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# Conformity Categories

Version: 3.0.0

Conformity Assessment Process on the IEC 61970-  
600 series

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## 1. Introduction

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

## 1. Glossary of terms and abbreviations

CAS	ENTSO-E CGMES conformity assessment scheme
CENELEC	European Committee for Electrical Standardization
CIM	Depending on context, ‘CIM’ can refer broadly to the standards and processes created by IEC TC57 WGs that share the use of a canonical data model, or it can refer to the canonical data model itself.
FAT	Factory Acceptance Test
FAT IOP	Interoperability test in which vendors’ implementation is tested using test data. It is part of the conformity assessment scheme.
IEC	International Electrotechnical Commission
IEC IS	IEC International Standard
IEC TS	IEC Technical Specification
IOP	Interoperability (tests) in general. These are tests to support efforts to have interoperability among applications. Interoperability tests are done at various stages: when developing the specification using draft specification and prototype tools; during conformity assessment so called Factory Acceptance Test (FAT) testing using final specification and applications exchanging test data; and during Site Acceptance Test (SAT) testing where the tools are challenged with real datasets.
SAT	Site Acceptance Test
SAT IOP	Interoperability test in which applications and their integration in the frame of a business process are tested using real datasets. It is performed when all applications were tested in a FAT IOP.
Std IOP	Interoperability tests organised to validate draft standards/technical specifications before they become published and ensure that the vendors can develop support before the ‘ultimate’ standard publishing. Always refers to a specific version number, which normally gets increased after the issues found in tests get fixed and incorporated into the draft standard. It is a pre-FAT testing that also validates that test data to be applied in the conformity process.
TSO	Transmission System Operator
CGM	Common Grid Model
EMF	European Merging Function
IGM	Individual Grid Model
MF	Merging Function

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## 2. Overview

The previous versions 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 (v3.0.0) covers IEC 61970-600-1 and IEC 61970-600-2 standards and it is designed to include assessment of Applications in the context of TSOs business processes. Currently the specific TUC for business processes (SAT) are only added as a draft and will be finalised in a revision of CGMES CAS.

The CGMES CAS is the set of documentation that defines the conformity assessment of the tools for a particular version of CGMES. The CAS covers functionalities applicable for both CGM and TYNDP processes. The focus of the documentation is how an Assessment body validates the tools for conformity with a standard/specification. The CAS has two parts, CAS Part 1 which is FAT (where an application is tested against CGMES global specification) and CAS Part 2, which is SAT. CAS Part 2 (SAT) refers to implementation guides and quality guides and it is published per process for a particular version of CGMES. Therefore, CAS Part 2 is process related and validates conformity when implementation guides are applied to the CGMES. Implementation guides and other process related documentation shall not contradict main standards and specifications.

In the level of FAT the applicant is a Supplier (developer of an Application). In SAT the applicant is a TSO (or RSCs).

The assessment process is sequential. An Application (Supplier) can enter in SAT testing only if the FAT conformity is reached to the level specified by the SAT TUC. As in many cases a set of integrated applications are used by a TSO to deliver for a business process, all applications need to have FAT conformity prior the SAT of the integrated solution.

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 1.

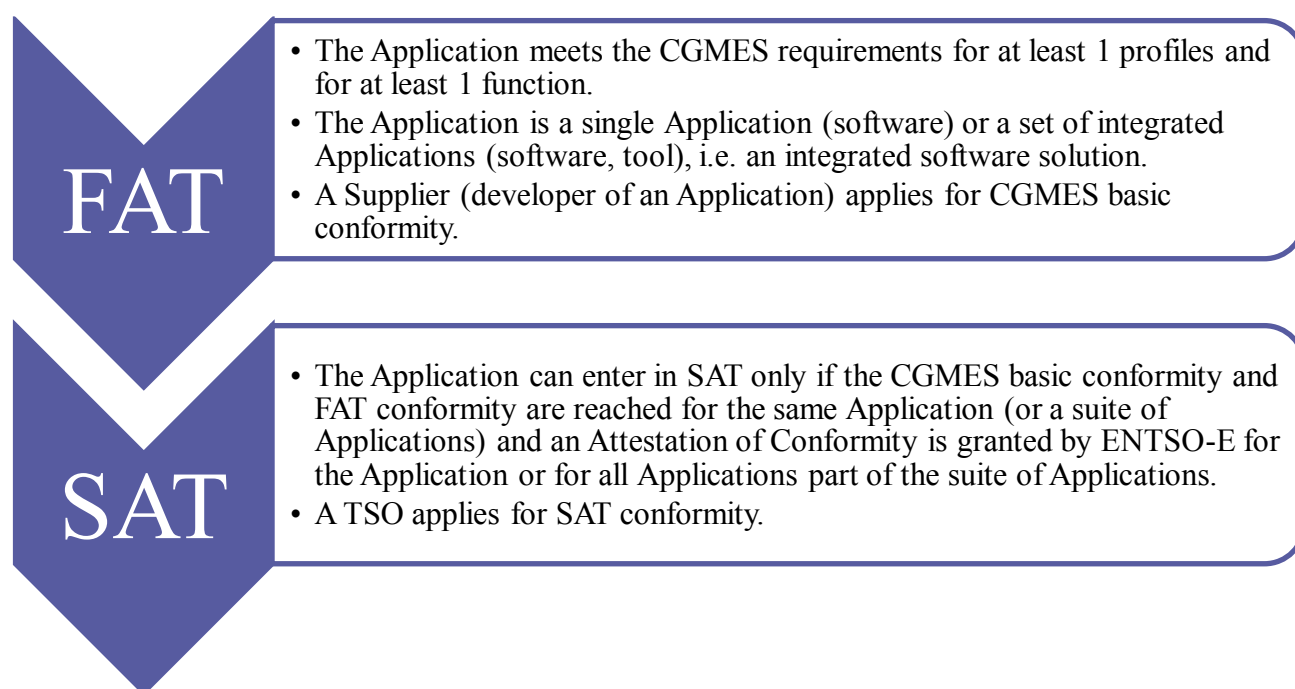


Figure 1. Overview of the overall CGMES conformity assessment process

### 3. Conformity categories for FAT conformity level

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

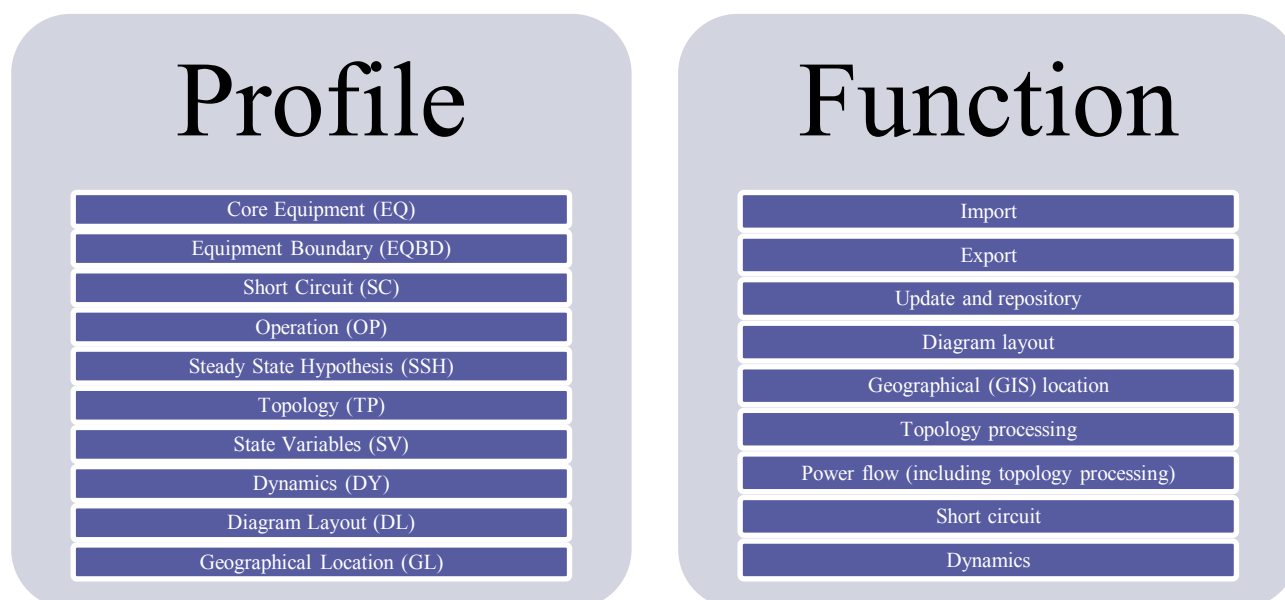


Figure 3. Overview of conformity categories for CGMES basic level

### 3.1. Profile category

The “Profile” category indicates which CGMES profiles are supported by an Application in terms of import and export function. This category has the following three subcategories:

- Inclusive - indicates if the Application’s import or export operations per profile depend on the relationship between the imported/exported instance file and its dependent models.
  - n/e – the support for inclusive import or export operation is not evaluated for this profile.
  - Yes – the Application supports inclusive import or export operation for this profile. For instance, equipment (EQ) is included in an import or export operation together with equipment boundary (EQBD) if it is depending on it. For Application that supports individual import or export operation this indicates that the Application can import or export multiple instance files including instance files for a given profile, e.g. import or export of equipment (EQ) and topology (TP) at the same import or export operation.
  - No – the Application does not support inclusive import or export operation for this profile. Each instance file needs to be handled in separate import or export operation.
- Individual - indicates if the Application supports import or export of instance file of a given profile as an individual instance file without including the need to import or export dependent instance file in the same operation, e.g. steady state hypothesis (SSH) can be imported independently of the EQ. If the Application requires that EQ is imported previously in a separate operation, it still meets the requirement of an individual operation.
  - n/e – the support for individual import or export operation is not evaluated for this profile.
  - Yes – the Application supports individual import or export operation for this profile.
  - No – the Application does not support individual import or export operation for this profile. Each import or export operation needs to include the dependent model instance file in the same operation.
- Difference - indicates that the Application can import or export instance files of a given profile as a difference individual instance file. The import or export operation can be inclusive or individual, but the application shall support individual operation of the difference model.
  - n/a – the support of difference file is not applicable for this profile according to CGMES.
  - n/e – the support for difference import or export operation is not evaluated for this profile.
  - Yes – the Application supports difference import or export operation for this profile.
  - No - the Application does not support difference import or export operation for this profile.

### 3.2. Function category

The “Function” category indicates the level of functional support of IEC 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.
- n/e – the function is not evaluated.

Due to the dependency between supported profiles and Import/Export functions, the Import and Export function grades are granted per profile as follows:

- Gold (Full support) – shall be granted to an Application that supports **all three** import or export operation for a given profile: Inclusive, Individual and Difference. For TP, SSH, SV and DL Gold grade is granted if Inclusive and Individual are supported.
- Silver (Support) – shall be granted to an Application that supports **two** of the following import or export operation for a given profile: Inclusive, Individual and Difference. For TP, SSH, SV and DL Silver grade is not applicable
- Bronze (Limited support) – shall be granted to an Application that supports **at least one** of the following import or export operation for a given profile: Inclusive, Individual and Difference.
- n/e – the function is not evaluated.

### 3.2.1. Function category matrix

The spreadsheet CGMES Function Category Matrix, hereafter referred as Table 1, defines the matrix for function category valid for the CGMES conformity assessment. The matrix defines the set of TUC that need to be tested in order to assess the Application for all 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 Silver 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.

## 4. Types of Applications

IEC 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 61970-600-1 and 61970-600-2 and business process (SAT) 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 limited

IEC 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 on the conformity level (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.

## 5. Guidelines on CGMES 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 conformity categories (i.e. 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, including difference exchange and model assembling shall require the Supplier to target the following CGMES conformity:

- **Profile:**
  - EQBD: Gold as import, export and difference exchange is required
  - EQ: Gold as import, export and difference exchange is required
  - SC: n/e as it is assumed not required in this specific case
  - OP: n/e as it is assumed not required in this specific case
  - SSH: Gold as import, export is required
  - TP: Gold as import, export is required
  - SV: Gold as import, export is required
  - DL: n/e as it is assumed not required in this specific case
  - GL: n/e as it is assumed not required in this specific case
  - DY: n/e as it is assumed not required in this specific case
- **Function:**
  - Update and repository: Gold as for all profiles that are supported by the Application all TUC are passed
  - Diagram layout: n/e as the DL profile is not evaluated
  - Geographical location: n/e as the GL profile is not evaluated
  - Topology processing: Gold



- Power flow (including topology processing): Gold as the Application could support all TUC defined for Gold.
- Dynamics: n/e as the DY profile is not evaluated
- Short circuit: n/e as the SC profile is not evaluated

## 6. Examples

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

### 6.1. Example 1: Application designed to convert instance data

Conformity assessment of an Application (App A) which is designed to convert instance data from IEC 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 EQBD, EQ, SC, OP, 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 SC. The Application targets assessment on Import and Export functions.

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

- Import function:
  - To test inclusive: 01, 02, 49, 48, 03, 04, 05
  - To test individual: 09
- Export function:
  - To test inclusive: 13, 14, 51, 50, 16, 15, 17
  - To test individual: 21
  - To test difference: 22

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

<u>Profile:</u>							<u>Function:</u>	
	<i>Inclusive</i>		<i>Individual</i>		<i>Difference</i>		<i>Import</i>	<i>Export</i>
	<i>Import</i>	<i>Export</i>	<i>Import</i>	<i>Export</i>	<i>Import</i>	<i>Export</i>		
Equipment	Yes	Yes	Yes	Yes	No	Yes	Silver	Gold
Boundary								
Core Equipment	Yes	Yes	Yes	Yes	No	Yes	Silver	Gold
Short circuit	Yes	Yes	Yes	Yes	No	Yes	Silver	Gold
Operation	Yes	Yes	Yes	Yes	No	Yes	Silver	Gold
Topology	Yes	Yes	Yes	Yes	n/a	n/a	Gold	Gold
Steady State	Yes	Yes	Yes	Yes	n/a	n/a	Gold	Gold
Hypothesis								
State Variables	Yes	Yes	Yes	Yes	n/a	n/a	Gold	Gold
Dynamics	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]
Diagram Layout	[n/e]	[n/e]	[n/e]	[n/e]	n/a	n/a	[n/e]	[n/e]
Geographical	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]
Location								
<u>Function:</u>								
Update and Repository							[n/e]	
Diagram Layout							[n/e]	
Geographical (GIS) location							[n/e]	
Topology processing							[n/e]	
Power flow (including topology processing)							[n/e]	
Short circuit							[n/e]	
Dynamics							[n/e]	

## 6.2. Example 2: Application designed to manipulate instance data

Conformity assessment of an Application which is designed to manipulate instance data in IEC 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, SC, OP and SSH. The application cannot manage boundary set. The 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. But because the application cannot support boundary it cannot be granted with Silver and Gold on that function.

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

<u>Profile:</u>							<u>Function:</u>	
	<i>Inclusive</i>		<i>Individual</i>		<i>Difference</i>			
	<i>Import</i>	<i>Export</i>	<i>Import</i>	<i>Export</i>	<i>Import</i>	<i>Export</i>	<i>Import</i>	<i>Export</i>
Equipment	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]
Boundary								
Core Equipment	Yes	Yes	Yes	Yes	Yes	Yes	Gold	Gold
Short circuit	Yes	Yes	Yes	Yes	Yes	Yes	Gold	Gold
Operation	Yes	Yes	Yes	Yes	Yes	Yes	Gold	Gold
Topology	[n/e]	[n/e]	[n/e]	[n/e]	n/a	n/a	[n/e]	[n/e]
Steady State	Yes	Yes	Yes	Yes	n/a	n/a	Gold	Gold
Hypothesis								
State Variables	[n/e]	[n/e]	[n/e]	[n/e]	n/a	n/a	[n/e]	[n/e]
Dynamics	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]
Diagram Layout	[n/e]	[n/e]	[n/e]	[n/e]	n/a	n/a	[n/e]	[n/e]
Geographical	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]
Location								
<u>Function:</u>								
Update and Repository							Bronze	
Diagram Layout							[n/e]	
Geographical (GIS) location							[n/e]	
Topology processing							[n/e]	
Power flow (including topology processing)							[n/e]	
Short circuit							[n/e]	
Dynamics							[n/e]	

## 6.3. Example 3: Application designed to perform load flow analyses.

Conformity assessment of an Application which is designed to support IEC 61970-600-1 and 61970-600-2 exchanges and perform power flow analysis. It is assumed that such application is therefore designed to support EQBD, EQ, SSH, TP and SV profiles. The Application can import, export these profiles and perform power flow calculations. The application can merge, manage and export data from these profiles. The Application handles difference files. The Application targets CGMES conformity on Import, Export and power flow function.

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

- Import function:

- To test inclusive: 01, 02, 03, 04, 05
- To test individual: 09
- To test difference: 10
- Export function:
  - To test inclusive: 13, 14, 16, 15, 17
  - To test individual: 21
  - To test difference: 22
- Power flow (including topology processing): 29, 34, 37.

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

<b><u>Profile:</u></b>							<b><u>Function:</u></b>	
	<i>Inclusive</i>		<i>Individual</i>		<i>Difference</i>			
	<i>Import</i>	<i>Export</i>	<i>Import</i>	<i>Export</i>	<i>Import</i>	<i>Export</i>	<i>Import</i>	<i>Export</i>
Equipment	Yes	Yes	Yes	Yes	Yes	Yes	Gold	Gold
Boundary								
Core Equipment	Yes	Yes	Yes	Yes	Yes	Yes	Gold	Gold
Short circuit	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]
Operation	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]
Topology	Yes	Yes	Yes	Yes	n/a	n/a	Gold	Gold
Steady State	Yes	Yes	Yes	Yes	n/a	n/a	Gold	Gold
Hypothesis								
State Variables	Yes	Yes	Yes	Yes	n/a	n/a	Gold	Gold
Dynamics	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]
Diagram Layout	[n/e]	[n/e]	[n/e]	[n/e]	n/a	n/a	[n/e]	[n/e]
Geographical	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]	[n/e]
Location								
<b><u>Function:</u></b>								
Update and Repository							[n/e]	
Diagram Layout							[n/e]	
Geographical (GIS) location							[n/e]	
Topology processing							[n/e]	
Power flow (including topology processing)							Gold	
Short circuit							[n/e]	
Dynamics							[n/e]	

#### 6.4. Example 4: Application designed to perform power flow, short circuit and dynamics analyses

Conformity assessment of an Application which is a suite of Applications designed to support IEC 61970-600-1 and 61970-600-2 exchanges and perform power 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 EQBD, EQ, SC OP, SSH, TP, SV, DY, DL and GL profiles. The Application can import, export these profiles, perform power 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 conformity, if the Application passes all necessary tests for all test configurations.

<u>Profile:</u>							<u>Function:</u>	
	<i>Inclusive</i>		<i>Individual</i>		<i>Difference</i>			
	<i>Import</i>	<i>Export</i>	<i>Import</i>	<i>Export</i>	<i>Import</i>	<i>Export</i>	<i>Import</i>	<i>Export</i>
Equipment	Yes	Yes	Yes	Yes	Yes	Yes	Gold	Gold
Boundary								
Core Equipment	Yes	Yes	Yes	Yes	Yes	Yes	Gold	Gold
Short circuit	Yes	Yes	Yes	Yes	Yes	Yes	Gold	Gold
Operation	Yes	Yes	Yes	Yes	Yes	Yes	Gold	Gold
Topology	Yes	Yes	Yes	Yes	n/a	n/a	Gold	Gold
Steady State	Yes	Yes	Yes	Yes	n/a	n/a	Gold	Gold
Hypothesis								
State Variables	Yes	Yes	Yes	Yes	n/a	n/a	Gold	Gold
Dynamics	Yes	Yes	Yes	Yes	Yes	Yes	Gold	Gold
Diagram Layout	Yes	Yes	Yes	Yes	n/a	n/a	Gold	Gold
Geographical	Yes	Yes	Yes	Yes	Yes	Yes	Gold	Gold
Location								
<u>Function:</u>								
Update and Repository							Gold	
Diagram Layout							Gold	
Geographical (GIS) location							Gold	
Topology processing							Gold	
Power flow (including topology processing)							Gold	
Short circuit							Silver	
Dynamics							Gold	