

5 Coordinate Reference Systems (CRS)

To define the location of features using the S-100 Framework, one first needs to define a Coordinate Reference System (CRS). A Coordinate Reference System in two dimensions uses a coordinate pair, either X and Y for a Cartesian system or latitude and longitude for a geodetic/geographic system to define the location of a feature on a 2-D grid. However, if one wants to plot features in a 3-dimensional Coordinate Reference System, where we now want to include depths on a nautical chart or elevations on a map, one needs to assign the depth or elevation as the third component. For Cartesian systems, one would use X, Y, Z as the triplet or for geodetic/geographic systems, one would use latitude, longitude and height. The height can be the ellipsoid height or any of the other vertical references (see Vertical Reference System below). Geodetic/geographic coordinates are more intuitive for positioning and navigation applications on or near the Earth's surface while Cartesian coordinates are more appropriate if vectors are needed to accurately illustrate a graphical relationship between two or more points. ~~If geodetic/geographic coordinates are specified, then the IHO recommends using the latest realisation of the World Geodetic System of 1984 (WGS 84).~~

5.1 Horizontal reference system

~~For products based on the S-100 Framework, including this Standard for S-104 products, the geodetic/geographic Coordinate Reference System must be of the form EPSG:xxxx (with WGS 84 as base datum). The generic form/code for the WGS 84 frame is EPSG:4326 while the latest and most widely adopted realisation of the WGS 84 reference frame as of 2022 was EPSG:9057. The full reference to EPSG can be found at <https://epsg.org> and other EPSG references for recent WGS 84 realisations are given below:~~

WGS 84 (generic)	ESPG:4326	
WGS 84(G2296)	EPSG:10606	
WGS 84(G2139)	EPSG:9755	Valid epoch 2016:0
WGS 84(G1762)	EPSG:9057	Valid epoch 2005:0
WGS 84(G1674)	EPSG:9056	Valid epoch 2005:0
WGS 84(G1150)	EPSG:9055	Valid epoch 2001:0
WGS 84 / UTM Zone 1N to Zone 60N	EPSG:32601	EPSG:32660
WGS 84 / UTM Zone 1S to Zone 60S	EPSG:32701	EPSG:32760
WGS 84 / UPS North (E,N)	EPSG:5041	
WGS 84 / UPS South (E,N)	EPSG:5042	

~~Allowed coordinate reference systems are listed below.~~

Coordinate Reference System:	EPSG:9057 (WGS 84) or another reference system listed above
	EPSG:4326 (WGS 84)
	WGS 84 / UTM Zone 1N to Zone 60N EPSG:32601 - EPSG:32660
	WGS 84 / UTM Zone 1S to Zone 60S EPSG:32701 - EPSG:32760
	WGS 84 / UPS North (E,N) EPSG:5041
	WGS 84 / UPS South (E,N) EPSG:5042

Datum:	WGS 84 defined by NGA
Projection:	None / UTM / UPS
Horizontal Units:	Decimal degrees / Easting and northing
Coordinate Reference System Registry:	EPSG Geodetic Parameter Registry
Date type (according to ISO 19115-1):	002 - publication
Responsible party:	International Association of Oil and Gas Producers (IOGP)

~~Producers of S-104 data must use the same CRS/projection as the underlying S-101 or S-102 dataset and should endeavour to use the same realisation. (Reference system information encoded in datasets must be~~

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such that application software can automatically match reference system information encoded in different data products, especially S-101/S-102/S-104.)