S-100 Maintenance - Change Proposal Form

TSMAD27-4.3.11A

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Change Proposal Type *Select only one option*

1.Clarification	2.Correction	3.Extension
		Y

Location *Identify all change proposal locations*

Note: (new) means numbering as in the accompanying redline document. Other numbering refers to the redlined documents prepared for TSMAD26.

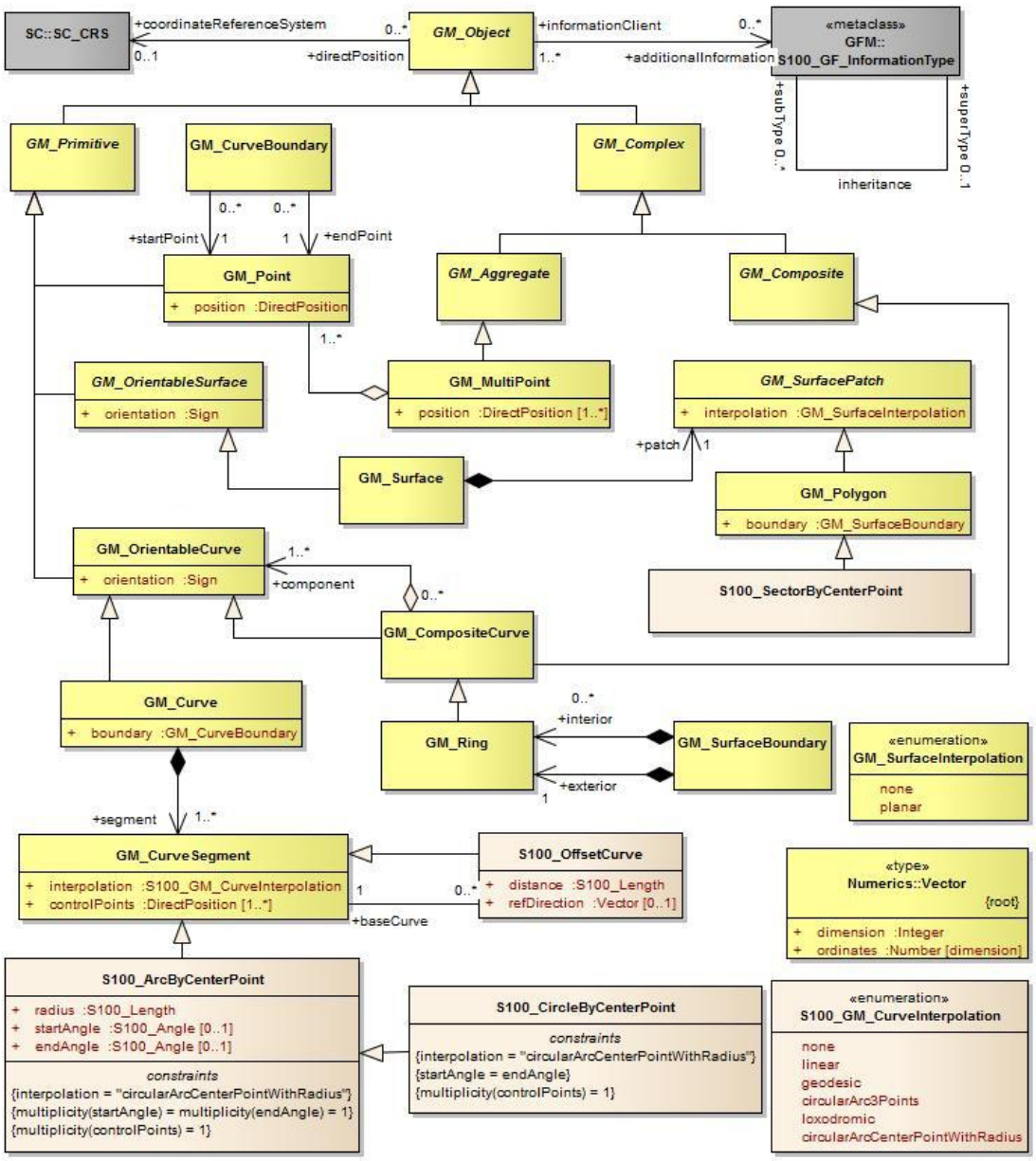
S-100 Version No.	Part No.	Section No.	Proposal Summary
1.0.0	5-A	Figure A-1 and table A.20	Add new spatial types to the enumeration for S100_FC_SpatialPrimitiveType
	5-A	Figure A-1	Restore missing ObjectType / NamedType generalization and type of attribute permittedPrimitives
	7	5.2	Add types for ArcByCenterPoint, CircleByCenterPoint, OffsetCurve, SectorByCenterPoint to Figure 7-3; add clauses describing added spatial types; add interpolation type circularArcCenterPointWithRadius
	7	5.3	Adapt text about “5 levels” to describe new levels 3c and 3d as extensions of Level 3a
	7	5.3.6 and Figures 7-4a, 7-4b	merge with 5.3.2, where the figures are referenced, Clause 5.3.6 currently contains only the figure for the boundary direction requirement in 7-5.3.2 . Figures renumbered 7-8a/b and 7-9 due to insertion of figures in 5.2
	7	(new) 5.3.6, 5.3.7	Descriptions of new levels 3c and 3d
	10a	(new) clause 5.12	ISO 8211 implementation for new spatial types at level 3c
	10a	(new) 5.13 to 5.16	Explicit ISO 8211 encodings for new spatial types at level 3d

Change Proposal

5-A Figure A-1 and table A.20 (see redline markup)

7.5.2 Simple Geometry

Replace Figure 7-3 by the figure below:



7-5.2.1 CurveInterpolation

Add the value *circularArcCenterPointWithRadius* to the enumeration S100_GM_CurveInterpolation, to conform to ISO 19136 (GML) and because none of the values in Edition 1.0.0 is applicable. The text to be added to clause **7-5.2.1.1 Semantics** is given below.

> 5) Circular arc with centre and radius (circularArcCenterPointWithRadius) – the interpolation is defined by an arc of a circle of the specified radius, centred at the coordinates of the single control point, and drawn from the azimuth of the start angle parameter to the end angle parameter.

Note: The conceptual model in the accompanying paper, describing SectorByCenterPoint as composed of two radius segments and one arc segment) is not added to S-100 since it is not realized as a distinct model – it merely constrains the polygon class.

7-5.2.20 S100_ArcByCenterPoint

7-5.2.20.1 Semantics

An ArcByCenterPoint (Figure XX) has the center of the arc as the single control point plus the radius and bearing of the start and end of the arc.

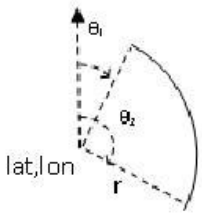


Figure XX. Arc By Center Point

7-5.2.21 S100_CircleByCenterPoint

7-5.2.21.1 Semantics

An CircleByCenterPoint (Figure XX) has the center of the circle as the single control point plus the radius. It is equivalent to an ArcByCenterPoint with identical start and end angle.

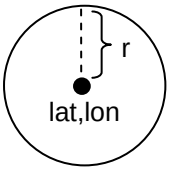


Figure XX. Circle by Center Point

7-5.2.22 S100_SectorByCenterPoint

7-5.2.22.1 Semantics

A SectorByCenterPoint (Figure XX) has the center of the circle and the end points of an arc of the circle as the control points plus the radius and the bearing of the start and end of the sector. It is equivalent to an ArcByCenterPoint combined with the two radii joining the center to the endpoints of the arc.

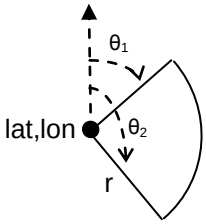


Figure XX. Sector By Center Point

7-5.2.23 S100_OffsetCurve

7-5.2.23.1 Semantics

An OffsetCurve (Figure XX) is a curve at a constant distance from a basis curve. The curve is specified by providing the distance and direction relative to a basis curve. The direction can be omitted in the 2D case, where the distance can be positive or negative. In that case, distance defines left side (positive distance) or right side (negative distance) with respect to the tangent to the basis curve.

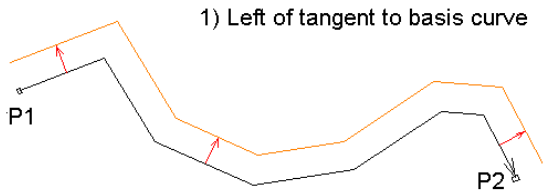


Figure XX: Offset Curve

7-5.3 Geometry configurations

Adapt text to addition of level 3c and 3d by adding the following "(1-3b). Two additional levels (3c and 3d) extend level 3a".

(new) **7-5.3.6 Level 3c – 0-, 1- and 2-Dimension**

Point, curve and surface primitives as for Level 3a, some of which may have attached constraints and/or annotations distinguishing some objects as one of the following four spatial types:

1) S100_ArcByCenterPoint
2) S100_CircleByCenterPoint
3) S100_OffsetCurve
4) S100_SectorByCenterPoint

The constraints for Level 2a apply.

(new) **7-5.3.7 Level 3d – 0-, 1- and 2-Dimension**

Point, curve, and surface primitives for Level 3a plus the following spatial types:

1) S100_ArcByCenterPoint
2) S100_CircleByCenterPoint
3) S100_OffsetCurve
4) S100_SectorByCenterPoint

The constraints for Level 2a apply.

Level 3d objects differ from Level 3c objects in that the four spatial types named in §§ 0 and 0 include explicit modelling of classes and additional attributes representing the added spatial types.

(new) **10a-5.12 Level 3c data records**

Data formats lacking explicit definitions of Level 3c spatial types may use information objects associated with instances of Level 3a spatial types to annotate them with extra information that distinguishes those instances as one of the additional spatial types. Except for the associated information objects, the data records are the same as records for Level 3a types. The information types for the additional spatial types defined in Level 3c are predefined types described in the following table. Details undefined in the table such as value type (e.g., integer/real), data format for latitude/longitude, units of distance, etc., must be defined by the product specification in the table, and must be the same as for other spatial types.

Table 1. Annotations for arc, circle, offset curve and sector types

Spatial Type	Predefined Information Type	Attribute	Type	Multiplicity	Constraints	Remarks
S100_ArcByCenterPoint	ArcByCenterPointAnnotation	center	GM_Point	1		Format and precision defined in product specification
		radius	S100_Length	1		Value type and precision defined in product specification
		distanceUnitOfMeasurement	enumeration	0..1		1) Metres 2) Yards 3) Kilometres 4) Statute miles 5) Nautical miles 6) Millimetres on screen Product specification must specify default
		startAngle	S100_Angle	1	multiplicity=1	Value type and precision defined in product specification
		endAngle	S100_Angle	1	multiplicity=1	Value type and precision defined in product specification
S100_CircleByCenterPoint	CircleByCenterPointAnnotation	center	GM_Point	1		Format and precision defined in product specification
		radius	S100_Length	1		Value type and precision defined in product specification
		distanceUnitOfMeasurement	enumeration	0..1		1) Metres 2) Yards 3) Kilometres 4) Statute miles 5) Nautical miles 6) Millimetres on screen Product specification must specify

						default
S100_OffsetCurve	OffsetCurveAnnotation	distance	S100_Length	1		Value type and precision defined in product specification
		distanceUnitOfMeasurement	enumeration	0..1		1) Metres 2) Yards 3) Kilometres 4) Statute miles 5) Nautical miles 6) Millimetres on screen Product specification must specify default
		refDirection	enumeration	1		1) Left of tangent to basis curve 2) Right of tangent to basis curve
S100_SectorByCenterPoint	SectorByCenterPointAnnotation (attributes are those of the defining arc, which implicitly defines the radius segments too)	center	GM_Point			Format and precision defined in product specification
		radius	S100_Length	1		Value type and precision defined in product specification
		distanceUnitOfMeasurement	enumeration	0..1		1) Metres 2) Yards 3) Kilometres 4) Statute miles 5) Nautical miles 6) Millimetres on screen Product specification must specify default
		startAngle	S100_Angle	1		Value type and precision defined in product specification
		endAngle	S100_Angle	1		Value type and precision defined in product specification

Note: (1) The UML model of arc by center point has multiplicity 0..1 for start and end angle, conforming to ISO 19136 and because ISO 19136 defines circle as a sub-type of arc, but for the instances of arcs these values are mandatory. (2) The definition of distance units of measurement 1-5 is the same as the draft S-101 DCEG (August 2013). (3) Millimetres on screen is intended for cartographic hints for presentation use, e.g. absolute sizes or shifting one of two coincident borders.

Example (Informative):

The example below shows how an arc by centre point may be annotated in an S-101 product. If S-101 permits only "loxodromic" interpolation, the "circularArc3Points" interpolation cannot be used. The format for coordinates uses the ISO 8211 data format and a coordinate multiplication factor of 10^7.

Note: The multiplicity of start and end angles for arcs is constrained over the UML model because the UML class must allow for specialisation by the "circle" class.

Description	Level 3a spatial object	Associated Information type
Arc of radius 0.5 nautical miles centred at 60°N 5°E spanning the quadrant from due North to NorthEast	GM_Curve interpolation=loxodromic coordinates = (sequence of points approximating the arc described)	ArcByCenterPointAnnotation center=complex (C2IL), sub-fields: YCOO=600000000, XCOO= 50000000 radius = 0.5 distanceUnitOfMeasurement = 5 startAngle = 0.0 endAngle = 45.0
Offset curve 10 nautical miles due east	GM_Curve interpolation=loxodromic coordinates = (sequence of points on the offset curve) + spatial association to basis curve	OffsetCurveAnnotation distance = 20 distanceUnitOfMeasurement = 5 refDirection = 1 or 2 depending on direction of basis curve

(new) **10a-5.13 Arc by Center Point Record – Level 3d data format**

10a-5.13.1 Encoding Rules

An Arc By Center Point is a 2D spatial object. An Arc consists of a segment of the circumference of a circle. The geometry is given by a control point (coordinates of the centre), radius, and the bearing angles of the end points. The end points are part of the arc. The arc is drawn from the end point at the first angular bearing in a clockwise direction until the second bearing angle is attained (equivalent to reaching the second end point). As with any other spatial object, arcs can have attributes and associations to information types.

An Arc Parameter field (ARCP) field contains the arc parameters.

An Arc By Center Point is a sub-type of a Curve, defined in terms of parameters (center, radius, and bearing) instead of a sequence of points on the Curve.

10a-5.13.2 Arc By Center Point Record Structure

```
Arc By Center Point record
  |
  |--ARID (4): Arc Record Identifier field
     |
     |-<0..*>-INAS (5\\*5): Information Association field
     |
     |-<1>-ARCP (1): Arc parameters field
```

10a-5.13.2.1 Arc By Center Point record Identifier field Structure

Subfield name	Label	Value	Format	Comment
Record name	RCNM	{155}	b11	{155} – Arc by Center Point
Record identification number	RCID		b14	Range: 1 to 2^{32}-2
Record version	RVER		b12	RVER contains the serial number of the record edition
Record update instruction	RUIN	{1}	b11	{1} – Insert

				{2} – Delete {3} – Modify

Data Descriptive Field

```
1100;&□□□Arc□Record□Identifier▲RCNM!RCID!RVER!RUIN▲(b11,b14,b12,b11)▼
```

10a-5.13.2.2 Arc Parameters field – ARCP

Subfield name	Label	Value	Format	Comment
Interpolation	INTP	{5}	b11	{5} – circularArcCenterPointWithRadius
Construction surface	SURF	{1}	b11	Describes whether the parameters (e.g., radius) are defined on the ellipsoid or the planar (e.g., UTM, Gauss-Krüger) projection. {1} Ellipsoidal – object must be reconstructed prior to projection onto a 2D surface {2} Planar – object must be reconstructed after projection onto a 2D surface, regardless of projection used
Coordinate in Y axis	YCOO		b24	Y coordinate or latitude of centre
Coordinate in X axis	XCOO		b24	X Coordinate or longitude of centre
Distance	DIST		b48	Radius
Distance unit	DISU	{1} – {6}	b11	{1} Metres {2} Yards {3} Kilometres {4} Statute miles {5} Nautical miles {6} Millimetres on screen
Start Bearing	SBRG		b48	In decimal degrees
End Bearing	EBRG		b48	In decimal degrees

(new) **10a-5.14 Circle by Center Point Record**

10a-5.14.1 Encoding Rules

An Circle By Center Point is a 2D spatial object. It is an Arc By Center Point with identical start and end angles, which are therefore omitted in the data format. The geometry is given by a control point (coordinates of the centre) and radius. As with any other spatial object, it can have attributes and associations to information types.

10a-5.14.2 Circle By Center Point Record Structure

```
Circle By Center Point record
  |
  |--CCID (4): Circle Record Identifier field
     |
     |-<0..*>-INAS (5\\*5): Information Association field
     |
     |-<1>-CIRP (1): Circle parameters field
```

10a-5.14.2.1 Circle By Center Point record Identifier field Structure

Subfield name	Label	Value	Format	Comment
Record name	RCNM	{160}	b11	{160} – Circle by Center Point
Record identification number	RCID		b14	Range: 1 to 2^{32}-2
Record version	RVER		b12	RVER contains the serial number of the record edition
Record update instruction	RUIN	{1}	b11	{1} – Insert {2} – Delete {3} – Modify

Data Descriptive Field

```
1100;&□□□Circle□Record□Identifier▲RCNM!RCID!RVER!RUIN▲(b11,b14,b12,b1
1)▼
```

10a-5.14.2.2 Circle Parameters field – CIRP

Subfield name	Label	Value	Format	Comment
Construction surface	SURF	{1}	b11	Describes whether the parameters (e.g., radius) are defined on the ellipsoid or the planar (e.g., UTM, Gauss-Krüger) projection. {1} Ellipsoidal – object must be reconstructed prior to projection onto a 2D surface {2} Planar – object must be reconstructed after projection onto a 2D surface, regardless of projection used
Coordinate in Y axis	YCOO		b24	Y coordinate or latitude of centre
Coordinate in X axis	XCOO		b24	X Coordinate or longitude of centre
Distance	DIST		b48	Radius
Distance unit	DISU	{1} – {6}	b11	{1} Metres {2} Yards {3} Kilometres {4} Statute miles {5} Nautical miles {6} Millimetres on screen

(new) **10a-5.15 Offset Curve Record**

10a-5.15.1 Encoding Rules

An Offset Curve is a curve at a constant distance from a basis curve. The geometry is given by a control distance and direction in reference to the basis curve. The spatial association field contains a pointer to the basis curve, which must be a spatial object defined in the data set. As with any other spatial object, it can have attributes and associations to information types.

10a-5.15.2 Offset Curve Record Structure

```
Offset Curve record
  |
  |--OCID (4): Offset Curve Record Identifier field
     |
     |-<0..*>-INAS (5\\*5): Information Association field
     |
     |-<1>-SPAS (*6): Spatial Association field
     |
     |-<1>-OFCP (1): Offset curve parameters field
```

10a-5.15.2.1 Offset curve record Identifier field Structure

Subfield name	Label	Value	Format	Comment
Record name	RCNM	{165}	b11	{165} – Offset Curve
Record identification number	RCID		b14	Range: 1 to 2^{32}-2
Record version	RVER		b12	RVER contains the serial number of the record edition
Record update instruction	RUIN	{1}	b11	{1} – Insert {2} – Delete {3} – Modify

Data Descriptive Field

```
1100;&□□□Offset□Curve□Record□Identifier▲RCNM!RCID!RVER!RUIN▲(b11,b14,
b12,b11)▼
```

10a-5.15.2.2 Offset Curve Parameters field – OFCP

Subfield name	Label	Value	Format	Comment
Distance unit	DISU	{1} – {6}	b11	{1} Metres {2} Yards {3} Kilometres {4} Statute miles {5} Nautical miles {6} Millimetres on screen

Offset Direction	OFFD	{1} or {2}	b11	{1} Left of tangent to basis curve {2} Right of tangent to basis curve
Distance	DIST		b48	Offset distance

(new) **10a-5.16 Sector by Center Point Record**

10a-5.16.1 Encoding Rules

A Sector By Center Point is a 2D spatial object. An Sector by Center Point consists of a wedge of the of circle bounded by the arc defined by the start and end angle and the radii joining the center of the circle to the endpoints of the arc. The geometry is given by a control point (coordinates of the centre), radius, and the bearing angles of the end points of the arc. As with any other spatial object, it can have attributes and associations to information types.

10a-5.16.2 Sector By Center Point Record Structure

```
Sector By Center Point record
  |
  |--SEID (4): Sector Record Identifier field
     |
     |-<0..*>-INAS (5\\*5): Information Association field
     |
     |-<1>-SECP (1): Sector by Center Point parameters field
```

10a-5.16.2.1 Sector By Center Point record Identifier field Structure

Subfield name	Label	Value	Format	Comment
Record name	RCNM	{170}	b11	{170} – Arc by Center Point
Record identification number	RCID		b14	Range: 1 to 2^{32}-2
Record version	RVER		b12	RVER contains the serial number of the record edition
Record update instruction	RUIN	{1}	b11	{1} – Insert {2} – Delete {3} – Modify

Data Descriptive Field

```
1100;&□□□Sector□Record□Identifier▲RCNM!RCID!RVER!RUIN▲(b11,b14,b12,b1
1)▼
```

10a-5.16.2.2 Sector by Center Point Parameters field – SECP

Subfield name	Label	Value	Format	Comment
Interpolation	INTP	{5}	b11	{5} – circularArcCenterPointWithRadius
Construction surface	SURF	{1}	b11	Describes whether the parameters (e.g., radius) are defined on the ellipsoid or the planar (e.g., UTM, Gauss-Krüger) projection. {1} – Ellipsoidal – object must be reconstructed prior to projection onto a 2D surface {2} – Planar – object must be reconstructed after projection onto a 2D surface, regardless of projection used
Coordinate in Y axis	YCOO		b24	Y coordinate or latitude of centre
Coordinate in X axis	XCOO		b24	X Coordinate or longitude of centre
Distance	DIST		b48	Radius
Distance unit	DISU	{1} – {6}	b11	{1} Metres {2} Yards {3} Kilometres {4} Statute miles {5} Nautical miles {6} Millimetres on screen
Start Bearing	SBRG		b48	In decimal degrees
End Bearing	EBRG		b48	In decimal degrees

Note: GML format for the three types defined in ISO 19136 (arc by center point, circle by center point, offset curve) should be the same as ISO 19136. A GML encoding for types not defined in ISO 19136 will be defined as part of work on the S-100 profile.

Change Proposal Justification

Please provide a suitable explanation for the change and where applicable supporting documentation.

Domains other than ENCs, such as nautical publications and marine safety information, often use spatial types that are extensions of the basic point, line, and surface types in S-100 Edition 1.0.0. This proposal includes the types most needed by SNPWG.