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<td>IFC2x3 CV V2.0 - WF</td>
<td>IFC2x3 Coordination View Version 2.0 Certification - Workflow Description</td>
<td>T Liebich, K Hausknecht, AEC3</td>
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1 General Description of the IFC Certification 2.0 Procedure

This document explains the procedure that is used to execute an IFC Certification 2.0 process for a given Model View Definition of the IFC schema. The official specification of the IFC Certification 2.0 procedure is defined by buildingSMART International and available at:


Although the principles outlined by this document apply to all certification processes, the detailed guidelines included are specific to the certification process for the IFC2x3 Coordination View Version 2.0.

1.1 General terms

The document details the general terms laid out in the official specification "IFC Certification 2.0: Specification of Certification Process" published by buildingSMART International. The following terms and definitions apply:

**certification procedure**

applies to e.g.:

IFC Certification 2.0 procedure

specifies how the certification is organized, what are the objectives, the platform used, the principle way of verifying the results and the role and responsibilities. This is independent of a particular IFC release or model view definition.

**certification process**

applies to e.g.:

IFC2x3 Coordination View Version 2.0

specified the details, how the overall certification procedure is applied to a particular IFC release and model view definition specific certification. It determines number and content of test instructions, automatic and manual checking rules, and finally the cost table.

**unit testing**

is the quality assurance during the software development process, e.g. by running small unit tests while implementing. This is not in scope of IFC Certification 2.0 procedure.

**certification**

is the verification of the shipping product by an independent organization according to a published test specification. This is in scope of IFC Certification 2.0 procedure.

**validation**

is the user validation of the product on whether it meets the user's particular expectations. This is not in scope of IFC Certification 2.0 procedure.

organized by the developer, includes regression test, unit testing specs can be provided by a third party

organized by standardization bodies or technical inspection authorities

organized by the user(s), user organizations or magazines.

Table 1: Terms and definitions used
1.2 Questions to be answered in this document

It answers the following principle questions that might be raised by participants of the certification process:

Prior to the participation in the certification process:

 where do I get information about the principles of the certification process
 when I am consider participating, to whom can I sent questions
 when I decided to participate, how do I register

After registration for the certification process:

 how do I get access to the certification center
 whom can I contact for questions occurring during the certification
 what is the work flow of the actual certification testing
 what do I have to do for export certification and for import certification

During the certification testing and verification:

 how many test cases are available, what do I have to do for each test case
 are there different types of test cases, what is verified by each test case
 how and by whom are the test results verified
 what are other criteria I have to fulfill for certification

At and after being granted the certification logo:

 what are the rules for using and displaying the certification logo and certificate
 how long is the certification valid, how can I re-certify newer releases of my product

The official website for the IFC Certification 2.0 procedure is:

 http://www.iai-tech.org/developers/certifying-ifc-implementations/ifc-certification-2.0

and for the IFC2x3 Coordination View Version 2.0 certification:

 http://www.iai-tech.org/developers/certifying-ifc-implementations/ifc-certification-2.0/ifc2x3-cv-v2.0-certification

These sites are continuously updated and should be checked regularly.
2 Prior to participation in a certification process

A certification process is specific to a Model View Definition (MVD) of the IFC schema published by buildingSMART International. Prior to organizing a certification process the MVD has to be defined and accepted by buildingSMART International. The copyrights and ownership of the MVD have to be handed over to buildingSMART International as part of the acceptance process.1

The IFC MVD specific specification process is announced and organized by the Model Support Group (MSG) and Implementation Support Group (ISG) of buildingSMART International. The announcement is made via the official technical website and published at:


2.1 Information about an announced certification process

Once the certification process is announced, interested software developers can register. The registration is handled by the organizers of the certification process with help by the business management of buildingSMART International. Certification has a cost, the exact certification fee is specific to the certification process - i.e. governed by the size and complexity of the model view definition. It may be broken down into individual and selectable items, such as export and import certification fee, fees for different exchange requirements, etc. The organizers can also suggest an "early bird" registration or other offers. The official fee structure is published at the certification section of the official technical website.

The certification fee structure of the IFC2x3 Coordination View Version 2.0 certification is published at:


The following information, beside the official “Specification of Certification Process” and this documentation is available prior to registration:

- the published Model View Definition
  - general http://www.iai-tech.org/products/ifc_specification/ifc-view-definition
  - for CV V2.0 2 http://www.iai-tech.org/products/ifc_specification/ifc-view-definition/coordination-view

- the certification platform "Global Certification and Testing Server" GTDS overview
  - http://gtds.buildingsmart.com

- the official starting date (and final date of early bird registration, if available)
- note: the new IFC Certification 2.0 procedure does not have fixed registration dates or dates for finishing the certification process, if a certification process is no longer available (e.g. if the IFC schema or MVD is superseded by a newer release) it will be announced early enough before this certification process is closed

- the software companies that already registered for this certification process, or have already finished the certification process
  - for CV V2.0  http://www.iai-tech.org/developers/certifying-ifc-implementations/ifc-certification-2.0/ifc2x3-cv-v2.0-certification

- the certification criteria in addition to the Model View Definition
  - for CV V2.0 it is currently included in this document3

1 The acceptance process is specified within the buildingSMART procedure of “Internationalization of Model View Definitions”.
2 “CV V2.0” is the official abbreviation for IFC2x3 Coordination View Version 2.0
• the basic structure of the test cases, including
  • approximate number, content and example for export test instructions,
  • approximate number, content and example for import calibration files
  • for CV 2.0 it is currently included in this document

2.2 Questions, answers and help prior to participation

A software developer considering participation might have further questions after studying the general information for the certification process. The following resources are available to help:

• the question and answer Q&A section at the certification part of the buildingSMART technical website
  • <not yet available>

• the discussion forum at the GTDS certification platform
  • http://gtds.buildingsmart.com
  • under "Field Tests" -> 03_Projects -> IFC2x3_Certifications

If there are further questions please contact the organizers of the certification process. See section 4 "Contact details".

2.3 Registration for a certification process

Once a software developer has made the decision to participate in the certification process the company should register. A registration is specific to:

• the Model View Definition (and consequently to the IFC release)
• the Exchange Requirement(s), if more than one is included in the Model View Definition
• the mode of interoperability (import, export, import and export)
• if applicable, other published criteria - organizational or technical

In case of the IFC2x3 Coordination View Version 2.0 certification it includes:

• Architectural, Building Service, or Structural exchange requirement for export
• export, import, or export and import
• early bird

A software developer registers a software application for certification. If the developers opt to undergo certification for several software applications, it is necessary to register them separately.

A registration form that includes the necessary fields to be filled in is published for each certification process.

• for CV V2.0 http://www.iai-tech.org/developers/certifying-ifc-implementations/ifc-certification-2.0/ifc2x3-cv-v2.0-certification

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3 Such information could be uploaded to a dedicated page of the buildingSMART website in future.
4 Example for organizational criteria is "early bird" for first comers, an example for technical is whether export is delivered as *.ifc file, or *.ifcXML file.
5 Note, there is no separation for import as IFC files containing either architectural, building services, or structural models need to be read for coordination.
6 The organizers may publish a fee structure that includes a reduced fee for additional applications. In the case of the IFC2x3 Coordination View Version 2.0 a special discount is granted for additional application belonging to the same software platform.
Each software developer should identify a person and address for the legal and billing information, a person representing product management and one or more persons for technical development (software developer, QA personnel).

The complete registration form should be sent to the organizers, see 4 "Contact details".

Note that you need to provide (at least) one NFR license for your application to the certification organizers during the certification process. In the case of a server based solution you need to provide access to the server. It is important that the certification testers can re-establish and counter-check the results of the self check.
3 Preparing for the certification test procedure

With the registration each software developer provides the contact details of one or several technical representatives that will participate in the certification process. Access to the certification center of the GTDS certification platform is then granted to those contacts.

3.1 Access to the certification platform

The Global Testing Documentation Server includes the following sections:

- **Quick Test** (general public access offering basic testing functions)
- **Field Test** (access only to buildingSMART members), including:
  - collection of test files (not specific and mandatory for certification)
  - general discussion forum (also used to discuss certification process questions prior to participation, and issues about the model view definition, etc.)
- **Application Center** (access only to buildingSMART members), including:
  - self declaration of support of IFC support by a software application
  - report of the certification results
- **Certification Center** (access only to registered participants in an active certification process) including:
  - the test instructions for creating the export test cases for export certification, plus:
    - automatic export checking of each uploaded IFC file based on the entity, attribute, property set tables, and implementation guidelines published for the Model View Definition
    - check items for the manual checking of each uploaded IFC file based on the concept description of the Model View Definition
  - the calibration file for import certification, plus:
    - check items for the manual checking of each uploaded IFC file based on the concept description of the Model View Definition

Access to the GTDS certification platform is role based. Any registered participant in the certification process get access to its tests, but the intermediate test results are hidden from anyone else. Only assigned testers of the certification team, and the organizers of the certification have access beside representatives of the software developer itself.

3.2 Questions, answers and help during the certification process

All registered participants of a certification process are included in an internal discussion forum specific to that certification process. The organizers and official testers are also included. This forum can be used to discuss issues in private.

The organizers also run regular teleconferences with the participants where any upcoming issues can be addressed. Telecoms are announced to all registered participants (product managers and technical representatives) - see chapter 2.3.

The CV V2.0 certification process is the first certification process that is organized under the IFC Certification 2.0 procedure. Feedback from the participants is therefore essential and will be used to continuously improve the process.

3.3 General workflow of the certification testing process

After the registration is finished, the workflow is separated into a workflow for export certification, import certification, and a common work item to finalize the certification process.
When the access to the certification centre is provided the next step depends on whether export and or import certification is sought. In general, first the export certification is started, thereafter the import certification. However, both can overlap in time.

### 3.3.1 General workflow for export certification

The certification organizers provide a series of export templates that have to be used for export certification. An export template describes:

- a general summary of the test purpose and a thumbnail
- the specific concepts of the model view definition that are tested by the export test case
  - those are identical to the check items for the export test case validation
- the exact instructions on how to generate the export test case (the required information corresponds to the specific concepts that constitute the export test case)
  - exact plans (as 2D DXF files for easier re-creation)
  - exact definition of project origin
  - exact definition of element parameters, materials and properties (as tables)
  - additional requirements, e.g. colors, CAD layers, units, etc.

The export templates are provided in the certification center of the certification platform. Each export template is assigned to one or several exchange requirements and to all participating software applications that seek export certification for these exchange requirements.
The participating technical representatives of the software developer then gain access to all export test templates that apply to their applications within the certification center.

Figure 5: Provision of the export test instruction within the certification center

The export certification workflow is:

1. Go to the export section of the certification center and download the test instructions (pdf)
2. Create test case in your certifiable application - note import of an IFC file and re-export is not permissible, each test case has to be created in the application from scratch. Only the provided DXF files can be used to ease entering the correct dimensions.
3. Create the IFC export file
   - Make a note about the IFC export options used to create the export file
   - Make sure that it includes the correct IFC header with "CoordinationView_V2.0"
4. Upload IFC export file onto the certification center
5. Get automatic test result, the automatic check is executed automatically during the upload
   - Check the automatic results
   - In case of uncertain results, contact the organizers
   - Repeat steps 3, 4, and 5 until no more errors are shown

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7  It is essential that the header includes as a minimum information FILE DESCRIPTION( {"ViewDefinition [CoordinationView_V2.0]'"}, '2r1' ); otherwise the automatic testing would not start.
8  Although the rules are developed with care, they (as any other software product) may contain errors.
6. Complete the manual test following the check items (shown in the certification center under the test case node). Enter the results of your tests into the check boxes
   - Select the appropriate results (fully supported, with restrictions, not supported)
   - Add any explanations, if necessary
   - In case of uncertain meaning of check items, contact the organizers

7. Repeat steps 3...6 until no errors occur and the manual test results are completed
   - make sure that the manual and automatic test results refer to the same uploaded test file
   - you may delete all previous test files

8. Upload original application file used to create the last test file
   - make sure that you also upload additional setting files, etc. so that the export of the test file can be re-established by the certification team
   - note that the test case will not be accepted until the original application file has been uploaded

9. Inform the certification organizers that this test case is ready for final inspection and validation
   - the notification can be done separate for each test case (there is no need to wait until all test cases are ready)

10. Once the assigned tester and the certification organizers have validated the test case:
    - you are notified about remaining issues (go back to step 3, or 6, or 8 depending on the issue
    - or, if there are no more issues, you are notified that this test case has been approved

The export test files are manually checked, both by a self check by the software developer and by a counter check by the certification tester. The manual checking should comply with the following steps:

![Figure 6: Example of a manual export check item](image)

**Self Test Instructions**

The self test contains various elements that should be performed by the software developer before submitting the test case for validation and approval (for step 6 above):
- Verify the IFC file for a correct header (in a text viewer) prior to uploading.
- Open the IFC file within at least two free IFC viewer, a list of applicable IFC viewers is available at: [http://www.iai-tech.org/developers/get-started/ifc-open-source](http://www.iai-tech.org/developers/get-started/ifc-open-source).
- Verify that the geometry, the presentation (layer, color), the spatial structure, the attributes and the property content is correct against the tables in the test instructions.
Make a re-import into your own application and verify the correct re-import\(^9\).

Export the re-imported test case file. Verify that the GUID’s of the building objects and spaces have not changed. Compare the old and new GUID's using an appropriate tool (e.g. reading both files, the first export and the second re-export into a viewer and compare the GUID's in the UI of the viewer).

These steps are followed for all export test instructions. Since the export test instructions are specific to the exchange requirements, a certain application only gets the architectural, structural or building service test instructions.

Test instructions are provided for

- few general tests (e.g. for persistence of GUID’s, support of character sets, etc.)
- entity specific test cases (as shown in the beam example above)
- small complex test cases (a small house, section/story of a bigger building)

![Figure 7: Complex test case example](image)

### 3.3.2 General workflow for import certification

The certification organizers provide a series of import calibration files that must be used for import certification. An import calibration file describes:

- a general summary of the test purpose and a thumbnail
- the specific concepts of the model view definition that are tested by the import test case
  - those are identical to the check items for the import test case validation

The import certification workflow is:

1. Go to the export section of the certification center and download the import calibration file (ifc).
2. Import the calibration file into your application
3. Complete the self test, check the geometry and create screen shots, also check the attributes and property content (document it based on the capabilities of your application)
   - repeat until correct results have been achieved
4. Enter the self test results into check boxes at the certification center
   - Select the appropriate results (fully supported, with restrictions, not supported)
   - Add any explanations, if necessary
   - In case of uncertain meanings of check items, contact the organizers
5. Upload significant screen shots and import verification documents

\(^9\) Re-importing into your own application is not a valid business case; however it can help to verify the correctness of the export within limits. However the exchange content in scope of the exchange (3D shape, object definitions, attribute content, spatial structure) should be correct after re-importing.
6. Inform the certification organizers that this test case is ready for final inspection and validation
   ▪ the notification can be done separate for each test case (there is no need to wait until all test cases are ready)

7. Once the assigned tester and the certification organizers have validated the test case:
   ▪ you are notified about remaining issues
   ▪ or, if there are no more issues, you are notified that this test case has been approved

These steps are followed for all import calibration files. In addition to the basic (small and entity specific) calibration files, complex import test files are also provided.

3.3.3 Finalize the certification process

After the export and/or import certification steps are completed, proceed with the final certification steps.

▪ Verify that the user interface descriptions for export and import options follow the common agreement as stipulated
▪ Verify that sufficient documentation and help files are provided for the end user, the documentation should also identify the exchange requirements and use cases that can be satisfied
▪ Register the official IFC icons for IFC files during installation procedure of your application. IFC files should not be registered with the file logo of your own application
▪ Complete IFC support statements at application center of the GTDS certification platform
▪ Confirm the publication rules of the IFC logo and associated IFC certificate
4 Contact details

Please contact the following persons on questions arising from the IFC certification 2.0 procedure:

buildingSMART International business manager
- on any legal and financial issue
  Christopher Groome
  chris.groome@b-r-t.co.uk

buildingSMART International ISG leader
- on general information and procedural issues
  Prof Rasso Steinmann
  steinmann@iabi.eu
- on how to register, etc.

buildingSMART International MSG leader
- on general information and procedural issues
  Dr Thomas Liebich
  tl@aec3.de
- on how to register, etc.

Please contact the following persons on those specific questions arising from the IFC2x3 Coordination View Version 2.0 certification process:

GTDS certification platform
- database issues
  Prof Rasso Steinmann
  steinmann@iabi.eu
- access to the certification and application center
  Klaus Linhard
  linhard@iabi.eu
- how to upload, download, etc.

Rule checker and automatic validation
- issues with automatic checking results
  Karl-Heinz Häfele
  Karl-Heinz.Haefele@kit.edu
- content of automatic testing
  Andreas Geiger
  Andreas.Geiger@kit.edu
- testing procedures

Test cases and validation instructions
- issues with test instructions
  Dr Thomas Liebich
  tl@aec3.de
- completeness or ambiguity of test instructions
  Kerstin Hausknecht
  kh@aec3.de
- check items, etc.

This document is specific to the IFC2x3 Coordination View Version 2.0 certification process. Once a new certification process is opened for a new buildingSMART International Model View Definition, either a new document, or an appendix to this document would be published. It would then also include the contact details for the new certification process.