



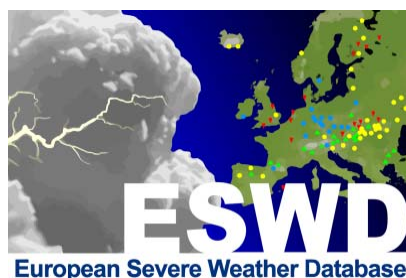
ESSL Technical Report No. 2009-01

**ESSL**

**European Severe Storms Laboratory e.V.**

**European Severe Weather Database**

**ESWD**



**Data format description**

**Version 01.40-CSV**

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**ESWD project web site:**

<http://www.essl.org/projects/ESWD/>

**ESWD database web site:**

<http://www.essl.org/ESWD/> or <http://www.eswd.eu>

**ESWD data format description:**

<http://www.essl.org/reports/tec/ESSL-tech-rep-2009-01.pdf> (*this document*)

<http://www.essl.org/reports/tec/ESSL-tech-rep-2006-01.pdf> (*original format*)



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## ESWD data format, version 01.40-CSV

### 1. General remarks

The database format is designed for the documentation of severe weather occurrence in Europe. The current version primarily deals with severe events associated with deep, moist convection and can be expanded in future to encompass more types of severe weather.

#### 1.1. Recording events vs. recording observations

The format is generally *observation-based*. This means that it is designed to handle observations rather than *events*. For example, when multiple reports of a hailstorm are received, all should be recorded in the database rather than combining them in one record. In this way, the amount of subjectivity that can be added by the managers of the database is minimized. The concept behind is that most interpretation of the data is left to the researchers who want to use them. The general rule therefore is:

*"Each observation gets its own record in the database..."*

Exceptions to this rule are made in case of *TORNADOES* (or *waterspouts*), *GUSTNADOES*, *FUNNELS*, and *DEVILS*. These are phenomena that can better be described per event than per observation. In these cases observations are combined in one record if they concern the same weather event.

*"...except when observations address the same tornado (or waterspout), gustnado, funnel or devil."*

If no evidence is present that two reports address the same event, the two reports should be retained separately. When two tornado or waterspout reports are closer than 5 kilometres in place and 30 minutes in time, it will likely be reports of the same tornado or waterspout, so that they can be merged into one database record. When there are indications that the reports indeed concern two separate events, they should not be merged. Any merging of reports should be documented in the INFO group.

#### 1.2. Merging of multiple reports of different events

In cases with more than one *TORNADO*, *GUSTNADO*, *FUNNEL*, or *DEVIL* vortex occurring, these may be merged into one report. This can be done, for example, when a number of waterspouts are observed at the same time, while no specific information about each of the waterspouts is known. The following conditions must be satisfied for multiple events to be combined into one record:

- the events are less than 30 minutes separated in time,
- the events are less than 5 kilometres away from each other
- there is no information available about each individual event, but only for the set of events.

## **2. Severe weather types: Definitions**

The types of severe weather covered by this version of the data format are:

### **DEVIL - dust- or sand devil (land devil) or steam devil (water devil)**

A vortex not associated with a convective storm, typically between a few metres to a few tens of metres in diameter, extending upward from the earth's surface but not reaching any cloud, visible by material that is lifted off the earth's surface or by water droplets.

**Remark:** Devils (lesser whirlwinds) result from temperature differences between the surface and the air above. Whirls in the lee of objects, which may meet the criteria above are dynamically driven and are not considered devils.

### **FUNNEL - funnel cloud**

A vortex, typically between a few metres to a few tens of metres in diameter, extending downward from a convective cloud but not reaching the earth's surface, that is visible by condensation of water vapour, normally having a cone or tube shape.

**Remark:** Funnel clouds and weak tornadoes can be easily confused if the tornado funnel does not fully extend to the ground, e.g. due to lack of boundary-layer moisture. If there is any evidence that the vortex had ground contact, the event should be reported as a tornado.

### **GUSTNADO - gust front vortex (gustnado)**

A vortex occurring along the gust front of a convective storm and being visible by material that is lifted off the earth's surface, typically between a few metres to a few tens of metres in diameter, extending from the earth's surface upward but not extending to a cloud.

### **HAIL - severe hailfall**

Hailstones observed having a diameter (in the longest direction) of 2.0 centimetres or more, or smaller hailstones that form a layer of 2.0 centimetres thickness or more on flat parts of the earth's surface.

**Remark:** The hailstones of a hail layer should not have been accumulated because of transport by water, wind or by any other means.

### **PRECIP - heavy precipitation**

Damage caused by excessive precipitation is observed, or no damage is observed but precipitation amounts exceptional for the region in question have been recorded, or one of the following limits of precipitation accumulation is exceeded: 30 mm in 1 hour, 60 mm in 6 hours, 90 mm in 12 hours, 150 mm in 24 hours.

### **TORNADO - tornado, waterspout**

A vortex, typically between a few metres to a few kilometres in diameter, extending between a convective cloud and the earth's surface, which may be visible by condensation of water vapour or by material (e.g. dust or water) being lifted off the earth's surface.

### **WIND - severe wind gust**

Measured wind speeds of 25 m/s or higher, or wind damage inflicted by winds that were likely stronger than 25 m/s.



### 3. Structure of the data format

The structure of the data format can be summarized by the following hierarchy:

*FILES contain a header line, followed by a set of RECORDS that contain a string of FIELDS*

The data format is compatible with the csv (comma-separated values) standard, although there exists no formal specification of this standard. That is, ESWD-csv is a particular type of csv.

#### 3.1. Files and records

- A database file consists of a number of records preceded by a header line.
- The file must be encoded in UTF-8 encoding (Unicode standard).
- Each record contains information about one event or various events of the same type that occurred simultaneously at the approximately same place and time.
- Records are separated by new line characters

#### 3.2. Records and fields

- A record consists of several fields
- A field contains one physical quantity or one characteristic of an event (see Section).
- Fields of a record are separated by the separation character comma (",") excluding the last element of the line
- Fields may contain a comma, which in that case is enclosed in double quotation marks
- An entry may contain newlines in which case the whole entry is enclosed in quotation marks
- Any white-spaces at the start of a line, just after a separating comma, just before a separating comma, or just before a newline character are ignored.
- An entry may contain a double quote, but it must be stored as its HTML-encoded equivalent: &quot;
- Fields can be *required* (req.) or *optional* (opt.). *Required* means that if the field is left empty, the data do not comply with the data format, which may cause errors in decoding. Events of which required information is not available must not be present in a data file. In case *optional* information is not available, the respective field should be left empty. Optional information should be given when available. Entering the number 0 indicates that the value of a field is zero, not that no information is available.

### 3.3. Field formats

Fields can contain data in the following formats. It is important to comply with this to ensure that the decoding be carried out without errors.

<b>varchar2(n)</b>	Variable length character string having maximum length <i>n</i> bytes.
<b>number</b>	Floating point number
<b>number(n)</b>	Number with precision <i>n</i>
<b>date</b>	Valid date range, represented as <b>YYYY-MM-DD HH:mm:SS</b>

Fields can be *optional* (**opt**), *recommended* (**rec**) or *required* (**req**).

Optional fields may be left empty without any consequence.

Where recommended fields are left empty, essential information is missing and the report is probably not useful for scientific analysis. However, software designed to work with the data format should be able to work with this data without producing errors.

Required fields may not be left empty, as this constitutes a violation of the data format specifications and the software will not be able to parse the data. The term “required” corresponds with the requirement “NOT NULL” which some databases use, e.g., Oracle.

## 4. Description of the fields

field number	name	type/required?	description
1	ID	number/ <b>req</b>	The report's ID number in the ESWD database at ESSL. Although, this is a required field, when importing new data into the ESWD, this field may be left empty as the database will assign this number automatically.
2	QC_LEVEL	varchar2(3)/ <b>req</b>	One of the following: <b>QC0</b> as received, or already plausibility-checked <b>QC1</b> confirmed report <b>QC2</b> event fully verified (usage of QC2 is restricted to ESSL and cooperating NHMSs)
3	INFO_SOURCE	number/ <b>rec</b>	a number representing the sources of the information contained in the report. It is calculated by adding the numbers listed below of the sources that apply <b>1</b> information from a newspaper <b>2</b> a report on a website <b>4</b> a report received by e-mail <b>8</b> a television or radio broadcast <b>16</b> a report by a weather service <b>32</b> a report by a trained spotter <b>64</b> a report in scientific literature <b>128</b> a report in other literature <b>256</b> an eye-witness report <b>512</b> an eye-witness report of the damage <b>1024</b> a photo or video of the event <b>2048</b> photo or video of the damage <b>4096</b> a damage survey by a severe weather expert
4	CONTACT	varchar2(200)/ <b>rec</b>	Name and other contact information
5	E-MAIL	varchar2(100)/ <b>rec</b>	The e-mail address of the contact person
6	NO_REVISION	number/ <b>req</b>	an integer representing the number of revision of the entry, where 1 means the submission to the database
7	PERSON_REVISION	varchar2(255)/ <b>opt</b>	person or organization performing the last revision of the report

<b>8 TIME_EVENT</b>	date/ <b>req</b>	time (GMT/UTC) of the event in the format: <b>YYYY-MM-DD HH:mm:SS</b>
<b>9 TIME_CREATION</b>	date/ <b>req</b>	time (GMT/UTC) the report was submitted to the database: <b>YYYY-MM-DD HH:mm:SS</b>
<b>10 TIME_LAST_REVISION</b>	date/ <b>req</b>	time (GMT/UTC) of the report's last revision: <b>YYYY-MM-DD HH:mm:SS</b>
<b>11 TIME_ACCURACY</b>	varchar2(50)/opt	estimate of accuracy of the time given in field 8. <b>1M</b> 1 minute <b>5M</b> 5 minutes <b>15M</b> 15 minutes <b>1H</b> 1 hour <b>3H</b> 3 hours <b>6H</b> 6 hours <b>12H</b> 12 hours <b>1D</b> 1 day <b>GT1D</b> date not certain
<b>12 COUNTRY</b>	varchar2(2)/ <b>req</b>	two-character country code (upper case, see Appendix 1)
<b>13 STATE</b>	varchar2(5)/opt	national code for state/province These codes are to be determined nationally.
<b>14 PLACE</b>	varchar2(255)/ <b>rec</b>	name of nearest town/settlement/observing station
<b>15 DETAILED_LOCATION</b>	varchar(4000)/opt	a more detailed description of the event's location
<b>16 NEAREST_CITY</b>	varchar(255)/opt	location in words (preferably w/ respect to the nearest larger city) (e.g. 5 km S of Amsterdam, 10 km SSE of Stuttgart, near Basle)
<b>17 LATITUDE</b>	number/ <b>rec</b>	decimal degrees north (+)/south (-) (e.g. 50.0000 instead of 50°00'00")
<b>18 LONGITUDE</b>	number/ <b>rec</b>	decimal degrees, west(-)/east(+)

**19 OROGRAPHY**      number(6)/opt

a number representing the type of topography, i.e. the sum of those types that apply

- 1      FLAT**      flat, definition: local terrain height variation <= 50 m
- 2      HILLS**     hilly, definition: local terrain height variation > 50 m and <= 500 m
- 4      MTS**        mountainous, definition: local terrain height variation > 500 m

**20 SURFACE\_INITIAL\_LOCATION**  
                           varchar(255)/opt

character of earth's surface at the initial event location. one of the words below:

- LAND**      land, not specified
- WATER**     water, not specified
- RURAL**     rural (crops, grassland, both or unknown)
- CROPS**     rural, crops.
- GRASS**     rural, grassland (pastures)
- SAND**       sand, (semi-)desert, beach, soil covered with very little vegetation)
- WILD**       wilderness (steppe, dunes, soil covered with some vegetation)
- SWAMP**     swamp
- ROCKS**     rocks
- URBAN**     urban, built-up zone
- FOREST**    forest
- ICE**        ice (Glacier or ice-covered water)
- RIVER**     river, canal
- SEA**        sea, ocean
- LAKE**      lake

**21 SURFACE\_CROSSED**  
                           number(6)/opt

a number representing all types of surface crossed by the feature. I.e. the sum of all numbers associated with the types of land surface that apply:

- 1      LAND**     land, not specified
- 2      WATER**    water, not specified
- 4      RURAL**     rural (crops, grassland, both or unknown)
- 8      CROPS**     rural, crops.
- 16     GRASS**     rural, grassland (pastures)
- 32     SAND**       sand, (semi-)desert, beach, soil covered with very little vegetation)
- 64     WILD**        wilderness (steppe, dunes, soil covered with some vegetation)
- 128    SWAMP**     swamp
- 256    ROCKS**     rocks

512	<b>URBAN</b>	urban, built-up zone
1024	<b>FOREST</b>	forest
2048	<b>ICE</b>	ice (Glacier or ice-covered water)
4096	<b>RIVER</b>	river, canal
8192	<b>SEA</b>	sea, ocean
16384	<b>LAKE</b>	lake

<b>22</b>	<b>TYPE_EVENT</b>	varchar2(255)/req	the type of event. One of the following: <b>DEVIL</b> <b>FUNNEL</b> <b>GUSTNADO</b> <b>HAIL</b> <b>PRECIP</b> <b>TORNADO</b> <b>WIND</b>																					
<b>23</b>	<b>NO_OBJECTS</b>	number/opt	the number of events when occurring within the constraints specified in section 1.2 When left empty, 1 is implied.																					
<b>24</b>	<b>MAX_HAIL_DIAMETER</b>	number/opt	size of the largest hailstone found in its longest direction in centimetres																					
<b>25</b>	<b>MAX_HAILSTONE_WEIGHT</b>	number/opt	height weight of a single hailstone in grams																					
<b>26</b>	<b>AVERAGE_HAIL_DIAMETER</b>	number/opt	size of one of the larger hailstones measured in an arbitrary direction in centimetres																					
<b>27</b>	<b>THICKNESS_HAIL_LAYER</b>	number/opt	in centimetres																					
<b>28</b>	<b>HAILSTONE</b>	number(6)/opt	a number representing the characteristics of the hailstones, i.e. the sum of the numbers listed below associated with applicable properties of the hailstone. <table> <tr> <td>1</td> <td><b>AGGR</b></td> <td>aggregates observed (aggregates formed while in air)</td> </tr> <tr> <td>2</td> <td><b>CLEAR</b></td> <td>clear ice</td> </tr> <tr> <td>4</td> <td><b>CONE</b></td> <td>cone-shaped hail stones</td> </tr> <tr> <td>8</td> <td><b>OBLATE</b></td> <td>oblate ("squeezed ball")</td> </tr> <tr> <td>16</td> <td><b>POROUS</b></td> <td>porous (white ice) hail stones</td> </tr> <tr> <td>32</td> <td><b>RINGS</b></td> <td>rings of white and clear ice</td> </tr> <tr> <td>64</td> <td><b>SPIKES</b></td> <td>spiky stones observed</td> </tr> </table>	1	<b>AGGR</b>	aggregates observed (aggregates formed while in air)	2	<b>CLEAR</b>	clear ice	4	<b>CONE</b>	cone-shaped hail stones	8	<b>OBLATE</b>	oblate ("squeezed ball")	16	<b>POROUS</b>	porous (white ice) hail stones	32	<b>RINGS</b>	rings of white and clear ice	64	<b>SPIKES</b>	spiky stones observed
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<b>29</b>	<b>F_SCALE</b>	number/opt	maximum intensity of the event on the Fujita-scale for <b>DEVIL</b> , <b>GUSTNADO</b> , <b>TORNADO</b> , <b>WIND</b>																					
<b>30</b>	<b>T_SCALE</b>	number/opt	maximum intensity of the event on the T-scale for <b>DEVIL</b> , <b>GUSTNADO</b> , <b>TORNADO</b> , <b>WIND</b>																					

- 31 RATING\_BASIS** number/opt a number representing all types of information used for establishing the F or T-scale rating. I.e. the sum of all numbers listed below, that are associated with the types of information used:
- 1 DMGEYEWTN** an eye-witness report of the inflicted damage
  - 2 DMGSVY** a damage survey by a severe weather expert
  - 4 DMGPHOTO** photograph(s)/video footage of the inflicted damage
  - 8 DMGTEXT** a written account of the damage (e.g. in a newspaper)
  - 16 WIND** a measured wind speed
- 32 WIND\_SPEED** number/opt strongest measured wind speed (at the event location and event time)
- 33 TEN\_MIN\_WIND\_SPEED** number/opt strongest measured 10 minute averaged wind speed (at the event location and event time)
- 34 FUNNEL\_SIGHTED** varchar2(255)/opt  
Was the a funnel cloud of the tornado observed visually (not necessarily reaching the ground)?  
one of the following:  
**FNLOBS** funnel observed  
**NOFNLOBS** funnel not observed
- 35 SUCTION\_VORTICES** varchar2(255)/opt  
Have embedded suction vortices been observed? I.e. is this a confirmed that multiple-vortex tornado?  
one of the following:  
**SVTCSOBS** suction vortices observed  
**NOSVTCSOBS** no suction vortices observed
- 36 PRECIPITATION\_AMOUNT** number/opt in millimetres (when measured)
- 37 MAX\_6\_HOUR\_PRECIP** number/opt (during the 0-6, 6-12, 12-18, or 18-0 UTC interval in which the time given in group TIME&PLACE falls. If the time given is exactly 0, 6, 12 or 18 UTC, the previous 6 hour period is meant)  
in millimetres

**38 MAX\_12\_HOUR\_PRECIP**

number/opt

(during the 0-12, 12-0 UTC interval in which the time given in group TIME&PLACE falls. If the time given is exactly 0, or 12 UTC, the previous 12-hour period is meant) in millimetres

**39 MAX\_24\_HOUR\_PRECIP**

number/opt

(during the 0-24 UTC interval in which the time given in group TIME&PLACE falls. If the time given is exactly 0 UTC, the previous 24-hour period is meant) in millimetres

**40 CONVECTIVE**

varchar(255)/opt

Was the precipitation due to deep moist convection?

One of the following:

<b>CONV</b>	convective
<b>PARTLYCONV</b>	partly convective
<b>NONCONV</b>	nonconvective
<b>UNCERTAIN</b>	a blank field implies this has not been determined

**41 TOTAL\_DURATION**

number/opt

**rec** if field 36 is not null

duration of accumulation of the amount mentioned in field 36

**42 TYPE\_PRECIP** number(6)/opt

Should not be set with type PRECIP.

A number representing the combination of accompanying weather phenomena.

The number is the sum of all numbers listed below that apply. Accompanying weather phenomena are those that are known to have occurred within 5 minutes of the event time and within 3 kilometres distance of the event location. As a confirmation that none of those events occurred, the number 256 is given.

<b>1</b>	<b>HRAIN</b>	heavy rain
<b>2</b>	<b>LRAIN</b>	light or moderate rain
<b>4</b>	<b>LGHAIL</b>	hail >= 2.0 cm in diameter
<b>8</b>	<b>HAIL</b>	hail < 2.0 cm, but >= 0.5 cm in diameter
<b>16</b>	<b>GRAINS</b>	hail < 0.5 cm in diameter, snow pellets or snow grains
<b>32</b>	<b>HSNOW</b>	heavy snow
<b>64</b>	<b>LSNOW</b>	light or moderate snow
<b>128</b>	<b>DUST</b>	dust or sand particles raised by the wind, reducing visibility
<b>256</b>	<b>DRY</b>	no dust or precipitation



**43 SIZE\_ACCOMPANYING\_HAIL**

number/opt

if LGHAIL or HAIL was reported in field 42, hail size in cm. otherwise this field should be left empty. In case LGHAIL was selected, the hail deserves a report of its own.

**44 POSSIBILITIES**

number(6)/opt

A number indicating whether there are doubts about the nature of the event causing wind damage. I.e. this field should only contain information when the event is reported as a TORNADO, DEVIL, WIND, or GUSTNADO.

The number is the sum of the applicable numbers listed here:

**1 POSSGUSTNADO**

It is **possible** that the wind damage is caused by a **gustnado**, but there is not enough evidence to confirm this. (please provide information in event description field 23)

**2 POSSDEVIL**

It is **possible** that the wind damage is caused by a **devil**, but there is not enough evidence to confirm this. (please provide information in event description field, field 55)

**4 POSSTORNADO**

It is **possible** that the wind damage is caused by a **tornado**, but there is not enough evidence to confirm this. (please provide information in event description field , field 55)

**45 PATH\_LENGTH** number/opt

Path length in km.

This field must not contain information when the event is PRECIP or FUNNEL.

**46 MEAN\_PATH\_WIDTH**

number/opt

Mean path width in m.

This field must not contain information when the event is PRECIP or FUNNEL.

**47 MAX\_PATH\_WIDTH**

number/opt

Maximal path width in m.

This field must not contain information when the event is PRECIP or FUNNEL.

**48 MAX\_VERTICAL\_DEVELOP**

number/opt

Vertical development of a funnel cloud in percentage of the distance between cloud base and the earth's surface. Only given for event type FUNNEL.

<b>49 DIRECTION_MOVEMENT</b>	varchar(255)/opt	direction of movement of the phenomenon (from-to) N-S, NNE-SSW, NE-SW etc.
<b>50 PROPERTY_DAMAGE</b>	varchar(255)/opt	quantitative measure of damage to properties excluding agricultural losses. Preferably the losses expressed in a currency.
<b>51 CROP_FORREST_DAMAGE</b>	varchar(255)/opt	quantitative measure of agricultural losses, including for example losses expressed in a currency.
<b>52 TOTAL_DAMAGE</b>	varchar(255)/opt	quantitative measure of total inflicted damage, preferably the losses expressed in a currency.
<b>53 NO_INJURED</b>	number(10)/opt	number of injured persons
<b>54 NO_KILLED</b>	number(10)/opt	number of killed people
<b>55 EVENT_DESCRIPTION</b>	varchar(4000)/opt	a description of the event, containing the its most essential aspects
<b>56 CREATOR_ID</b>	varchar(50)/opt	Identifier of the creator of the report.
<b>57 REVISOR_ID</b>	varchar(50)/opt	Identifier of the last revisor of the report.
<b>58 LINK_ORG</b>	varchar(20)/opt	Identifier of the linked (national) database.
<b>59 LINK_ID</b>	varchar(20)/opt	Field number of the associated report in a linked database.
<b>60 DELETED</b>	varchar(1)/req	Character indicating whether the report is deleted. <b>Y</b> Yes <b>N</b> No. All retrieved data from the ESWD server not for synchronization purposes should have "N" here.

## **Appendix A: Two-character country codes**

The two-character codes of countries in Europe, Mediterranean Africa and Asia, Jordan and the Caucasian countries (including WMO Region VI) are given in this list.

<b>AD</b>	Andorra	<b>LI</b>	Liechtenstein
<b>AL</b>	Albania	<b>LT</b>	Lithuania
<b>AR</b>	Armenia	<b>LU</b>	Luxembourg
<b>AT</b>	Austria	<b>LV</b>	Latvia
<b>AZ</b>	Azerbaijan	<b>LY</b>	Libya
<b>BA</b>	Bosnia and Herzegovina	<b>MA</b>	Morocco
<b>BE</b>	Belgium	<b>MC</b>	Monaco
<b>BG</b>	Bulgaria	<b>MD</b>	Republic of Moldova
<b>BY</b>	Belarus	<b>ME</b>	Montenegro
<b>CH</b>	Switzerland	<b>MK</b>	Former Yugoslav Republic of Macedonia
<b>CY</b>	Cyprus	<b>MT</b>	Malta
<b>CZ</b>	Czech Republic	<b>NL</b>	Netherlands
<b>DE</b>	Germany	<b>NO</b>	Norway (incl. Svalbard and Jan Mayen Islands)
<b>DK</b>	Denmark	<b>PL</b>	Poland
<b>DZ</b>	Algeria	<b>PT</b>	Portugal and Azores
<b>EE</b>	Estonia	<b>RO</b>	Romania
<b>EG</b>	Egypt	<b>RS</b>	Serbia and Kosovo
<b>ES</b>	Spain	<b>RU</b>	Russian Federation
<b>FI</b>	Finland	<b>SE</b>	Sweden
<b>FR</b>	France	<b>SI</b>	Slovenia
<b>GE</b>	Georgia	<b>SK</b>	Slovakia
<b>GL</b>	Greenland	<b>SM</b>	San Marino
<b>GR</b>	Greece	<b>SY</b>	Syria
<b>HR</b>	Croatia	<b>TN</b>	Tunisia
<b>HU</b>	Hungary	<b>TR</b>	Turkey
<b>IE</b>	Ireland	<b>UA</b>	Ukraine
<b>IL</b>	Israel	<b>UK</b>	United Kingdom (incl. Channel Islands, Gibraltar etc.)
<b>IS</b>	Iceland	<b>VA</b>	Vatican City State
<b>IT</b>	Italy		
<b>JO</b>	Jordan		
<b>KZ</b>	Kazakhstan		
<b>LB</b>	Lebanon		

