European Network of
Transmission System Operators
for Electricity

Conformity Categories

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Conformity Assessment Process on the IEC specifications TS 61970-600-1 and 61970-600-2

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1. Introduction

The document is defining the conformity categories applicable for the CGMES Conformity Assessment Scheme.

2. Overview

The previous version (i.e. version 1.1.3) of the CGMES conformity assessment scheme (CGMES CAS) assessed Applications' support to a given version of the IEC specifications TS 61970-600-1 and 61970-600-2. Therefore the Test Use Cases (TUC) defined in that version of the CGMES CAS were general and were not linked to a business process.
The present version of the CGMES CAS (v2.0.0) is designed to include assessment of Applications in the context of TSOs business processes. The following chart illustrates the new concept of the CGMES CAS.

Figure 1. Overview of the CGMES conformity assessment scheme

There are three main levels of CGMES CAS:

1. CGMES basic conformity: The CGMES CAS defines a number of TUC for assessment of the Applications on 9 different functions (i.e. Import, Export, Update and repository, etc.).
2. FAT: TUC are defined for FAT (factory acceptance tests) kind of testing related to the business processes. FAT is testing of Applications on IEC specifications TS 61970-600-1 and 61970-600-2 functionalities needed in the context of a business process. Test configurations (example test data) are used when performing these tests.

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3. SAT: TUC are defined for SAT (site acceptance tests) kind of testing related to the business processes. SAT is testing to validate that a given TSO, which uses 1 or many Applications, integrated its Applications in an appropriate way to meet the requirements of the business processes. Decisions on how the suite of integrated Applications is able to be part of the required business processes and how different Applications are integrated are TSO's responsibility and choice. Test configurations are real TSO data which is used when performing these tests.

In the level of CGMES basic conformity and FAT the applicant is a Supplier (developer of an Application). In SAT the applicant is a TSO (or RSCIs).

The assessment process is sequential. An Application (Supplier) can enter in FAT testing only if the CGMES basic conformity is reached to the level specified by the FAT TUC. The same for SAT – an application or a set of integrated applications could be used by a TSO to deliver for a business process only if they are having CGMES basic conformity and FAT.
The merging applications that are used by European Merging Functions (EMF) are treated in the same way. It is also perfectly normal if an application which is not used by EMF applies for "CGM merging process".

The overall process is illustrated in the Figure 2.

Figure 2. Overview of the overall CGMES conformity assessment process

3. Conformity categories for CGMES basic conformity level

The following conformity categories are a measure of the CGMES Conformity achieved by an Application. The chart below illustrates these categories.

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Figure 3. Overview of conformity categories for CGMES basic level

3.1. Standard category

The "Standard" category is the highest category for CGMES basic level conformity. It measures the overall support of IEC specifications TS 61970-600-1 and 61970-600-2 by an Application. The category has three grades:

- Gold (Support of all functions at Gold grade) – shall be granted to an Application that passes all TUC defined for CGMES basic conformity assessment. The Application supports all profiles and all CGMES basic functions at Gold grade.
- Silver (Support of all functions at Silver grade) – shall be granted to an Application that passes all TUC marked as "Silver" and "Bronze" across all functions defined for CGMES basic conformity assessment. The Application supports all profiles and all CGMES basic functions at minimum Silver grade.
- Bronze (Support of some functions - at least Bronze grade) – shall be granted to an Application that passes all mandatory (marked with "Bronze") TUC defined for at least one profile or function. The Application supports at least one profile or for at least one CGMES basic function at minimum Bronze grade.

3.2. Profile category

The "Profile" category indicates which CGMES profiles are supported by an Application. The category has three grades:

- Gold (Import, Export and Dependency) – shall be granted to an Application that passes all TUC defined for the following CGMES basic level conformity function categories: Import **and** Export. **In addition**, the Application supports this profile in combination with other CGMES profiles and manages the dependencies with these CGMES profiles.
- Silver (Import **and** Export) – shall be granted to an Application that passes all TUC defined for Import **and** Export CGMES basic level conformity function categories. Import and Export functions shall be supported with minimum Bronze grade.
- Bronze (Import **or** Export) – shall be granted to an Application that passes all TUC defined for Import **or** Export CGMES basic level conformity function categories. Import or Export functions shall be supported with minimum Bronze grade.

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3.3. Function category

The "Function" category indicates the level of functional support of IEC specifications TS 61970-600-1 and 61970-600-2 by an Application. The category has three grades:

- Gold (Full support) – shall be granted to an Application that passes all TUC defined for a CGMES function for the profiles supported by the Application and required for the function.
- Silver (Support) – shall be granted to an Application that passes all TUC marked as "Silver" and "Bronze" for a CGMES function for the profiles supported by the Application and required for the function.
- Bronze (Limited support) – shall be granted to an Application that passes all TUC marked as "Bronze" for a CGMES function for the profiles supported by the Application and required for the function.

3.3.1. Function category matrix

The spreadsheet CGMES Function Category Matrix, hereafter Table 1, defines the matrix for function category valid for the CGMES basic level conformity assessment. The matrix defines the set of TUC that need to be tested in order to assess the Application for the 9 functions that are defined.
It is important to note that there is a dependency between the different functions. For instance, an Application shall only be examined for function "Update and Repository" if the Application meets the requirements for Import and Export functions at Gold grade.

Some Suppliers may not be able to use the test configurations provided by ENTSO-E because by the design of the Application they are not able to import any data. In this case, such Suppliers can participate in the CGMES Conformity Assessment by both exporting their data and manually inserting data from relevant test configurations before performing the export. For these specific situations the Assessment Body shall be contacted and the content (which function categories and TUC could be applied) of the Declaration of Conformity shall be clarified and documented. In cases when the Supplier is using real data, this data shall not be confidential for the reviewers part of the Review Team assigned to assess the Application.

In case the Application is supporting only a given CGMES profile, the Import and Export TUC are only required for the supported profiles, i.e. if an Application can only import Equipment this Application will get Bronze grade if it passes TUC 02 for all relevant test configurations. The same is valid for some Applications which could only be able to apply TUC 9 or TUC 21 to prove the support to Import or Export functions. For instance, an Application supporting EQ and SSH profiles and which passes TUC9 will receive Silver.

4. Conformity categories – business processes

There are two conformity categories that consider the business processes that support the operational planning and long term planning. An overview of the FAT and SAT categories is illustrated in Figure 4.

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Figure 4. Overview of conformity categories for FAT and SAT levels

It shall be noted that it is not required that an Application is granted with Attestation on both IGM delivery and CGM merging functions. This only depends on the use of the Application.

4.1. FAT

The FAT category indicates if an Application supports certain business processes that are reflected in the TUC defined for the FAT. There is no scale of grades for FAT category. Only if an Application passes all tests the FAT conformity level is granted.

The Application can only enter in FAT if the same version of the Application received Attestation of conformity for CGMES Basic Conformity.

It is possible for the Application to apply for CGMES Basic Conformity and FAT at the same time. However, if the review session related to the CGMES Basic Conformity demonstrates gaps, the process is stopped until the Application receives Attestation of conformity related to the basic level.

4.2. SAT

The SAT category indicates if an Application supports certain business processes that are reflected in the TUC defined for the SAT. There is no scale of grades for SAT category. Only if an Application passes all tests the SAT conformity level is granted.

The Application can only enter in SAT if the same version of the Application received Attestation of conformity for FAT Conformity.

5. Types of Applications

IEC specifications TS 61970-600-1 and 61970-600-2 and ENTSO-E/TSO operational planning or long term planning processes can be supported by Applications with different functionalities. Therefore large variety of Applications will seek IEC specifications TS 61970-600-1 and 61970-600-2 and business process conformity. The Framework defined an Application as computer software, referring to a particular version in use for commercial activities, may it be an off-the-shelf product or a version customised for the use in a particular business environment.

Taking into account the conformity categories and test use cases defined in the conformity assessment scheme the following types (not a definite list) of Applications could seek conformity:

- Data management applications;
- Data converters;
- Power system analysis applications;
- SCADA/EMS applications.

Each of these types of Applications could easily achieve conformity on a given CGMES profile or a function they are designed to support. However, some applications such as data converters could have very

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limited IEC specifications TS 61970-600-1 and 61970-600-2 coverage if only tested as a data converter. In some cases it might be appropriate that such Applications are tested as part of a suite of Applications. This would allow performing better assessment of the conformity of the Application which is applying for the Second party assessment according to the Framework. In such cases the Declaration of Conformity and the Attestation of Conformity shall explicitly indicate the purpose of the Application and list other Applications that were part of the suite during the tests. The Declaration of Conformity and the Attestation of Conformity are issued for the Application which applies for conformity and do not give information on conformity of other applications part of the suite. ENTSO-E shall not be liable for misuse of other Applications' names. Suppliers are duly responsible to handle the relation with other Applications (and their Suppliers if different) part of the suite.
In addition many of the ENTSO-E/TSO business processes for operational planning and long term planning are not supported only by one Applications but rather by a set (suite) of Applications that are properly integrated for the purpose of the business process(es) in which they are involved. In this case the Declaration of Conformity is issued from one Supplier (if one Supplier developed all Applications part of the suite) or from multiple Suppliers (if multiple Suppliers developed different Applications part of the suite). Depending from the conformity level (CGMES basic, FAT or SAT) only one Declaration of conformity is either issued by Supplier(s) or by a TSO. In the cases in which a suite of Applications applies for conformity, only one Attestation of conformity is issued by ENTSO-E.

6. Guidelines on CGMES basic level conformity categories

There are many different business processes that require slightly different approach in terms of level of detail of the exchanged data or the number of functionalities to be supported by the Applications. The CGMES basic level conformity categories (i.e. Standard, Profile and Function) defined in this document aim at providing users of the Applications an instrument to be able to guide their Suppliers what the targeted conformity grade is necessary so that the Application can be used in different data exchanges. Different business processes can refer to these categories in order to define requirements for the Applications. This will facilitate Suppliers in planning the development of their Applications to satisfy users' requirements.

Users that would like to use Application A for long term planning exchanges as a tool for load flow analyses excluding short circuit, DL, GL and node-breaker representation, but including difference exchange and model assembling shall require the Supplier to target the following CGMES conformity:

- **Standard**: Bronze
- **Profile**:
    - EQ_BD: Gold as import, export and dependencies with other profiles is required
    - TP_BD: Gold as import, export and dependencies with other profiles is required
    - EQ_Core: Gold as import, export and dependencies with other profiles is required
    - EQ_Short Circuit: N/A as it is assumed not required in this specific case
    - EQ_Operation: N/A as it is assumed not required in this specific case
    - SSH: Gold as import, export and dependencies with other profiles is required
    - TP: Gold as import, export and dependencies with other profiles is required
    - SV: Gold as import, export and dependencies with other profiles is required
    - DL: N/A as it is assumed not required in this specific case
    - GL: N/A as it is assumed not required in this specific case
    - DY: N/A as it is assumed not required in this specific case
- **Function**:
    - Import: Gold as for all profiles that are supported by the Application all TUC are passed
    - Export: Gold as for all profiles that are supported by the Application all TUC are passed

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- Update and repository: Gold as for all profiles that are supported by the Application all TUC are passed
- Diagram layout: N/A as the DL profile is not supported
- Geographical location: N/A as the GL profile is not supported
- Load flow (Node-breaker input representation): N/A as the Application does not support node-breaker model representation
- Load flow (Bus-branch input representation): Gold as the Application could support all TUC defined for Gold.
- Dynamics: N/A as the DY profile is not supported
- Short circuit: N/A as the EQ_Short Circuit profile is not supported

If the user would like that the application supports node breaker model representation it shall require the application to have Load flow function which receives Silver or even Gold grade.

7. Guidelines on FAT and SAT level conformity categories

The operational planning processes including the preparation of the Common Grid Model (CGM) are the main focus in the current release of the conformity assessment scheme. As the FAT and SAT are levels that follow after CGMES basic conformity level the tests are performed with test data which is designed to reflect the types of files that are usually required for performing the real use cases.
If an Application receives an Attestation of FAT level such Application can be integrated in TSO environment and the necessary links with the Operational Planning Data Environment (OPDE) realised so that the Application can be rested in real conditions with real TSO data under SAT conditions. As soon as the Application is granted with an Attestation at SAT level the TSO is allowed to perform with in the business process.

8. Examples

In order to illustrate the CGMES basic level conformity categories the following examples are described:

8.1. Example 1: Application designed to convert instance data

Conformity assessment of an Application (App A) which is designed to convert instance data from IEC specifications TS 61970-600-1 and 61970-600-2 for the purpose of load flow analysis in another Application. It is assumed that App A is therefore designed to support EQ_BD, TP_BD, EQ_Core, EQ_ShortCircuit, EQ_Operation, SSH, TP and SV profiles. The App A cannot import difference instance files but it can export difference instance files. The App A cannot export boundary set and cannot import or export EQ_Short Circuit. The Application targets assessment on Import and Export functions.

According to Table 1, the application shall be assessed on the following TUC:

- Import function: 1, 2, 3, 4, 5 and 9 as a limited set of profiles are supported by the Application
- Export function: 14, 15, 16, 17, 21 and 22.

Based on this example the Application would receive the following CGMES basic level conformity, if the Application passes all necessary tests for all test configurations.

- **Standard**: Bronze
- **Profile**:
  - EQ_BD: Bronze
  - TP_BD: Bronze
  - EQ_Core: Gold
  - EQ_Operation: Gold
  - SSH: Gold
  - TP: Gold

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- SV: Gold
- **Function**:
  - Import: Silver
  - Export: Gold

8.2. Example 2: Application designed to manipulate instance data

Conformity assessment of an Application which is designed to manipulate instance data in IEC specifications TS 61970-600-1 and 61970-600-2 form for the purpose of data repository. It is assumed that such application is designed to only support the following profiles: EQ_Core, EQ_Short Circuit, EQ_Operation and SSH. The application cannot manage boundary setThe application targets only assessment of Update and Repository function.

According to Table 1, the application shall be assessed on the following TUC:

- All TUC defined for Import and Export functions as these two functions are prerequisite for the Update and Repository function
- Update and Repository function: 12, 24, 25, 45 and 47.

Based on this example the Application would receive the following CGMES basic level conformity, if the Application passes all necessary tests for all test configurations.

- **Standard**: Bronze
- **Profile**:
  - EQ_Core: Gold
  - EQ_Short Circuit: Gold
  - EQ_Operation: Gold
  - SSH: Gold
- **Function**:
  - Import: Gold
  - Export: Gold
  - Update and repository: Bronze

8.3. Example 3: Application designed to perform load flow analyses.

Conformity assessment of an Application which is designed to support IEC specifications TS 61970-600-1 and 61970-600-2 exchanges and perform load flow analysis. It is assumed that such application is therefore designed to support EQ_BD, TP_BD, EQ_Core, SSH, TP and SV profiles. The Application can import, export these profiles and perform load flow calculations. The application can assemble, manage and export only bus-branch model representation. The Application handles difference files. The Application targets CGMES conformity on Import, Export and Load flow functions.

According to Table 1, the application shall be assessed on the following TUC:

- Import function: at least TUC 9 and Silver grade is required for Load flow (bus-branch input representation). However as the Application supports difference file exchange TUC 10 should be tested in case Gold level is the target.
- Export function: at least TUC 21 and 22
- Load flow (Bus-branch input representation): 24, 29, 33, 37, 38, 39, 41, 43 and 44.

Based on this example the Application would receive the following CGMES basic level conformity, if the Application passes all necessary tests for all test configurations.

- **Standard**: Bronze
- **Profile**:
  - EQ_BD: Gold

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- TP_BD: Gold
- EQ_Core: Gold
- SSH: Gold
- TP: Gold
- SV: Gold

- **Function**:
  - Import: Gold
  - Export: Gold
  - Load flow (Bus-branch input representation): Gold

8.4. Example 4: Application designed to perform load flow, short circuit and dynamics analyses

Conformity assessment of an Application which is a suite of Applications designed to support IEC specifications TS 61970-600-1 and 61970-600-2 exchanges and perform load flow, short circuit and dynamics analyses. The application handles DL and GL data and it is able to provide digital image exports of diagram and GIS information. It is assumed that such application is therefore designed to support EQ_BD, TP_BD, EQ_Core, EQ_Short Circuit, EQ_Operation, SSH, TP, SV, DY, DL and GL profiles. The Application can import, export these profiles, perform load flow, short circuit calculations and perform dynamics simulations. The application handles difference files. The application fails on TUC 31. The application targets conformity on all functions and profiles. Therefore the Application shall be assessed against all TUC marked with Bronze, Silver or Gold in Table 1.

Based on this example the Application would receive the following CGMES basic level conformity, if the Application passes all necessary tests for all test configurations.

- **Standard**: Silver (because TUC 31 fails)
- **Profile**:
  - EQ_BD: Gold
  - TP_BD: Gold
  - EQ_Core: Gold
  - EQ_Short Circuit: Gold
  - EQ_Operation: Gold
  - SSH: Gold
  - TP: Gold
  - SV: Gold
  - DL: Gold
  - GL: Gold
  - DY: Gold
- **Function**:
  - Import: Gold
  - Export: Gold
  - Update and repository: Gold
  - Diagram layout: Gold
  - Geographical location: Gold
  - Load flow (Node-breaker input representation): Gold
  - Dynamics: Gold
  - Short circuit: Silver (as TUC 31 fails)

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9. APPENDIX

9.1. Glossary

CGM = Common Grid Model

EMF = European merging Function

IGM = Individual Grid Model

MF = Merging Function

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