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## EPSG Geodetic Parameter Dataset

Version 7.1 – 21st May 2009

### Readme file

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The EPSG Geodetic Parameter Dataset, or EPSG dataset, is maintained by the Geodesy Subcommittee of the Surveying and Positioning Committee of the International Association of Oil and Gas Producers (OGP).

Version 7.1 of the EPSG Geodetic Parameter Dataset comprises of data corrections and updates to the v6.18 release of November 2008. It includes those updates in Registry interim releases v6.18.1 of January 2009 and v6.18.3 of February 2009 and Access interim release v6.18.2 of February 2009.

Version 7.1 marks the transition of the master dataset from the Access database to the online Registry. It also marks a change in the version of MS Access in which the database is distributed, from v97 to v2000.

### Contents of this document

- [Use of the data](#)
- [Criteria for inclusion of data](#)
- [New in this version](#)
- [Known limitations and/or problems in the version](#)
- [Data availability](#)
- [Shipping list](#)
- [Data structure](#)
- [Future developments](#)
- [OGP Geodesy Subcommittee](#)

### **Use of the Data**

The user assumes the entire risk as to the accuracy and the use of this data. The data may be used, copied and distributed subject to the following conditions:

1. INFORMATION PROVIDED IN THIS DOCUMENT IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT

NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE.

2. The data may be included in any commercial package provided that any commerciality is based on value added by the provider and not on a value ascribed to the EPSG dataset which is made available at no charge. The ownership of the EPSG dataset [OGP] must be acknowledged.
3. Subsets of information may be extracted from the dataset. Users are advised that coordinate reference system and coordinate transformation descriptions are incomplete unless all elements detailed as essential in OGP Surveying and Positioning Guidance Note 7-1 annex F are included.
4. Essential elements should preferably be reproduced as described in the dataset. Modification of parameter values is permitted as described in the table below to allow change to the content of the information provided that numeric equivalence is achieved. Numeric equivalence refers to the results of geodetic calculations in which the parameters are used, for example (i) conversion of ellipsoid defining parameters, or (ii) conversion of parameters between one and two standard parallel projection methods, or (iii) conversion of parameters between 7-parameter geocentric transformation methods.

	As given in EPSG dataset	Permitted change for vendors / users to adopt
<b>Change of ellipsoid defining parameters.</b>		
4.1a	Ellipsoid parameters a and b.	a and 1/f ; a and f; a and e; a and $e^2$ .
4.1b	Ellipsoid parameters a and 1/f.	a and b; a and f; a and e; a and $e^2$ .
<b>Change of projection method</b>		
4.2a	Lambert Conic Conformal (1 SP) method with projection parameters $\varphi_0$ and $k_0$ .	Lambert Conic Conformal (2 SP) method with projection parameters $\varphi_1$ and $\varphi_2$ .
4.2b	Lambert Conic Conformal (2 SP) method with projection parameters $\varphi_1$ and $\varphi_2$ .	Lambert Conic Conformal (1 SP) method with projection parameters $\varphi_0$ and $k_0$ .
4.3a	Mercator (1 SP) method with projection parameters $\varphi_0$ and $k_0$ .	Mercator (2 SP) method with projection parameter $\varphi_1$ .
4.3b	Mercator (2 SP) method with projection parameter $\varphi_1$ .	Mercator (1 SP) method with projection parameters $\varphi_0$ and $k_0$ .
4.4a	Hotine Oblique Mercator method with projection parameters $E_C$ and $N_C$ .	Oblique Mercator method with projection parameters $E_C$ and $N_C$ .
4.4b	Oblique Mercator method with projection parameters $E_C$ and $N_C$ .	Hotine Oblique Mercator method with projection parameters $E_C$ and $N_C$ .
4.5a	Polar Stereographic (Variant A) method with projection parameters $\varphi_0$ and $k_0$ .	Polar Stereographic (Variant B) method with projection parameter $\varphi_F$ .

4.5b	Polar Stereographic (Variant B) method with projection parameter $\varphi_F$ .	Polar Stereographic (Variant A) method with projection parameters $\varphi_O$ and $k_O$ .
4.5c	Polar Stereographic (Variant A) method with projection parameters $\varphi_O$ , $k_O$ , $FE$ and $FN$ .	Polar Stereographic (Variant C) method with projection parameters $\varphi_F$ , $E_F$ and $N_F$ .
4.5d	Polar Stereographic (Variant C) method with projection parameters $\varphi_F$ , $E_F$ and $N_F$ .	Polar Stereographic (Variant A) method with projection parameters $\varphi_O$ , $k_O$ , $FE$ and $FN$ .
4.5e	Polar Stereographic (Variant B) method with projection parameter $FE$ and $FN$ .	Polar Stereographic (Variant C) method with projection parameters $E_F$ and $N_F$ .
4.5f	Polar Stereographic (Variant C) method with projection parameters $E_F$ and $N_F$ .	Polar Stereographic (Variant B) method with projection parameter $FE$ and $FN$ .
<b>Change of transformation method</b>		
4.6a	Position Vector 7-parameter transformation method parameters $R_X$ , $R_Y$ and $R_Z$ .	Coordinate Frame transformation method with signs of position vector parameters $R_X$ , $R_Y$ and $R_Z$ reversed.
4.6b	Coordinate Frame transformation method parameters $R_X$ , $R_Y$ and $R_Z$ .	Position Vector 7-parameter transformation method with signs of coordinate frame parameters $R_X$ , $R_Y$ and $R_Z$ reversed.
4.7	Concatenated transformation using geocentric methods (Geocentric translations, Position Vector 7-parameter transformation, Coordinate Frame rotation).	Equivalent single geocentric transformation in which for each parameter the parameter values of the component steps have been summed.
<b>Change of units</b>		
4.8	NTv2 method grid file filename.	NTv2 method grid file relative storage path with file name including removal (if necessary) of “special characters” [spaces, parentheses, etc] which are replaced by underscore characters.
4.9	Parameter value.	Convert unit to another, for example from microradian to arc-second, <i>using conversion factors obtained from the EPSG dataset Unit table.</i>

- No data that has been modified other than as permitted in these terms and conditions shall be described as or attributed to the EPSG dataset.

### **Criteria for inclusion of data**

Criteria used for material in the dataset include:

- information must be in the public domain: "private" data not released and available to the general public is not included.
- data must be in current use by a significant number of users. This definition has been broadened to include data generated by a single user but regularly referenced by a significant number of others, including contractors and subcontractors.
- parameters are given to the precision consistent with the original publication documents. The EPSG Geodetic Parameter Dataset aims for derived coordinates to be to a precision of one centimetre or better.

### **New to version 7.1**

- Changes as documented in Change Records through 2009.035, but with actions still remaining on some change requests.
- Significant revisions to data for Austria, Burundi, Democratic Republic of the Congo, Netherlands and former Yugoslavia.
- Minor revisions to data for Brazil, China (Hong Kong), Germany and Spain (Canary Islands).
- New data for Brazil, Canada, Democratic Republic of the Congo, Ecuador, Iraq, Moldova, Spain, United States, and polar areas.
- Corrections to some coordinate operation method formulas.
- Data released in interim version 6.18.1 (Registry only) consolidated in this v7.1 release
  - Change requests 2008.100 through 2008.108 including:
  - New data for Antarctica, Brazil, pan-European heights, Japan, New Zealand, Switzerland and Taiwan.
  - An upgrade of the registry software to fix bugs in the data management functionality.
- Data released in interim version 6.18.2 (Access only) consolidated in this v7.1 release
  - Changes made to some forms and reports to prevent errors when running under Access 2007.
- Data released in interim version 6.18.3 (Registry only) consolidated in this v7.1 release

- Change requests through to 2009.009 but with some outstanding including:
- New data for EGM 2008 geoid (height correction) model.
- Significant revision to the way we have treated the Popular Visualisation Mercator.
- Minor correction to data for Venezuela.

### **Known limitations and/or problems in version 7.1**

In the Registry (but not in Access) there is a problem with the correct decoding of the sexagesimal values of projection parameters for CRSs 5819 and 5821.

Known limits and problem areas within this version of the MS Access database data maintenance functions are:

- Deletion of any record with an alias does not remove the associated alias records from the alias table. In MS Access terms, there is an inability to "Enforce Referential Integrity" on links from ALIAS tables to other tables. Thus removal of aliases must be done before removal of the primary record to which they apply, or they will remain as unused residuals in the Alias table. We have added a warning to all Edit/Add forms to warn users of this problem.
- Likewise, there is an inability to force deletion of Coordinate\_Operation Parameters when a Coordinate\_Operation Method is deleted. Any coordinate operation parameters (e.g., geodetic transformation parameters) that are used only in the deleted Coordinate\_Operation Method will remain as unused residuals in the Coordinate\_Operation Parameter table unless removed prior to deletion of the Coordinate\_Operation Method. *[Caution here: One should be **extremely** cautious in deleting Coordinate\_Operation Parameter (Geodetic Transformation Parameters or Map Projection Parameters) as these are often used in various different Coordinate\_Operation Methods.]*
- Similarly, if you delete a single Geodetic Transformation, any dependent Concatenated Operations (Concatenated Transformations) remain in the database (but clearly show that something is wrong with the now missing step.)

### **Data Availability**

This dataset is available online through the [OGP Geodetic Registry](#) service. The registry supports anonymous (guest) access through which users may query and view the data and generate printable reports. It also permits the user to register for additional services, such as the export of the entire EPSG data set as GML 3.2 dictionaries. Additionally the OGP Geodetic Registry supports access through an API, permitting geospatial software to query and retrieve geodetic parameters without human intervention. Details are described in [Guidance Note 7 part 3](#)

It is additionally available for downloading at no charge as an MS Access database or as SQL

scripts for loading to another relational database from the EPSG geodetic parameter dataset internet web site at <http://www.epsg.org>.

Additional information, including detailed Guidance Notes relating to the use of the information in this geodetic parameter dataset is available via the same web site. In particular, [Guidance Note 7 part 2](#) may be useful as it provides formulae and test points for all conversions and transformation methods used in the EPSG dataset.

The parameter listings are "living documents" and will be updated from time to time, usually following meetings in April and October. Comments or suggestions for improvements may be [submitted](#) at any time.

The master dataset is available only at this site. Users are discouraged from making the data available on alternate sites, but instead are encouraged to provide hot links to the EPSG site. This will reduce or eliminate the potential problem of users accessing versions of the data that have been superseded.

Previous versions of the Access database released since February 2002 are available as superseded [archived databases](#). These older databases are not recommended for current use, but are available to users should they need to check data in a prior release, etc.

To be on an electronic mailing list to receive notification of EPSG dataset updates at no charge, select the [subscribe option](#) on the web site. This same form may be used to send information about possible errors in the database or to request that new data be added to the EPSG dataset.

## **Shipping List**

In addition to the online registry, this release of the dataset consists of the following.

- a downloadable file [epsg-v7\\_1.zip](#) containing:
  - One MS Access 2000 database file (*EPSG\_v7\_1.mdb*) which includes 21 related *tables*, 19 *queries* which provide necessary controls and inputs for the various reports and forms, 55 *reports* (29 on valid data plus 26 to review deprecated records) in which data is displayed in formats suitable for browsing, printing or export and 31 *forms* through which the data may be browsed or edited (4 welcome/navigation forms, 12 browse forms and 15 edit/add forms). Numerous subreports and subforms provide integral components and help for the various reports and forms. The database also contains a number of queries entitled *qry\_epsg\_gn7\_1\_\** that are used for extracting data from the database using SQL queries. These are described in GN7-4 annex E. They do not impact other reports or forms. There are also three macros that are provided for form navigation.
  - A README file in MS Word 97-2000 (this file), *epsg-v7\_1\_Readme.doc* and in Adobe Acrobat pdf format, *epsg\_v7\_1\_Readme.pdf*.
- three downloadable files [epsg-v7\\_1sql-mysql.zip](#), [epsg-v7\\_1sql-Oracle.zip](#) and [epsg-v7\\_1sql-PostgreSQL.zip](#) for mySQL, Oracle and PostgreSQL respectively, each containing:

- A Data Description Language (DDL) file which contains the SQL CREATE statements necessary to create a database equivalent to the Access on an SQL server.
- A Data Manipulation Language (DML) file which contains the SQL INSERT statements necessary to populate a database created using the DDL file with the current contents of the dataset.
- A second DDL file which contains the SQL ALTER statements necessary to enforce Foreign Key Constraints on the tables.
- A README file in MS Word 97-2000 & 6/95 - RTF (this file, *epsg-v7\_1\_Readme.doc* and in Adobe Acrobat pdf format, *epsg-v7\_1\_Readme.pdf*).

## **Data Structure**

See [Guidance Note 7 part 1](#) – *Using the EPSG Geodetic Parameter Dataset* – for a general description, [Guidance Note 7 part 3](#) – *Registry Developer's Guide* – for a specific description of the registry implementation, and [Guidance Note 7 part 4](#) – *Database Developer's Guide* – for a specific description of the Access and SQL relational implementation.

## **EPSG Codes**

The OGP Geodesy Subcommittee has reserved the integer range 0 to 32767 for use as codes. As of dataset version 6.3, the integer range from 60,000,000 to 69,999,999 was also reserved for codes for geographic CRSs in explicitly described degree representations, but this is no longer supported. To prevent conflict with future additions to the EPSG dataset, users who wish to augment the data with their own information should utilise codes greater than 32768 and outside the 60 million number range indicated.

If users wish to supplement the change table with their own entries, it is important that the user's change notice IDs be above the EPSG integer code limit of 32,767.0. Such an entry in the change table is required for users to deprecate any erroneous user data.

EPSG codes are unique within any particular entity type, but the same value may be used for different entity types (for example CRS and Area). Codes are not reused. See [Guidance Note 7 part 1](#) for further information on coding, deprecation and naming policies.

## **Future Developments**

In the longer term it is intended to describe area of use polygons using GML in accordance with ISO 19136.

An interactive GIS front-end has been requested and remains under consideration, subject to availability of resources.

## **OGP Geodesy Subcommittee**

(Send any comments or queries to the entire group by submitting the comment form at [www.epsg.org](http://www.epsg.org)).

Roger Lott (*chairman*)  
formerly Head of Survey  
BP Exploration  
Chertsey Road  
Sunbury on Thames  
Middlesex, TW16 7LN  
United Kingdom

Christian Amiel  
Total  
CSTJF - L1/1041  
Avenue Larribau  
64018 Pau  
France

Jim Cain  
Cain & Barnes, L.P.  
12418 Stafford Springs Drive  
Houston, Texas 77077  
U.S.A.

Bish Karko  
Devon Energy,  
1200 Smith Street  
Houston, Texas 77002  
U.S.A.

Melita Kennedy  
ESRI  
380 New York Street  
Redlands, CA 92373  
U.S.A.

Walter Jardine  
AIOC / BP  
Enterprise Centre, Icheri Sheher  
Mirza Mansur St. 99  
370004 Baku,  
Azerbaijan

Roel Nicolai  
Shell Exploration and Production  
Kesslerpark 1  
2288 GD Rijswijk  
The Netherlands

Derek Salvage  
ExxonMobil  
233 Benmar  
Houston, TX 77060  
U.S.A.

Geir Simensen  
Statoil  
Grenseveien 21,  
N-4035 Stavanger  
Norway

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[Back](#) to OGP Surveying and Positioning Committee home page