International Hydrographic Office

Digital Tide Table Product Specification

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Digital Tide Table Product Specification

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10) Metadata – see Clause 16

A data product specification may also contain sections covering the following aspects of the data product:

k) Data Maintenance – see Clause 12

l) Portrayal – see Clause 13

m) Additional Information – see Clause 16

Each of these sections of the data product specification

1 Overview

1.1 Introduction

1.2 References

1.3 Terms, definitions and abbreviations

1.3.1 Terms and Definitions

1.3.2 Abbreviations

1.4 S-??? General Data Product Description

Note: This information contains general information about the data product.

Title: **Digital Tide Tables**

Abstract: **……..**

Content: Digital Tide Tables contain predicted tide information at tidal stations for a specific length of time.

Spatial Extent:

Description: Global, marine areas only

East Bounding Longitude: 180

West Bounding Longitude: -180

North Bounding Latitude: 90

South Bounding Latitude: **-**90

Temporal Extent: ???

Specific Purpose: …….

1.5 Data product specification metadata

Note: This information uniquely identifies this product specification and provides information about its creation and maintenance.

Title: Digital Tide Table Product Specification

S-100 Version: 1.0.0

S-??? Version: 0.0.1

Date: ??????????????

Language: English

Classification: Unclassified

Contact: Organisation Name

Role

Address Line 1

Address Line 2

Address Line 3
Tel
Fax

URL: http://www.iho.int

Identifier: S-???

Maintenance: Maintenance frequency

2 Specification Scopes

Scope ID: General Scope

Level: General Scope

Level name: General Scope

3 Data Product Identification

A data set that conforms to this product specification will be identifiable by the discovery metadata that supports it.

Title: Digital Tide Table

Alternate Title: Tide Table

Abstract: The data product contains predictions of tidal height for primary and secondary ports. It may also include harmonic constituents and other ancillary information.

Topic Category: Transportation

Geographic Description: Areas specific to marine navigation.

Spatial Extent:

Description: Areas specific to marine navigation.

eastBoundLongitude: 180

westBoundLongitude: -180

northBoundLatitude: 90

southBoundLatitude -90

Vertical Extent:

minimumValue:

maximumValue:

unitOfMeasure: meters

Temporal Extent:

TM_Primitive: **1 year**

Spatial Resolution:	???? Not really applicable
Purpose:	To provide predictions of tidal height at different times.
Language:	English
Classification:	Unclassified
Spatial Representation Type:	Vector
Point of Contact:	Producing Organisation
Use Limitation:	The data product should be used with consideration for the method by which the tidal predictions were produced.

4 Data Content and structure

An S-??? Digital Tide Table is a feature-based product. This section contains the product application schema expressed in UML and an associated feature catalogue. The feature catalogue provides a full description of each feature type including its attributes, attribute values and relationships in the data product.

4.1 Application Schema

Need to produce application schema TSMAD can assist with this.

This will include, primary and secondary ports as point features with complex attributes containing tidal prediction times and heights. In order to produce graphic plots all primary ports will need to include hourly height predictions.

Harmonic Constants could also be included as complex attributes for each port.

Figure ?? Application Sch

4.2 Feature Catalogue

Only feature types, information types, attributes, attribute values, associations and roles which are defined in the S-??? Feature Catalogue may be used in this product.

The feature catalogue will only be available in XML format with an accompanying style sheet.

4.2.1 Features

Feature Type: **Primary Port (P)**

Feature Type Name: **Primary Port**

Feature Type Definition: A port for which tidal predictions can be produced.

Feature Type Code: PrimaryPort

Feature Type Aliases: null

Feature Operation Names: null

Feature Attribute Names:
stationName
alternativeName
country
timeZone
corLat
corLong

Feature Association Names:
Example:

Feature Type: **Secondary Port (P)**

Feature Type Name: **Secondary Port**

Feature Type Definition: A port for which tidal predictions are calculated based on differences from a referenced standard port.

Feature Type Code: SecondaryPort

Feature Type Aliases: null

Feature Operation Names: null

Feature Attribute Names:
stationName
alternativeName
country
timeZone
corLat
corLong

Feature Association Names:
Example:

4.2.2 Attributes

Feature Attribute: Station Name

Name: Station Name

Definition: The name of the tidal station.

Code: stationName

Value Data Type: Character (36)

Value Measure Unit: Null

Value Domain Type:

Value Domain:

Feature Attribute Values:

Feature Attribute: Alternative Name

Name: Alternative Name

Definition: A name by which the tidal station is commonly known.

Code: alternativeName

Value Data Type: Character (36)

Value Measure Unit: Null

Value Domain Type:

Value Domain:

Feature Attribute Values:

Feature Attribute: Country

Name: Country

Definition: The name of the country.

Code: country

Value Data Type: Character (36)

Value Measure Unit: Null

Value Domain Type:

Value Domain:

Feature Attribute Values:

Feature Attribute: Time Zone

Name: Time Zone

Definition: The Time Zone relative to Coordinated Universal Time. Eg +3.5

Code: timeZone

Value Data Type:

Value Measure Unit: Null

Value Domain Type:

Value Domain:

Feature Attribute Values:

Feature Attribute: Coordinate Latitude

Name: Coordinate Latitude

Definition: Latitude of the Tidal Station

Code: corLat

Value Data Type:

Value Measure Unit: Null

Value Domain Type:

Value Domain:

Feature Attribute Values:

Feature Attribute: Coordinate Longitude

Name: Coordinate Longitude

Definition: Longitude of the Tidal Station

Code: corLong

Value Data Type:

Value Measure Unit: Null

Value Domain Type:

Value Domain:

Feature Attribute Values:

Feature Attribute: Date

Name: Date

Definition:

Code: date

Value Data Type:

Value Measure Unit: Null

Value Domain Type:

Value Domain:

Feature Attribute Values:

Feature Attribute: Day of the Week

Name: Day of the Week

Definition:

Code: corLong

Value Data Type:

Value Measure Unit: Null

Value Domain Type:

Value Domain:

Feature Attribute Values:

Feature Attribute: Lunar Phase

Name: Lunar Phase

Definition:

Code: lunarPhase

Value Data Type:

Value Measure Unit: Null

Value Domain Type:

Value Domain:

Feature Attribute Values:

Feature Attribute: Time of Sunrise

Name:

Definition:

Code: timeOfSunrise

Value Data Type:

Value Measure Unit: Null

Value Domain Type:

Value Domain:

Feature Attribute Values:

Feature Attribute: Time of Sunset

Name:

Definition:

Code: timeOfSunset

Value Data Type:

Value Measure Unit: Null

Value Domain Type:

Value Domain:

Feature Attribute Values:

Feature Attribute: Type of Prediction

Name:

Definition:

Code: typeOfPrediction

Value Data Type:

Value Measure Unit: Null

Value Domain Type:

Value Domain:

Feature Attribute Values:

typeOfPrediction Value	Definition
Routine	A prediction of tidal height at a set time.
HW	High Water
LW	Low water

Feature Attribute: Time

Name:

Definition:

Code: time

Value Data Type:

Value Measure Unit: Null

Value Domain Type:

Value Domain:

Feature Attribute Values:

Feature Attribute: Height of Tide

Name: Height of Tide

Definition: Height of tide below or above a known datum

Code: heightOfTide

Value Data Type:

Value Measure Unit: Meters

Value Domain Type:

Value Domain:

Feature Attribute Values:

4.2.3 Complex Attributes

Complex Attribute: **Daily Prediction**

Complex Attribute Name: **Primary Port**

Complex Attribute Definition: A group of tidal predictions for a single day.

Complex Attribute Code: dailyPrediction

Sub Attribute Names:
date
dayOfWeek
lunarPhase
timeOfSunrise
timeOfSunset

Complex Attribute: **Tidal Prediction**

Complex Attribute Name: **Tidal Prediction**

Complex Attribute Definition: A prediction of tidal height at a set time.

Complex Attribute Code: tidalPrediction

Sub Attribute Names: **date**
dayOfWeek
typeOfPrediction
time
heightOfTide

Complex Attribute: **Tidal Observation**

Complex Attribute Name: **Tidal Observation**

Complex Attribute Definition: An observation of tidal height at a set time.

Complex Attribute Code: tidalObservation

Sub Attribute Names: **date**
dayOfWeek
typeOfPrediction
time
heightOfTide

4.3 Feature Types

4.3.1 Meta Feature Types

4.3.2 Geographic Feature Types

Geo feature types form the principle content of the navigational product and are fully defined by their associated attributes and information types.

4.3.3 Aggregated Feature Types

4.3.3.1 Associations

Associations between features are established and carried in the feature catalogue.

EXAMPLE A primary port is associated to a secondary port.

4.3.3.2 Roles

Roles between features are established and carried in the feature catalogue.

EXAMPLE A light is a slave to a buoy; buoy is the master of the light. Where master and slave are the role between the light and the buoy.

4.4 Time Varying Features (S-57 PS 3.7)

The ENC may contain information about magnetic variation, tides, tidal streams and currents.

4.5 Feature integrity (S-57 PS 5.9)

4.5.1 Processing

$$G(x) = x^{32} + x^{26} + x^{23} + x^{22} + x^{16} + x^{12} + x^{11} + x^{10} + x^{8} + x^{7} + x^{5} + x^{4} + x^{2} + x + 1$$

Encoding is defined by the following generating polynomial:

Processing is applied to relevant files as they appear in the exchange set.

The CRC value of the file is defined by the following process:

1. The first 32 bits of the data are complemented.
2. The n bits of the data are then considered to be the coefficients of a polynomial M(x) of degree n-1.
3. M(x) is multiplied by x^{32} and divided by G(x), producing a remainder R(x) of degree <31.
4. The coefficients of R(x) are considered to be a 32-bit sequence.
5. The bit sequence is complemented and the result is the CRC.

The hexadecimal format of CRCs are converted to ASCII characters and stored in the ACatalogue Directory≅ [CATD] field.

An example of coding in C language is given in Annex.

4.6 Attributes

4.6.1 Numeric Attribute Values (S-57 PS 3.5.4)

Floating point or integer attribute values must not be padded by non-significant zeroes.

4.6.2 Text Attribute Values (S-57 PS 3.5.5)

Character strings must be encoded using the character set specified in Unicode Transformation Format-8 (UTF-8).

The lexical level used for the “Feature Record Attribute” [ATTF] field must be 0 (ISO/IEC 646 IRV) or 1 (ISO 8859-1). Lexical level 0, 1 or 2 may be used for the “Feature Record National Attribute” [NATF] field. Format effecting (C0) characters as defined in S-57 Part 3, Annex B are prohibited. The delete character is only used in the update mechanism.

4.6.3 Mandatory Attribute Values

Certain attributes are mandatory in order for the data product to make sense.

All mandatory attributes are identified in the feature catalogue.

4.6.3.1 Unknown Mandatory Attribute Values (S-57 PS 3.5.1)

In a base data set, when an attribute code is present but the attribute value is missing, it means that the producer wishes to indicate that this attribute value is unknown.

In a revision data set, when an attribute code is present but the attribute value is missing it means:

- that the value of this attribute is to be replaced by an unknown value if it was present in the original data set,
- that an unknown value is to be inserted if the attribute was not present in the original data set.

4.7 ENC Data Set

An ENC data set is a collection of geo-referenced cells containing geographic features that are used to fully describe the physical marine environment for the safe passage of vessels.

4.8 Cells (S-57 PS 2.2)

A cell is a grouping of features, attributes, geometry and metadata which form a data surface with a specific coverage.

4.9 Unique Universal Identifier

Each feature type within a DTT must have a unique universal identifier [UUID].

UUIDs must not be reused, even when a feature has been deleted.

4.10 Geometry

Only Point geometry is permitted for use within this product specification.

Features contain descriptive attributes and do not contain any geometry (i.e. information about the shape and position of a real world entity). Spatial objects may have descriptive attributes and must contain geometry. A feature is located by a relationship to one or more spatial objects. Features may exist without referencing a spatial object, but each spatial object must be referenced by a feature.

Potentially point and area geometry could be used with Tidal Stations having both a point object and an area which defines the area for which that tidal station should be used. ?????

5 Coordinate Reference Systems (CRS)

5.1 Introduction (S-57 PS 4.1)

Due to the nature of hydrography it is common practice to separate the horizontal and vertical part of a position. This leads to 2D coordinate reference systems for the horizontal positions and 1D coordinate reference systems for the vertical positions. To describe 3D coordinates those coordinate reference systems must be combined to produce a compound reference system. An ENC data set must define at least one compound CRS. An ENC compound CRS is composed of a 2D geodetic CRS (WGS84) and a vertical CRS.

5.2 Horizontal Geodetic Datum (S-57 PS 4.1)

For ENC the geodetic datum of the horizontal CRS must be WGS 84. If the CRS WGS84 is not defined in the encoding by referencing then it must be fully defined, encoding all parameters.

5.3 Vertical and Sounding Datum (S-57 PS 4.2)

Datum used for this product specification is chart datum.

Can we use chart datum? How will this work if the product is used in conjunction with ENC using different sounding datums to generate a dynamic tides layer?

5.4 Projection (S-57 PS 4.3)

No projection is to be used within the ENC. Coordinates must be encoded as geographical positions (latitude, longitude).

5.5 Units of Measure (S-57 PS 4.4)

Units to be used in an ENC

- Position: latitude and longitude in decimal degrees (converted into integer values).
- Depth: metres.
- Height: metres.
- Positional accuracy: metres.
- Distance: nautical miles and decimal miles, or metres.

5.5.1 Positions (S-57 PS 4.4)

Latitude and longitude values are converted from decimal degrees to integers by means of the Coordinate Multiplication Factor. The number of decimal digits is chosen by the data producer and is valid through out the data set.

Coordinates must be held in ENC production systems at a resolution of 0.0000001 (10^{-7}) and the coordinate multiplication factor value should be set to 10000000 (10^{7}) for all cells.

EXAMPLE A longitude = 34.5678E is converted into X = longitude * COMF = 34.5678 * 10000000 = 345678000.

6 Data Quality

Data quality comprises the following:

- source of data;
- accuracy of data;
- Up-to-datedness of data.

Data quality is considered to be meta information. As such, it can be encoded at three different levels

Data quality information is considered to be application specific. Therefore, rules for encoding data quality must be defined by the relevant product specification.

6.1 Quality, Reliability and Accuracy of Tidal Data

.

6.1.1 Technique of sounding measurement

The technique of sounding measurement must not be encoded using TECSOU on the depth geo feature, unless it is different to the value of TECSOU encoded on M_QUAL.

6.2 Accuracy of non-tidal data

7 Data Capture and Classification

The S-1?? Data Capture and Classification guide shall provide the information to map real world objects into the data set. This Guide is located in Appendix A. Data collected as S-101 shall conform to the data classification and capture guide.

7.1 Correction Version Control

Corrections shall be denoted as 0.x.0. Each correction or set of corrections approved at a single point in time shall increment x by 1. Correction version control shall set clarification version control to 0. Figure 2 shows the S-101 Correction Version Control.

Figure 1 — Correction Version Control

7.2 Extension Version Control

Extensions shall be denoted as x.0.0. Each extension or set of extensions approved at a single point in time shall increment x by 1. Extension version control shall set the clarification and correction version control to 0. Figure 3 shows the S-101 Extension Version Control.

Figure 2 — Extension Version Control

7.3 Data Maintenance

Item Name	Description	M/O	Card	type
maintenanceAndUpdateFrequency	Frequency with which changes and additions are made to the data product (per update scope)	M	1..*	MD_MaintenanceInformation (ISO 19115)
dataSource	Identification of the kinds of data sources usable to produce data sets	M	1..*	LI_Source (ISO 19115)
productionProcess	Textual description of the production process applicable to the data sets (per scope or data source)	M	1..*	LI_ProcessStep (ISO 19115)

8 Portrayal

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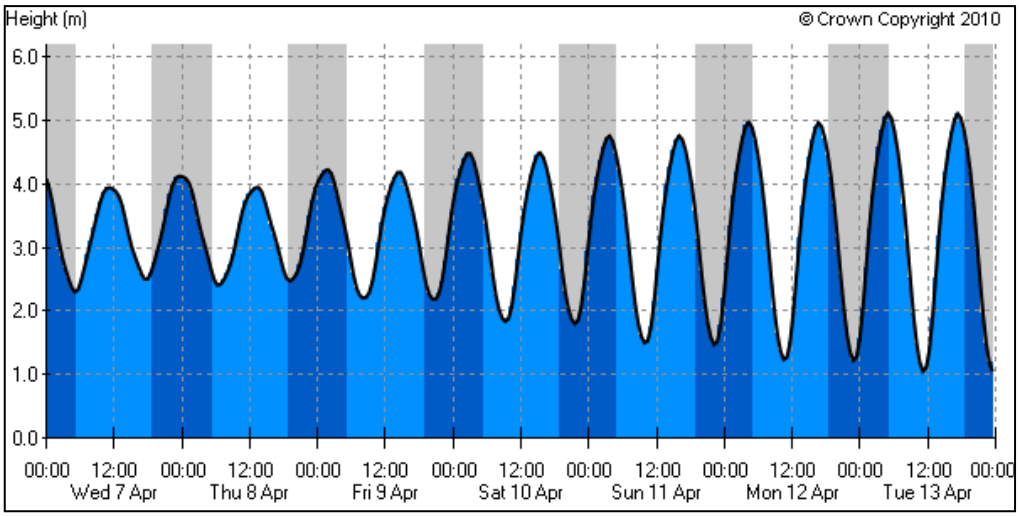
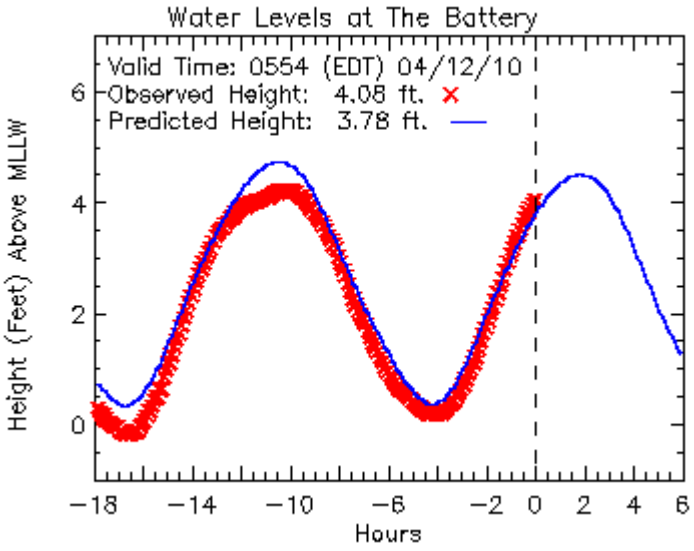
Due to the nature of this product a very basic portrayal catalogue is required for the two features in the data product.

However the display of the data and graphical depiction does need to be specified. Details of minimum display in any software supporting this data product need to be laid out here eg Tidal Graph minimum requirements:



UK Easytide Display



NOAA Tides and Currents display incorporating observed tidal heights.

9 Data Product format (encoding)

formatName	XML
version	1.0
characterSet	UTF-8
specification	

9.1 Feature and Portrayal Catalogue Delivery

The feature catalogue will be delivered as a single XML document.

9.2 The standard encoding

The S-101 product specification defines an encoding which can be used as a default for transmission of data between parties.

10 Metadata

Discovery meta data elements required for Digital Tide Tables.

Name	Cardinality	Value	Type	Remarks

DataSetDiscoveryMeta data	-		-	-
metadataFileIdentifier	1		CharacterString	
metadataPointOfContact	1		CI_ResponsibleParty	
metadataDateStamp	1		Date	
metadataLanguage	1	English	CharacterString	All data sets conforming to S-101 PS must use English language
fileName	1		CharacterString	Dataset file name
filePath			CharacterString	Full path from the exchange set root directory
abstract	1		CharacterString	Short description of the area covered by dataset harbour or port name, between two named locations etc.
dataProtection	1	{1} to {2}	CharacterString	1. Encrypted 2. Unprotected
purpose	1	{1} to {4}	CharacterString	1. New 2. New Edition 3. Update 4.Cancellation
specificUsage	1	{1} to {3}	CharacterString	1.Port Entry 2. 3.
editionNumber	1		CharacterString	when a data set is initially created, the edition number 1 is assigned to it. The edition number is increased by 1 at each new edition. Edition number remains the same for a re-issue.
updateNumber	1		CharacterString	Update number 0 is assigned to a new data set.
updateApplicationDate	0..1		Date	

issueDate	1		Date	
productSpecification	1		S-100_ ProductSpecification	This must be encoded as S-1??
producingAgency	1		CI_ResponsibleParty	
horizontalDatum	1		CharacterString	
verticalDatum	1		CharacterString	
soundingDatum	1		CharacterString	
dataType	1		S-100_DataFormat	
otherDataTypeDescription	0..1		CharacterString	
boundingBox	1		EX_GeographicBounding Box	
boundingPolygon	1		EX_BoundingPolygon	
comment	0..1		CharacterString	
cyclicRedundancyCheck	1		CharacterString NonNegativeInteger	
layerId	1..*		Double	Identifies the relationship to other layers that are required to view the complete data set.