



Rijksgebouwendienst
*Ministry of the Interior and
Kingdom Relations*

Rgd BIM Standard

Rgd BIM Norm | Version 1.0.1 | 1 July 2012 | EN 1.0 | 1 July 2012

Colophon

Contact

postbus.RgdBIM@rgd.minbzk.nl

Website

www.RgdBIM.nl

Authors

ir. D. Van Rillaer

ir. J. Burger

ir. R. Ploegmakers

ir. V. Mitossi

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This document is published by:

Rijksgebouwendienst

Rijnstraat 8, 2515 XP The Hague, The Netherlands

www.rijksgebouwendienst.nl

Concerning this translation

This is a preliminary translation of the Rgd BIM Standard, the purpose of which is purely to aid communication concerning this Rgd standard with international parties. In the event of any contradiction between this document and the Dutch Rgd BIM Standard (*Rgd BIM Norm*), the Dutch Rgd BIM Standard will prevail.

For some terms, existing translations of the Dutch building regulations (*Bouwbesluit*) into English and translations of ISO and CEN standards into Dutch have been followed.

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Introduction

The Rijksgebouwendienst Building Information Model Standard, shortened to Rgd BIM Standard (*Rgd BIM Norm* in Dutch), describes the specifications of BIM extracts and accompanying deliverable files.

The Rgd BIM Standard describes neither the process nor step-by-step instructions for achieving a result in compliance with these specifications; the Rgd BIM Standard does not contain a BIM or CAD manual.

1 Terms

1.1 General

The following terms are used in the Rgd BIM Standard:

- **building:** the whole of building elements.

*Note: The original Dutch term *bouwwerk* refers to a wider class of built objects than what we would normally understand as a 'building'.*

- **building element:** a spatial or material component of the building. Building elements are the spatial, architectural, structural, and building services elements or components, as well as interior, equipment, and furnishing elements.
- **level:** the grouping of all building elements that belong to an identifiable floor of the building.

Note: A floor level may contain more than one floor slab at differing elevations.

- **building information products:** the (combinations of) files and documents which describe the building, such as 3D models, 2D drawings, and products that use building information, such as quantity take-offs, measurement data, and calculations.
- **BIM or Building Information Model:** the integral 3D information source model of the building as constructed with BIM objects in a BIM modelling application. The BIM may consist of multiple individual models, for instance for separation per discipline or aspect. The BIM contains all building information necessary for the production of the required BIM extracts.
- **BIM object:** each entity in the BIM which contains or describes information of the building, with or without a geometric representation.

Note: The representation of a building element in the BIM is a BIM object.

- **BIM object ID:** a free to choose identification code for a BIM object which is unique within the BIM and which is propagated to certain BIM extracts, and with which unambiguous mappings can be made to other information.
- **BIM extracts:** the building information products derived or exported from the BIM.

1.2 Context specific

Depending on the specific context in which the delivery of BIM extracts is required, such as the nature of the contract or project, additional requirements may be applicable.

1.2.1 DBFMO and DBM

For DBFMO and DBM the following additional terms are used:

- **Object:** in the Rgd BIM Standard the term building is to be understood as the Object. The term Object, with a capital "O", is defined in the contract (*Overeenkomst*).

Note: The term 'Object' is to be distinguished from the term 'BIM object'.

- **BIM:** in addition to the description of the term under §1.1, the BIM comprises in general the representation of the building (the Object) and in particular the representation of all function providers of which the building is composed.
- **function:** the function required by the principal (*Opdrachtgever*) as described in the Output Specifications (*Output Specificaties*).
- **function ID:** unique identification code of the function, as assigned in the Output Specifications.

- **function provider:** the term building element in the Rgd BIM Standard is to be read as function provider. It is the solution provided by the contractor (*Opdrachtnemer*) to realise a required function.

Note: In order to achieve a correct representation of the provider of a required function, it may be necessary to subdivide BIM objects such as spaces in the BIM.

- **identification label ID:** unique identification code of the physical identification label (e.g. RFID tag) of the function provider.
- **function provider ID:** the term BIM object ID in the Rgd BIM Standard is to be read as function provider ID.

Note: This identification code is the unique code assigned to a function provider in the model. The contracted party is free to choose this code.

- **table of relations:** the description of the solution, to be compiled by the contracted party, which comprises the explicit and unambiguous mapping between the function provider IDs and the function IDs or between the function provider IDs and the identification label IDs.

2 BIM extracts

BIM extracts include the following:

- IFC model;
- CAD drawings;
- measurement data, calculations, quantity take-offs, etc.

2.1 General requirements of BIM extracts

The Rgd BIM Standard contains requirements for the deliverable end products, the BIM extracts. In order to ensure consistency between BIM extracts regarding such things as structure and naming, the requirements in this chapter are applicable to all BIM extracts.

Note:

- *Exporting a BIM extract from the BIM source file using the associated BIM modelling application does not necessarily guarantee that the resulting BIM extract complies with the stated requirements. The delivering party remains responsible for the technical validity and validity of the content of the BIM extract.*
- *There are no brand specific requirements for the BIM modelling applications to be used for producing the required BIM extracts. The applications must however be suitable for obtaining the extracts from the BIM according to the required specifications, in a correct, efficient, simple, and reproducible manner.*

2.1.1 Coordination and aspect information

The BIM extracts, such as IFC models and CAD drawings, are mutually coordinated. In order to group aspect specific information in a sensible manner, such as on the basis of the commonly identified disciplines, the BIM extracts have been split into separate aspect extracts. These aspect extracts are mutually coordinated. The BIM extract in the discipline architecture is the base or reference model, or the underlay for all the other BIM extracts.

Note: Among other things, coordination means that when aspect models or drawings are combined into one model or drawing, all extracted (i. c. exported) BIM objects in the BIM extract have the correct scale, location, and orientation, without any scaling, translation, or rotation of an aspect model being required.

2.1.2 Local position and orientation

Local position: In the BIM extract the representation of the building as model or drawing is positioned close to the origin, entirely within the first quadrant.

Local orientation: The representation of the building is generally oriented such that its main dimensions are aligned with the x and y axes and that in a top-down view the North is directed to the top as much as possible, or the main entrance to the bottom.

Note:

- *The local position and orientation is to be distinguished from the geographic position and orientation. The definition of the latter is specified where required per BIM extract type.*
- *In CAD drawings the origin is to be understood as the origin of the World Coordinate System (WCS).*

2.1.3 Structure and naming

To the extent not further specified elsewhere in this standard, all files of or belonging to a BIM extract and all entities and information in a BIM extract is structured and named in a logical, meaningful, recognisable, intelligible, and consistent manner.

Note: For the purpose of minimising interoperability issues with the exchange and linking of data, the values in text fields or free fields must always begin with a number or a letter, unless explicitly specified otherwise in this standard.

2.1.4 Correct use of entities

To the extent not specified elsewhere in this standard, an entity in the BIM extract is modelled or drafted with the entity appropriate for that purpose in view of the correct use of the application with which the BIM has been created.

Example: wall as a wall object, text as a text entity, etc.

In principle, the BIM extract does not contain any proxy objects:

- 2D BIM extract: a CAD drawing may not contain any proxy objects.
- 3D BIM extract: an IFC model may only contain a proxy object according to the buildingSMART IFC specification, i.e. if there is no suitable IFC object for the representation of the building element.

2.1.5 Accuracy

Geometrical entities in the BIM extract are positioned exactly. The entities are accurate, recognisable, and modelled fully or drafted according to the required level of detail, taking into account any commonly applied approximations.

2.1.6 Doubling and intersection

In principle there are no 'doublings' in the BIM extract: There are no BIM objects in the same BIM extract which represent the same thing at the same location, even when the BIM extract consists of multiple aspect models or drawings.

Note: Doubling can occur due to drafting errors where multiple copies of a BIM object are placed at the same location. Such doubling is never permitted. Doubling can also result from discipline specific detailing of building elements. An example could be building elements in the disciplines architecture and structural engineering. A floor element in the architectural model may be detailed into a number of distinct hollow-core slabs in the structural model. Such doubling is only permitted when the elements are mutually completely overlapping and the elements are unambiguously and consistently distinguishable per discipline in separate aspect models or drawings.

Whole or partial intersection or overlapping is in principle not permitted.

Note: Mutual intersection of building elements is generally not permitted, such as where wall meets wall or wall meets floor. Intersections of negligible nature are permitted, such as electrical wiring cast or cut into walls. Intersection is never permitted between significant building services elements and major structural elements.

2.1.7 Model units, dimensions, display units, and rounding

The BIM extract has been set up using a metric template, where one model unit (drawing unit) equals one millimetre, and where dimensions are displayed as:

- lengths in mm or m;
- areas in m²;
- volumes in m³.

The values of displayed or stored dimensions follow from the exact dimensions of modelled or drafted BIM objects. It is not permitted to manually adjust or override values to correct modelling inaccuracies.

When displayed, dimensions in BIM extracts are to be rounded off according to the conventions commonly applicable for the given building information product.

2.1.8 Layer structure and naming

Information is distinguished by placing entities on layers. Entities in the BIM extract are placed on the appropriate layer with naming according to NL-SfB, using the NL-SfB number codes with at least two digits. Further information structuring within the NL-SfB hierarchy is permitted.

Naming convention: <NL-SfB code><space><text description>, where:

- <NL-SfB code>: code consisting of two sets of digits. The general level is filled out with the number zero, "0".
- <text description>: NL-SfB description.

Note: In the text field a semi-colon (";") is not permitted, and is to be replaced by a space followed by a dash, "-".

Examples:

2200 binnenwanden

2210 binnenwanden - niet constructief

2.1.8.1 Aspect fire safety

Elements that are an exit for escape, such as certain doors, are placed on a separate layer, with the suffix " - exit" in the layername.

Example: 3130 buitenwandopeningen - gevuld met deuren - exit

2.1.9 Building levels and naming

Level: see terms, §1.1.

Note:

- *A level's structural floor and floor finish belong to that level as its lower bound.*
- *A landing or incidental mezzanine floor is in principle not a separate level. Where necessary additional (plan) views of such floors can be created, without deviating from the level model structure.*

Level naming convention:

<level number><level type><space><text description>, where:

- <level number>: ..., -2, -1, 00, 01, 02, ..., where 00 is reserved for the level with the dominant main entrance.
- <level type>:
 - For a normal level: code is not applicable (no letter).
 - For an incidental level: code consists of one letter, where:
 - a = 1st mezzanine floor,
 - b = 2nd mezzanine floor,
 - etc.
- <text description>: *kelder, begane grond*, etc.

Examples of level naming and additional views in the case of a mezzanine floor:

3D BIM extract: -2 kelder, -1 kelder, 00 begane grond, 01 eerste verdieping, etc.

2D BIM extract: -2 kelder, -1 kelder, 00 begane grond, 00a tussenverdieping, 01 eerste verdieping, etc.

2.2 Specifications of the IFC model

In addition to the general requirements for BIM extracts, specifically for IFC models the requirements in this section are also applicable.

2.2.1 Terms

- **IFC model:** 3D BIM extract that is the whole of the IFC objects in one or more IFC files that comply with the requirements in the Rgd BIM Standard. The IFC model can consist of multiple mutually coordinated partial or aspect models.
- **IFC object:** the entity in the IFC model which is created through extraction (i.c. export) from the corresponding BIM object in the BIM according to the stated IFC specifications.
- **IFC object ID:** free to choose, easily recognisable and readable identification code of the IFC object, which is unique within the IFC model.
- **ObjectGUID:** GUID (*globally unique identifier*) of the IFC object, a unique identifier generated by the BIM software.

Note: Depending on the intended application, either the IFC object ID or the ObjectGUID can be understood as the BIM object ID.

2.2.2 Area of application

- Model type:
 - As designed (*DO/bestek*)
 - As built, as maintained (*revisie*)
- Disciplines: all

2.2.3 Normative references

To the extent not specified otherwise in the Rgd BIM Standard, the following references are applicable:

- IFC 2x3 TC1:
<http://buildingsmart-tech.org/ifc/IFC2x3/TC1/html/index.htm>
- BNA - NL-SfB tabellen 2005 incl. herziene Elementenmethode 'g1.
- AIA Document E202-2008 "Building Information Modeling Protocol Exhibit".
 - Solely §3 Level of Development.
- NEN-EN 15221-6 "Facility Management - Part 6: Area and Space Measurement in Facility Management".

2.2.4 File format and name

- File format: IFC 2x3 TC1
- File name: <project name>_<yyyy-mm-dd>_<aspect model number>_<version number>

2.2.5 Delivery requirements

There are no additional delivery requirements, beyond that the delivered IFC model in IFC format complies with the general and specific requirements in the Rgd BIM Standard.

Note:

- *It is permitted for the IFC model to contain more building information than is minimally required according to the Rgd BIM Standard.*
- *See §3 for the additional files to be delivered with BIM extracts.*

2.2.6 IFC model

The IFC model complies with the following specifications.

2.2.6.1 Level of Detail (LOD)

To the extent not specified elsewhere in the Rgd BIM Standard, geometric IFC objects have at least the three dimensional shape and size as they appear in their visible form in reality, with a level of detail as detailed below.

Per model type the following LODs according to AIA E202 – 2008 BIM Protocol Exhibit are applied:

- As designed (*definitief ontwerp/bestek*): LOD 300
- As built, as maintained (*revisiemodel*): at least LOD 300

Note:

- *For example, a wall consisting of multiple layers of materials is represented in the IFC model at least by the geometry of its external form: this is the outside of the finishing layer at the plane of the wall surface.*
- *The delivering party is responsible for ensuring that the outer form and associated alphanumeric information of IFC objects corresponds with that of the BIM objects in the BIM source file.*

2.2.6.2 Information structuring (layers)

At least all IFC objects that are geometric in nature have a correct `IfcPresentationLayerAssignment` according to the prescribed layer naming convention for the BIM extracts, see §2.1.8.

2.2.6.3 Object relationships

To the extent not specified elsewhere in the Rgd BIM Standard, IFC objects have mutual relationships conforming to the buildingSMART IFC specification. To the extent applicable, IFC objects have at least a correct `IfcRelContainedInSpatialStructure` relationship.

Example: The piece of furniture belongs to the room, the room belongs to the level, the level belongs to the building.

Note: The physical building elements are in principle modelled per level: see §2.2.7.8.

2.2.6.4 Object GUID

Each IFC object has a unique identification code (GUID). When updating or revising the IFC model, each IFC object in principle retains its original GUID.

2.2.6.5 Geographic position and orientation

The IFC model is geographically correctly positioned and oriented according to WGS84 and NAP.

Note:

- *Consider the geographic position of the terrain object and the geographic orientation (TrueNorth) of the project object.*
- *The geographic position and orientation is to be distinguished from the local position and orientation: see §2.1.2.*

2.2.7 IFC objects

To the extent applicable, the IFC model contains at least all the IFC objects listed below.

2.2.7.1 Project

- **Description:** the project is the IFC object containing project and model information.
- **Relationships:** the IFC model contains at most one project object.
- **IfcObject:** *IfcProject*

Attributes:

- **Name:** <project name>
- **RepresentationContexts:** the project is correctly geographically oriented, through inclusion of the *TrueNorth* value.
- **UnitsInContext:** see §2.1.7.

2.2.7.2 Terrain

- **Description:** the terrain, the topographic site of the project.
- **Geometry:** 3D

The IFC object has the three dimensional form and dimensions of the terrain surface of the project:

- **Contour:** of the cadastral lot or whole of lots.
- **Height:** according to the local topography.
- **Location:** the reference point of the terrain in the IFC model is geographically correctly positioned.
- **Relationships:** the project contains at most one terrain object.
- **IfcObject:** *IfcSite*

Attributes:

- **Name:** <cadastral reference>

Example: Delft AB 1234

If the project extends over multiple cadastral lots, all cadastral references are given, separated by <space>"-"<space>.

Example: Delft AB 1234 - Delft AB 1235

- **RefLatitude:** geographic location, latitude of reference point according to WGS84.
- **RegLongitude:** geographic location, longitude of reference point according to WGS84.
- **RefElevation:** geographic location, elevation of reference point, elevation with respect to NAP.

2.2.7.3 Building

- **Description:** see terms §1.1.
- **Relationships:**
 - One or more buildings are on the terrain.
 - The building is correctly positioned with respect to the terrain.
- **Note:** buildings with significantly different levels are in principle in separate, but coordinated, IFC models.
- **IfcObject:** *IfcBuilding*

Attributes:

- **Name:** <Rgd object number>

Example: OR123456

If the project consists of multiple Rgd object numbers, all numbers are given, separated by <space>"-"<space>.

Example: OR123456 - OR123457

2.2.7.4 Level

- **Description:** see terms §1.1.
- **Relationships:**
 - A building contains at least one level.
 - Each geometric IFC object is associated with the appropriate level, taking into account the hierarchical relationship between IFC objects.
- **IfcObject:** IfcBuildingStorey

Attributes:

- **Name:** see §2.1.9.

Example: -1 kelder, 00 begane grond, 01 eerste verdieping, etc.

2.2.7.5 Level Area object

- **Description:** the Level Area object is the geometric IFC object which explicitly represents the set of building elements associated with a level. The distinction between internal and external regions is made explicit by using different Level Area objects to represent the relative sets.

Note: Physical building elements which serve as boundaries between interior and exterior, such as the façade, belong in the interior set.

- **Geometry:** 2.5D/3D
 - Contour: Determined by the principles of Level Area according to NEN-EN 15221-6.
 - Height: of the associated level.
- **Relationships:**
 - A building contains at least one Level Area object.
 - Level Area objects may not intersect each other.
 - In principle a Level Area object encloses entirely all spaces associated with a particular level, separated into solely interior spaces and solely exterior spaces.

Note: Both the Level Area object and the space (room) are represented in the IFC model as an IfcSpace. This relationship is an explicitly permitted intersection between both IFC objects.

- Each Level Area object is associated with the appropriate level.
- **Note:**
 - The area of a Level Area object does not equal gross floor area (*bruto vloeroppervlakte, BVO*) according to NEN 2580.

- **IfcObject:** IfcSpace

Attributes:

- **Name:** the string "Gross" is present in the name.

2.2.7.6 Space

- **Description:** the space is the three dimensional IFC object which is in principle bounded by its surrounding physical building elements (walls, floors, etc.) and the shape of which is determined by these elements. A space is either an interior space or an exterior space.
- **Geometry: 3D**
 - Contour: In general the contour at floor level of the three dimensional object follows the net contour of the space along the inner side of the enclosing building elements. Internally located building elements, such as columns, are excluded from the contour of the space object irrespective of their size.
 - For spaces in a stairwell, elevator shaft, or accessible technical shaft, the net contour of the shaft is followed.
 - Where rules and regulations require, a space may be subdivided along bounds other than the enclosing physical building elements.
 - Spaces that span multiple levels may also lead to subdividing into multiple separate spaces (see below).
 - Height: In general the height of the three dimensional object equals the net height of the space, measured from the top of the finished floor to the bottom of the element that bounds the space at the upper end.
 - For interior spaces: the upper bound is typically the lower surface of the (suspended) ceiling. The height of a space can vary within one level. A space can also, partially or entirely, have a height which exceeds the height of the level, for instance due to the absence of floor segments or openings in the floor.
 - For exterior spaces: in the absence of a physical upper bound, the height of the space equals the height of the level with which the space is associated.

In particular:

- A space which spans multiple levels with accessible floor areas on higher levels is split into separate spaces in the model.

Example: A double-height space such as a lobby, with an accessible floor area on the higher level, such as a gallery, is represented in the model with two complementary spaces.

Note: The height of the split spaces is again determined by the general principle that the space runs to the lower surface of the upper bounding building element, such as the lower surface of the (suspended) ceiling.
- A space in a stairwell, elevator shaft, or accessible building services shaft is subdivided per level, there where the shaft is accessible on that level.
- **Relationships:**
 - A building is fully filled with spaces.
 - Spaces do not intersect.
 - Spaces are entirely within the contour of a Level Area object.

Note: Both the space and the Level Area object are represented in the IFC model with an IfcSpace. This is an explicitly permitted intersection between both IFC objects.
 - Each space is associated with the appropriate level. This is the level of the lower bounding building element, typically the floor.

- **Notes:**
 - Not to be considered as a space: a wall cavity; the space between a suspended ceiling and the floor slab.
 - To be considered as a space: a non-accessible building services shaft. This space has a net height equal to the actual height of the shaft.

Note: The term 'vide' ('open to below') does not exist in the IFC model.

- **IfcObject: IfcSpace**

Attributes:

- **Name:** <IFC object ID>
- **ObjectType:** space function type according to the current building regulations (*bouwbesluit*). Value from the fixed choice list in §4.1.1.
Example: verblijfsruimte
- **LongName:** <space function name>. Free to choose string, but named according to the general requirements: see §2.1.3.
Example: kantoorruimte
- **InteriorOrExteriorSpace:** [INTERNAL|EXTERNAL] according to the current building regulations.
- **BoundedBy: IfcRelSpaceBoundary:** The 2nd level Space boundary of the space has been generated.

2.2.7.7 Grouping of spaces: zones

- **Description:** a zone is a grouping of spaces. A space can belong to none, one, or multiple zones.

Note: Zones make it possible to cluster spaces in the model in an explicit manner, thus allowing information to be attached to each space belonging to a zone at the aggregate level.

- **IfcObject: IfcZone**

Attributes:

- **Name:** code of the group, according to the respective grouping as described below.
- **ObjectType:** type grouping, according to the respective grouping as described below.

*Note: For certain groupings of spaces, the naming convention requires a "<sequence number>". This is necessary in order to distinguish groups within a type grouping, such as in the case of 'habitable space' according to building regulations (*Bouwbesluit verblijfsgebied*). There may after all be more than one habitable space in a building, which must be individually measurable and therefore distinguishable as an individual group.*

The following groups are identified:

- **Bouwbesluit gebruiksfunctie:**
 - **Name:** functional unit (*gebruiksfunctie*) according to current building regulations.
Naming convention: **GF_<code1>.<code2>**
where,
 - <code1>: code1 from the list in §4.1.2.
 - <code2>: code2 from the list in §4.1.2.

Example: a space belonging to the office function is named: GF_05.0

When a space meets the requirements of the definition **communal** (*gemeenschappelijk*) according to current building regulations, the string "**_GM**" is appended to the naming convention of all the applicable functional units.

Example: A common area serving both an office function and a meeting function belongs to both group GF_05.o_GM and GF_01.o_GM. In the same building, the non-common spaces with an office function belong to the group GF_05.o, and the non-common spaces with a meeting function belong to the group GF_01.o.

When a space meets the requirements of the definition **shared** (*gezamenlijk*) according to current building regulations, the string "**_GZ**" is appended to the naming convention of all the applicable functional units, analogous to the above.

When a space has a **secondary function** (*nevenfunctie*) according to current building regulations, the space belongs both to the group with the "primary" functional unit and to the group with the "secondary" functional unit. The group that represents the secondary functional unit has the suffix "**_N**".

- **ObjectType:** value = "gebruiksfunctie"
 - **Bouwbesluit gebruiksgebied:**
 - **Name:** functional space (*gebruiksgebied*) according to current building regulations.
Naming convention: **GG_<code>_<sequence number>**
where,
 - <code>: code from the list in §4.1.3.
 - <sequence number>: 01, 02, 03, etc.

Example: GG_G_01
 - **ObjectType:** value = "gebruiksgebied"
 - **Bouwbesluit verblijfsgebied:**
 - **Name:** habitable space (*verblijfsgebied*) according to current building regulations.
Naming convention: **VG_<code>_<sequence number>**
where,
 - <code>: code from the list in §4.1.4.
 - <sequence number>: 01, 02, 03, etc.

Example: VG_V_01
 - **ObjectType:** value = "verblijfsgebied"
- Pset_SpaceOccupancyRequirements:**
- **OccupancyNumberPeak:** the maximum number of people simultaneously present in the habitable space according to current building regulations.
- **Bouwbesluit brandcompartimentering:**
 - **Name:** (protected)(sub)fire compartment (*(beschermd) (sub)brandcompartiment*) according to current building regulations.
Naming convention: **BC_<code>_<sequence number>**
where,
 - <code>: code from the list in §4.1.5.
 - <sequence number>: 01, 02, 03, etc.

Example: BC_BC_01

- **ObjectType:** value = "brandcompartment"
- **Bouwbesluit vluchtroute:**
 - **Name:** escape route (*vluchtroute*) according to current building regulations. Naming convention: **VR_<code>_<sequence number>** where,
 - <code>: code from the list in §4.1.6.
 - <sequence number>: 01, 02, 03, etc.

Example: VR_bVR_01
 - **ObjectType:** value = "vluchtroute"

2.2.7.8 Architectural, structural, and mechanical & electrical engineering elements

- **Description:** the physical building elements which form part of the building: architectural, structural, and mechanical & electrical engineering elements.
 - **Geometry:** 3D
See IFC model specifications (Level of Detail): §2.2.6.1.
In principle the elements are modelled per level.
 - **Relationships:** each building element is associated with the appropriate level.
 - **Notes:**
 - Elements in the discipline architecture have a materialisation.
IfcMaterial: free to choose material name, but named according to the general requirements for BIM extracts and consistently applied in the IFC model.
 - All elements in the discipline structural engineering are also present in the IFC model in their structural analytical representation including the appropriate structural dynamics.
IfcStructuralItem (IfcStructuralMember, IfcStructuralConnection)
IfcStructuralActivity (IfcStructuralAction, IfcStructuralReaction)
 - Doors and windows have a correct representation of the direction of opening (operation type) and are defined with the appropriate **IfcDoorStyle** or **IfcWindowStyle**.
 - **IfcObject:** Every building element is modelled correctly and consistently with the appropriate IfcObject:
IfcBuildingElement (**IfcBeam**, **IfcColumn**, **IfcDoor**, **IfcSlab**, **IfcWall**, **IfcWindow**, etc.), **IfcDistributionElement**, **IfcElectricalElement**, **IfcTransportElement**, etc.
- Attributes:**
- **Name:** <IFC object ID>
- Pset_###Common:** there where the property is applicable to the model object in question:
- **IsExternal:** [True|False]
 - **LoadBearing:** [True|False]: the value "True" is applied to all elements which bear a structural load.
 - **FireRating:** fire resistance (*weerstand tegen branddoorslag en brandoverslag*), WBDBO value according to current building regulations (in minutes).
Example: 60
 - **Compartmentation:** [True|False]
Applicable to IfcWall, amongst others.

Specifically for an IFC object which provides access to a space, such as a door, the following properties are additionally applicable:

Pset_###Common

- **FireExit:** [True|False]
- **SelfClosing:** [True|False]
- **SmokeStop:** [True|False]

2.2.7.9 Grouping of structural elements

IfcStructuralLoadGroup is applied to the grouping of load combinations.

IfcStructuralAnalysisModel is applied as system for the structural analytic model.

2.2.7.10 Grouping of mechanical & electrical engineering elements

IfcElectricalCircuit is applied as the system for electrical distribution elements.

2.2.7.11 Inventory, interior, and equipment elements

- **Description:** inventory, interior, and equipment elements.
- **Geometry:** see IFC model specifications (Level of Detail): §2.2.6.1.
- **Relationships:**
 - Each element is associated with the appropriate level.
 - Where an element is located in a space, the element is associated with the enclosing space.
- **IfcObject:** Each element is correctly and consistently represented by the appropriate IfcObject (IfcFurnishingElement, IfcEquipmentElement, etc.).

Attributes:

- **Name:** <IFC object ID>

2.3 Specifications for CAD drawings

In addition to the general requirements for BIM extracts, specifically for CAD drawings the specifications in this chapter are applicable.

2.3.1 Terms

- **CAD drawing:** 2D BIM extract as the whole of drawing sheets with CAD entities in a CAD file which complies with the CAD specifications in the Rgd BIM Standard.
- **drawing sheet:** the sheet in the CAD drawing with the drawing border within which the title block and for instance a legend, overview drawing, a *viewport*, or other entities are placed. The drawing sheet is intended for display in a digital or paper document.

2.3.2 Area of application

- Drawing type:
 - As designed (*DO/bestek*)
 - As built, as maintained (*revisie*)
- Disciplines: all

2.3.3 Normative references

The following references are wholly applicable unless otherwise stated. Where there is a conflict between standards, the first-mentioned is leading. In all cases that which is specified in the Rgd BIM Standard prevails over the following references.

- BNA - NL-SfB tabellen 2005 incl. herziene Elementenmethode '91.
- GB-CAS 4.0 "GB CAD Afsprakenstelsel 4".
 - That which is specified under §2 is optional.
 - Including the preferences specified in §5 and §6.
- NEN-ISO 128-40:2001 "Technical drawings - General principles of presentation - Part 40: Basic conventions for cuts and sections"
 - That which is specified under NEN-ISO 128-50:2001 §9 is not applicable.
- NEN-ISO 5455:1990 & /C1:1996 "Technical drawings - Scales"
- NEN-EN-ISO 5457:1999 & /A1:2010 "Technical product documentation - Sizes and layouts of drawing sheets"
 - Including the preferences specified in §3.1.
 - That which is specified under §4.3, §4.4, and §4.5 is optional.
 - That which is specified under NEN-EN-ISO 7200:2004 §5 is optional.
- NEN 1413 "Symbolen voor veiligheidsvoorzieningen op bouwkundige tekeningen en in bouwkundige schema's".
- NEN 2302:1983 "Tekeningen in de bouw - Algemene regels".
 - That which is specified under §2.7.1 is optional.
 - Including the preferences specified in §5.1.1.
- NEN 2574:1993 "Tekeningen in de bouw - Indeling van gegevens op tekeningen voor gebouwen".
- NPR 2570:1986 "Tekeningen in de bouw - Coördinatie van gegevens op tekeningen voor gebouwen".
 - Solely §2.

2.3.4 File format and name

- File format:
 - DWG 2007: the file must be usable stand-alone in the current version of Autodesk AutoCAD, without for instance additional applications or libraries.
Note: TrustedDWG is not a requirement, but the file must be fully compatible with the current version of Autodesk AutoCAD.
 - PDF/E: all required fonts are embedded.
- Filename: in principle free to choose. For floor plans the filename begins with the level naming convention as required according to the general requirements for BIM extracts, see §2.1.9.

2.3.5 Delivery requirements

The CAD drawing and associated drawing sheets are provided in DWG and PDF format respectively. They comply with the general and specific requirements specified in the Rgd BIM Standard.

Upon delivery of the CAD drawing:

- the drawing is fully purged and otherwise cleaned;
Note: Consider for instance the removal of construction lines or left-over lines resulting from the extraction from 3D geometry which affect the legibility of the entities in the drawing. Consider also the use of a tool such as "purge".
- there are no additional entities in the drawing such as OLE objects, dictionaries, raster images, external references, LISP or VBA routines, hyperlinks, or database links; see also §2.1.4 with respect to proxy objects;
- layer 0 is set as the current layer;
- there are no printer or plotter definitions associated with any layout tabs;
- all layout tabs are displayed as *zoom extents*;
- the system variable MEASUREMENT is set to 1.

Note: See §3 for the files deliverable with BIM extracts.

2.3.6 CAD entities

- There are solely one- and two-dimensional entities drawn in the *xy* plane of the WCS.
- Repetitive elements are, where possible and usual, defined as a *block*.
 - Within a legend there are no *blocks*.
- The elevation, *z* value, *thickness*, *linewidth*, and *global width* of entities are *0* or *default* (where *default* is set to *0*). Properties of entities are set to *by Layer* or *by Entity*.

2.3.7 CAD drawing

The CAD drawing complies with the following specifications.

2.3.7.1 Drawing sheet

The drawing sheets in the CAD drawing meet the following requirements:

- When visualised on (virtual) paper of the intended format the drawings, and in particular the *linetypes* and material indications, are clearly visible and distinguishable.
- Line thickness is solely determined through colour.

- Each drawing sheet contains one title block. The title block contains the information specified in §4.2.

2.3.7.2 Level of detail

The level of detail is at least appropriate to the phase construction documentation (*bestek*) (according to NEN 2574).

Depending on discipline or aspect the drawings comply with the following additional requirements:

2.3.7.2.1 Discipline architecture

All building elements to be realised (as designed) or realised (as built) have been drawn. At minimum this includes the following elements:

- Walls, floors, and roofs; including intermittent interruptions (voids, shafts, etc.).
- Openings in walls, floors, and roofs (doors, windows, shutters, dormer windows, chimneys, etc.) including an abstract representation of the filling element (frame, window, etc.) and direction of rotation of any movable or moving parts in the form of an arc or movement direction in the form of an arrow.
- Wall finishes which are accompanied by a certificate in order to comply with regulations, including indication of the material.
 - The text in the legend matches the material name or indication on the certificate.
- Vertical circulation elements, such as stairs, ramps, and elevators, where usual featuring an arrow in the direction of ascent.
- Railings and banisters.
- Fixed provisions (kitchens, bathroom fixtures, cupboards, etc.).

2.3.7.2.2 Discipline structural engineering

- For the discipline structural engineering, the current regulatory requirements provide the initial basis. At minimum all building elements of the main structural system are included.
- The following is identifiable in the drawing:
 - The distinction between prefab and poured-in-place concrete.
 - Concrete quality and steel types.
 - Time to collapse, when determined during the design of a building element or material.

2.3.7.2.3 Discipline mechanical engineering

- The following mechanical engineering building elements have been drawn:
 - Fire dampers;
 - Fire dampers for fire compartment-boundary-crossing mechanical services;
 - (Emergency) valves for building services;
 - (Emergency) switches for building services.

2.3.7.2.4 Discipline electrical engineering

- The following electrical engineering building elements have been drawn:
 - Fire dampers for fire compartment-boundary-crossing electrical services.

2.3.7.2.5 Aspect fire safety engineering

- All realised or to be realised fire safety provisions have been drawn. At minimum this concerns those mentioned in §4.3 and NEN 1413.

- (Protected) (sub-)fire compartments are indicated using compartment lines with the properties described in §4.3.
- Fire safety provisions are indicated with the symbols described in §4.3.
- When fire safety provisions originate in another discipline (architecture, electrical engineering, etc.), a building element or provision may need to be represented multiple times within a set of as-maintained drawings of a building. This is permitted provided the representations do not disagree.

2.3.7.3 Drawing structure

The drawings meet the following requirements:

- Floor plans are in principle a horizontal section at 1200 mm above the elevation of the level.
 - If this leads to a drawing which is not clearly legible or has a likelihood of incorrect interpretations, the plane of the section may be placed at a different height for the whole floor plan, or for a portion thereof. In such cases an explanatory note is present in the drawing.
- In addition to the projections described in NEN-ISO 128-30, the projection of building elements in front of or above the section plane is also represented in the drawing.
- Graphical distinction between positions of building elements relative to the section plane is as follows:
 - Building element view:
 - Line width narrower than for a section;
 - Line type continuous;
 - No hatch.
 - Building element section:
 - Line width greater than for view or projection;
 - Line type continuous;
 - Hatch.
 - Building element projection:
 - Line width narrower than for a section;
 - Line type dashed;
 - No hatch.
- On sections of building elements, materialisation is indicated with an appropriate hatch.
- Building elements which are at significantly differing distances (depths) from the section plane are graphically sufficiently distinguished. The use of a decreasing level of detail and successively thinner or lighter line types is preferred.
 - Examples are portions of a lower floor visible through floor openings in a plan view, or parts of a building lying further back in an elevation.
- In elevations, filled areas and shadows are indicated by hatches.
- The following information elements are present:
 - All views include:
 - Grid, including dimensions, providing a reference for determining the position of building elements.
 - External dimensions of the building.
 - For each floor, the elevation of the top of the finished floor.

- The net clearance (width and height) of all wall, floor, and roof openings (particularly doors and other elements for passage).
- Floor plans additionally include:
 - Section markers for any sections present.
 - For each space: at minimum the associated space function name, as free-to-choose string following the naming convention in the general requirements in §2.1.3; space number, and area.
- Cross-sections additionally include:
 - Net elevations of floors with intermediate and total dimensions, with respect to the reference level.
- Elevations additionally include:
 - Main façade dimensions, gutter elevations, roof ridge elevations, with respect to the reference level.
- All hatches, symbols, and uncommon line types in a drawing are explained in a legend.
 - Corresponding elements are the same throughout the legend of a set of drawings of a given building.
 - Line types for grid lines, framing lines, and building element projections need not be included.
 - Where necessary for clarity, a line type may be accompanied by an explanatory text in *modelspace*.
 - Symbols may be explained by reference to a table or standard, following NEN 2302 §4.3.
- When a drawing represents only a portion of a building (such as a wing, a space, or a detail) it is accompanied by an overview drawing which clarifies the position of the drawing within the whole building. Such an overview drawing could contain the following:
 - A schematic plot drawing;
 - A schematic floor plan of the whole building in which the represented wing is indicated;
 - A schematic cross-section of the building in which the represented floor or viewing direction is indicated.
- Text in drawings is in the Dutch language.

2.3.7.3.1 Aspect fire safety engineering

Drawings for the aspect fire safety engineering meet the following additional requirements:

- The corresponding architectural drawing is included as underlay, as a single *block* on *layer 0*.
- Each symbol (excluding compartment lines) consists of a *block* with the content and properties as described in §4.3.
- Compartment lines consist of a polyline with properties as described in §4.3.

2.3.7.4 Layer structure and naming

The drawings meet the following requirements:

- The layer structure and naming is according to the general requirements for BIM extracts in §2.1.8.

2.3.7.4.1 Aspect fire safety engineering

Drawings for the aspect fire safety engineering meet the following additional requirements:

- All drawn fire safety information, such as symbols and lines, is placed on the layer with the code 6510.
- Compartment lines have their associated characteristics encoded in the suffix of their layer name, following the format TTT_EIW_SX_B_SN, where:
 - TTT = Time in minutes (three characters);
 - EIW = quality indication (three characters);
 - SX = resistance to smoke penetration (two characters);
 - B = fire safety class (one character);
 - SN = smoke class (two characters).

The field values match the properties of the symbol compartment separation (symbol 6.4.16 in NEN 1413). Where a character needs to be indicated as null or absent, a zero ("0") is substituted.

2.4 Specifications of quantity take-offs and calculations

In addition to the general requirements for BIM extracts, specifically for quantity take-offs, calculations, and other such information the specifications in this chapter are applicable.

2.4.1 Terms

-

2.4.2 Area of application

- Product type:
 - As designed (DO/bestek)
 - As built, as maintained (revisie)
- Disciplines: all

2.4.3 Normative references

-

2.4.4 File format and naming convention

- File format: any appropriate file format, unless otherwise specified.
- File name: free to choose, unless otherwise specified.

3 Accompanying files deliverable with the BIM extracts

The following files are delivered accompanying the delivery of BIM extracts.

3.1 General

3.1.1 BIM

- BIM source file and associated files necessary to reproduce the delivered extract completely, efficiently, and reproducibly.

Note: The BIM may consist of multiple individual models which are mutually coordinated.

- File format: free to choose, in original (proprietary) file format.
- File name: free to choose.

3.1.2 Modelling documentation

- Log containing descriptions of:
 - Noteworthy modelling choices, conventions, etc.
 - Instructions to efficiently reproduce all extracts from the BIM.
 - BIM software and system details: software name and version, operating system name and version.
- File format: Word or ODF.
- File name: <project name>_<yyyy-mm-dd>_<version number>_modeldocumentatie

3.1.3 File list

- Overview of delivered files (including context specific files: see §3.2) detailing file names, file formats, format versions, and a brief description of the file contents. The overview also describes the folder structure used.
 - Specifically for CAD drawings: the overview also includes a drawing overview which lists the properties required in §4.2. These correspond to the properties in the title block.
 - There where it concerns files such as calculations, they are linked to the associated building element via the BIM object ID, in the file list or in a separate table of relations.
- File format: Excel or ODS.
- File name: <project name>_<yyyy-mm-dd>_<version number>_bestandenlijst

3.2 Context specific

Depending on the specific context in which the delivery of BIM extracts is required, such as the nature of the contract or project, additional accompanying deliverables may be required.

3.2.1 DBFMO and DBM

3.2.1.1 Table of relations OS

The solution provided by the contracted party which contains the explicit and unambiguous mapping between the function provider IDs and one of:

- The function IDs. This relationship can be one to many.
- The identification label IDs, for those function providers which are physically identifiable with an identification label. This relationship is one to one.

Note: The Output Specifications (Outputspecificatie) determines which function providers require an identification label.

The provided solution meets at least the functionality of the following example solution:

- Table with relationship mappings.
- File format: Excel or ODS.
- File name: <project name>_<yyyy-mm-dd>_<version number>_relatiemodel
- Template: see §4.4.

The table contains the explicit and unambiguous mapping between the function provider IDs and one of:

- The function IDs. The mapping is listed in table 1, where:
 - 1st column: function provider IDs
 - 2nd column: function IDs
- The identification label IDs. The mapping is listed in table 2, where:
 - 1st column: function provider IDs
 - 2nd column: identification label IDs

4 Accompanying files

The documents listed below accompany the standard and are available from the Rgd website.

4.1 Nomenclature Bouwbesluit 2012

Excel workbook "Rgd BIM Norm v1.0 - bijlage - nomenclatuur BB2012" contains the following lists on the worksheets of the same name:

- 4.1.1 Ruimtefunctie (space function)
- 4.1.2 Gebruiksfunctie (functional unit)
- 4.1.3 Gebruiksgebied (functional space)
- 4.1.4 Verblijfsgebied (habitable space)
- 4.1.5 Brandcompartimentering (fire compartments)
- 4.1.6 Vluchtroute (escape route)

4.2 Title block and drawing list details

Excel workbook "Rgd BIM Norm v1.0 - bijlage - titelblok- en tekeninglijstgegevens".

4.3 Fire safety engineering: symbols and line types

Excel workbook "Rgd BIM Norm v1.0 - bijlage - brandveiligheid symbolen en lijnen".

4.4 Table of relationships template

Excel workbook "Rgd BIM Norm v1.0 - bijlage - relatietabel sjabloon".