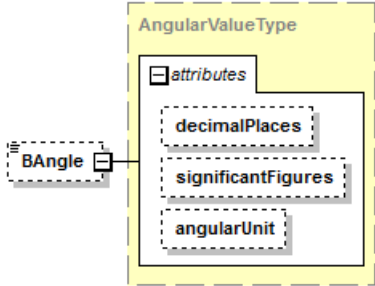
diagram				
type	QualificationsType			
properties	content complex			
children	Qualification			
annotation	documentation The Qualifications element is a list of qualifications of a CMM sensor.			

C.168 element SensorType/AAngle

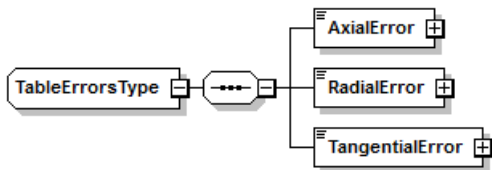
diagram						
type	AngularValueType					
properties	minOcc 0 maxOcc 1 content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	angularUnit	xs:token				documentation The optional angularUnit attribute defines the UnitName for the AngularValueType.

annotation	documentation The AAngle element is the nominal primary rotation angle of the sensor axis for an indexable sensor.
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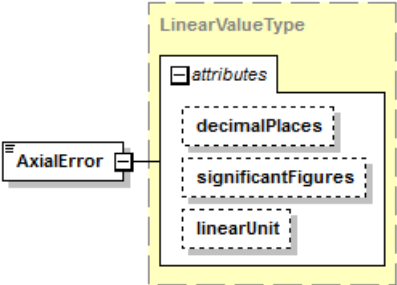
C.169 element SensorType/BAngle

diagram						
type	AngularValueType					
properties	minOcc	0				
	maxOcc	1				
	content	complex				
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	angularUnit	xs:token				documentation The optional angularUnit attribute defines the UnitName for the AngularValueType.
annotation	documentation	The BAngle element is the nominal primary rotation angle of the sensor axis for an indexable sensor.				

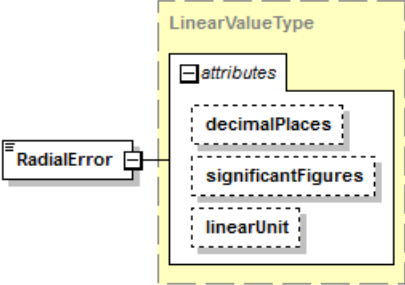
C.170 complexType TableErrorsType

diagram						
children	AxialError RadialError TangentialError					
used by	element	RotaryTableType/TableErrors				
annotation	documentation	The TableErrorsType gives the maximum errors of a rotary table.				

C.171 element TableErrorsType/AxialError

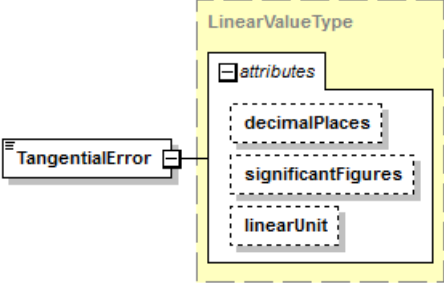
diagram						
type	LinearValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The AxialError element is the maximum error in the direction of the axis of the table.					

C.172 element TableErrorsType/RadialError

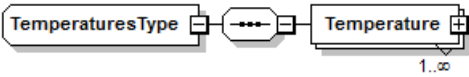
diagram						
type	LinearValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.

annotation	documentation The RadialError element is the maximum error in the direction of the radius of the table.
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C.173 element TableErrorsType/TangentialError

diagram						
type	LinearValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The TangentialError element is the maximum error in the direction of the tangent to the table at the outer edge of the table.					

C.174 complexType TemperaturesType

diagram						
children	Temperature					
used by	elements MeasurementDeviceType/InspectionTemperatures CalibrationType/Temperatures					
annotation	documentation The TemperaturesType defines a list of temperatures.					

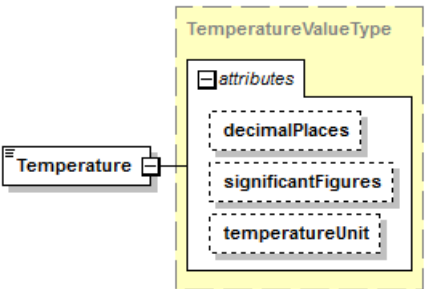
C.175 element TemperaturesType/Temperature

diagram	
type	TemperatureType
properties	minOcc 1 maxOcc unbounded content complex
children	Attributes Temperature TimeStamp
annotation	documentation Each Temperature element is a temperature noted for a machine.

C.176 complexType TemperatureType


diagram	
children	Attributes Temperature TimeStamp
used by	element TemperaturesType/Temperature
annotation	documentation The TemperatureType defines information about a temperature measurement.

C.177 element TemperatureType/Temperature

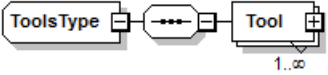
diagram						
type	TemperatureValueType					
properties	content	complex				
attributes	Name decimalPlaces	Type xs:nonNegativeInteger	Use	Default	Fixed	Annotation documentation See documentation of SpecifiedDecimalType.

	significantFigures xs:nonNegativeInteger temperatureUnit xs:token	documentation See documentation of SpecifiedDecimalType. documentation The optional temperatureUnit attribute defines the UnitName for the TemperatureValueType.
annotation	documentation The Temperature element is the temperature value.	

C.178 element TemperatureType/TimeStamp

diagram		
type	xs:dateTime	
properties	content simple	
annotation	documentation The TimeStamp element is a time and date associated with the temperature value.	

C.179 complexType ToolsType

diagram		
children	Tool	
used by	element	MeasurementResourcesType/Tools
annotation	documentation The ToolsType defines a list of tools (CMM tool bodies with sensors).	

C.180 element ToolsType/Tool

diagram						
type	ToolType					
properties	minOcc	1	maxOcc	unbounded	content	complex
children	Name Description Manufacturer ModelNumber SerialNumber LocationId Location SensorIds					
attributes	Name id	Type QIFIdType	Use required	Default	Fixed	Annotation documentation The id attribute is the QIF id of the measurement resource, used for referencing.
annotation	documentation Each Tool element gives information about a CMM tool.					

C.181 complexType ToolType

diagram						
type	extension of MeasurementResourceBaseType					
properties	base MeasurementResourceBaseType					
children	Name Description Manufacturer ModelNumber SerialNumber LocationId Location SensorIds					
used by	element ToolsType/Tool					
attributes	Name id	Type QIFIdType	Use required	Default	Fixed	Annotation documentation The id attribute is the QIF id of the measurement resource, used for referencing.
annotation	documentation The ToolType defines a CMM tool body having one or more sensors.					

C.182 element ToolType/SensorIds

diagram						
type	ArrayReferenceFullType					

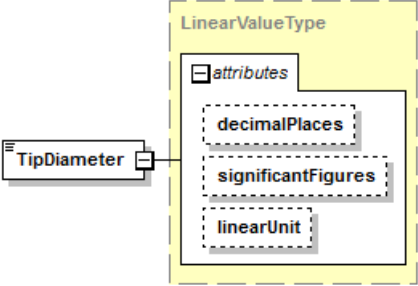
properties	minOcc maxOcc content	0 1 complex				
children	Id					
attributes	Name N	Type NaturalType	Use required	Default	Fixed	Annotation documentation The required N attribute shows how many Id elements are present in this array.
annotation	documentation The optional SensorIds element is a list of the QIF ids of sensors mounted on the tool.					

complexType TouchProbeType

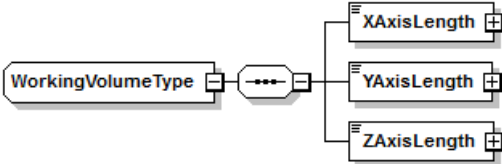
diagram						
type	extension of SensorType					
properties	base SensorType					
children	Name Description Manufacturer ModelNumber SerialNumber LocationId Location Qualifications AAngle BAngle TipDiameter					
used by	element TouchProbe					
attributes	Name id	Type QIFIdType	Use required	Default	Fixed	Annotation documentation The id attribute is the QIF id of the

		measurement resource, used for referencing.
annotation	documentation The TouchProbeType defines a CMM touch probe tip.	

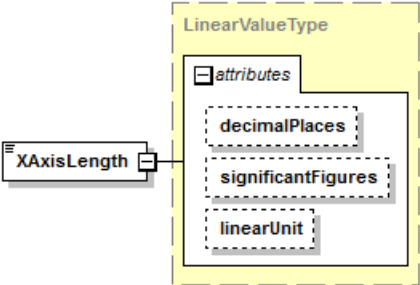
C.183 element TouchProbeType/TipDiameter

diagram						
type	LinearValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The TipDiameter element is the nominal diameter of a CMM touch probe tip.					

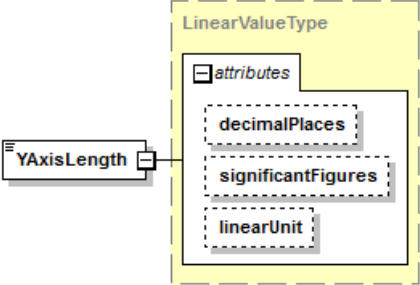
C.184 complexType WorkingVolumeType

diagram	
children	XAxisLength YAxisLength ZAxisLength
used by	element ProbingDeviceType/WorkingVolume
annotation	documentation The WorkingVolumeType defines a box-shaped working volume whose sides are aligned with the axes of a 3D Cartesian coordinate coordinate system.

C.185 element WorkingVolumeType/XAxisLength

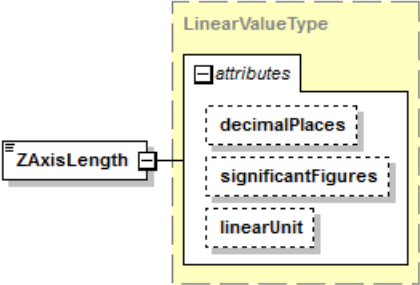
diagram						
type	LinearValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The XAxisLength element gives the length of the working volume in the X direction.					

C.186 element WorkingVolumeType/YAxisLength

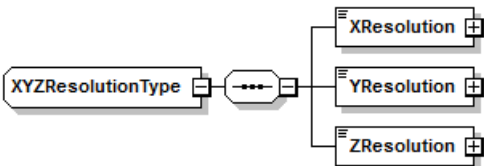
diagram						
type	LinearValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.

annotation	documentation The YAxisLength element gives the length of the working volume in the Y direction.
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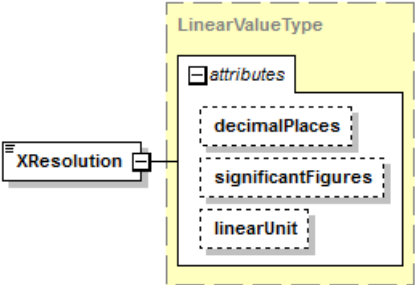
C.187 element WorkingVolumeType/ZAxisLength

diagram						
type	LinearValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The ZAxisLength element gives the length of the working volume in the Z direction.					

C.188 complexType XYZResolutionType

diagram	
children	XResolution YResolution ZResolution
used by	elements ResolutionType/XYZResolution ResolutionType/XYZResolution
annotation	documentation The XYZResolutionType defines the resolution of a CMM (or other device with 3D Cartesian coordinates) using separate values for the three axes.

C.189 element XYZResolutionType/XResolution

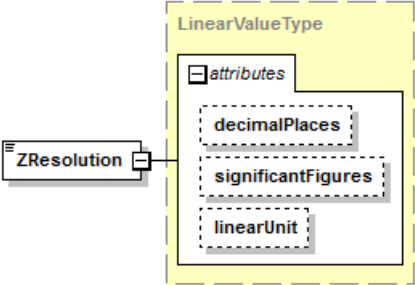
diagram						
type	LinearValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The XResolution element is the resolution of the X axis.					

C.190 element XYZResolutionType/YResolution

diagram						
type	LinearValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.

annotation	documentation The YResolution element is the resolution of the Y axis.
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C.191 element XYZResolutionType/ZResolution

diagram						
type	LinearValueType					
properties	content complex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	decimalPlaces	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	significantFigures	xs:nonNegativeInteger				documentation See documentation of SpecifiedDecimalType.
	linearUnit	xs:token				documentation The optional linearUnit attribute defines the UnitName for the LinearValueType.
annotation	documentation The ZResolution element is the resolution of the Z axis.					

C.192 simpleType CMMDirectionEnumType

type	restriction of xs:NMTOKEN		
properties	base	xs:NMTOKEN	
used by	elements	CMMAxisDirectionsType/XAxisDirection CMMAxisDirectionsType/YAxisDirection CMMAxisDirectionsType/ZAxisDirection	
facets	Kind	Value	Annotation
	enumeration	RIGHT	
	enumeration	LEFT	
	enumeration	FRONT	
	enumeration	BACK	
	enumeration	UP	
	enumeration	DOWN	
annotation	documentation The CMMDirectionEnumType enumerates values that describe the directions on a CMM with which axes may be aligned. The directions are those seen when standing in front of the CMM.		

C.193 simpleType CMMGeometryEnumType

type	restriction of xs:NMTOKEN		
properties	base	xs:NMTOKEN	
used by	element	CMMGeometryType/CMMGeometryEnum	
facets	Kind	Value	Annotation
	enumeration	CANTILEVER	
	enumeration	BRIDGEMOVINGBRIDGE	
	enumeration	BRIDGEMOVINGTABLE	
	enumeration	COLUMN	
	enumeration	GANTRY	
	enumeration	HORIZONTALARMMOVINGARM	
	enumeration	HORIZONTALARMMOVINGTABLE	
	enumeration	ARTICULATEDARM	
annotation	documentation	The CMMGeometryEnumType enumerates values that describe types of CMM construction.	

~~ end of data dictionary for QIFMeasurementResources.xsd ~~

Bibliography

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- [3] ASME B89.7.2 – 1999, *Dimensional Measurement Planning*