Allplan
BIM Compendium
Theory and Practice

based on the official release of IFC 4

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OPEN BIM™

IFC2x3 CV2.0

ARCH

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Certificate

Standard :

IFC2x3 ISO/PAS 16739

Scope :

Coordination View 2.0 - Import

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Allplan 2015-0

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Standard :

IFC2x3 ISO/PAS 16739

Scope :

Coordination View 2.0 - Export Architecture

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Contents

Welcome!

The topic of data exchange has become increasingly important in recent years. There are two reasons for this development: first, computers, software and networks have become more and more powerful. Second, the tasks of the building industry have become more and more complex and global.

So everybody is talking about BIM and openBIM when it comes to handling projects and combining all project-specific characteristics in a central database (BIM model). BIM and openBIM are now the standard for many contracts in the building industry.

As an open platform with a component-oriented data structure, **Allplan** provides the ideal basis for setting up and maintaining a BIM model: with Allplan, you create a central building data model including all components, objects and attributes relevant to planning, designing, constructing and maintaining the building.

Via the IFC interface or a (BIM) server, all those involved in a project can access the model created, which forms the basis for all project-related tasks. If the model is updated and maintained throughout the project, everybody will benefit from comprehensive information that is always up-to-date.

Some notes on the second edition

You have the second edition of the BIM Compendium in your hand. This is a reference book that is based on the official release of IFC4 for the first time. In particular, we completely revised the sections dealing with components and attributes, adjusting them to the requirements and structures of IFC4. This applies not only to the chapters in the text part, but also to the tables in the appendix. In addition, you can find a new section that describes the IFC ObjectTypes you can use in Allplan.

The quality of the BIM model, which is at the center of the whole BIM process, is crucial to success. In other words, the better the BIM model, the more you get out of your projects! The Allplan objects palette helps you achieve this. It assists you in keeping track of everything so that you can detect errors or inconsistencies at an early stage. As a result, you can avoid delays and increase efficiency. A new chapter in the practical part of this book describes the objects palette in detail.

Furthermore, we expanded the glossary and adjusted the chapter about the bim+ data server to the current version.

Introduction

A paradigm shift from pure 2D drafting to object-oriented 3D building modeling has been taking place ever since the introduction of CAD for computer-aided drawings. In particular, this development started in the early eighties. Since then it has been reinforced by increasingly powerful applications. As a pioneer, Professor Georg Nemetschek has always played a decisive role in the development of BIM.

The IFC specifications facilitate and support the exchange of object-oriented building information. Allplan GmbH strongly focuses on developing the IFC specifications and the associated interfaces. The goal is to integrate all building-specific aspects, such as quantity takeoff and cost planning, facility management, building services and engineering, into a data-neutral building model. Thus, all phases of the building life cycle can be virtualized and visualized.

This BIM compendium is designed for anyone who wants to deal with this topic. As the points you need to consider are very complex, BIM challenges you to study its tools and methods, making sure you achieve the best possible results.

This applies to anybody involved in the BIM process. Therefore, the first part of this book gives general information instead of dealing with specific software. This book should serve as a guideline, supporting you in your daily work. It helps you answer any question you may have about BIM. By making informed decisions together with your project partners, you will be able to reap the benefits of BIM.

The BIM Compendium

Although BIM and its methods are increasingly used in the building industry, there are still a great many interpretations, doubts and misunderstandings. Today you can find a multitude of documents and publications dealing with BIM. However, these documents usually focus on the theoretical aspects of BIM, generally ignoring office routine.

This BIM compendium is different. It has two parts that are closely related:

- The first part covers the BIM philosophy in general and its underlying ideas and methods. In addition to discussing myths and doubts, this part also looks at the opportunities and advantages of BIM. Under the motto of ”all you need to know about BIM”, this part provides you with the theoretical background you need for implementing BIM in your daily work.
- The second part describes how to work with the BIM philosophy in practice. In other words, it shows you how to use BIM in a real project. You will work your way through the project tasks step by step, learning how and to what extent you can use BIM throughout the project cycle. Despite the motto of ”integrated thinking”, this does not necessarily mean that the whole project is geared to the BIM approach. Sometimes it makes sense to use BIM in specific project phases or areas only.

Whenever you start a new project, you must discuss this issue with your team, thus deciding how to proceed. Basically, this decision is influenced by a number of boundary conditions. The more BIM is practiced and implemented, the greater the benefit to all those involved and the more natural it becomes in office routine.

Terms

You have certainly heard of the terms IFC and BIM if you have exchanged 3D data and building models before or worked with the IFC interface in general. But what exactly do these terms mean? And what about PropertySet or the abbreviation IAI?

Some terms are clearly defined, whereas others are ambiguous. As a result, almost everybody understands something else, which is not very helpful in exchanging complex data and information. In addition, you will find a lot of abbreviations (IDM, STEP...) from which you cannot deduce the meaning easily.

So that you know what you are talking about, this chapter explains the most important terms about BIM, helping you to communicate clearly.

BIM

Building Information Modeling, in short **BIM**, is used in different contexts nowadays. It describes how you can create and maintain a virtual, three-dimensional building on the basis of a digital data model. This building is the central object of Building Information Modeling, in short, the BIM model.

The model is a kind of database including all graphic, geometric and alphanumeric parameters and characteristic values of a building or project. These data are available to all those involved. All new features, changes and further developments are integrated into this model.

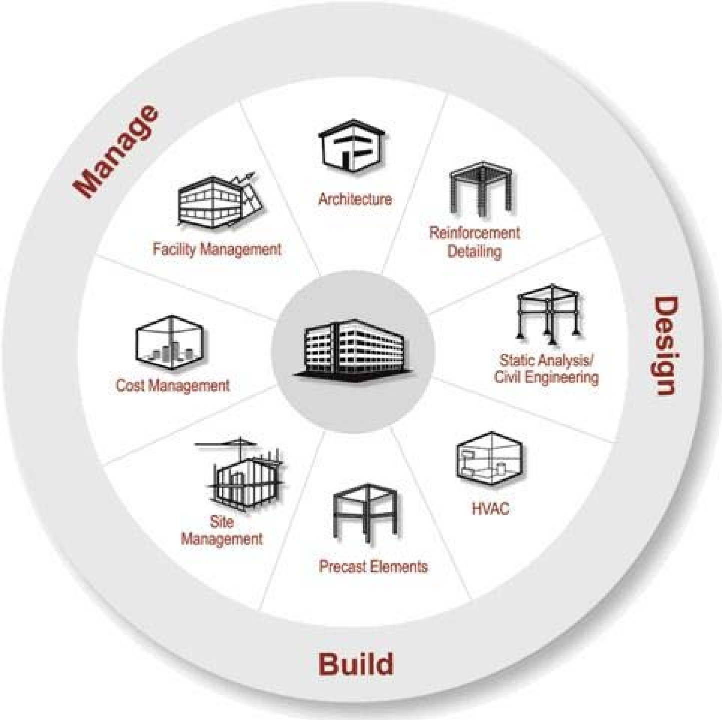
By entering data graphically and geometrically, you create and change components and (architectural) elements. In addition, you can give these objects additional information in the form of properties and attributes.

You can use the database itself and the BIM model well beyond the initial phases of planning and construction, reaping the benefits of BIM throughout the life cycle of the building. And if it is time to demolish and dispose of the building, the BIM model even helps you do this quickly and easily.

The architect starts planning, thus creating the basic structure of the BIM model. Over the course of the project, the actual BIM model constantly evolves. Data and objects of any kind are added, changed and adjusted, forming an integrated whole:

- Architecture
- Structural analysis
- HVAC / building services
- Contractor, production
- FM, management ...

This ranges from materials, costs and quantities to structural analyses (such as compressive strength and bending deflection) or HVAC characteristics (such as flow velocity or required number of air changes) to access control and maintenance intervals relevant to facility management.



On the one hand, the BIM model includes the "physical" components and elements that can be modeled geometrically (such as walls, slabs and reinforcement) as well as HVAC elements and other equipment (such as conduits, switches, control modules, sanitary objects and so on). On the other had, it also includes virtual areas and volumes in the form of rooms and room groups, which are required for operating, maintaining and managing the building. In addition, the project structure itself is part of the model. It is included in the form of a hierarchical tree structure.

After completion the model can still be used as the database for the building in operation and (new) information can be added and analyzed using data sheets.

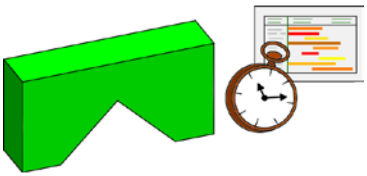
Ideally, the BIM model grows together - although not simultaneously - with the actual construction project. Finally, it represents a second building model that is identical to the actual building. Although the BIM model exists only virtually, it includes all pieces of information on the actual building.

Provided it is constantly maintained and updated, the BIM model is an exact copy of the actual building, providing all those involved with the information and data they need at any time.

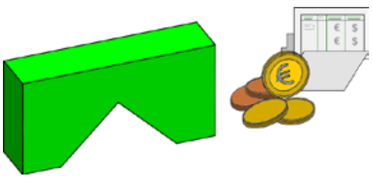
BIM XD

BIM is not only about the geometric sizes, such as length, width and height, but also about 4D, 5D or even 6D.

In addition to the familiar three dimensions (X, Y and Z), **BIM 4D** features the **time factor**, where all model elements are assigned to actions defined in a time schedule. This way, you can visualize the chronological sequence of the building process and the progress in the model.



BIM 5D includes not only the time factor, but also the **cost factor**. Here, the model elements form the basis for quantities which are then priced. This way, you can visualize and thus check the building costs in accordance with the building process.



AEC

You will often hear the abbreviation **AEC**, which stands for Architecture, Engineering and Construction. People frequently use it as a synonym for CAD, referring to CAD programs simply as AEC software. In its entirety, AEC describes all topics, data or objects that are commonly used in the construction industry. So AEC can refer to both real parts of a building (such as walls, slabs or columns) and virtual data (such as rooms, formwork or reinforcement). Being used collectively by the entire construction industry, AEC usually stands for ”concerning building and real estate”.

Building structure

The **building structure** is one of the two options you have to structure and manage drawing files and documents in **Allplan**. It has been available since **Allplan 2006**. You can use the building structure on its own or in parallel with the fileset structure. Reflecting the structure of a real building, the building structure has individual structural levels that are arranged hierarchically. You can assign documents and drawing files to these levels.

The building structure can be associated with a plane model, which defines the heights of the real building. You can then assign planes from this model to the structural levels, thus defining the heights of the individual parts of the building.

If you want to exchange data via the IFC interface, you need a building structure. Otherwise, the program cannot create the IFC file.

IFC

IFC stands for **I**ndustry **F**oundation **C**lasses. It is a neutral, open file format you can use to describe and exchange data relevant to the construction industry and facility management. What you exchange is a digital building model. The structure and properties of this model are specified precisely by the IAI.

The IFC format is certified by ISO and registered as ISO/PAS 16739. IFC 4 is the first format to be a separate ISO standard.

A neutral data format has a number of advantages: problems that occur when data are exchanged and converted to a different format can be reduced to a minimum, albeit they cannot be avoided completely. In addition, all those involved in a project can choose the software they need. The only requirement is that the software has an IFC interface.

Architects usually work with CAD programs and software for layouting, whereas structural engineers need software for calculating loads and forces and analyzing moment curvature. Quantity takeoff operations and cost calculations require costing software and programs for tendering, awarding and invoicing. Scheduling is also an important aspect. When it comes to execution planning, it is a question of machines and CNC that analyze the modeled geometry and implement it. Finally, (CA)FM programs and associated databases play an important role. They are used to manage and maintain buildings and real estate throughout their life cycle.

In their entirety, IFC and the IFC format include all these details. The geometric data form the virtual model. The alphanumeric data are the attributes, descriptions and properties, describing the elements in this model.

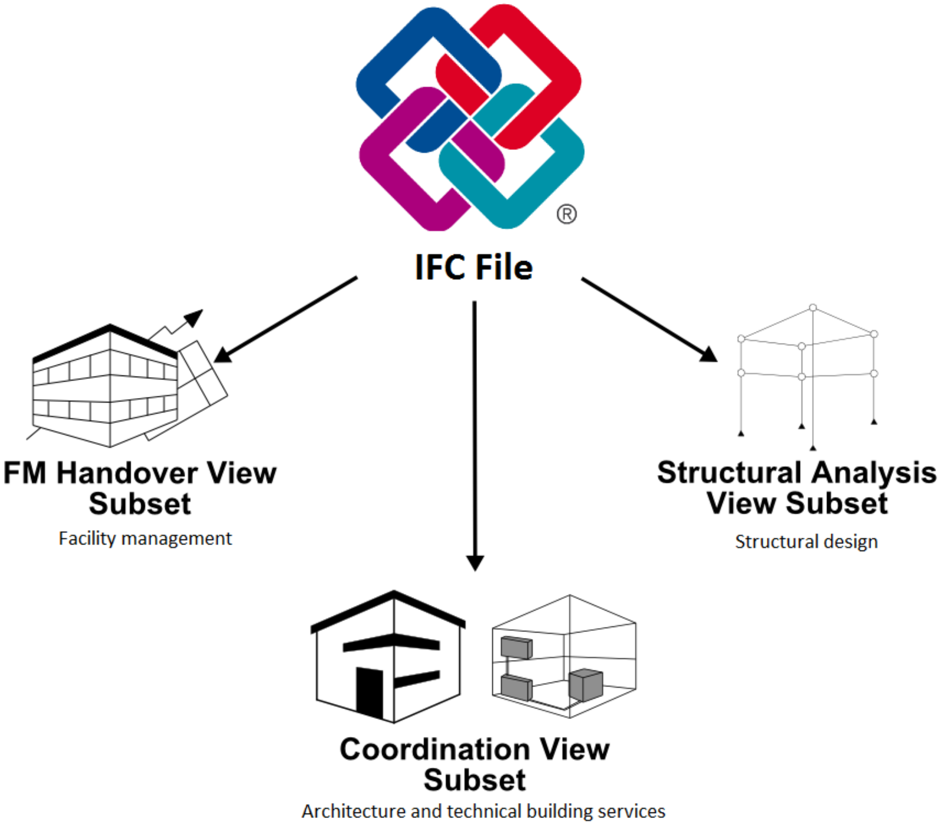
IFC subset

When IFC-format data are exchanged as a BIM model, the IFC interface normally transfers all information it finds in the model, including both the geometric data and the alphanumeric data. However, all these data are not required by all project participants. Depending on the persons involved and the project phase, different pieces of information are important to different persons. What's more, most programs cannot even read and analyze data they do not need. Therefore, you can extract individual subgroups - called subsets - from the complete data package. These subsets contain reduced and filtered information for specific applications, optimizing data exchange. With subsets, you can reduce the volume of data and speed up processing times.

The IFC format currently offers three subgroups. Depending on the purpose and type of data you want to exchange, you can choose between the following:

- IFC CoordinationView
- IFC StructuralAnalysisView
- IFC FMHandOverView

Like the superordinate IFC file, the subsets have version names referring to a specific IFC version.

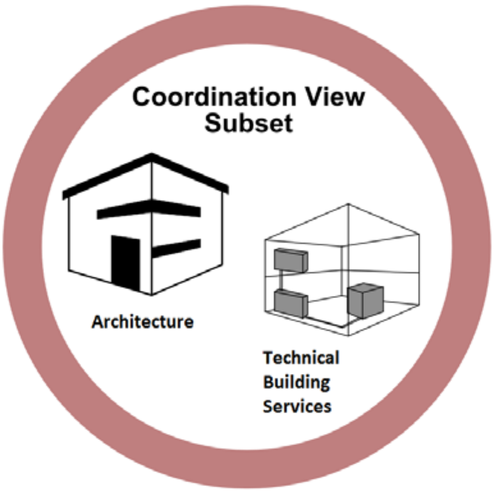


Along with new versions featuring new fields, new objects and views will be added, enabling you to use them for specific applications. The existing views will be updated and adjusted.

IFC CoordinationView

The IFC CoordinationView or in short, CV (2.0 is the current version) which describes the BIM model, is the most common subgroup. It includes all components and (architectural) elements as 3D objects. In addition, the characteristic values and attributes of all these components and elements are saved to this view.

As it is both the largest and the most extensive subset, it is often considered to be equivalent to IFC. In addition to the project structure, the IFC CoordinationView includes and supports the architectural components and HVAC components, such as walls, columns, downstand beams as well as pipes, ducts and switches.

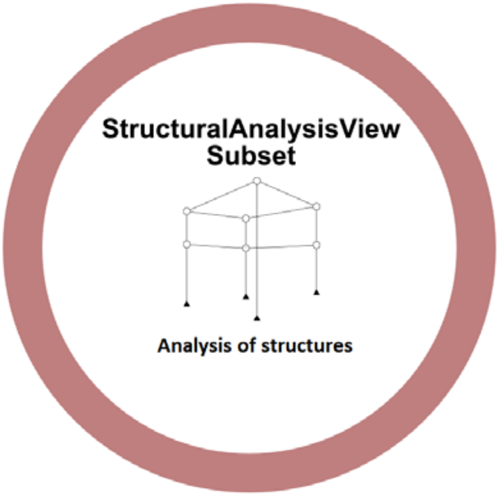


All elements are given a unique ID for the transfer. You can also give them an unlimited number of additional pieces of information. They are always displayed in relation to the other elements and the structures that are subordinate and superordinate to them.

In addition to architects and HVAC planners, engineers also use this IFC subgroup, in particular for creating precast elements, general arrangement drawings and reinforcement drawings.

IFC StructuralAnalysisView

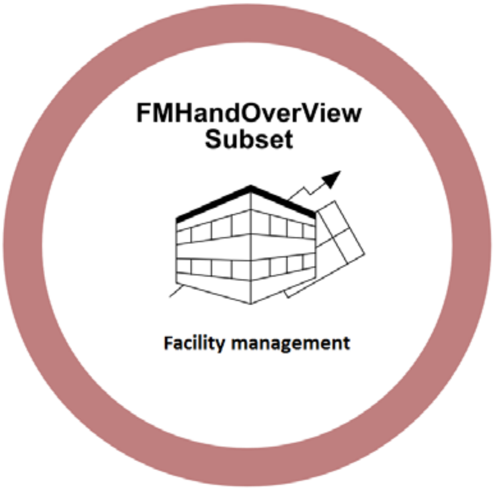
The IFC StructuralAnalysisView is a separate subgroup for structural design. The way it describes and displays the elements is completely different from that used by the IFC CoordinationView.



The IFC StructuralAnalysisView includes support conditions, static and dynamic loads, load factors and so on. For example, in this view, a downstand beam made of wood is not a geometric, architectural component with information on the material and a predefined cross-section. Instead, it is a member with specific support conditions engineers can use to calculate loads and characteristic values, such as the cross-section and the quality of the material.

IFC FMHandOverView

Facility management and real estate management usually rely on databases without graphical information.



In order to get the data for these CAFM (ComputerAidedFacilityManagement) programs, you can derive the characteristic values as a separate subgroup from the complete model In addition to the spatial structure, this subset includes the equipment objects as tables and data records.

CityGML

The CityGML format was developed as BIM was opening up to new disciplines and planning areas. This format is an application of the Geography Markup Language, in short GML. GML is a markup language, a term that originates from the printing industry. Using this language, you can structure and format texts and objects, thus adding information (”marking up” a manuscript).

CityGML is used to describe and exchange virtual 3D models of cities. It includes classes, definitions and descriptions for all common objects in urban planning and regional planning, such as, water, roads, vegetation or buildings. Each object is described with its geometry and position. In addition, the description defines how the object looks and interacts with other objects.

Like IFC and the IFC library with the IFC object types common in building construction, CityGML simplifies this structure, applying it to urban planning and regional planning.

MVD

As you have learned before, you can use IFC subsets to filter elements before you export them. In addition to the term IFC subset, you can find the abbreviation **MVD**, which stands for **M**odel**V**iew**D**efinition. A view is identical to a subset. It always defines a specific selection of elements or data records, which are taken from the complete model. In other words, you define WHAT is transferred. However, the structural engineer sees a column in a different light than the architect: the structural engineer sees the column as a vertical element for transferring vertical loads. For the architect, on the other hand, the column is a three-dimensional component with a specific material and surface finish. Therefore, the ViewDefintion defines not only which elements are transferred but also HOW these elements are transferred. In other words, which form and which information these elements are given.

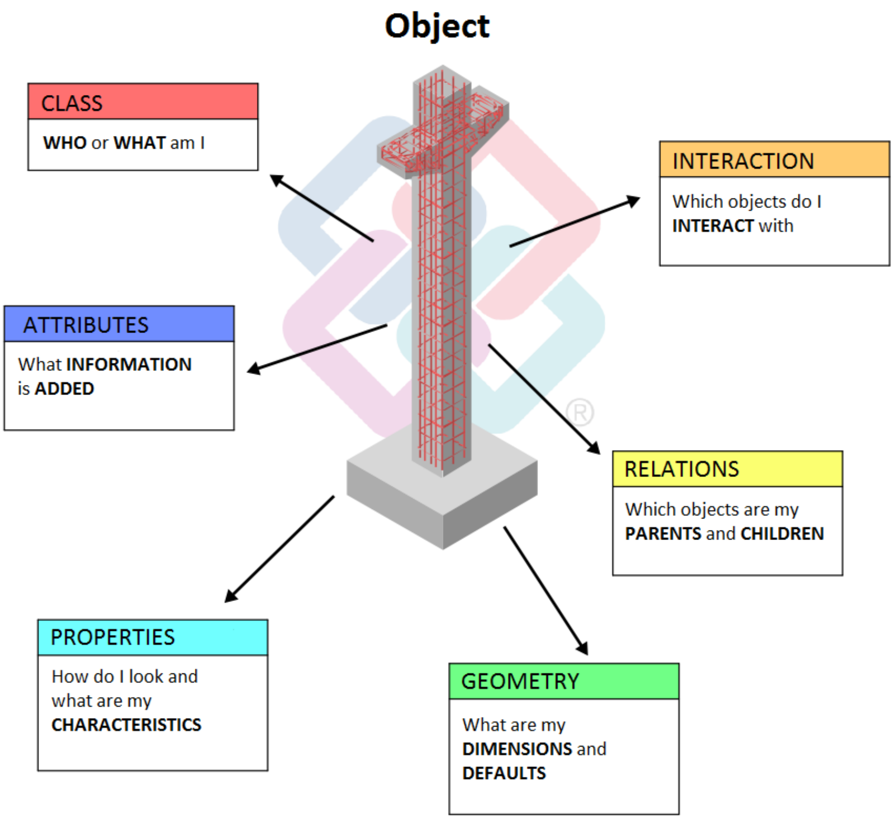
IDM

The **I**nformation**D**elivery**M**anual (**IDM**) describes the view definitions and subset definitions of the IFC format. Each subset has its own manual, describing how this subset is exchanged. In other words, the manual describes the subset in more detail, defining WHO has to provide which information and WHEN.

STEP

The structures of the IFC format are based on the **ST**andard for the **E**xchange of **P**roduct Model Data (**STEP**). STEP is part of ISO 10303. It is not primarily a file format. Rather, it is a standard defining the structure of files you can use to transfer geometric elements.

In other words, STEP describes the elements and (architectural) components of the building model both physically and functionally. This description includes the geometric values (=BaseQuantities) as well as the inherent and given properties (=PSets). In addition, it defines how the components interact with other objects.



STEP also defines the life cycle of the objects. By interacting with other components, the objects and thus their properties and attributes can change.

Like the IFC subsets, STEP is divided into subgroups for specific applications and tasks. Here, these subgroups are referred to as application protocols. It is the subgroup 225 ”Structural Building Elements Using Explicit Shape Representation” that is particularly important for the construction industry and thus for BIM and IFC.

EXPRESS is the data modeling language and programming language behind STEP and IFC. With EXPRESS, developers create the objects with their possible properties and attributes. These objects can then correlate and interact.

XML

XML is short for Extensible Markup Language. It is an all-purpose, platform-independent programming language that is common in the IT industry and software industry. As an alternative to EXPRESS, you can use this ”extensible markup language” for data modeling. XML includes tools not only for creating and describing objects with their properties and relations but also for transferring these objects to specific exchange formats. Although this language can be universally used, files in XML format are often very large, thus requiring a lot of disk space.

XML files are pure text files. Therefore, you can open, read and edit them using a normal text editor. When applied to BIM, the XML format commonly used is the ifcXML format. However, there are numerous other XML subtypes.

IFCClass/ObjectType

All standard elements commonly used in architecture, building services, structural analysis, facility management and other sectors in the construction industry are defined as types in IFC. These types can be combined into classes. Each type is equivalent to a specific IFC library element to which the associated component or object is automatically assigned during data exchange. The types in this library grow with each new IFC version. So the number of objects you can transfer as IFC objects increases steadily. Elements or components must have specific properties so that the program can detect them and assign them to the appropriate IFC library element. When you create a **Column** or **Room** using the associated **Allplan** tool, the program automatically assigns the appropriate object type and class to the column or room.

Using the IFCObjectType attribute, you can change the class later. This is useful if you want to transfer an architectural element as a different component. For example, if you want to transfer a column as a wall. In addition, you can assign an IFCObjectType to 3D objects and user-defined architectural elements in order to transfer them as predefined elements.

PSet

Depending on information density and purpose, each (architectural) element can be given any attributes and properties. Some of these features are defined as minimum requirements for transferring elements in accordance with IFC. These basic features are combined in **P**roperty **S**ets (**PSet**). Each element or component that can be transferred via IFC has its own, general property package (PSetWallCommon, PSet_DoorCommon and so on). The number of attributes in these packages can differ. Some components have additional predefined attribute groups, for example, for glass properties or specific manufacturer information. In particular, this applies to finish elements, such as doors, windows and rooms. With this grouping, you can break down the complete attribute set into smaller structures, so that you can clearly see which components have which attributes.

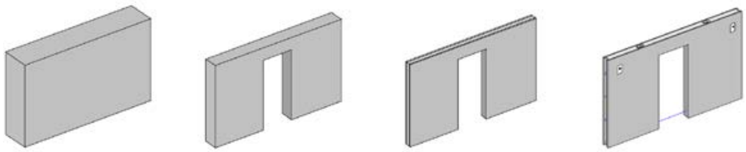
BaseQuantities

In **Allplan**, each element is defined by its geometry. Without its geometric definition, Allplan cannot create the element. This definition includes the dimensions of the element and its position in the coordinate system, which in turn defines its position in the building model. You can enter the dimensions of the element in its properties dialog box. Although these dimensions are also attributes of the element, you cannot change these attributes in the properties dialog box.

Unlike normal attributes, the geometric data are not fixed values. On the contrary, the program recalculates these values whenever you select the element, making changes immediately visible. Take a wall, for example. To identify and display the element, the program requires the height, length and thickness. In addition, it calculates the attribute values from these data and combines them in the BaseQuantities attribute package in the IFC file.

LoD

The Level of Detail or Level of Development describes the **level of detail** of the components and the overall model. The level of detail can vary depending on the project phase and the requirements. The level of detail, which is usually specified in a project handling plan, is based on the definitions laid down by the AIA (American Institute of Architecture). The AIA **classifies the levels of detail from 100 to 500**, with 100 having the least information content and 500 having the highest information content of the model or object in question. In practice, the five main levels can be named as follows: **conceptual**, **approximate geometry**, **precise geometry**, **fabrication** and **as-built**.



Conceptual (100): the element may be graphically represented in the model with a symbol or other generic representation; information related to the element can be derived from other elements in the model.

Approximate geometry (200): the element is graphically represented within the model as a generic system or object with approximate quantities, size, shape, location and orientation. Non-graphic information may also be attached to the element

Precise geometry (300): the element is graphically represented within the model as a specific system or object in terms of quantity, size, shape, location and orientation. Non-graphic information may also be attached to the element.

Fabrication (400): the element is graphically represented within the model as a specific system or object in terms of size, shape, location, quantity and orientation with detailing, fabrication, assembly and installation information. Non-graphic information may also be attached to the element.

As-built (500): the element is a field verified representation in terms of size, shape, location, quantity and orientation. Non-graphic information may also be attached to the elements.

BRep

When it comes to describing the geometry of a closed volume solid, you can choose between two options. Boundary representation or BRep is one of them. This method describes the solid as volume bounded by its surfaces. BRep can also be applied to surface models.

The advantage of BRep is that it can be used to model and describe any solid, regardless of its shape and complexity. The only requirement is that the surfaces actually form a closed solid and the edges match.

Swept Solid

Swept Solid is the second option you can use to describe a volume solid. The term 'sweep' indicates the method: a profile and a path form the basis. This is similar to the polyline sweep solid in **Allplan**. Using this method, you create the solid by "sweeping" the profile (any surface) along the path (a curve) in 3D space. While doing so, you can change the profile by turning or distorting it.

The descriptions of solids created in this way do not take up much disk space. However, you cannot use this method to create solids of any shape. This method is primarily used to export standard components like walls or columns to IFC. You must use a swept solid to describe the shape of an object if its IFC type includes the addition "StandardCase".

UUID or GUID

The two expressions Universally Unique Identifier and Globally Unique Identifier have more or less the same meaning. GUID is a Microsoft-specific implementation of UUID. IFC and BIM also tend to use GUID. One of its subtypes is the IFC ID. This universal and thus unique number has 32 characters, which are subdivided into 5 blocks and assigned to each object in a database. This method produces countless combinations, making sure each number is unique. Therefore, it can be used to identify an object within the structure.

As opposed to other object IDS, a Unique Identifier does not give any information on the type or properties of the object identified. It is a random number that is not based on parameters.

BCF

The **BimCollaborationFormat** (**BCF**) is a completely new format within IFC. IFC4 is the first version to include this new format. With BCF, you can mark changes within a model and provide others with information thereon. The aim is to exchange these data and not the entire model in a first step. So you can change, adjust and use only the elements in question afterwards. Unlike IFC objects, these elements are not elements with geometric and alphanumeric properties but coded messages. Acting as a kind of virtual notepad, these messages are used by software programs to exchange information on specific objects.

IAI

The International Alliance for Interoperability (IAI) was founded by leading software providers in 1994. Its aim is to develop an open and platform-independent data model that can be used to map the entire life cycle of a building. By defining specifications for the data structure, this international organization focuses on integrating as many applications as possible.

The IAI was initially founded as the Industry Alliance for Interoperability. Right from the outset, it was open to all interested parties. In 1997 it was renamed International Alliance for Interoperability. In 2005 it was renamed again. Since then it has been called buildingSMART.

buildingSMART

buildingSMART International, formerly the International Alliance for Interoperability (IAI), is an alliance of organizations with regional chapters all over the world. In Germany, it is represented by the **buildingSMART e.V.** association.

Its goal has not changed - it is still dedicated to improving processes within the construction and facility management industries through defining the use and sharing of information. Organizations within the alliance include architects, engineers, contractors, building owners, facility managers, manufacturers, software vendors, information providers, government agencies, research laboratories, universities and more.

Allplan GmbH, which has been a pioneer in this alliance right from the start, strongly focuses on improving and developing open program interfaces and formats.

History

Whereas mankind has constructed and used buildings since earliest times, people started documenting the relevant information not so long ago.

At the beginning, people passed information by word of mouth. In particular, this was common in medieval construction. The master builder knew everything about the building, acting as a human ”data carrier”. Written records did practically not exist. On the one hand, information was lost when the person in charge died or left the building site. On the other hand, master builders were highly respected persons.

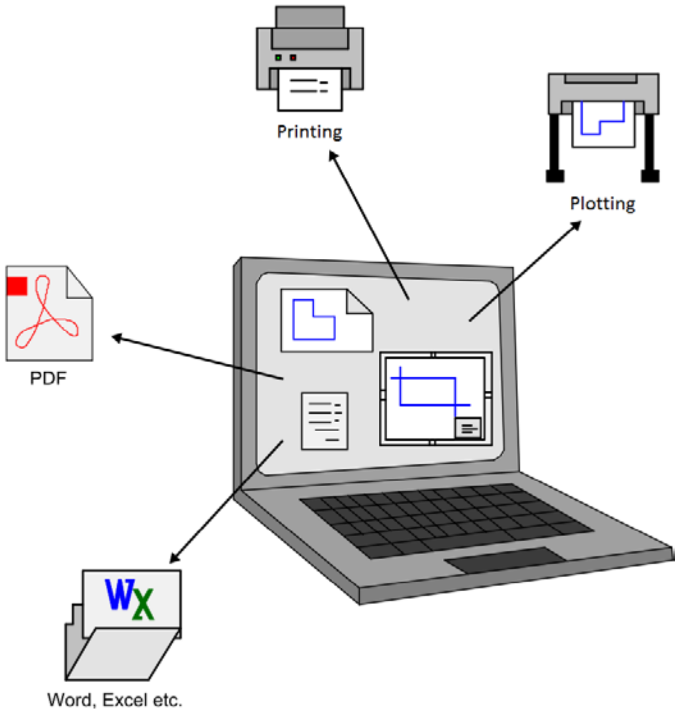
The first building drawings passed down to us are from the end of the Middle Ages. These drawings include sections on parchment and sections scratched into the stone floors of Gothic cathedrals. From then on parchment or paper served as the ”data carrier”, making it possible for the first time in history to document, store and reuse these drawings.

These sections on parchment were the prototypes of the modern drawings. Even today, paper drawings are widely used, in particular on construction sites. Drawings have primarily changed in two points over time:

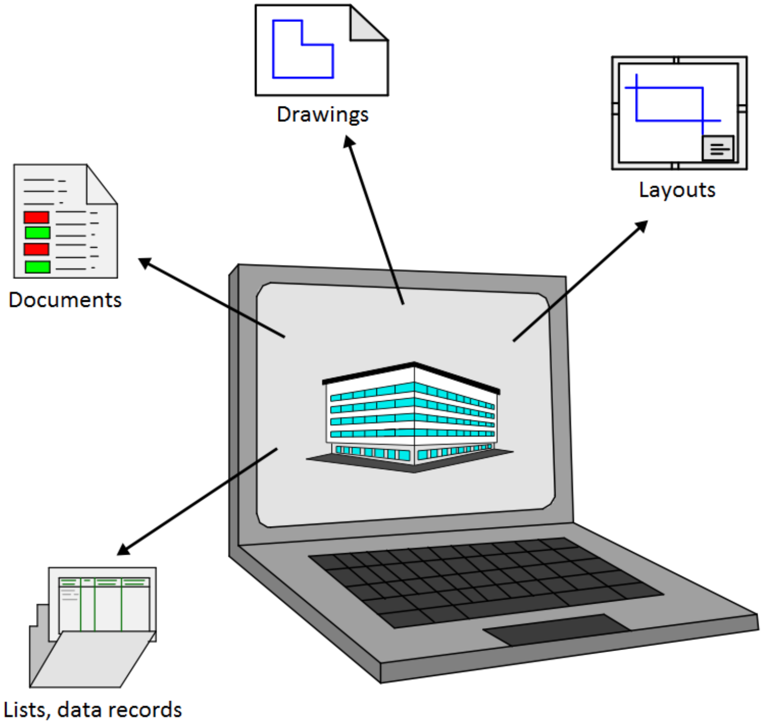
- The type and form of the tools used to create these drawings as well as the material of the drawings and the form of the ”data carrier”
- The number and contents of the drawings as well as the degree of abstraction

Although the development and rise of the computer fundamentally revolutionized office routine, this had little effect on the construction industry a first. When documenting buildings and information in the form of plans and drawings, computers initially changed only the way these documents were created.

Starting with mechanical engineering and automotive engineering, the first CAD systems came onto the market in the early eighties. Consequently, drawings were no longer created on the drawing board. Instead, the computer was used to generate the necessary building documents, such as floor plans, sections, elevations and details. However, all these documents were still two-dimensional line drawings. The mouse replaced the pencil as the drawing tool and a more or less program-specific file replaced paper as the data carrier.



Even at this early stage, there were first steps towards object-oriented, three-dimensional building models, making the most of computers and software. Although three-dimensional building modeling has still not gained full acceptance to this day, it has become the standard for documenting building processes.



Whereas drawings, plans and other documents can be exchanged easily in paper form, digital and program-specific files cannot be exchanged so easily, in particular, if the persons involved do not work with the same software programs. As each program has its own rules and specifications, it can happen that data are not read correctly or not at all.

By converting data to a different format, you always run the risk of changing the data. Due to the great variety of programs and formats, it is impossible to transfer data one-to-one. Information may be lost altogether or it may be wrong afterwards. In order to minimize this risk, optimize the flow of information and provide as large a bandwidth of programs as possible, some of the leading software providers for the construction industry formed an alliance in the middle of the Nineties.

Their aim was to use existing standards to develop a neutral and open file format for describing and exchanging the data, elements and processes of the construction industry and real estate industry.

Until then PDF had been the only (relatively) neutral format. But its structure and contents are more like paper or a digital printout. The advantages of the PDF format are that it displays the original drawing elements as they are and that you can display it on any computer using the free Adobe Reader®. But when it comes to exchanging complex data, the PDF format has some big disadvantages:

Once created, you can no longer change, edit or expand the PDF file. What's more, not every program can import PDF files or interpret their contents correctly. But the fundamental weakness is that any information other than pure 2D graphics is lost when the PDF file is created. Basically, the PDF file is a paper drawing in digital form. So PDF serves the intention and purpose for which it was developed but it falls short of the alliance's aim.

In addition to PDF, the AutoCAD-based DXF format has been and is still used for exchanging CAD data. However, DXF is not a neutral format and it is also geared to exchange 2D data. With DXF, you can exchange normal design entities, 3D shapes and additional information as attributes. However, this is limited to the AutoCAD form and description. In order to ensure that (CAD) software correctly transfers and interprets DXF data, you need a program that is based on this standard.

The IFC format, on the other hand, is based on STEP. This is an open and software-neutral standard. The IFC format, which was developed by IAI, describes the elements and processes with all their properties. In addition, it describes how they look in 3D and how they interact. Another important aspect is that STEP focuses on the construction industry with its specific requirements and conditions.

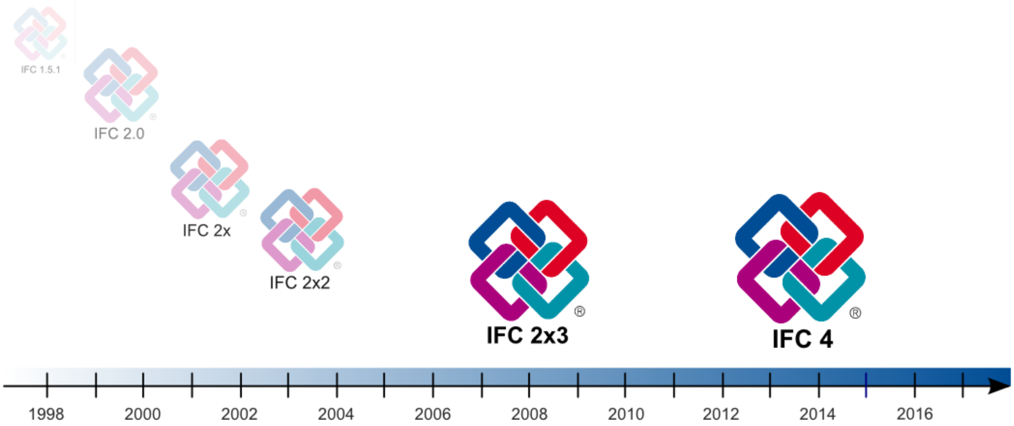
Therefore, the IFC objects include walls, reinforcing bars and room groups. But they do not include pistons and ball bearings, which are commonly found in mechanical engineering and automotive engineering. So you find the objects and processes you actually need.

The first IFC version - IFC 1.5.1 - came on the market at the end of the Nineties. It was a kind of prototype, but the more stable version 2.0 replaced it shortly afterwards. The structures of these two versions are completely different from those of all subsequent versions. Therefore, they are not compatible with any subsequent versions.

This changed with the first ”X” release: since then each new version has been building on and thus expanding the previous one, ensuring upward compatibility. There have been four ”X” versions from the first ”X” release - IFC 2x - in 2000 to this day:

- IFC 2x
- IFC 2x2
- IFC 2x3
- IFC 2x4

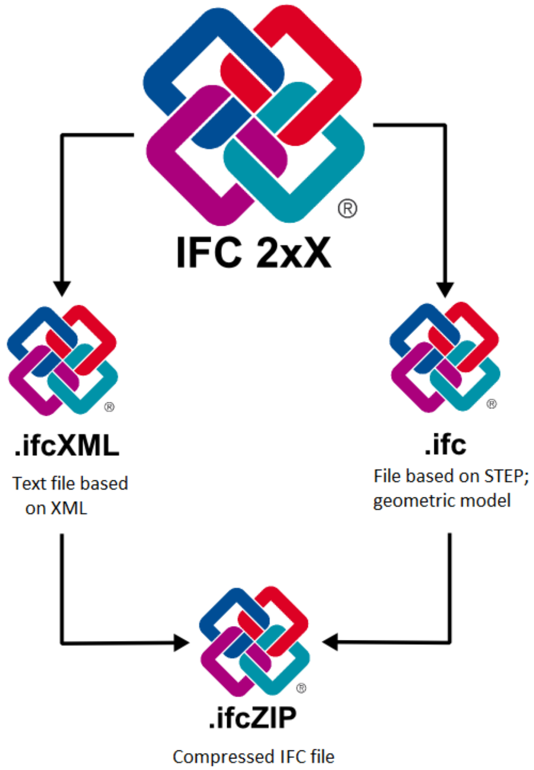
At the moment IFC 2x3 is the most widely used release. It will soon be superseded by version 2x4 (with the name IFC4), which is the official standard right now.



Apart from improving features and correcting errors, buildingSMART focuses on adding new objects and functions, opening up new applications. In doing so, buildingSMART added the area of facility management some time ago. Currently, it is working on providing objects and functions for landscaping and urban planning. Not only members of the alliance but also any (CAD) user has the right to suggest new elements or improvements in general. buildingSMART is always open to new ideas and suggestions.

In addition to the ”main version”, each release comes with a text file and a compressed format. Whereas the STEP-based main format includes the geometric model, the text file provides a 2D description in the form of an XML script. Thus, it has the extension *.ifcXML. You can open this text file in any text editor. It can even be read by programs that do not have their own IFC interface.

You can convert both the IFC file and the IFC-XML file to a compressed file in *.ifcZIP format, thus considerably reducing the file size. In order to open the file again, you can use any file archiver.



Myths and Facts

Not only the term BIM itself but also the associated topic as a whole entails numerous opinions, beliefs and (half-)truths. This applies to single concepts and to the whole process of creating and handling projects.

As a result, people tend to reject BIM in general or they do not want to pursue it further.

Above all, people worry about two things:

- On the one hand, they fear that they have to spend much time and effort creating and maintaining the building model, resulting in extra costs they cannot charge anybody.
- On the other hand, they are afraid that they have to give up their usual way of working, being forced to redefine all office standards, resources and defaults, also involving much time and extra costs.

Although these concerns are definitely justified, switching to BIM has far less impact on office routine than most people assume. Of course, you have to spend some time rethinking building data so that you can create the building model in an optimal way. In addition, the employees in your office have to be trained in the ”BIM method”, in particular if they have not (yet) worked in 3D. If so, most **Allplan** tools are not used at all.

In any case, switching to BIM is always a worthwhile and future-oriented investment. A database that is universally available, functional and up-to-date can not only prevent a lot of misunderstandings and errors during planning but also speed up project work on the whole.

The following section briefly describes the most important FAQs on BIM and IFC. They are described in detail later. Here, we just want to do away with some misunderstandings right from the start, helping you to quickly get a realistic view of BIM and its effects on planning.

BIM model

Everybody is talking about BIM, BIM models and "BIM-compliant" software. What is it all about? And what does the abbreviation BIM mean and is Allplan BIM-compliant?

Apart from "Be Intelligent Man", the abbreviation **BIM** stands for **Building Information Modeling**, which roughly means "modeling the data of a building" BIM describes the process and method of creating a central building data model that includes all data, characteristic values and attributes relevant to planning, designing, constructing and maintaining the building.

The virtual model of the building created in this manner is often referred to as a BIM model.

There is no actual "BIM-compliant" label in the form of a certification for a software program. Each (CAD) program you can use to create a data model of this kind is "BIM-compliant".

Allplan has been supporting this development as a pioneer since the eighties even though Allplan 2008 was the first version to focus on BIM. With **Allplan** you have always been able to create and analyze 3D models. Therefore, **Allplan** is considered to be "BIM-compliant" in every respect.

IFC format

What is the IFC format? Are there different types? Can my planning partner read all these types?

IFC or **Industry Foundation Classes**, which is the full name, is a special file format, such as BMP, DOC or PDF. Using files in this format, you can describe and transfer project information relevant to the construction industry and facility management. To do this, you can use a digital building model, whose structure and properties are predefined by the `*.ifc` format.

Depending on setup, date of issue and contents, IFC differentiates between the **IFC2x2**, **IFC2x3**, **IFC2x4** and **IFC-XML** formats. The format most commonly used today is IFC2x3, which is also the default setting in **Allplan**. IFC2x4 (or, in short, IFC 4) will soon replace IFC2x3. IFC-XML, on the other hand, does not provide model data but returns the associated descriptions in text form. You can use any common editor to read this format. Therefore, it is mainly useful to exchange partial information.

For the time being, you should use the **IFC2x3** format, which can usually be read by every (CAD) program with an IFC interface. However, this format will soon be superseded by the IFC 4 format.

IFC specifications

AutoCAD is behind the DWG format and Adobe is behind PDF. So who is responsible for IFC and who defines its specifications?

IFC is an open and neutral format, which means that it is independent of any program and provider.

The specifications and standards describing how building models are to be created and how data are to be structured are defined and refined by an international consortium. Launched in 1994, the IFC alliance was founded by a group of leading software providers. Right from the outset, it was open to all interested parties. Today, it also includes government agencies, research laboratories, universities as well as groups and private persons. Founded as **International Alliance for Interoperability** (**IAI**), the consortium was renamed **buildingSMART International** in 2005.

The specifications developed and defined by IAI and buildingSmart have become a standard by now and they are certified by ISO and registered as ISO/PAS 16739.

Being a member of the alliance, Allplan GmbH strongly focuses on improving and developing the IFC interface. Allplan also takes part in the certification.

File preview

How can I display IFC files? Do I need a specific CAD program or can I get a preview of these files prior to importing them to Allplan?

Being an open and platform-independent format, an IFC file can be read by any CAD program provided it has an IFC interface. Basically, you import IFC data, which means that the data are read and converted to the program-specific format. As a result, you can then edit the information as if it was initially created by this program.

To display the file, you can choose from numerous **IFC Viewers**, which are mostly available as freeware. However, you cannot edit or change anything in the file. Using these viewers, you can move around and explore the 3D model interactively as well as retrieve information on elements in this model. You can even convert the data to other formats. However, this feature is not provided by all viewers.

To display IFC files, you can also use the open data platform **bim+**. Its use is included in your current Allplan license. After having logged in and created your own account, you can upload IFC files from anywhere, combine them with other models, give them additional information and attach data. You can find detailed instructions for bim+ in the ”Checking data” section (see page 188). This section shows you how to use bim+ in conjunction with IFC and **Allplan** models.

As opposed to the DWG interface, the IFC interface in **Allplan** does not provide an integrated preview. You can use a viewer to access the relevant information. After having created an IFC file, you can also check the data in a viewer before you distribute the file.

Import

I have received IFC-format files. What is the best approach to import these files to Allplan? What settings should I use? Can I specify where and how the file contents are saved?

You can import the data to an existing project. You can also create a new project and import the data to this new project. In order to import the data, select the **File** menu - **Import** or **Create** - **Interfaces** - **Import IFC Data**. You can also drag the file directly into the workspace.

In any case, the current drawing file is irrelevant: you always specify the first drawing file for the import in a separate dialog box. Starting with this drawing file, Allplan arranges the elements in the IFC file on empty drawing files in ascending order. As **Allplan** uses only empty drawing files, you do not run the risk of overwriting existing data.

As the structure of the data is defined in the file itself, you cannot influence or change it during the import. Therefore, you do not need to define any specific import settings. But you can specify which elements are to be imported. In addition, you can use the ”Copy, Move Elements between Documents” tool to refine the existing structure after the import. So, for example, you can arrange the data by component.

Layers

What is the role of layers in IFC?

In **Allplan** and in other CAD programs, layers provide an additional means of applying a structure to elements, in particular when it comes to defining visibility, format properties and privileges. Other CAD programs store data in layers. In Allplan, on the other hand, the actual data creation process happens in drawing files.

A layer is a **format property**, such as the color or line type. Consequently, layers are transferred as format properties to IFC. In the IFC file, layers are displayed as (general) **element properties** and they can also be shown or hidden.

Layers are particularly important if you work with programs that do not provide any other means of applying a structure.

The term layer in an IFC file refers to the construction layer of a component, such as a multi-layer wall.

Attributes

Which component attributes and element properties are transferred? Can I also transfer user-defined attributes and attributes that are not in the IFC attribute group?

Each transferable (architectural) element created in three dimensions in **Allplan** is aways transferred with all its properties that are required to identify it in IFC. These properties include the **geometry** and **position** as well as general properties, such as the **object type** and **name.**

Any other data and characteristic values that are relevant to the element and that are to be included in the transfer can be assigned in the form of attributes. For this **Allplan** provides the **Assign, Modify Object Attributes** tool in the **Object Manager** module.

The group from which you take the attributes is irrelevant. You can also use user-defined attributes. All assigned attributes with values are transferred.

The entries in the **IFC attribute group** are mainly used for **structural analyses, building physics, fire protection** or for the **general element description.** Therefore, they are defined as minimum requirements in the IFC specifications.

When it comes to transferring data, the group to which an attribute belongs is completely irrelevant. It is the internally coded assignment that defines whether an attribute is transferred as an **IFC** or as an **Allplan attribute.**

The BIM Process

”What is BIM - and what is it not?” there are a lot of different, in part opposing views and opinions. What’s more, people often use the terms BIM and IFC synonymously. Although being closely related, these two terms differ completely in content. By no means is BIM a new invention. On the contrary, its ideas and underlying philosophy is quite old.

However, it has become more and more important in recent years. Today it is an ever-present topic, particularly in building construction. Apart from a number of other factors, some specific tendencies and general developments mainly account for this trend:

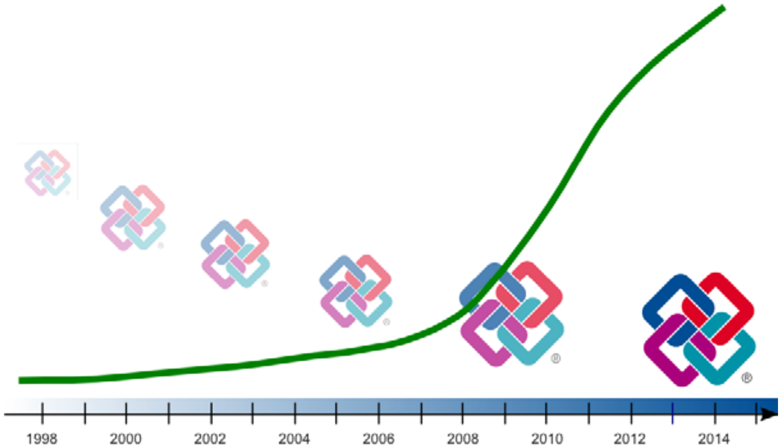
- The increasingly complex construction cycle - accompanied by more and more rules and regulations - has split the construction process into a number of small parts, forcing the people involved to specialize in specific fields. You can find this phenomenon not only in the construction industry but everywhere. As a result, it has become increasingly important how people communicate and exchange information. In the end, this often decides whether a project is successful or not.
- Internationalization is another phenomenon, involving all industries throughout the world. Here, too, it is essential that people communicate and exchange information. This will only work if they create a common database everybody can access at any time.
- When computers and CAD found their way into office life, building professionals switched from drawing lines and points to modeling entire structures. Thanks to powerful computers and a large variety of

programs, people can nowadays use and analyze data in myriad ways. For example, a building model created as the basis for planning can also be used to simulate energy consumption (provided you enter appropriate parameters). But this will only work with a common database that can be interpreted and processed by the different programs.

So communication involves both people and programs.

This trend will not only continue but also accelerate considerably. Construction-related fields, such as landscaping and urban planning, have also been integrated into BIM. In addition, more and more countries include BIM in their specifications and regulations. In the US or Scandinavia, for example, BIM is an integral part of public contracts.

Although the situation is (still) different in Germany, BIM has become increasingly popular in recent years, prompting the government to draft some bills.



The following section shows you what's behind BIM. You will learn about the BIM philosophy. In addition, you will discover how you can plan and handle your projects using BIM.

You will find that within a short time you will be in a position to adjust your own workflow and office routine accordingly.

Philosophy

When people were building the ”Tower of Babel”, they realized how important it is to communicate. In other words, communications is the key to project success. Its importance increases with the number of people involved and the complexity of the task at hand.

Only if all project participants speak the same language and have access to the same data will they be able to communicate effectively and make the right decisions. In addition, these data must always be up to date and available to everybody. Otherwise, there will be misunderstandings.

This is exactly where BIM starts. Actually, BIM comprises several aspects:

- Data type
- Data creation
- Data exchange

buildingSMART has defined detailed specifications for each of these aspects, making sure its underlying concept works as a whole. Being understood as ”modeling building data”, BIM describes the entire process, including much more than just creating a 3D model and stuffing it with parameters.

However, this 3D model in the form of a database is the central object of Building Information Modeling. It is at the core of each project, forming the basis for all those involved. Whether BIM works or not depends on the data of this model.

In order to provide a database that can be used by any software, the BIM model uses an open file format, which is based on a predefined standard of given elements with a uniform structure:

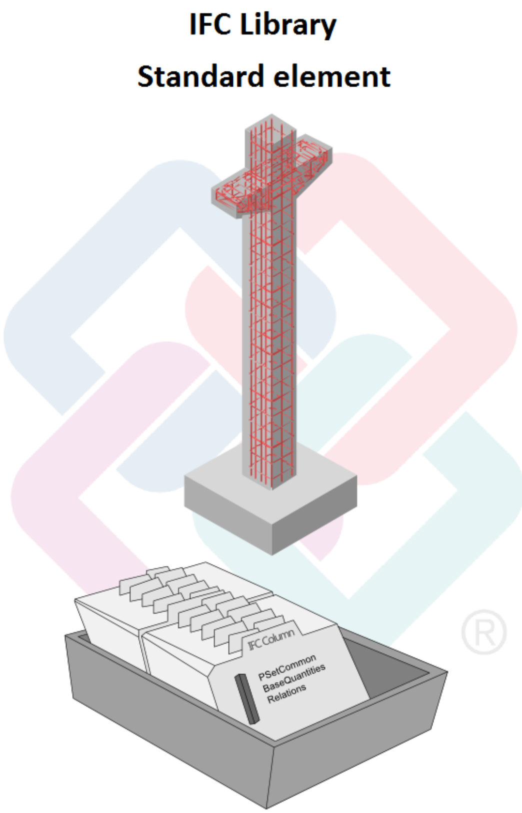
- IFC, the Industry Foundation Classes

IFC is *not* a character format; rather, it focuses on objects and their shapes, parameters and attributes. In addition, it describes how these objects interact and fit in the overall context.

This format is based on the ISO standard STEP, specifying how the structure of files must look if geometric elements are transferred with these files. In addition, these files must be able to describe any changes during the ”life cycle” of these elements.

The IFC ”language” includes all objects in the form of a component library of predefined elements. Apart from its name, each object has a list of possible parameters, properties and functions. This list also describes how this object interacts with other objects. Being the same for all objects, the advantage of this scheme is that new elements can be added to the library quickly and easily.

Take a column, for example. Its object name in the library is ”IFCColumn”, regardless of its name in the different (CAD) programs. The most important parameters are the column’s geometric values, such as its height and cross-section. You can find a list with its functions and properties in the Property Set. For the ”Column” object, the Property Set includes the name, column type, static load capacity, inclination, fire resistance and an identifier indicating whether the column is inside or outside a building. If you want to know how the column interacts with other objects, you can look at recesses, connected components, reinforcement, technical building equipment and so on.



The contents of the PSets change with the object types and their complexity. However, architectural elements are an exception, as most of their general properties are included in IFC objects. Therefore, you can find these properties in (nearly) every PSet:

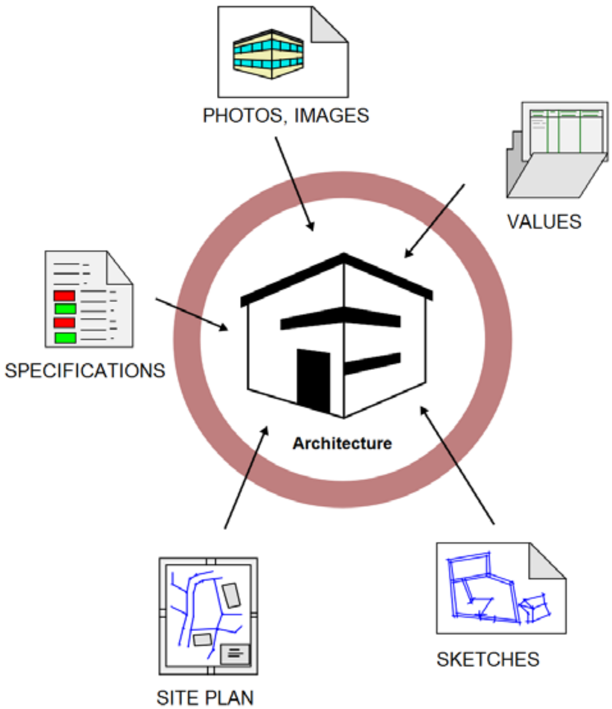
- Object type (”Reference”)
- Alteration category (”Status”)
- Load capacity (”LoadBearing”)
- Inside, outside (”IsExternal”)
- Fire resistance (”FireRating”)
- Sound insulation (”AcousticRating”)

These properties are in the general property package, which can also contain any number of additional properties in the form of attributes.

Implementing BIM

Regardless of whether working with or without BIM, planners start each project by assessing and compiling information and looking over the parameters and boundary conditions given. This results in an initial database, forming the basis for all subsequent steps. In the first step, the architect usually plans and designs the building, creating drawings, sketches, layouts and (three-dimensional) models. Ideally, BIM starts at the same time and continues until the project ends:

The planner combines the key data into a three-dimensional virtual data model, forming the prototype of the BIM model. This model is identical to the real building. From now on, it is at the center of all processes. ”BIM” - that is, ”modeling building data” - means creating, maintaining and updating this data model. However, this only covers one aspect of BIM as a whole, that is to say, data creation.

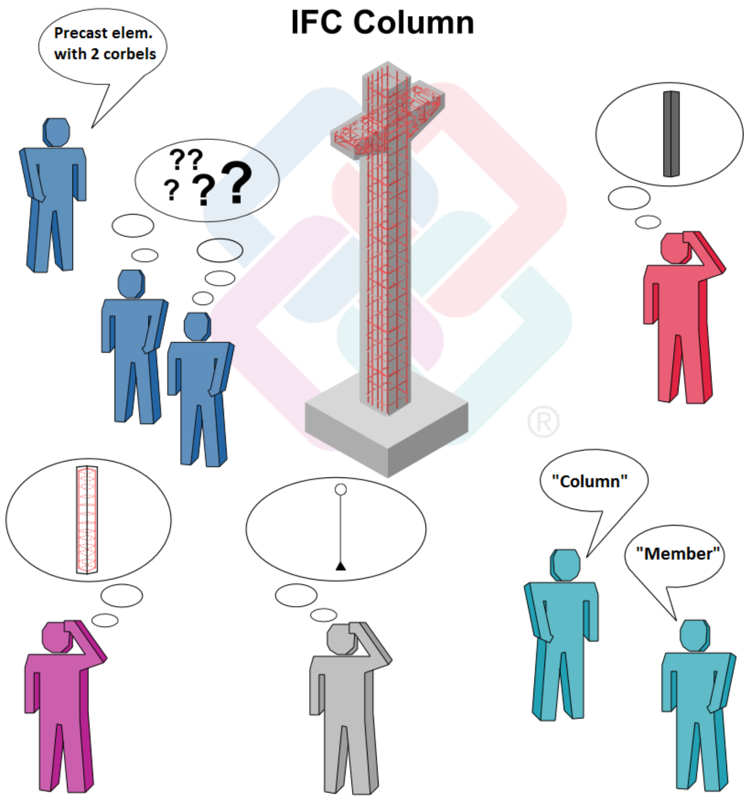


Planners create the geometry of all objects and elements in the model using CAD software. After this, the objects and elements are given additional information. This forms an initial database, which is identical to the building and which can serve as the basis for all subsequent steps.

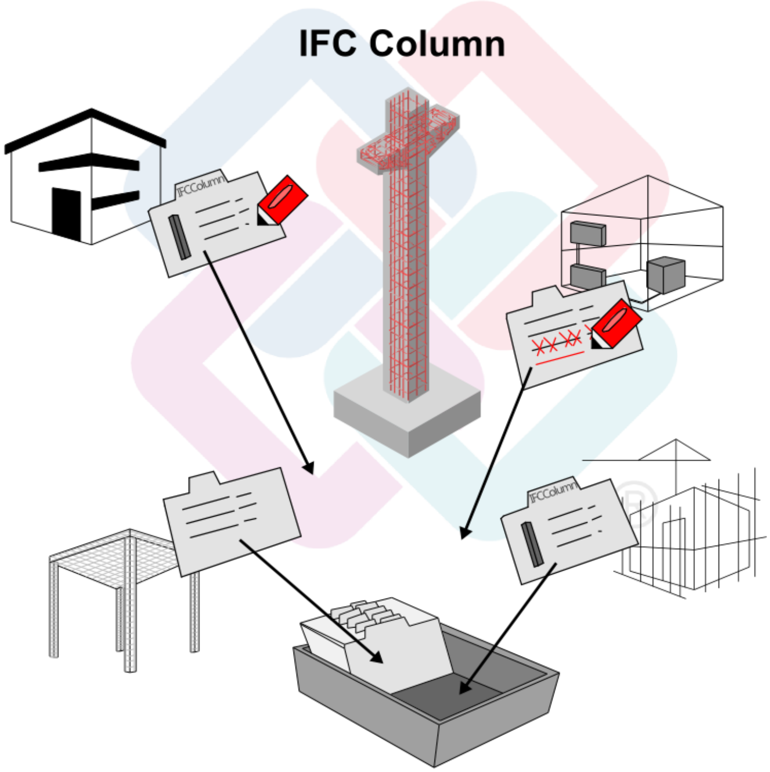
So that all project participants can access and work with this database as well as use the information therein, it must meet the following requirements: the database must be in a form that can be read by the software program at hand and it must be a uniform, program-independent data package that is available to everyone.

So the next step is to convert the model to this form, which means exporting it to IFC format via the corresponding interface. In doing so, the program assigns each object - that is, each building block of the model - to the appropriate library element within the IFC definition and writes the object-specific information to the list of characteristic values and parameters. In other words, each object becomes a data sheet with a uniform structure.

As a result, everybody who works with the database knows exactly which object he or she is dealing with, avoiding misunderstandings right from the start.



During planning the database grows with the project, as all those involved not only add new objects or components but also change the existing ones. In doing so, they create new library elements or fill the columns of existing data sheets with values. As a result, the entire model builds up building block by building block. By interacting with one another, the objects produce additional information, which is entered in the data sheets.



As the IFC format and the IFC platform do not provide tools for manipulating objects directly, project participants CANNOT edit the IFC model itself. Instead, each project participant can use his or her own familiar software program, provided it has an IFC interface. This is the basic requirement for translating objects from the BIM model into the program-internal format and writing them back after editing.

Planners do not need to transfer the entire model or all the components of an object if they want to edit only specific properties, as is usually the case. Instead, they can use IFCSubsets or ModelViewDefinitions (MVD) to filter and transfer exactly the elements and parameters they need. During import, these objects are translated into the program-specific ”language” for editing. For example, the structural engineer uses a structural analysis program to calculate the cross-sections for the reinforcing bars. The engineer in charge of technical building services uses a separate program to place the heating lines and ventilation lines. And last but not least, the quantity surveyor assigns cost keys to the components using a program for tendering, awarding and invoicing.

As in real life, everybody can speak the language that is specific to his or her own field and use the vocabulary he or she is familiar with, making internal processes faster and more efficient. The standardized format is used only for external communication and communication between different groups, ensuring that technical terms, which might be ambiguous, are not used. Otherwise, misunderstandings and planning errors are inevitable, resulting in delays and higher costs.

Having edited the objects, planners write them back to the BIM model, thus integrating them into the database that is available to all project participants. In other words, the program converts the modified objects back to the IFC format using the export interface. Provided all those involved continuously synchronize the office documents with the BIM model, the virtual BIM model is an identical copy of the real building throughout the whole project.

Instead of editing the whole model, planners usually have to change only individual objects or areas. In practice, markers indicating changes have been proven to be useful. In addition to communicating changes in the traditional way by email, telephone or fax, planners can now mark changes or problems directly in the software program.

In order to do this, they can use a kind of virtual notepad, the **BIMCollaborationFormat (BCF)**. It can be attached to any IFC object within the model. In addition to acting as note, it also tells planners who created it and when. Instead of exchanging the whole model, planners can exchange these notes in a first step. After this, they can change and adjust only the objects in question.

These virtual notes not only help project participants to collaborate closely and efficiently but also to reduce the volume of data and thus the time it takes to upload and download the data.

Ideally, the BIM model is complete at the same time as the real building is complete. So both the building and the database can enter the second phase, that is, utilization. Basically, this is done by facility managers using FM programs for managing buildings and real estate. They can use the data to derive specific key figures and values, such as the number of windows that must be cleaned or the total office area within a block of buildings. At the same time, they can continue to ”model building data” by adding more attributes and information to the existing objects of the BIM model.

The BIM model helps all those involved. For example, research facilities can use the BIM model to create energy simulations. Above all, it is the client and owner who benefits most from the BIM model, as he or she can access the building data at any time. For example, if it is time to renovate parts of the building, owners can quickly and easily derive all necessary values from the model. And finally, when it comes to demolishing a building, the BIM model provides everything owners need - from quantity values to material types to constituent parts required for disposal.

Summary

As you can see, BIM and its philosophy is much more than just creating a 3D building model with the aid of (CAD) software and attaching information and attributes to the objects and components within this model. Furthermore, BIM is not limited to planning and construction, that is, the work typically done by architects. Rather, BIM encompasses the full life cycle of a building.

You can also see that switching to BIM does not disrupt office routine, as you do not require any new or additional software programs or more powerful computers. Rather, all those involved need to rethink how they work and communicate.

Big BIM and Little BIM

How BIM benefits your daily work

As you all know, opinions about the meaning of the term BIM differ widely and its ideas and underlying philosophy are interpreted differently. Similarly, you can find diverse approaches to implementing BIM in practice. Apart from worrying about the effort and the costs involved, people weigh up the opportunities and risks of this ”new method of working”. In addition, they want to know how and to what extent this new method can be integrated into office routine.

Basically, BIM adds to planning and the building process as a whole, thus boosting efficiency over the long term. However, the attitude of those involved is not the only thing that matters. There are a number of other conditions controlling how and to what extent BIM can be applied to a specific project. There is neither a universal rule of thumb nor a general formula for predicting the degree of utilization that will be achieved in the end.

Although both **Allplan** and BIM are based on the motto of ”integrated thinking”, this does not necessarily mean that everything is geared to this approach. Sometimes it makes sense to use it in specific project phases or areas only. You must take this decision whenever you start a new project, as it is influenced by a number of additional factors, such as the software used. In addition, you need to think about whether you are dealing with a complex project or whether you are working together with external partners.

In the end, it is up to you to decide whether you want to embrace the BIM philosophy and its underlying ideas and methods. At any rate, it is a future-oriented investment in your own knowledge that pays. The more BIM is practiced and implemented, the greater the benefit to all those involved and the more natural it becomes in office routine. One day it will be taken as a matter of course much in the same way as computer-aided design replaced the conventional drafting board some time ago.

Once you have decided to use BIM in your office, there are a number of possible scenarios:

- The client requires you to provide a BIM model and to handle the project in a BIM-compliant manner. These points are integral parts of the contract. This is already the case in the US and Scandinavia. In Germany, too, more and more public contracts include BIM.
- There is an external project controller instructing all those involved to use a BIM model as the basis for planning.
- The parties involved agree to use BIM for the whole project or individual phases or areas.

If all those involved agree to use BIM although they are not required to do so, this agreement should be drawn up in writing at the beginning of the project. This basic agreement should include all details so that it can be expanded as the project takes shape.

Like cooperation and data exchange in general, BIM will only be successful if all those involved embrace it and communicate openly and easily. As you can see, BIM also encourages communication.

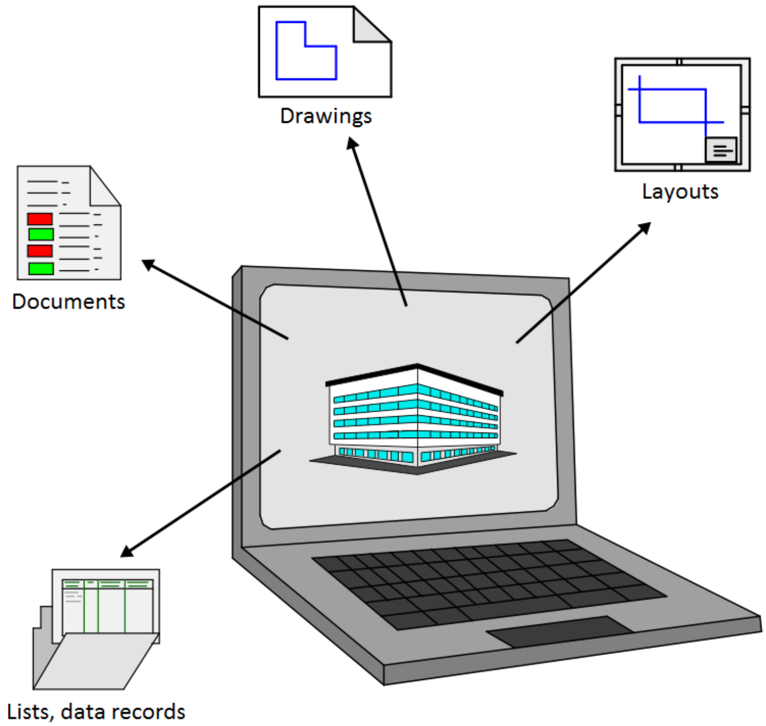
Benefit

If BIM is an integral part of the contract, you do not need to think about the benefit. But if the decision is up to the project participants, they will only opt for BIM if they can see the additional benefit. There are still a great many doubts and worries. In the early project phases in particular, the effort involved in BIM seems to be much more than in conventional project handling.

That’s right and this fact cannot be dismissed. However, the effort involved also depends on your general office routine and whether you are working together with external partners. But you will enjoy the benefits as the project expands. In the end, the benefit is far greater than the initial effort involved.

If you regularly work together with other offices, the topics of data exchange and appropriate data and documents play an important role. Basically, the volume and quality of these data define how efficiently all those involved can work. The more detailed the information, the easier it is to analyze and edit the data. Ideally, it should be possible to exchange data one-to-one. Even though this is not (yet) possible, each piece of information that can be transferred and each object that can be exchanged saves everybody a lot of time and effort. If this is the way you work, you are used to working with defined structures and specifications, allowing you to save information as uniform and up to date as possible to exchange files and thus to a building model - even without BIM.

As you can see, even if you do not focus on BIM, this approach helps you tap the full potential of CAD and building-specific software for planning. This also applies if you use the data only within your own office. If you build up your building model right from the start and consistently add all pieces of information, changes and new components, you always have the current data at hand throughout the project. You can use and analyze these data in many different ways. In addition, you do not run the risk of working with different or obsolete documents, nor do you have to create the data for each phase from scratch. In the end, this brings about additional benefit which more than compensates for the additional work at the beginning.



BIM is not limited to planning. Rather, BIM encompasses the full life cycle of a building, resulting in a great deal of options for using and analyzing the data of the building model. Although the client and facility managers benefit most from these options, you - as a planner - can also benefit greatly from these models and databases:

- You can use them as templates and documents for other projects that are similar or that use similar components. Based on these data, you can then estimate the time and costs using practical values.
- When it comes to altering or extending the building, you can use the planning documents as the basis for your work. Consequently, you do not need to adjust (obsolete) as-completed drawings on site, nor do you need to enter the geometry of the building from scratch.
- If the BIM model remains the property of the creator - that is to say, you as the planner - and you also own the copyright, you can conclude a maintenance contract with the client. This contract is similar to that for the real building. In this case, you update the model to reflect any changes in the building, charging the client separately for this service.
- ...

Scope

The manner in which you implement BIM in your daily work and in real projects can vary considerably. In addition, this is influenced by numerous boundary conditions. For example, you can apply BIM to the whole project from its beginning to its end. Or you can use it for specific project phases or areas only. In this context, you will often hear the terms ”Big BIM” and ”Little BIM”. Strictly speaking, only ”Big BIM” is real BIM. This is the only method to reflect the central idea of BIM. However, it is not always possible to implement ”Big BIM” without restrictions. For example, some project participants may not have appropriate software or they want to stick to the conventional way.

Even so, ”Little BIM” offers advantages to all those involved. Provided it is used consistently, ”Little BIM” allows project participants to use and analyze the data in many different ways. In addition, you do not necessarily need to exchange data or use different software programs. As you can see, you can also use BIM within a program or family of programs.

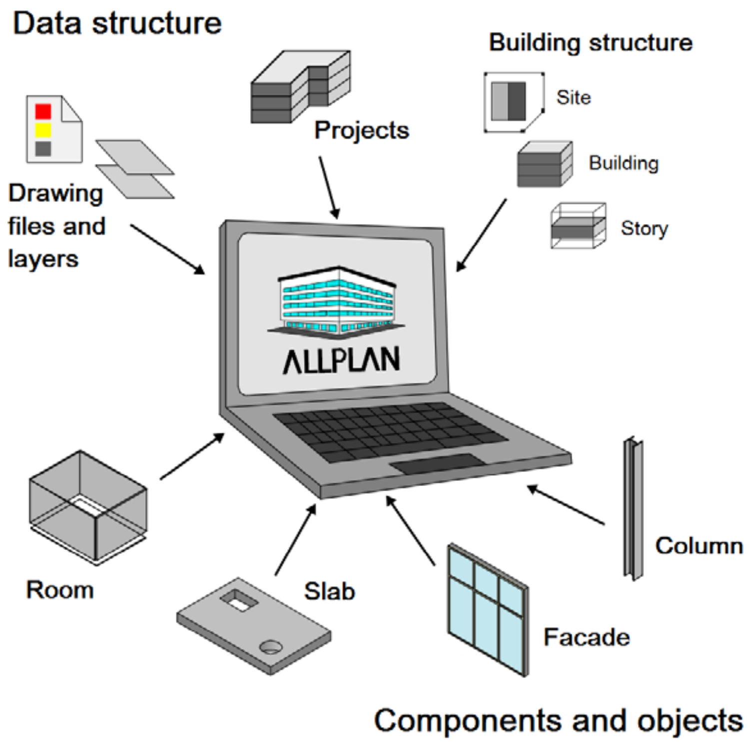
BIM and Allplan

Allplan’s data structure and its numerous tools and objects are tailored to suit the needs of architects and engineers. Therefore, **Allplan** provides the ideal platform for creating, editing and maintaining a BIM model as well as handling projects in accordance with the BIM concept:

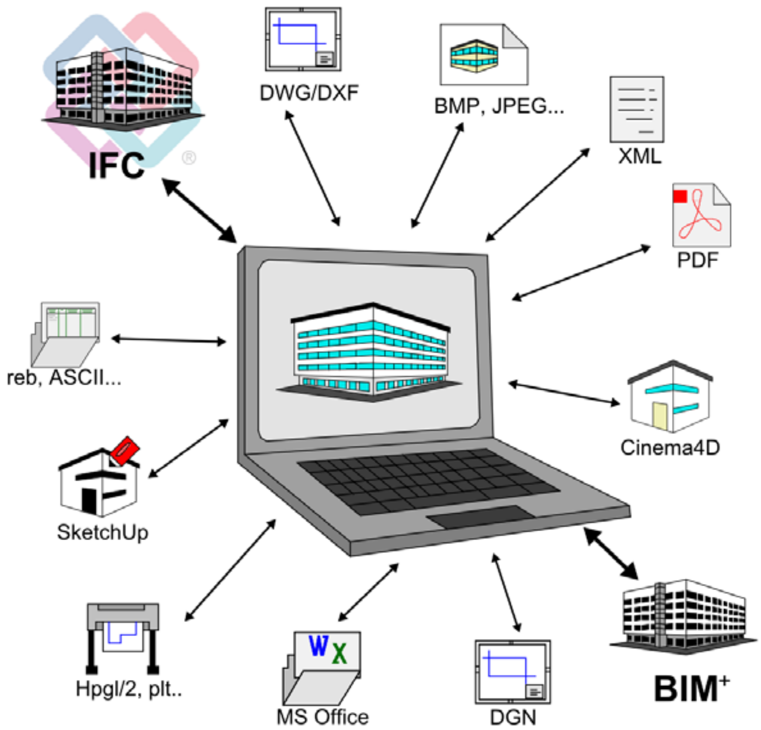
Almost all elements you can find in **Allplan’s** library have counterparts in the IFC library, for example, walls, columns, stairs, rooms and so on. If you create drawings and projects using architectural components as usual, Allplan automatically assigns these components to the appropriate ”IFC ObjectType” during export. Allplan transfers all parameters and properties, including interactions with adjacent components. You do not need to define anything separately.

In addition to the data generated automatically, you can attach any number of properties to the components using **Allplan’s** attribute catalog. As a result, you can provide your planning partners with everything they need to know about a component. Allplan transfers all the values attached as attributes.

In order to structure the data within **Allplan**, you use a building structure and drawing files, which you can assign to the individual levels in the hierarchy. This data structure is in compliance with the requirements the IFC format places on the structure.

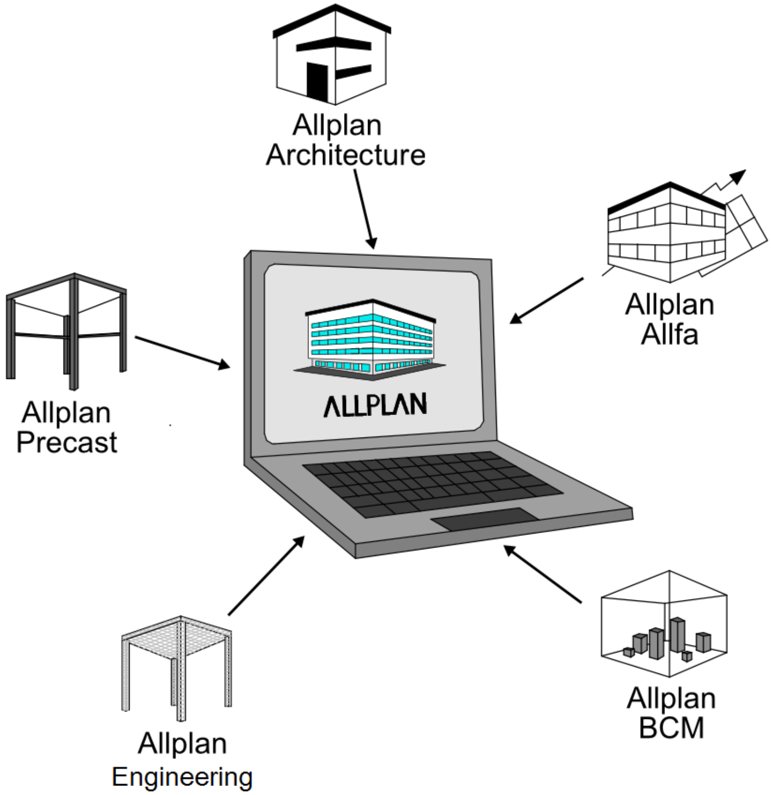


Acting as an open platform, **Allplan** has supported the IFC version and numerous other file types for a long time. Allplan's IFC interface is certified and quality-assured, guaranteeing smooth data exchange at all times.



The Allplan product family - encompassing Allplan Architecture, Allplan Engineering, Allplan Allfa, Allplan BCM, Nevaris, Allplan Precast and various add-ins, such as the program for structural analyses - allows you to not only create the model but also to edit and analyze it using a single software solution.

Therefore, you can work with BIM and handle your projects in a BIM-compliant manner even in parts of Allplan itself. You do not need to exchange data using other formats or the IFC interface.



Support

If you want to successfully introduce BIM to office routine, the first and moist important step is to study the BIM philosophy and its underlying ideas and methods. The first part of this compendium helps you do so.

In the second part, you will learn how to use BIM in practice. This part describes each step in detail, showing you which software programs can be used and how.

Other important factors are communication, coordination and cooperation. Apart from in-depth knowledge in your own field, you require basic knowledge in related fields. In addition, you should be familiar with the topic of data exchange. If you want to take on the role of the person responsible for BIM in your office or for a project, you will be the contact person for all employees and project participants. As you can imagine, this role requires skills for coordinating and controlling.

With its modular training concept, Allplan GmbH offers you the training you need to be successful. Allplan's training is designed for both newcomers to BIM and experienced BIM users who want to deepen their knowledge. In different levels of qualifications which build on one another, you can have yourself and your employees certified, thus proving your BIM competence.

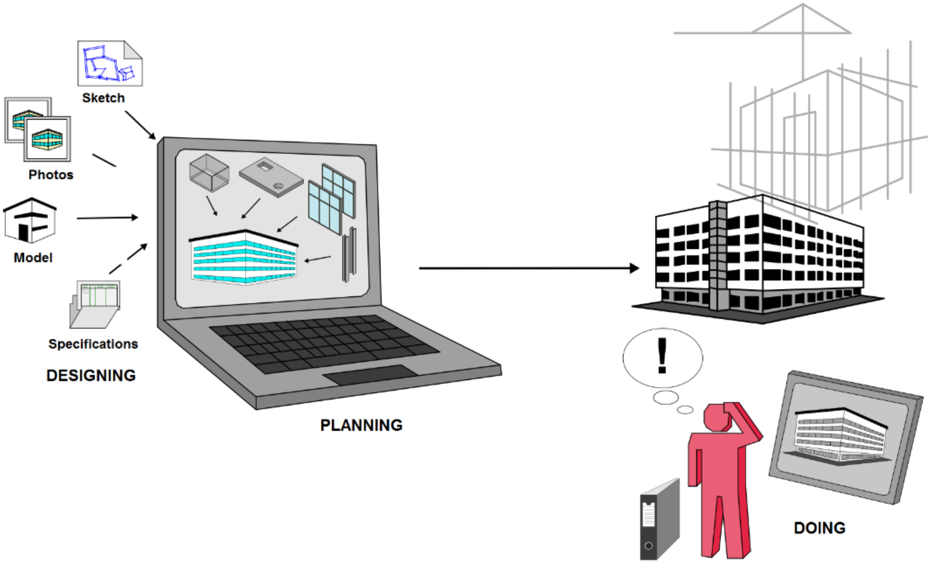
In addition, you can turn to external BIM consultants for help.

BIM in Practice

In the end, it is up to you to decide whether you want to embrace the BIM philosophy and its underlying ideas and methods. At any rate, it is a future-oriented investment in your own knowledge that pays. However, when it comes to introducing BIM to office routine, you need to consider a number of additional factors, such as the software used. In addition, you need to think about whether you are dealing with a complex project or whether you are working together with external partners. Moreover, there is more to it than simply switching from pure 2D drafting to 3D building modeling. Rather, it is about a completely different approach to thinking and doing, requiring a completely different view of project handling and planning.

So much for theory, but what about practice?

- The persons responsible enter all the key data of a project or construction project in digital form, combining the data into a virtual model.
- They define all the details of a component or object in the form of parameters or by its geometry. Regardless of the approach, the information must be identical.
- As in a real building, the components and objects in the database interact, forming a whole. They cannot be regarded separately. This must be kept in mind when it comes to creating and maintaining the model.
- Pieces of information and documents are always derived from this model, which is similar to an extensive project database including a geometric representation in three dimensions.
- Throughout the project, the persons responsible constantly update and maintain the database by adding new details, changing and adjusting data.
- The data model with all its components is given to all those involved in the project. It is essential that the model is in a neutral format and that it can be accessed by everyone at any time.
- All those involved communicate via the data model, which reflects the current planning status. Consequently, the model is an identical copy of the real building.



In this context, you will hear the terms ”Big BIM” and ”Little BIM”, describing to what extent BIM is used in a project. ”Little BIM” means that the data model is used for some project phases or specific areas only. This may be necessary if some project participants do not have appropriate software. Although BIM can be used in this way, you have to spend more time coordinating and planning the project. ”Big BIM” is the ideal solution if all project participants have embraced the BIM philosophy and agree to use BIM for the whole project.

Check list I: evaluating the current situation at your office (see page 228)

Before getting started on the project

In the building industry, in particular, projects are hardly similar. Therefore, you must decide whether and to what extent you can use BIM whenever you start a new project. There is no one-size-fits-all solution. You have to consider numerous parameters and components, which may not even be known at the beginning of the project.

But, as you have learned before, the BIM process should start together with the project. So you have to take decisions and make arrangements on which you can build. Like cooperation and data exchange in general, BIM will only be successful if all those involved communicate openly and easily. As you can see, communication is the essential factor.

Basically, there are three possible scenarios for any project:

- The client requires you to provide a BIM model and to handle the project in a BIM-compliant manner. Here in Germany, more and more public contracts include BIM. In the US or Scandinavia, for example, BIM is already an integral part of public contracts.
- An external project controller, who is in charge of the whole project, instructs all those involved to use a BIM model as a central database.
- After having discussed this topic, all those involved decide whether and how to use BIM for handling the project.

At the beginning of the project, you should draw up a check list as the basis for cooperation. This check list should include all the details you have agreed upon, such as the ways you have chosen to exchange data and to communicate.

If you have not yet cooperated with some project participants (for example, external companies), you need to exchange some test files in advance. This is the only way to detect and remove any stumbling blocks right from the start, ensuring that everything runs smoothly afterwards.

Check list II: exchanging data and formats (see page 231)

Creating the model

After having discussed the important points with all those involved, you can start creating the building model in **Allplan**. The model should start at an early stage, ideally during preliminary design. It will then be expanded, adjusted and completed throughout the project.

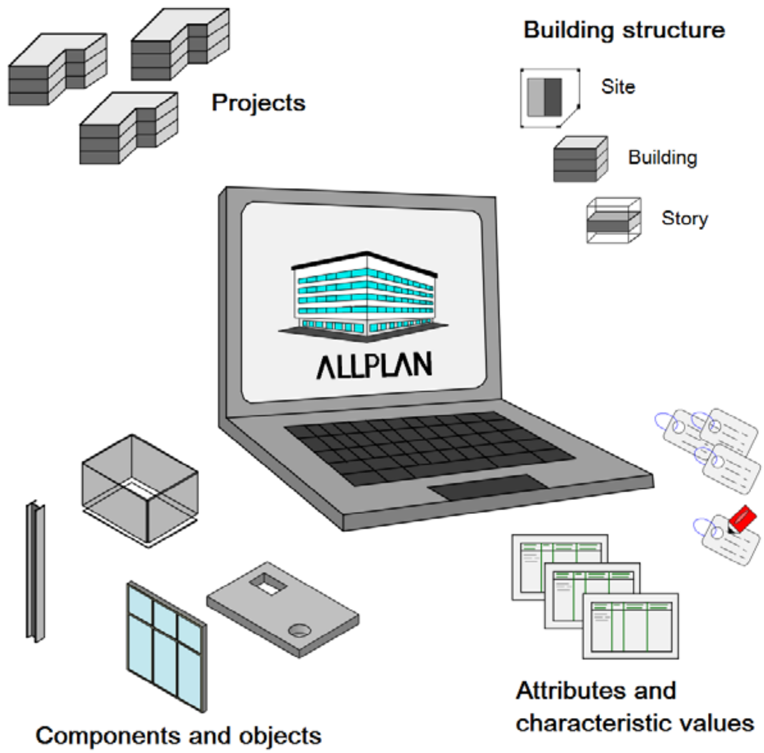
The architecture of the building and thus, the architectural model you have created is at the center of the whole BIM process. Consequently, you are responsible for managing and maintaining the model, assuming the role of the coordinator and controller (provided there is no (external) project controller).

Apart from working in 3D and using a *single* model, designing in and with **Allplan** is not different from other programs or methods of working.

However, there are some points you must bear in mind, making sure the **Allplan** data meet the specifications and requirements of a BIM model. Otherwise, you cannot exchange the data using the IFC interface. The basic rule is that only objects and elements modeled in 3D can be part of the BIM model: texts, line drawings, dimensions and so on are not included.

Consequently, if you want to add information to a component or object, you must include this information in the geometry of the component or object. As an alternative, you can also define an (additional) attribute and assign it to the component or object. This also applies to values and data you receive from other project participants, for example, the structural engineer. In addition, the data structure within the model and thus, within the whole project must be in compliance with IFC and BIM specifications.

To achieve this, you must use a building structure in **Allplan**. In addition, you can use only specific structural levels within this building structure.

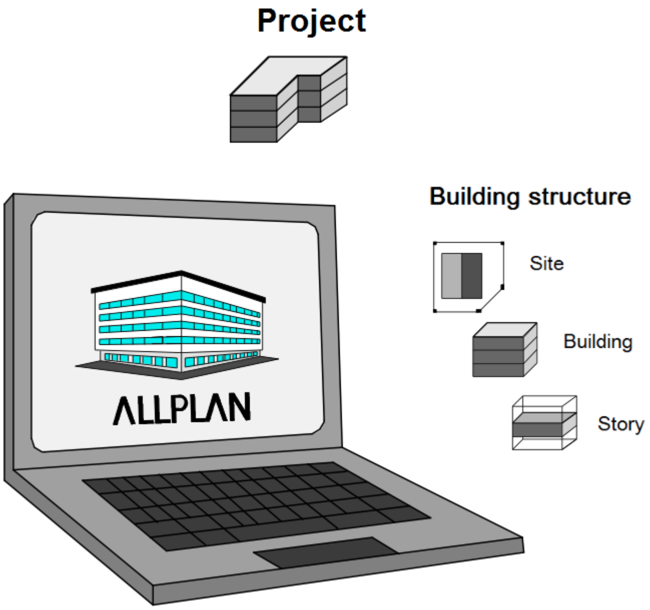


Check these rules time and again, making sure you do not have to spend much time correcting data later.

- Create all the elements and components of the building model in 3D using the corresponding **Allplan** tools.
- Use a BIM-compliant building structure for the data. Make sure the model includes drawing files of the appropriate structural levels only.
- Define any details and values of the components and objects together with their geometry or use attributes to attach the data to the components and objects.

The building structure

Unlike most other CAD programs, **Allplan** is a multiple file system, allowing you to flexibly structure the data using drawing files, filesets, free NDW documents and so on. However, if you want to work with BIM and exchange the complete architectural model, you need to stick to BIM specifications, somewhat limiting this flexibility. A BIM-compliant structure reflects the structure of a real construction project. Consequently, you can use sites, buildings and stories for structuring the drawing files. Of course, you can also use filesets and the fileset structure in parallel.



Start by creating a basic structure that meets these criteria. You can create your own structure from scratch. As an alternative, you can use one of the templates that come with **Allplan** and adjust it to BIM specifications.

If you use **New Project, Open Project** (on the **File** menu) to create a new project, Allplan will ask you whether you want to use a project template for structuring the data. If you select one of the templates, Allplan will load the associated building structure into the new project. You can then use and adjust it. If you want to create your own building structure, just skip this point and create the project without a structure. You can add it afterwards. In any case, you need a building structure as soon as you want to give the building model to other project participants or upload it to a (BIM) server.

You must use a building structure for drawing files in a BIM project!

Apart from the fact that the building structure is required for BIM, there are three main differences between the building structure and the fileset structure:

- The building structure is structured hierarchically. It includes superordinate and subordinate levels, reflecting the topology of a real building. Within a fileset structure, on the other hand, all structures are at the same level.
- Each drawing file within a project can be assigned to exactly one structural level in the building structure. But it can belong to countless filesets.
- The building structure can include a plane model defining the heights of the default planes in the drawing files. Using this plane model, you can define the heights for all documents assigned to a structural level, allowing you to work across drawing files.

As the building structure reflects the structure of a real building, you can use only structural levels that exist in real buildings for creating a building structure that complies with IFC and BIM specifications. In addition, you must make sure that the structural levels are logically and hierarchically correct: for example, a story cannot include a site, but a site can include a story.

Using **Open on a Project-Specific Basis** (on the **File** menu), you can find out whether the structure complies with IFC and BIM specifications or you can create your own structure in accordance with these specifications.

Below the project level, you can use the following structural levels:

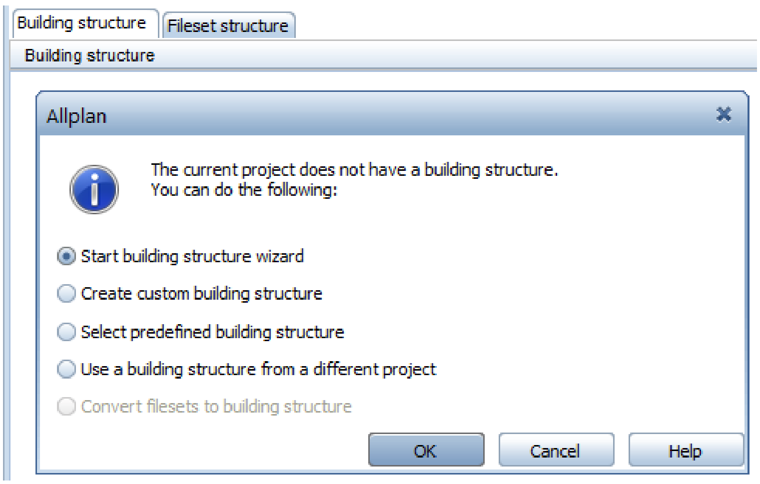
- Site (you can assign drawing files to this level)
- Structure
- Building (you can assign drawing files to this level)
- Story (you can assign drawing files to this level)
- Sub-story

It is not enough to simply give structural levels these names. You must use the corresponding tool to create structural levels as such. This is the only way to ensure that they get the correct identifiers for export.

Creating the building structure

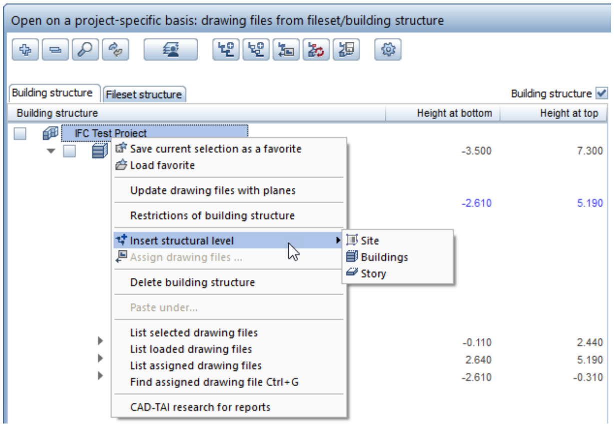
If you do not want to use a template, you can create your own building structure. To do this, double-click with the left mouse button in an empty area of the workspace. As an alternative, open the **File** menu and click **Open on a Project-Specific Basis**. Then go to the **Building structure** tab. **Allplan** will display the following message "The current project does not have a building structure" and list the options you have to change this:

- Use one of the structures that come with **Allplan** and adjust it for your needs.
- Use the structure of another project, for example, a template in the office standard.
- Convert a fileset structure to a building structure. Allplan will convert the filesets to structural levels of the same name and assign the drawing files accordingly,
- Create the building structure using the wizard, which leads you through the process step by step.
- Create the building structure manually.



If you decide to use the wizard or to do it manually, you can start creating the building structure immediately afterwards. Only the *left* side of the building structure is important for BIM and exchanging data using IFC. You cannot export the *right* side (derived from building structure), regardless of whether it includes 3D data or not.

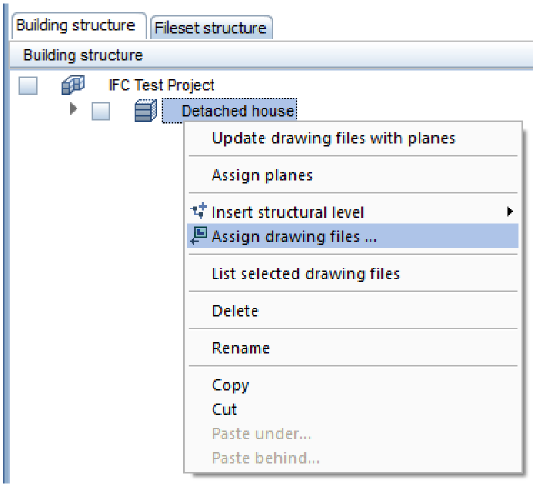
The **Project** is the topmost level in any building structure. You cannot delete this level. Below it, you can insert structural levels both on the left and one the right. To do this, click the project node with the right mouse button and open the **Insert structural level** shortcut menu.



The next dialog box lists only the structural levels you can assign to this node, making sure everything is hierarchically correct. Repeat this step until the basic structure is complete. Use **Sites**, **Buildings** and **Stories**. Then go to the right side (derived from building structure) and insert the **Views**, **Sections**, **Details** and **Reports** structural levels below the project node.

Next, assign drawing files to the structure. This is roughly the same as moving files in Windows Explorer. Although the options provided by **Allplan** are different, the result is the same. Make sure you assign drawing files to BIM-compliant structural levels only (**Site**, **Building**, **Story**).

You can open the **Assign drawing files...** tool by selecting it on the shortcut menu or by clicking the corresponding icon. To assign drawing files, you can enter their numbers or drag them from the list to the relevant structural levels. Using this approach, you build up the entire project structure. Of course, you can adjust and change it at any time.



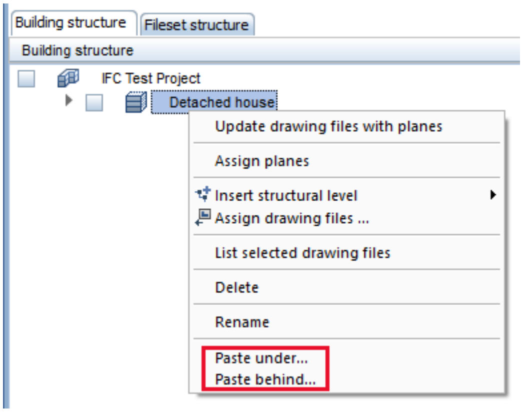
Modifying the building structure

If you use a building structure from another project or a template provided by **Allplan**, you usually have to adjust this structure to the requirements of your project, which can vary considerably. Similarly, a structure may change over the course of a project, so that you need to adjust it.

Like the building model with its objects and elements, the data structure in the building structure is not rigid and unchangeable. You can modify and adjust it whenever you need. The procedure is always the same, regardless of when you change the structure. You can select all the tools you require on the shortcut menu. In addition, you can use drag-and-drop operations.

Whereas you are required by BIM specifications to use specific structural levels, you can define their names freely. To do this, simply click a name or open the shortcut menu and select **Rename**. You can then change the name proposed by **Allplan**. You can rename not only structural levels but also the files assigned to these levels.

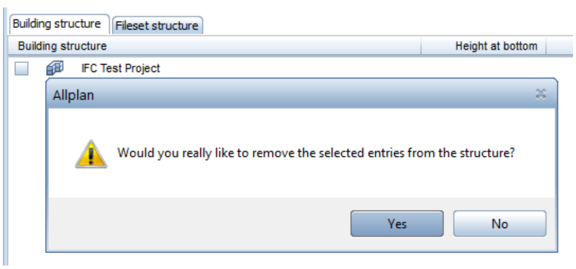
If you need additional structural levels, select the node where you want to insert a structural level that is hierarchically subordinate. Then open the shortcut menu and select **Insert structural level**. Finally, click the structural level you require. If you have already assigned structural levels of the same type to this node, Allplan will place the new level so that it is the first in the list. You can then move it to the required position. Do the same if you want to rearrange the structural levels in a building structure. If you want to move or copy structural levels, you can use the shortcut menu's **Cut** and **Copy** tools as you would in any other Windows application. Using **Paste behind...** and **Paste under...**, you can then place the structural levels correctly.



There is an important difference between these two tools:

- **Paste behind...** places the structural level so that it is at the same level as the node selected in the building structure.
- **Paste under...** places the structural level so that it is hierarchically subordinate to the node selected in the building structure.

You can also use drag-and-drop operations to rearrange structural levels within the building structure. All you need to do is keep the mouse button pressed down and drag them to the required position. If the building structure includes structural levels you no longer need, you can remove those levels by selecting **Delete** on the shortcut menu. As an alternative, drag them to a place outside the dialog box so that the cursor changes to a waste bin. As you cannot undo this operation, Allplan will prompt you to confirm. Only after you have confirmed this prompt will Allplan delete the data.



Like folders and subfolders in Windows Explorer, structural levels are merely folders for storing the actual files. Therefore, deleting these folders will not delete the data and the associated drawing files. It is simply the assignment that will be lost. This also applies to filesets: deleting filesets will not the delete the drawing files with their data. To access the data again, you must simply reassign the files - that’s all!

You should adjust and revise the building structure *before* you start working on the actual project. This is the only way to ensure that you use the appropriate files right from the start, thus avoiding the time-consuming process of moving data afterwards.

Restoring the building structure

As soon as you click **Close**, you cannot undo any changes you have made in the building structure. As with *.bak files for drawing files, **Allplan** automatically creates some backup files for the building structure. Using these files, you can restore the building structure if data are lost or changed inadvertently.

As the building structure is project-specific, Allplan saves all the files to the BIM subfolder in the project folder.

You can usually find the following files in this folder:

- `Allplan_BIM_BuildingStructure.xml` or `*.log`
- `Allplan_BIM_Views.xml` or `*.log`
- `Allplan_BIM_LevMo_XXXX.xml`

If the project includes a layout structure, you can also find the following file:

- `Allplan_BIM_LayoutStructure.xml` or `*.log`

Wheres the *.log files save the status, the XML files save the structure:

- The `BuildingStructure` file includes the left side of the building structure, that is to say, the actual project structure.
- The `Views` file includes the objects derived from the building structure, that is to say, the right side with the sections and views.
- The plane model saved with the building structure is written to the `LevMo_XXXX` file. `XXXX` stands for the name of the plane model.

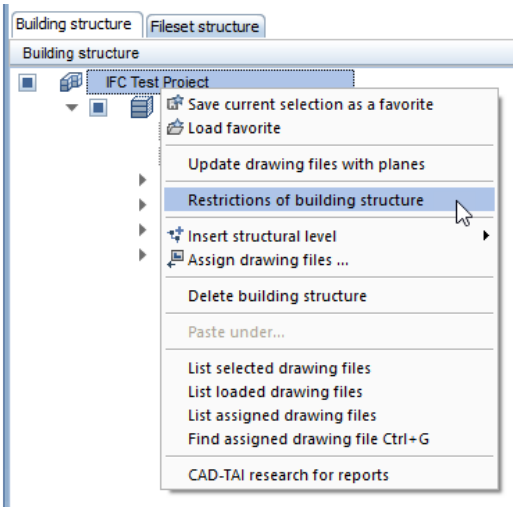
You can find backup files for both sides of the building structure in the `Backup` subfolder. These files end in `*.bak`. They have the same name as the files mentioned above. The only difference is that their names include the date and time. The backup file for the plane model is in the BIM folder.

If you want to restore one of these files, all you need to do is remove the additional information manually from its name. You can then move the file back into the BIM folder, thus replacing the existing file. Now you have restored the building structure to its previous state.

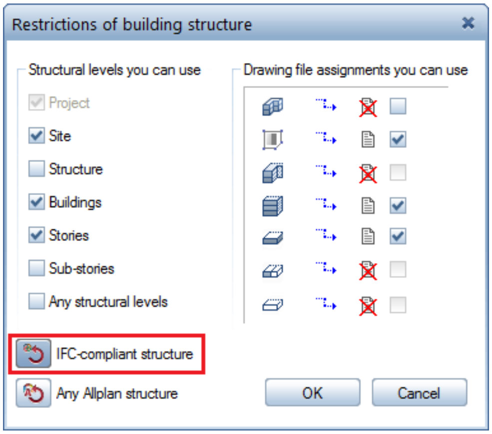
Checking the building structure

If you want to handle your project in a BIM-compliant manner and exchange data using the IFC interface, you must structure the **Allplan** data in a building structure which complies with IFC and BIM specifications. **Allplan** helps you do so by checking the building structure for errors.

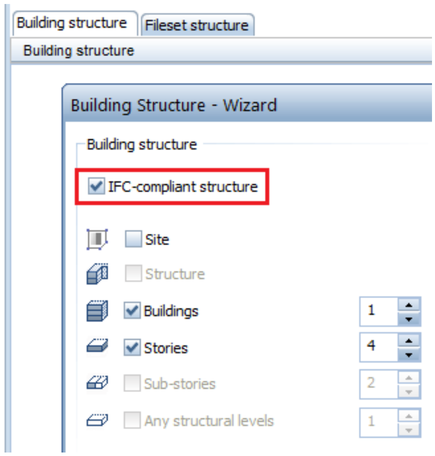
Like most tools in the building structure, this checking tool is on the shortcut menu. To access it, click the project node with the right mouse button. Select the **Restrictions of building structure** option.



In the next dialog box, click the **IFC-compliant structure** icon to check the building structure. Allplan shows you which structural levels and assignments are allowed. At the same time Allplan checks the structure to find out whether it meets these requirements. If this is not so, Allplan displays a message and marks the errors in the building structure. You can then correct the structure by removing invalid structural levels and reassigning drawing files.



If you use the wizard to create the building structure, you can create an IFC-compliant structure right from the start. All you need to do is select the corresponding check box.

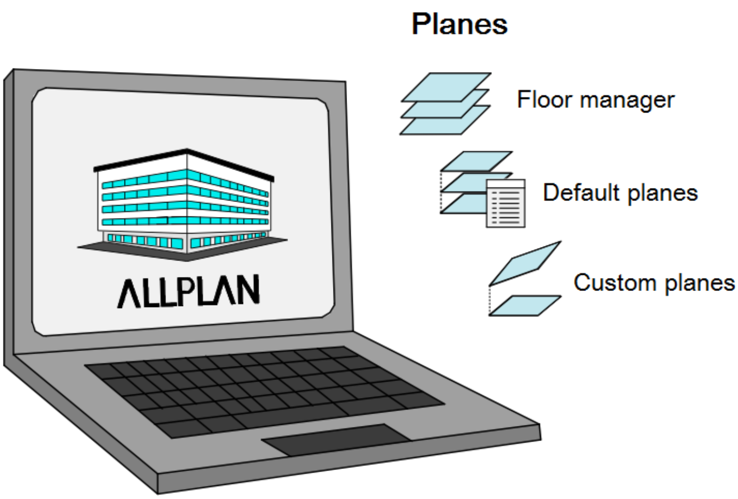


You can then select only drawing file assignments and structural levels that meet these criteria. All the other levels are grayed out and inactive. This also applies if you select the IFC-compliant structure for the project node BEFORE you start (manually) creating the building structure. Allplan then presents only structural levels you are allowed to use. Consequently, the shortcut menu no longer includes the **Any structural level** entry.

Check list III: building structure (see page 234)

The plane model

The **Plane model**, which is produced by the **Floor Manager**, is closely linked with the building structure. However, unlike the building structure, the plane model is not necessarily needed for handling projects in a BIM-compliant manner. As the plane model and the building structure are saved to two different files, they do not depend on each other. Consequently, you can use the building structure without a plane model and the plane model without a building structure. With regard to BIM, however, we recommend working with both the building structure and the plane model. Using the plane model, you can define and modify heights quickly and easily.



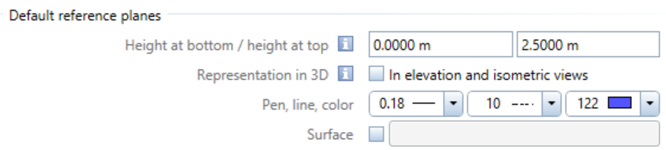
The concept of reference planes in Allplan

The concept of reference planes in **Allplan** controls the height of the building model with all its components and objects. You can find the following planes in Allplan: **default planes**, **custom planes** and **roof planes**. Although roof planes and custom planes are created differently, their effect is almost exactly the same. Basically, planes always come in pairs, regardless of which planes you use. Every pair consists of an upper plane and a lower plane. There is no single plane.

Default reference planes

As indicated by their name, default reference planes exist in every **Allplan** drawing file. You cannot delete them, but you can change the height of these planes. Being invisible, default reference planes extend parallel to the datum level over the whole drawing file. They are always horizontal. You can predefine the height of these planes.

To do this, select the **Tools** menu, click **Options** and open the **Planes** page. The default is 0.00 m for the lower plane and 2.50 m for the upper plane.



The **List Default Planes** tool gives you an overview of the planes' height settings in all active drawing files (current and open in edit mode). If you want, you can change the height settings. As well as entering any value, you can take the height settings from a plane model (provided your project includes a plane model).

> **Default reference planes stretch to infinity, extending parallel to the xy plane. They are always horizontal and have the lowest priority-**

Custom reference planes

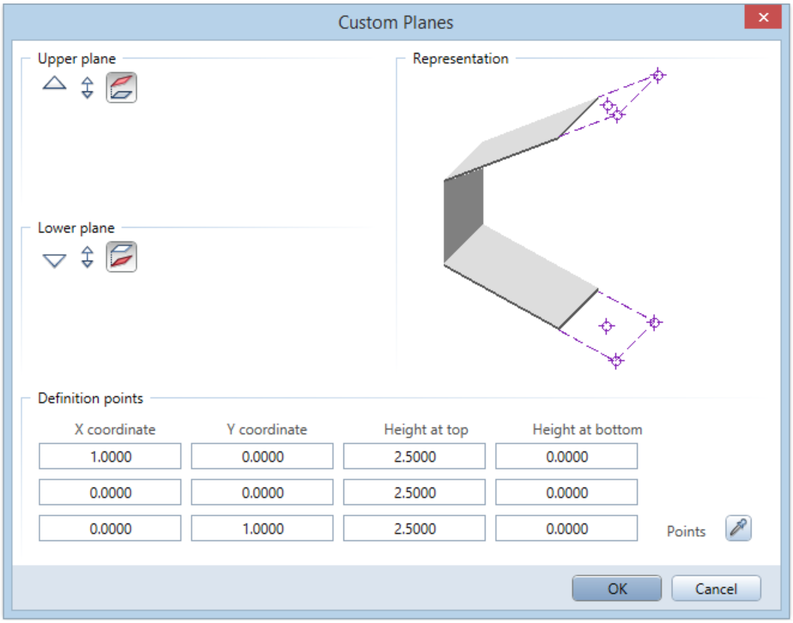
You can create these planes using the **Custom Planes** tool. You can define all the properties of these planes freely, such as the height and the position in three-dimensional space. You can use as many custom planes as you want in a file or in the whole project. However, custom reference planes apply only to objects in the drawing file in which you created these planes. In addition, custom reference planes cannot be part of a plane model. Therefore, you should use custom planes only if there is no other way.

Custom reference planes have priority over default reference planes. Consequently, inserting a pair of custom planes will cause components whose heights were defined relative to the default pair to lose their association with the default pair and to adjust to the new constraints imposed by the custom pair. You can define a custom pair in the xy plane by entering a closed polyline in plan. To do this, you can use the coordinates or the angle of inclination. As soon as you have defined a pair of custom planes, they take precedence over the default reference planes. Any component associated with planes will take its height from the custom reference planes, ignoring the default reference planes. To define custom planes, you can enter coordinates or the angle of inclination.

The following four combinations are possible:

- Both planes are horizontal.
- One of the planes is inclined.
- Both planes are inclined but parallel.
- Both planes are inclined at different angles.

To create a pair of custom reference planes, open the **Architecture - General: Roofs, Planes, Sections** module or the **Create** menu and select the **Custom Planes** tool. Click **Properties** to open the dialog box in which you can define the geometry of the planes by entering parameters. The preview on the right changes with the settings you make for the planes.



To define the height of horizontal planes, enter a **fixed Z value** as an elevation point. If both planes are horizontal, you can enter the **offset** for one of the planes instead. This also applies if both planes are inclined but parallel to each other. To define inclined planes, enter three definition points in the bottom part of the dialog box. The settings that are actually available to you depend on the settings you have already defined for the other plane. Values you have already defined are grayed out.

As the name implies, **planes** are always planar. They cannot be curved or bent. Planes are entered in a geometrically precise manner using three points or two points and an angle. To define these points, enter their X, Y and Z coordinates. You can also define them graphically: go to the **Definition points** area and click the  **Match** icon. The dialog box closes temporarily and you can click the points on screen. This method is especially useful if you want to use height values from your model. You can also use this method if you know the inclination of the plane, but you do not know the height of the points defined.

Note: To take height values from your model, you must click the points in isometric view. You cannot do this in plan. If you click a point in plan, **Allplan** interprets this point as being in the xy plane. Consequently, its height is 0. This applies not only to plane points you define but also to coordinate values you measure.

Next, click the three points one after the other. If you want to enter the inclination instead, the first two points you click must have the same height values. Otherwise, the planes would be warped. As soon as you have defined all points, the dialog box opens again, showing the values of the points clicked. You can check and change these values. Clicking **OK** takes you back to the workspace. Next, define the actual outlines of the planes using the polyline input tools.

The **Modify Planes** tool allows you to change the height or inclination of pairs of planes you have already defined. To change the outlines and thus the spatial boundaries of the planes, use the **Modify Offset**, **Fold Lines** and **Stretch Entities** tools.

Custom reference planes do not stretch to infinity. They can have any planar shape. Custom reference planes have the highest priority, overriding both roof planes and default reference planes. A pair of custom reference planes applies only to elements in the same drawing file. It cannot be part of a plane model.

Roof planes

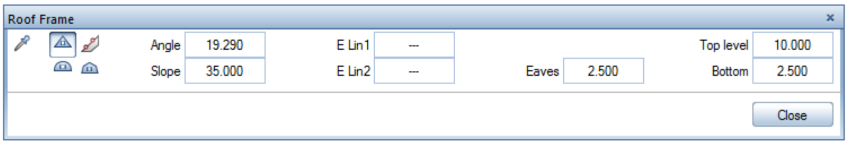
In **Allplan**, you can also create **roof planes**. These planes are often referred to as roof frames. Their main use is in roofs and attics. But regardless of their name, you can also use them to define the heights of any objects and components. Roof planes have priority over default reference planes. Therefore, any component associated with planes will take its height from the roof planes, ignoring the default reference planes.

Pairs of custom reference planes, on the other hand, take precedence over roof planes (provided they are on top of each other). There is a main difference between custom planes and roof planes: the lower plane of a roof frame is always horizontal, whereas the upper plane can be horizontal or inclined. Depending on the roof shape (barrel roof, gambrel roof), the upper plane can also consist of several parts. Here, too, the following applies: the parts that make up the roof frame must be planar.

You can thus create roof planes of complex geometry. This would not be possible with custom planes. In addition, you can add roof planes to a plane model, allowing you to define the heights of components across drawing files.

Use the **Roof Frame** tool to create roof planes. You can find this tool in the **Architecture - General: Roofs, Planes, Sections** module or on the **Create** menu. Like custom planes, roof planes are entered in two steps: first, you enter the outline in plan. Then, you define the shape of the roof frame. To enter the outline in plan, use the **polyline input tools**. As opposed to custom planes, it is irrelevant whether you start by entering the outline or by defining the roof parameters. You can do this in any sequence.

The **Roof Frame** dialog box changes with the roof shape you select. When designing barrel roofs or gambrel roofs, you can define additional parameters in a separate dialog box. Regardless of the roof shape you select, you always have to specify the global height of the roof frame in the Z direction.

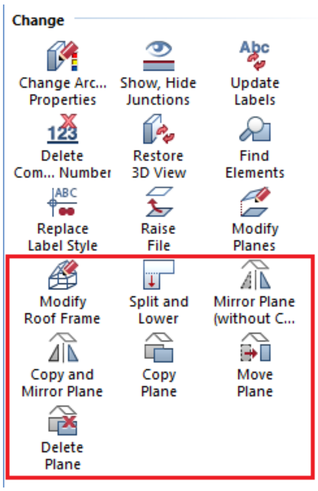


Whereas the bottom level is equivalent to the lower default reference plane, the top level does *not* define the value for the upper roof plane. Rather, it defines the upper limit of the roof frame. In other words, the roof frame can extend as far as this value. Together, the two values define an envelope. The actual roof frame is within this envelope. Allplan cuts any component projecting from the top level. Therefore, make sure this value is always greater than the maximum ridge height. Another important value is the eaves height. This value must be greater than the bottom level but less than the top level. Otherwise, Allplan cannot create the roof frame.

After you have defined all parameters and entered the outline, the dialog line prompts you to **click edges of roof frame to apply slopes**. You can click as many sides as you need. While doing this, you can even select a different roof shape to design a complex roofscape. Press **ESC** to finish, thus creating the actual roof frame.

Note: The roof frame you create here is not actually a roof - it is simply a collection of planes defining the height. To create the actual components of the roof, use the **Roof Covering**, **Slab** or any other tool and define the height of these components relative to the roof planes.

You can find various tools for modifying roof planes in the **Architecture - General: Roofs, Planes, Sections** module or on the **Change** menu.

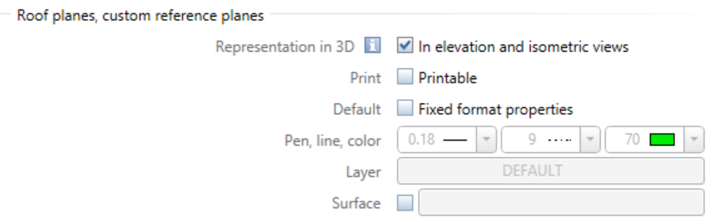


Roof planes or roof frames are a collection of different pairs of planes that do not stretch to infinity. The lower roof plane is always horizontal. Roof planes have a higher priority than default reference planes but a lower priority than custom reference planes. Roof planes can be part of a plane model, defining the heights of components across drawing files.

As custom reference planes and roof planes are clearly delimited, you can see their outlines in plan. This does not apply to default reference planes. As default reference planes are usually not visible, you cannot assign format properties (pen, line, color and so on).

Custom reference planes and roof planes, on the other hand, can be given any format properties. Using the **Modify Format Properties** tool, you can change these properties at any time. In addition, you can configure Allplan to display all planes in elevation and isometric views. You can even define the format properties for the planes in these views.

To do this, open the **Tools** menu, click **Options** and go to the **Planes** page. Select the **Representation in 3D** check box to display the planes in all views. As this is very useful for defining heights, select this check box for the roof planes and the custom reference planes.

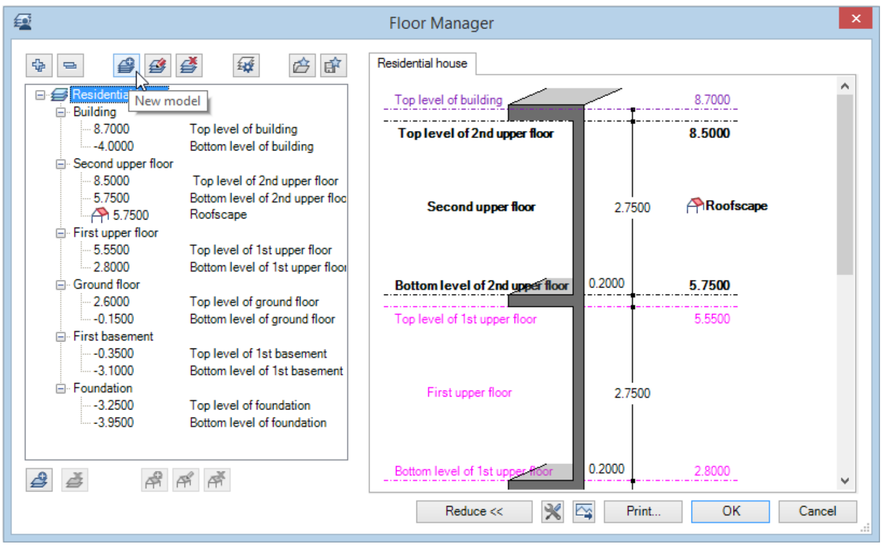


Note: Like rooms and stories, planes are not real objects, but they are virtual structures. Therefore, pen 7 (= pen thickness of 0.13) plays a special role when it comes to defining format properties. If you have selected this pen, virtual elements are automatically created as construction lines, regardless of whether this option is active on the format toolbar or not. To avoid this, you must select a different pen. You cannot use **Modify Format Properties - Convert construction lines to 2D entities** to change this later.

Creating the plane model

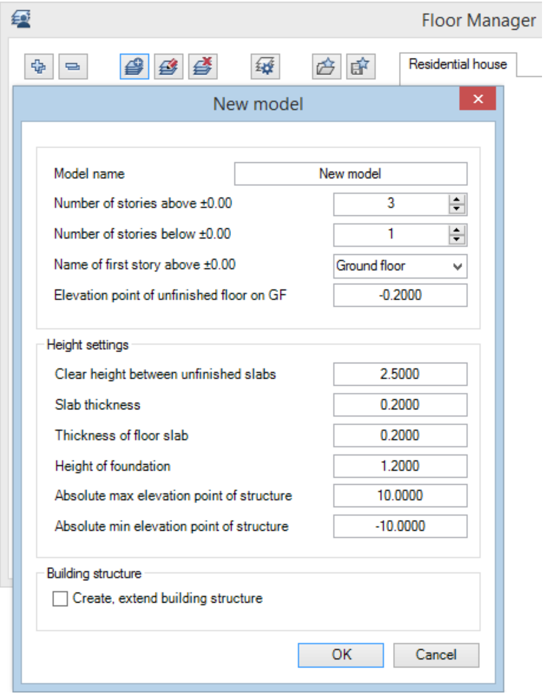
Unlike the concept of reference planes in **Allplan**, the floor manager and the plane model do not apply universally. With regard to BIM, however, we recommend using the plane model in conjunction with the building structure. The plane model and the building structure are closely linked. Thus, you can create a building structure from a plane model, and vice versa.

You can always use the floor manager, regardless of whether you want to create or modify a plane model. To access the floor manager, click **Open on a Project-specific Basis**. As an alternative, double-click with the left mouse button in an empty area of the workspace. The **dialog box for selecting drawing file** opens. Then click the **Floor Manager** icon. You can find this icon both in the fileset structure and in the building structure. Another dialog box opens. If you have already defined a plane model, you can see this plane model. Otherwise, the dialog box is empty. Click the **New model** icon to create your own model. You can then use this model to define the heights of the structural levels and stories within the building structure.



The structure of the floor manager reflects the structure of a real building. Therefore, the planes (this is to say, the floors) and the heights you define are based on the geometry of a real building. As you have already learned, planes always come in pairs in **Allplan**.

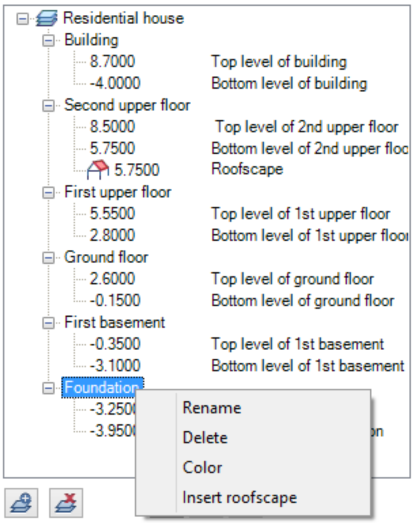
Here, too, you can find an upper plane and a lower plane. These planes are usually equivalent to the top and bottom levels of the stories. Therefore, they take their name from the corresponding story. Generally, the height of the ground floor is set to ± 0.00. You can create additional stories - and thus the corresponding pairs of planes - above or below the ground floor. To create the initial structure, start by defining how many stories you want to create above and below the ground floor. Then enter the slab thickness and the clear height between the unfinished slabs. If you have not yet created a building structure, you can do this together with the plane model.



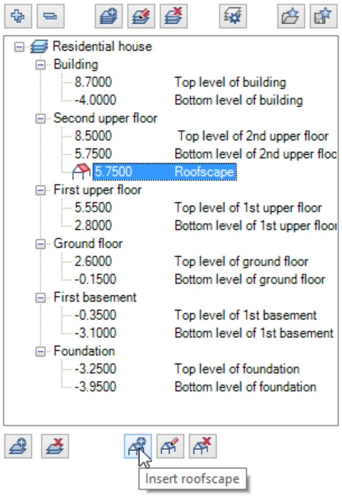
Click **OK** to finish, thus creating an initial model. As the stories in a building are hardly ever of the same height, you can change and adjust the settings whenever you need.

The **Floor Manager** dialog box has two parts: On the left, you can see the building structure in a tree structure, which is similar to that in Windows Explorer. The area on the right shows a preview of the building structure. The two areas are dynamically linked. Consequently, any changes you make on either side are automatically adjusted and updated. To change a value, double-click it so that it is highlighted in blue. Then enter the new value.

It is irrelevant whether you want to change the name of a pair of planes or its height. The procedure is always the same. If you want to insert or delete stories or pairs of planes, you can use the shortcut menu or the icons at the bottom of the dialog box. Allplan always deletes the pair of planes you have selected. When inserting an additional story, Allplan places it in accordance with the height settings you have defined. Stories cannot overlap. Consequently, the upper plane must always be below the lower plane of the story above.



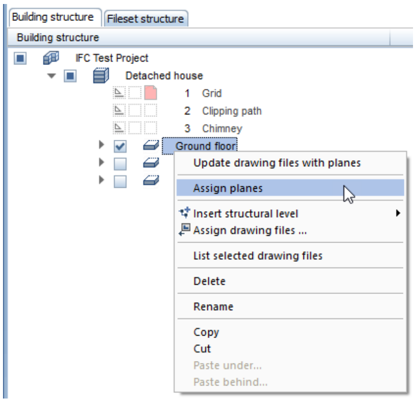
As mentioned before, roof frames and roofscapes can be part of a plane model. However, you cannot create these elements in this dialog box. You must design them in a drawing file or free NDW document in advance using the **Roof Frame** tool. You can then integrate them into the plane model by clicking the **Insert roofscape** icon. A roofscape is not a story; rather, it is a third, locally delimited plane you add to a story. You can see which story has a roofscape: a roof symbol appears in both the plane model and the building structure.



Using a roofscape together with a plane model has a lot of advantages over using it on its own. You can benefit from these advantages when both creating and modifying the building model. As you know, roof planes and custom reference planes apply only to components and objects that are *in the same drawing file*. However, the data are usually in different drawing files, such as rooms, walls and roof components. Therefore, you must copy the roof frames to all the drawing files, making sure the heights are correct. If you need to change something, you must do this separately in each file. This takes up a lot of time and is prone to errors. By integrating a roofscape into a plane model, you can apply the roofscape to *several drawing files* at the same time. In addition, the roof frame cannot be changed inadvertently: it is placed on an internal **Allplan** layer, which is always set to visible, frozen or hidden, frozen. You cannot set it to modifiable.

Assigning planes

Creating the plane model is only the first step. The plane model you have created will not automatically apply to the building structure and the drawing files used. To achieve this, you must assign the heights defined to the structural levels. Like most tools in the building structure, the **Assign planes** tool is on the shortcut menu. You can select this tool for individual drawing files and for entire structural levels. A structural level is NOT automatically linked with a story in the floor manager even if it has the same name. Clicking **Assign planes** opens the floor manager with the model you just created. You can now select the planes or stories and assign them to the selected files or structural levels.



Note: You do not necessarily have to use the planes of a single story. The upper and lower planes can come from different stories. The planes Allplan actually uses for the upper plane and the lower plane depend on the height settings. The names in the plane model are absolutely irrelevant.

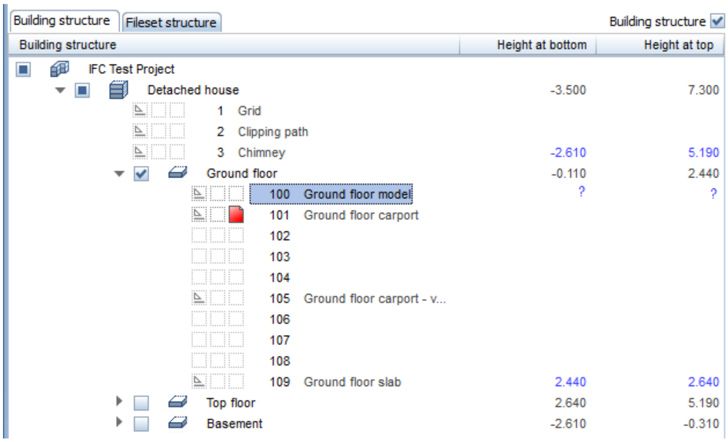
Note: You can create several discrete plane models within a project. But the planes you assign must be from one and the same plane model.

Note: If a drawing file is to have height settings that are not defined in the plane model, use the  **List Default Planes** tool instead and enter the height settings you need.

In addition to the data structure within the project, the building structure also shows the height settings of the files. You do not need to open the floor manager.

Just have a look at the **Height at bottom** and **Height at top** columns:

- If you have assigned height settings to an entire structural level, these height values are shown in **black**.
- If the drawing files take their height settings from the structural level to which they are assigned, these columns are empty.
- If you have assigned planes from the plane model directly to a drawing file, these height values are shown in **blue**.
- If drawing files have height settings that are not taken from the plane model, you can see a **–** instead of the height values in the columns.
- A **?** indicates that the plane is not defined.



Any changes you make in the plane model always apply to all the drawing files and components associated with planes. This is perfectly suited to planning, where changes are the rule. You can adjust everything quickly and easily without having to change the properties of each component or the height settings of each file separately.

Defining the height settings of components

Creating a plane model and assigning the height values defined therein to the drawing files and structural levels of your project does *not* mean that the components and objects in these files automatically assume the heights defined in this model. This is a specific **object property**. In other words, components can also have fixed height settings, which do not depend on the drawing file. This is the default setting for 3D solids you create in the **3D Modeling** module. A 3D solid always has a fixed, absolute height defined by its geometry.

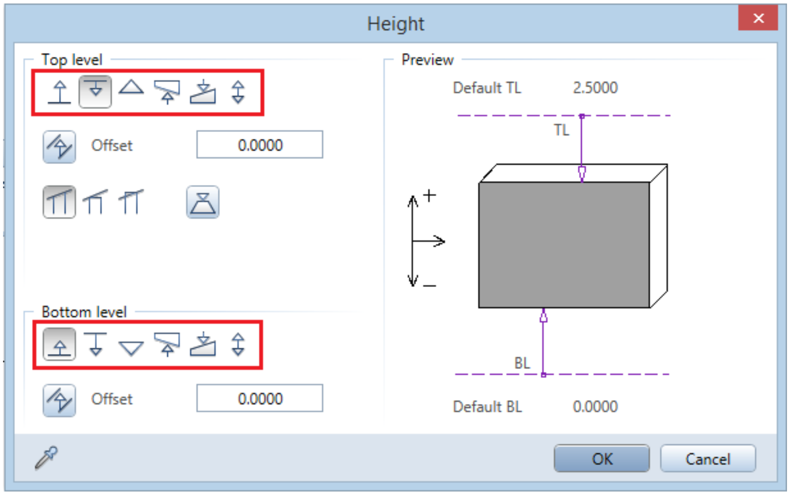
Define the height settings of a component while you are creating it. To do this, use the **Properties** dialog box. We recommend working with planes as much as possible. Try to avoid using fixed elevations, thus keeping the components flexible. You can find the **Height...** button in the properties dialog box of every component. Click this button to open the dialog box for setting the height. In this dialog box, you can define the height separately for the top level and for the bottom level. A preview on the right shows the settings you have made.

You have the following options:

- Using the first two icons, you define the component height so that it is relative to the lower default reference plane or to the upper default reference plane. If you want, you can also enter an offset between the component and the plane. This offset is always constant even if you change the height of the reference plane. In areas with custom reference planes or roof planes, Allplan will use these planes instead of the default reference planes. This setting is most commonly used.
- Using **elevation point**, you can enter an absolute value in the Z direction. This value defines the height of the component's upper edge or lower edge. We recommend using this setting for fixed components within the model. These components do not adapt to any changes in the story height. In addition, only components with fixed elevation points can be raised or lowered using **Move** or modified using **Stretch Entities.**
- Using the two icons with the sloping planes, you can take the height of the bottom or top from a component you have already defined. Contrary to the symbols, this has nothing to do with sloping planes. The height is defined by the component you click. When you click this icon, the **Height** dialog box closes temporarily so that you can click the component whose height

settings you want to use. This is *not* a dynamic selection: if you change the height of the component clicked or delete this component later, the height defined will *not* update accordingly. It remains a fixed Z value.

- Using the last icon, you define the Z dimension of the component, that is to say, the component height from its upper edge to its lower edge. However, this option defines only *one* height setting. This is useful for slabs or similar elements, which have a fixed structure and component thickness but whose absolute height may change over the course of the project.

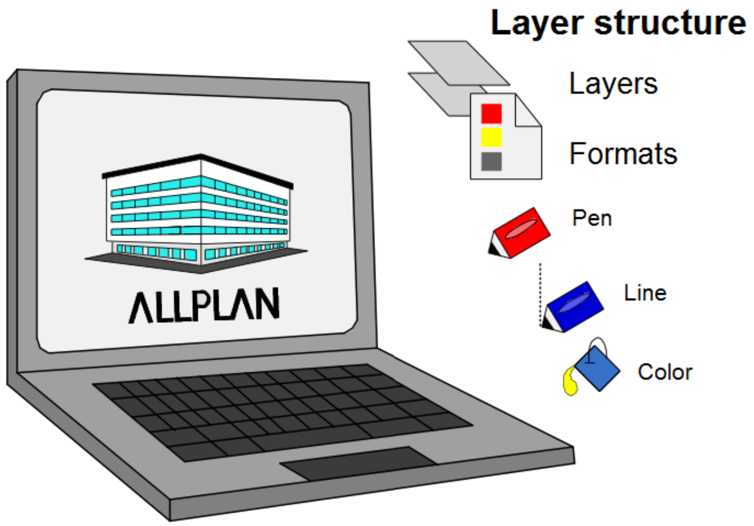


Basically, it is worth spending some time thinking about how to define the heights of the components. Once you have drawn up a concept, stick to it throughout the project. For example, you can associate all exterior walls with the upper and lower default reference planes. For slabs, on the other hand, you can define the component height and use only one plane. These rules make it easier for you to create the model, as you can proceed quickly. Based on these rules, you can create the plane model in the building structure and assign the heights to structural levels and drawing flies.

Check list IV: plane model and component heights (see page 237)

Layers in Allplan

Using the building structure and the plane model, you make sure your building model is set up correctly, being and remaining both consistent and flexible. In **Allplan**, layers provide an additional means of applying a structure. Most CAD users are familiar with layers, as layers are part of numerous CAD systems, such as AutoCAD.



In other CAD programs, users only have layers to structure data. In **Allplan**, on the other hand, a layer is a **format property**. You can assign this property to every element independently of its drawing file. Apart from being on a par with the element color and line type, layers have some additional functions. For example, you can define the other format properties (pen, line, color) together with the layers assigned. In addition, you can use layers to grant individual users access to specific parts of the building model. Last but not least, layers allow you to quickly show or hide elements on screen and in layouts. For this, you need to create print sets and privilege sets, which will be explained in detail later.

An Allplan layer is a format property, such as the element color. In addition to drawing files, you can use layers to structure data within the model. Layers work across drawing files. You can define them within the project or in the office standard.

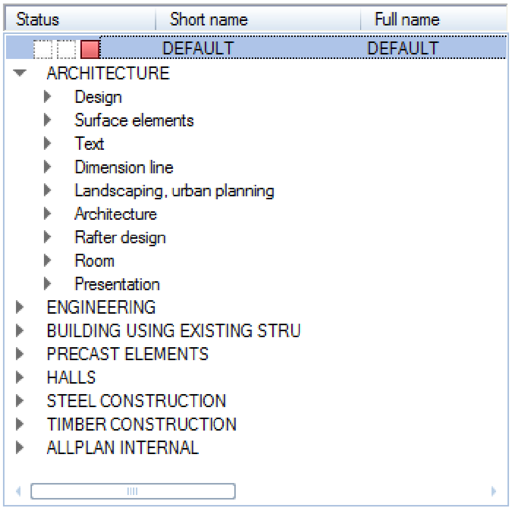
Each object you draw has a layer. In addition, you can use layers to predefine the other format properties (from layer).

By defining print sets and privilege sets, you can specify which elements are visible and control who can access which parts of the model.

Although BIM does not require you to use layers in your building model, we strongly recommend working with layers in **Allplan**. In addition to the advantages listed above, data exchange benefits greatly from layers. When you export data using the IFC interface, you can use layers to control how the individual components and objects are transferred.

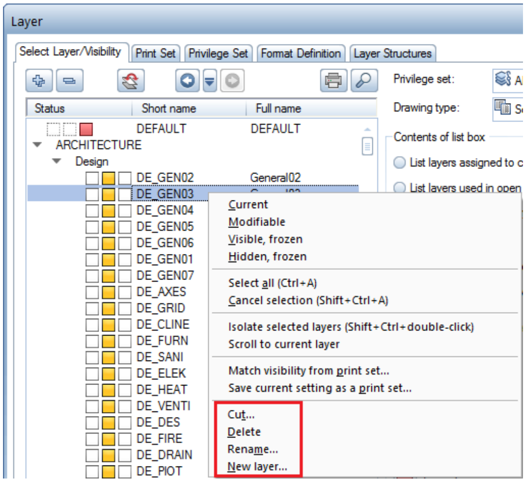
Creating the layer structure

Allplan comes with appropriate layers for all common elements and objects. The layers are arranged in categories (architecture, engineering, timber construction ...), which are divided into subgroups. Based on this default structure, you can create your own office-specific or project-specific layer structure. So you do not have to spend time creating your own structure from scratch. Public authorities or large institutions often have their own layer structures. If this is so, you are obliged to use the given structure when exchanging data. In this case, you can create the required structure manually based on a layer table. As an alternative, you can use a prototype file (ends in *.dwt) to import the layer structure directly into **Allplan**.



Keep your layer structure as "lean" as possible so that you do not have to waste time finding the right layer. Therefore, delete all the layers or subgroups you do not need or combine them into new groups. As experience has shown, 60 to 80 layers are usually enough.

Using the **shortcut menu in the Layer dialog box**, you can delete, move, rename and create layers and layer levels. To open this dialog box, double-click with the right mouse button in an empty area of the workspace. As an alternative, use the **Format** toolbar or the **Format** menu and select
Select, Set Layers. The layer palette does not offer these functions. But you can use it to show and hide layers.



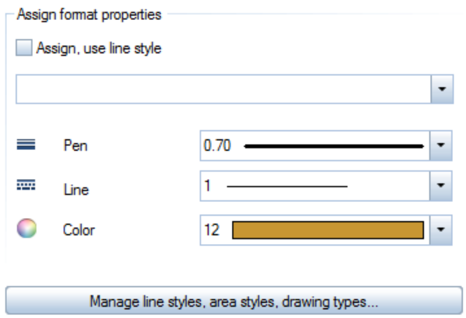
Note: The layers that come with **Allplan** are default layers. Therefore, you cannot delete these templates on the Select Layer/Visibility tab. But you can do this on the Layer Structures tab.

Note: Depending on the resource settings, only the administrator (if you use office-specific layers) or the administrator and project owner (if you use project-specific layers) are allowed to create and change the layer structure, making sure it is not changed inadvertently.

Every layer has a full name and a short name. These names should be meaningful and unique, making it easier for you to identify the layers. Whereas you can use the full name as often as you want, the short name must be unique for each layer, as Allplan uses it together with the (internal) layer number for identification. Once you have created a layer and integrated it into the layer structure, you can assign more properties to this layer using the tabs.

Layers' format properties

Apart from being a format property itself, every **Allplan** layer can define the pen, line and color formats of the elements placed on it. Here, the emphasis is on ”can”, as this is not a property of the layer itself but a property of the individual element. In other words, one and the same layer can include elements with different settings, that is to say, elements that take all their format properties from the layer, elements that take some of their format properties from the layer and elements that take no format properties from the layer. To assign a specific format to a layer, select the layer on the **Format Definition** tab and set the **pen**, **line** and **color** as you need. As an alternative, you can also assign a **line style**. A line style combines these three formats for different scales or drawing types. You will learn more about line styles later.



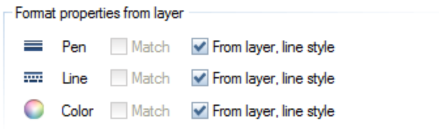
However, defining the format of a layer does *not* mean that the elements on this layer assume these properties automatically. You can set this option for the entire project in the layer dialog box. You can also assign it to individual elements using the **Modify Format Properties** tool.

We recommend working with the **”from layer“ for pen, line and color** option, giving a uniform look-and-feel not only to your data and but also to the BIM model. There is another big advantage: by selecting the right layers, users automatically use the right formats. They do not have to set the formats separately.

The ”from layer” option is a project setting. To select it, do the following:

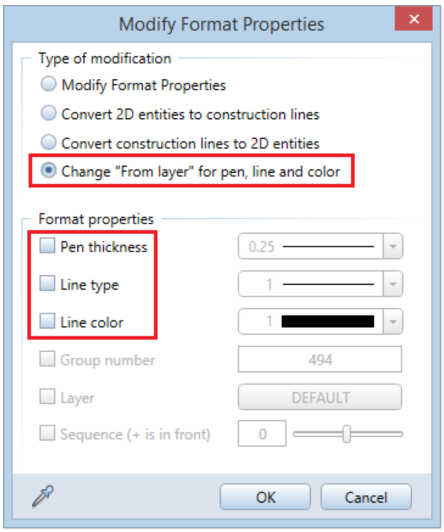
- First, open the **Format Definition** tab. In the **Layers' format properties** area, select the **Match from layer based on line style, pen, line, color assigned** option.

- Second, open the **Select Layer/Visibility** tab and select the **From layer, line style** check boxes for the **Pen**, **Line** and **Color**.



As long as you do not change this setting, all the elements you create take their format properties from the layer used. If you want to assign this option to an element or remove it from an element, use the **Modify Format Properties** tool. In the **Type of modification** area, select **Change "From layer" for pen, line and color.** Now you can select only these three format properties in the lower part of the dialog box.

- The element you are modifying takes the format properties you select from the layer.
- Consequently, the format properties you do not select are not taken from the layer; so you can still set these properties independently of the layer.



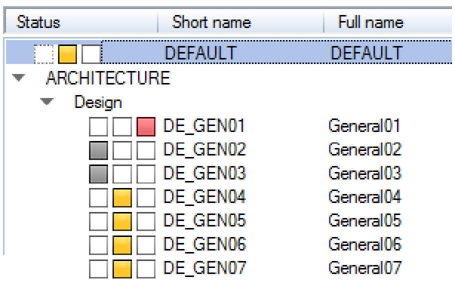
As this option is a global setting that applies to the entire project, only the project owner or administrator can select this option, which then applies to all the users working on this project.

Print sets and privilege sets

In addition to helping you structure data and define format properties, the layers in **Allplan** offer two more options, allowing you to control how elements on layers are displayed and edited: **print sets** and **privilege sets**. Using **print sets**, you can **show and hide layers** quickly and easily. Using **privilege sets**, you can grant individual users access to specific parts of the building model, thus protecting objects or areas from unauthorized changes. This option is very useful if a lot of users work on the same project at the same time, which is often the case with BIM projects. Involving a lot of people, BIM projects are usually very complex. So you have to break up tasks within the office. Using privilege sets, you can define responsibilities quickly and easily.

Every Allplan **layer can have four different statuses:**

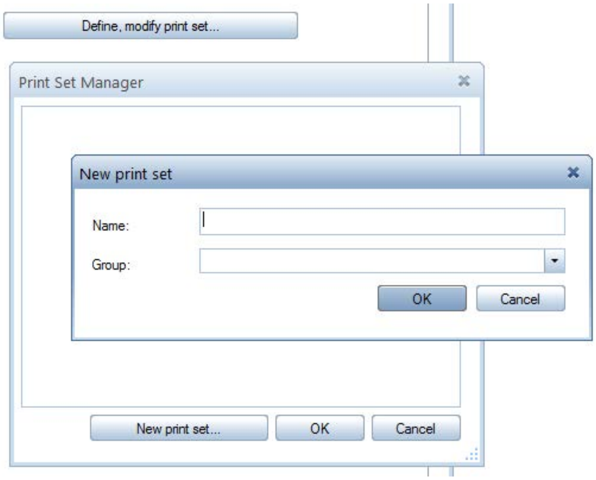
- **Current (red)**: all elements get this layer while you are creating them. You can see the name of the layer on the **Format** toolbar.
- **Modifiable (yellow)**: all elements on this layer are visible on screen; you can edit them.
- **Visible, frozen (gray)**: although the elements on frozen layers are visible, you cannot edit them. If the **Display elements on frozen layers using a fixed color** option is active (default setting) in the layer dialog box, all elements on frozen layers are displayed in the color selected.
- **Hidden, frozen (white)**: you can neither see nor edit elements on hidden layers.



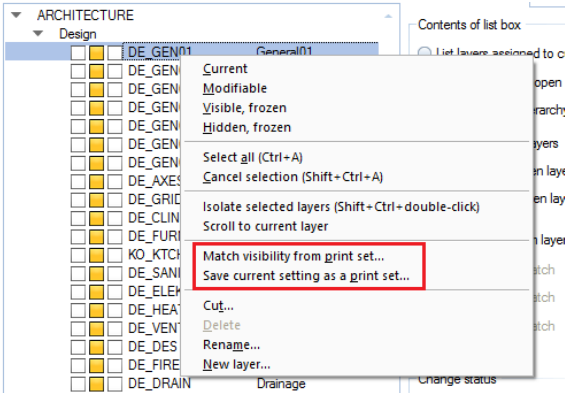
Using the **Layer palette** or the **Select Layer/Visibility tab** in the **Layer dialog box**, you can change the status separately for each layer or for an entire layer level. Note that only one layer can be **current** at any one time.

Print set

Although its name suggests otherwise, a **print set** is not limited to printing. Rather, you can use print sets to **control the visibility of layers** in general. Any layer in a **print set** can have the **visible** or **hidden** status, which means that the elements on this layer are visible or not. You can define a print set in two different ways: using the **Print Set** tab or the **Select Layer/Visibility** tab. If you want to use the latter, define the layer settings as you need. Then open the shortcut menu and select **Save current setting as a print set**. If you use the **Print Set** tab instead, you also start by defining the layer settings. After this, click the **Define, modify print set** button. Then click **New print set...** and enter a meaningful name for the print set. If you want, you can also assign it to a group. This is useful if you work with a large number of different print sets.



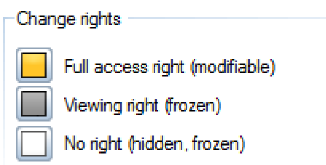
If you want to use a print set you have already defined to change the visibility of the layers in a single step, open the shortcut menu again. This time click **Match visibility from print set...** and select the **print set** you want to use. Allplan displays the layers in accordance with the settings in this print set.



In the layout module, however, the global layer dialog box applies *only* to elements you have drawn directly in the layout. Use the **Properties** to define visibility settings for the drawing files and layout windows placed. To do this, select the **List Layout Elements** tool, which shows you all the documents placed in a table. Use the **Layer, print set** column to define the settings as you need.

Privilege set

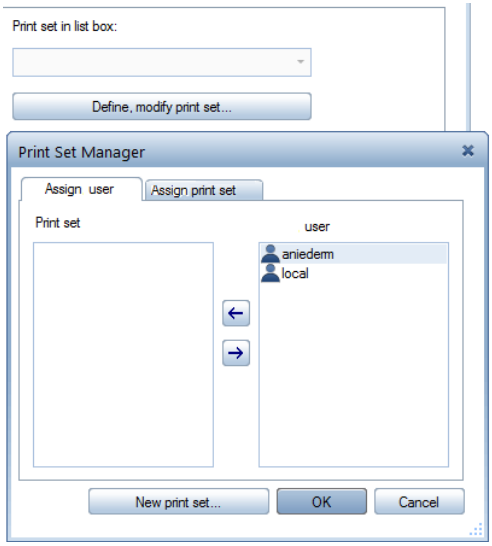
You can use a **privilege set** to control **who can access what.** In addition, you can use privilege sets to define which layers are available to the current project, thus reducing a large layer structure to a number of defined layers. This makes it easier for project participants to select the right layers. Any layer in a **privilege set** can have the **Full access right (modifiable)**, **Viewing right (frozen)** or **No right (hidden, frozen)** status.



As opposed to the status in the layer selection, the status in a **privilege set** cannot be changed by the user. What's more, neither the elements on hidden, frozen layers nor the layer itself is displayed in the structure. The procedure for creating a **privilege set** is almost exactly the same as that for creating a **print set**. The only difference is that you must use the **Privilege Set** tab. Define the layer settings as you need. Then click **Define, modify privilege set.... -> New**

privilege set.... and enter a meaningful name. The default privilege set **Allplan** comes with the program. It includes all the layers in the **Allplan** default folder.

If you use Workgroup Manager and several users work on the same project at the same time, layers play an important role in controlling access and cooperation. Therefore, it is the project owner or **Allplan** administrator who is responsible for defining the settings described. Normal users can just use the print sets and privilege sets (provided they have been assigned to these sets; otherwise, they cannot access them). You can make these assignments when defining a set or later. To do this, click **Define, modify privilege set...** or **Define, modify print set....** The assignment table consists of two tabs, which function in the same way. Therefore, you can assign a user to a set or a set to a user. The result is the same.



When working with layers and their functions, make sure all assignments are complete. Otherwise, you cannot fully exploit the benefits of layers.

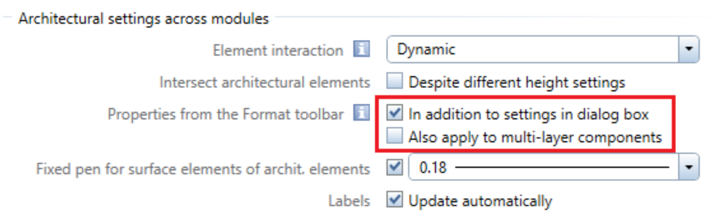
Assigning layers

When working with layers, you first need to create a layer structure and define the properties. Although this is the first step, it is not the most important one. Just creating the layers is not enough. You must also use them when designing the objects. Otherwise, Allplan simply places every object on the same layer, which is usually the DEFAULT layer. The most important step is assigning the layers to the components, ideally while you are creating them. Like drawing files, layers can be changed later. However, this takes a lot of time and effort. Therefore, each time you select a tool, check the layer set.

Depending on the tool selected and the settings in the options, you can select layers in two different ways:

- Directly in the **Properties** dialog box on the **Format properties** tab. You can do this for linear components, multi-layer components and objects made up of individual parts that can have different layers (dimension strings ...).
- On the **Format** toolbar using **Select...** or **Set...**.

If you want to use the **Format** toolbar to set the layers globally for all tools, open the **Tools** menu, click **Options** and go to the **Components and architecture - Architectural settings across modules** area. Then select **In addition to settings in dialog box**. Do not select the second option: **Also apply to multi-layer components**. Otherwise, Allplan places all construction layers on the same layer, making it impossible for you to show or hide the construction layers separately.



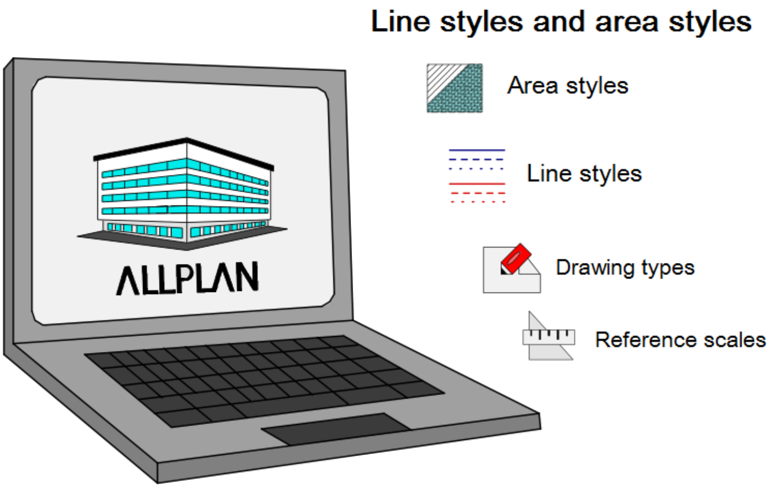
For example, if you want to give the structural engineer only the load-bearing construction layers of the components, you can do this in the current **Allplan** version. Just hide the unnecessary layers and select **Do not transfer hidden layers** in the **IFC export settings**. This option is not available if all construction layers are on the same layer. To find out more about export, see page 177.

We recommend that you work with the **Auto-select layer with tool** setting, helping you use layers systematically in your building model. You can select this setting on the **Select Layer/Visibility** tab in the **Settings** area. With this setting, Allplan automatically chooses the layer that is appropriate to the tool you select. There is another option helping you use layer consistently: you can copy the layer from an element you have already created. To do this, click the  **Match current layer** icon or double-click a component with the right mouse button.

In the beginning, using layers might feel like an unpleasant duty, especially when you are cooperating and exchanging data with public authorities or large institutions. But as soon as you have familiarized with layers and seen their advantages, you will never want to do without them again. Admittedly, setting up an office-specific, logical layer structure takes some time and effort, but in the end, the benefits will far outweigh the effort.

Check list V: layers and format definitions (see page 240)

The database is one of the core aspects of handling projects in a BIM-compliant manner. Based on an initial model, the database is developing and growing constantly. This database is the BIM model you create as a prototype in the early project phases. This model will then be expanded, adjusted and refined over the course of the project. The manner in which components and details are displayed varies depending on the planning phase. The database is always the same; only the representation and level of detail differ. To display everything correctly in accordance with the relevant phase, you can use **area styles and line styles** when you model components in **Allplan**. Using these styles in conjunction with **drawing types** and **reference scales**, you can display one and the same element in many different ways.



Line styles and area styles allow you to display one and the same object differently depending on the planning phase and situation. You do not have to spend time entering the object from scratch.

Clearly reflecting the concept of BIM, line styles and area styles play an important role in handling projects in a BIM-compliant manner. Using drawing types and scale ranges, you can control what you can see and when. Drawing types and scale ranges can even have their own format properties.

Working with line styles and area styles

Line styles and area styles are an alternative to simple and relatively rigid format properties and to ”normal” surface elements, such as patterns, hatching, fills and bitmap areas. You can use line styles and area styles not only for simple 2D elements but also for 3D objects and components. In 3D, the benefits are even more obvious than in 2D. When creating the BIM model, you should always prefer line styles and area styles to any other option. Otherwise, you have to spend a lot of time adjusting the model to the relevant planning phase or you even have to create parts of the model or the entire model from scratch.

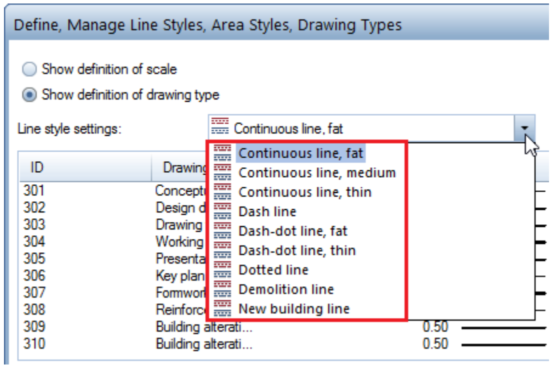
In addition, you can benefit from line styles and area styles in various ways without having to do any additional work. Whether you select a hatching style or a style area when you create a component is completely irrelevant to the overall procedure. The same is true for other format properties: simply select a line style instead of a pen, line and color on the **Format** toolbar.

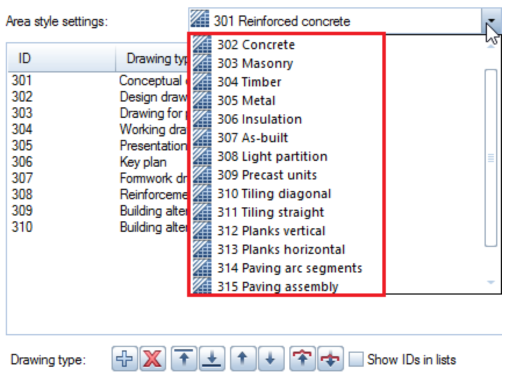
Area styles and style areas look differently depending on the drawing type or scale range. Line styles, on the other hand, change their appearance in accordance with the format properties (pen, line and color) of the elements.

There are two important differences between line styles and area styles:

- A **line style** is an element’s format property whereas an **area style or style area** is a discrete 2D element or it can be used to display architectural elements in plan.
- Furthermore, you cannot assign a **line style** directly to an element; you can assign it only to a **layer** as a format definition. All elements that are on this layer and that have the **from layer** setting take their format properties from the line style.

Allplan comes with some predefined area styles for the most common materials. The same applies to line styles: you can find various line definitions in the default folder. To get an overview of these resources, open the **Tools** menu, select **Defaults** and click **Line Styles, Area Styles, Drawing Types**.





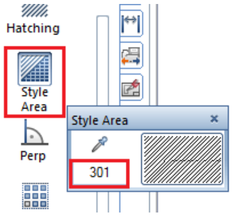
Select the line style or area style for which you want to see the details. Allplan shows the relevant parameters depending on whether you have selected **Show definition of scale** or **Show definition of drawing type** at the top of the dialog box. For a **line style**, you can see the **pen**, **line** and **color**. For an **area style**, you can see a **pattern**, **hatching style**, **fill** or **bitmap area**. In other words, area styles and line styles simply refer to basic formats and surface elements, which are then displayed in accordance with the setting.

The default templates in **Allplan** come with separate definitions for both scale and drawing type, making them as flexible as possible.

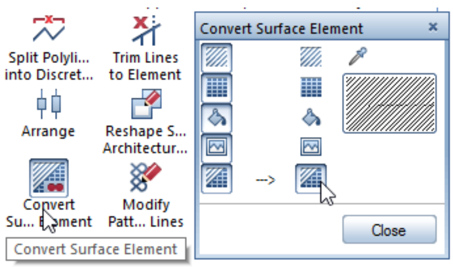
Using line styles and area styles

In **Allplan**, the two terms **style area** and **area style** refer to two different things, even though they are often used synonymously. A **style area** is a **drafting tool** you can use to create a discrete surface element. The way it looks depends on the **area style** used. In other words, this area style is a **format definition** for a surface element or the surface element of an object.

So if you want to draw a 2D area whose appearance is to change, use the **Style Area** tool in the **Draft** module (**Create** area). Using the **Properties**, you can select the area style you want to use. After this, enter the area as you would a polyline or "simple" surface element.

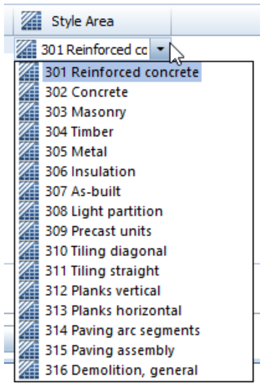


You can even convert existing surface elements to style areas, thus making them more flexible. To do this, use the **Convert Surface Element** tool.

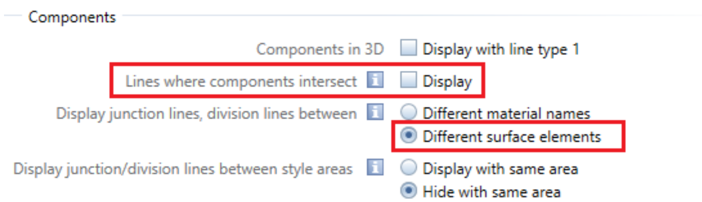


Now all you need to do is change the reference scale or the drawing type - the area will look differently each time you select a different setting.

As you create your building model in three dimensions, you will not work with these 2D drafting tools. However, you should use area styles for architectural components wherever possible, making sure the components are displayed correctly in different planning phases and at different scales. This applies to the way surface elements appear in plan view and to the level of detail used to display construction layers of walls. To select and set the ”format”, open the **Allplan** tool you want to use (wall, column, slab…) and click the **Properties** icon. Then open the **Surface elements** tab, click below **Style area** and select an area style in the drop-down list



Like 2D style areas, the components displayed in plan change with the scale or drawing type you select. Whether the lines between the layers of multi-layer walls are visible or not depends on the settings in the options. Select the **Tools** menu, click **Options** and open the **Components and architecture** page. While working with ”intelligent” surface elements, you do not need the **Display lines where components intersect** option. Therefore, make sure it is not selected. For the next option, select **Display junction lines, division lines between different surface elements.**



There is a third option defining the lines between style areas. Here, select **Hide with same area.** As a result, you can display a multi-layer wall as a single-layer wall in a design plan or a submission plan (provided the style areas used have the same definitions for the relevant scale range or drawing type).

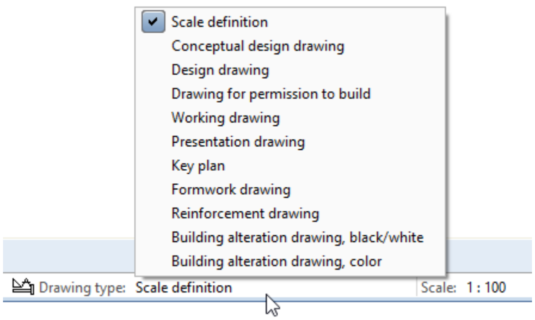
If you want to use **line styles** for elements, you must work with the **"from layer" format property**. Remember: you *cannot* assign a line style to an element; you can assign it only to a layer. As described in 'Layers in Allplan' (see page 87), you can select this property in the layer dialog box on the **Format Definition** and **Select Layer/Visibility** tabs.

You can choose the line style you want to use on the **Format Definition** tab, too. To do this, select the **Assign, use line style** check box and click a line style in the drop-down list.

All elements that are on this layer and that use the "from layer" format property take their settings from the line style. Consequently, these elements look different whenever you change the drawing type or scale. This applies to 2D elements, architectural elements and complex objects. Consequently, when you work with line styles and the "from layer" format property, the elements you place on the same layer must be identical in their display options. Take this into account when you create the layer structure.

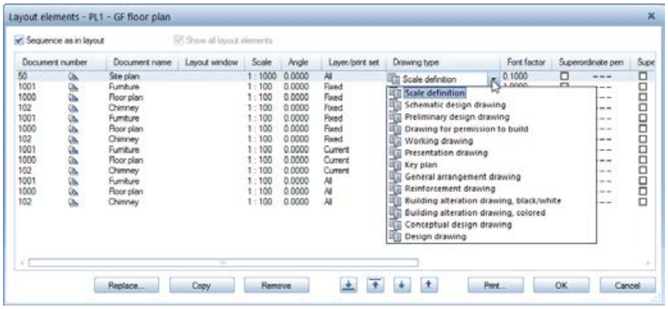
In addition to layers, **drawing types** are closely linked with line styles and area styles in **Allplan**. Using drawing types or the **reference scale**, you can control how components and objects are displayed. The "styles" themselves only form the basis.

To find out which drawing type and reference scale you are currently using, have a look at the **status bar** at the bottom of the viewport. There, you can also change these settings. You can also select a different scale on the **View** menu. Just click **Reference Scale**.



When working with line styles and area styles, you must bear two important points in mind:

- The reference scale is hierarchically subordinate to the drawing type. If you have selected a drawing type, the scale definition is irrelevant. Consequently, simply changing the scale will not change the appearance of your drawing. To display the elements differently, you must select **Scale definition**.
- In the layout editor, the settings displayed in the status bar apply only to the elements drawn directly in the layout, such as the layout border or the title block. If you want to define these settings for the drawing files and layout elements placed, use the **List Layout Elements** tool or the properties. You can make these settings separately for each element.



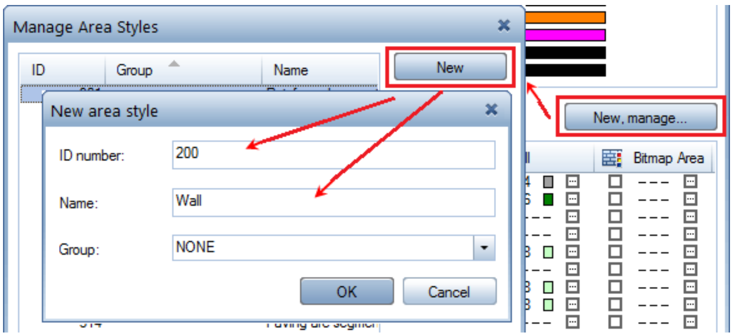
Here, too, the drawing type takes precedence over the scale. If you want to use the latter, select scale definition.

Creating your own line styles and area styles

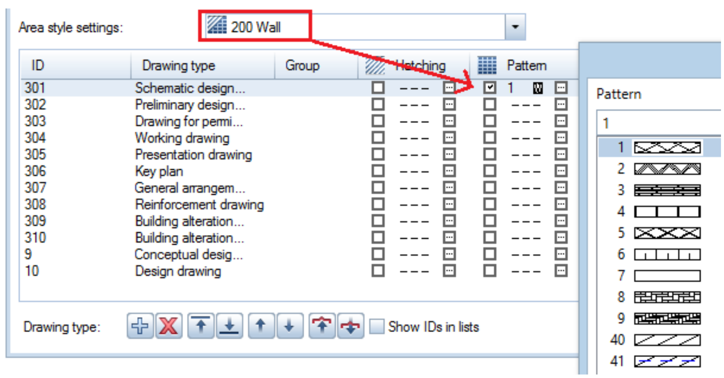
The line styles and area styles in the **Allplan** default folder cover the most common materials. However, you can add your own line styles and area styles at any time or customize the existing resources for your needs or for project-specific requirements.

We recommend that you create only as many area styles as you need, keeping the total number to a minimum. In addition, spend some time thinking about the structure and logic of the area styles you want to use and discuss this topic with the other project participants in advance.

In conjunction with Workgroup Manager, you require administrator privileges if you want to define and modify resources in **Allplan**. The administrator can edit both the office standard (STD) and the project standard. The project owner can edit only the latter. To define new resources, open the **Tools** menu, select **Defaults** and click **Line Styles, Area Styles, Drawing Types**. You can also change, adjust or delete existing definitions. A dialog box opens, showing all available line styles and area styles. To create a new style, click the **New, manage...** button. In the next dialog box, click **New**. Enter a meaningful name for the new line style or area style. You can also assign an ID number. If you require a lot of different styles, you should arrange them in subgroups.

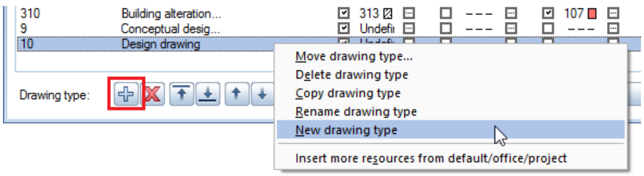


As soon as you click **OK**, Allplan creates the line style or area style and selects it automatically. Next, you can define how you want to display it. To do this, specify which **surface element (pattern, hatching, fill, bitmap area)** or which **format (pen, line, color)** you want to use for each **drawing type** or **scale range**. Simply select the surface element or format in the drop-down list. For surface elements, you can define additional parameters by clicking the **...** icon.



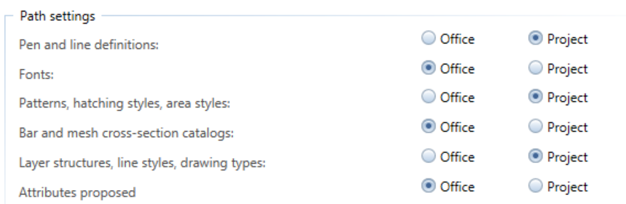
Do the same to change existing definitions.

If the drawing types that come with Allplan do not meet your requirements, you can customize them for your needs or define your own ones. To do this, click the **+** icon to the right of **Drawing type** or use the shortcut menu. Enter a name for the new drawing type.



Allplan lists the new drawing type with all available line styles and area styles. You can define display parameters for the new type as described above.

Line styles, area styles and drawing types are always linked with a specific layer structure and the patterns, hatching, pens and lines defined here. Therefore, make sure that you always work with project-specific or office-specific resources. This is the only way to ensure that everything appears correctly. You can check these path settings in the project properties. To do this, open the **File** menu and select **New Project, Open Project** or **ProjectPilot**.

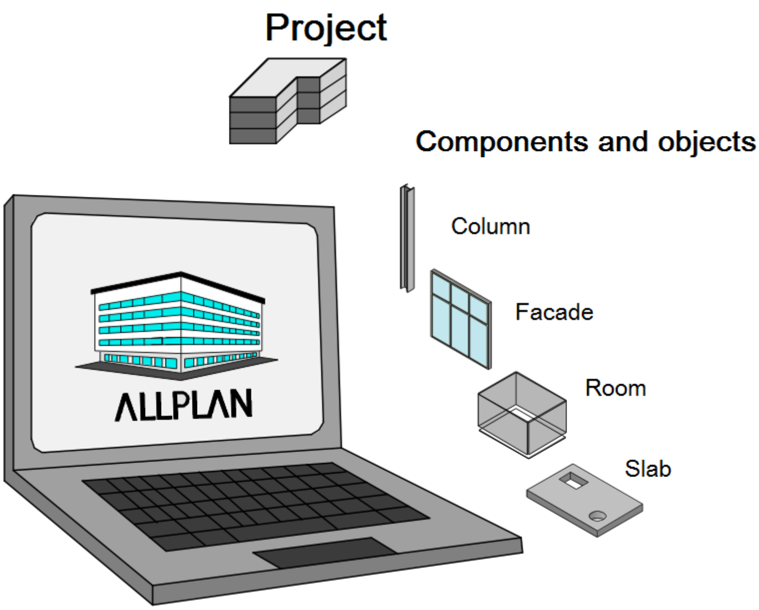


We recommend creating a **sample project** as a project template with project-specific resources, including the entire office standard. This is useful not only for creating a BIM model but also for defining an office-specific standard. You can use this project as a template for new projects or use some of its resources for other projects.

Check list VI: line styles, area styles (see page 242)

As mentioned many times before, when you work in **Allplan**, you use the appropriate **Allplan** tools for creating the components and thus the data in your project. By doing so, you can fully exploit the benefits afforded by the program's extensive functionality, thus avoiding the time-consuming process of adjusting data later. This is particularly important when it comes to creating the BIM model and handling projects in a BIM-compliant manner.

For example, by using the **Wall** tool, you ensure that the component you create is transferred and identified as a wall. While you are creating the component, it is automatically given object-specific attributes and properties, without you having to do anything. Some of these attributes and properties apply to almost all architectural components whereas others are very specific and apply to a few objects only. In addition, just by creating the component, you define how it interacts with other components, such as a window opening or an adjacent room.



Advantages of using the appropriate Allplan tool:

- You can transfer the component as a **predefined type**.
- The component automatically gets the **properties** and **parameters** required for identification.
- The component knows how to **interact with other objects**.
- You can use the **Allplan** tools for **analyses** and **conversion**.

While designing a component, you enter its geometry and define various settings in the **properties dialog box** (wall thickness, column cross-section...). In addition, you can give every object you are creating additional information in the form of **parameters** and **attributes**.

Of course, you can display these details as 2D labels, dimension lines and so on in **Allplan**, allowing you to visually check the data as well as create layouts and (PDF) files. However, these additional details are NOT part of the building model; thus, they are NOT transferred by the IFC interface. Therefore, you should always use them in such a way that only the inherent characteristics of an object are visible. A typical example is a room stamp in the form of a label style: it is not the visible text that defines the function of the room, but the function is a property of the room, which is labeled with this property. As soon as you change a property, the contents of the room stamp update automatically. You do not have to modify the text manually.

The IFC ObjectType

BIM and **Allplan** are geared primarily to the AEC industry. Therefore, the data model and IFC library include all common elements in the fields of architecture (wall, window, room, ...), engineering (beam, foundation, ...) and building services (conduit, switch, outlet, ...). Each object you create with the appropriate **Allplan** tool automatically gets the associated **IFCObjectType**. You can change this **IFCObjectType** later if you want to give an element a different class, thus allowing you to transfer the element as a different component. However, in this case you first need to turn the element into a ”neutral” object using the **Convert Elements** tool. This removes the **IFCObjectType** from the element and you can assign a new type afterwards.

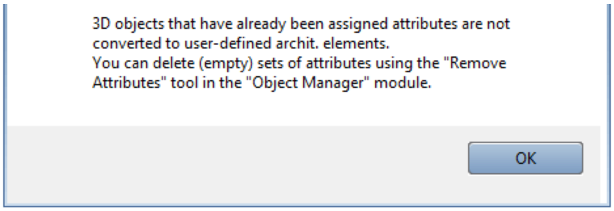
Assigning the type

If **Allplan** does not provide an appropriate tool for a component you require in your model, you can create this component as a solid using the tools in the **3D Modeling** module. You can assign IFC ObjectTypes to all the elements you design in this module. Similarly, elements you combine into **smart 3D symbols** or into **user-defined architectural elements** can be given IFC ObjectTypes. The same applies to user-defined **SmartParts**. Allplan then transfers these elements in accordance with the IFC ObjectType definitions assigned. Using **Allplan**, you can thus create elements of any current **IFCObjectType**. However, the element must be a **3D element**. As you know, Allplan does not transfer 2D elements in any form, including smart 2D symbols or 2D SmartParts.

We recommend converting an element to a BIM object or an IFC component immediately after you have created it. Otherwise, you might forget it or lose track of the elements you still need to convert. Work through the following steps one after the other. Do not change this workflow. This is the only way to ensure that you do not have to assign attributes and types multiple times:

- **Model** the 3D geometry and combine the elements into a smart symbol or convert them to a user-defined architectural element.
- **Assign** the necessary attributes, primarily the IFCObjectType.
- **Set** the required **values** within the attributes and define other parameters.

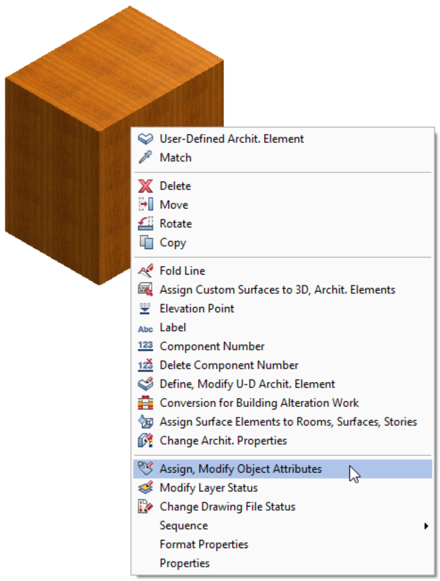
If you do not use the **User-Defined Archit. Element** tool but convert a 3D solid to a user-defined architectural element, there is one more point you must bear in mind: you can convert an element to a user-defined architectural element only if the element does not have any additional attributes. Therefore, you must delete these attributes before you convert the element. To do this, you can use the **Remove Attributes** tool in the **Object Manager** module. Otherwise, **Allplan** will issue a message and it will not convert the element.



If you want to combine your elements into a smart symbol, note the following points: Allplan will export and transfer only the attributes and information you assign directly to the smart symbol, ignoring any characteristics of the objects making up the smart symbol.

After this, create the object using the **Convert Elements - 3D to U-D Elements** or **Smart Symbol** tool.

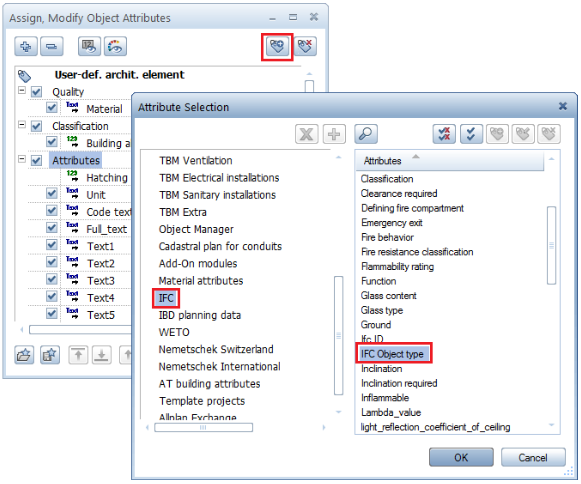
Next, assign attributes. Click the object with the right mouse button and select **Assign, Modify Object Attributes** on the shortcut menu.



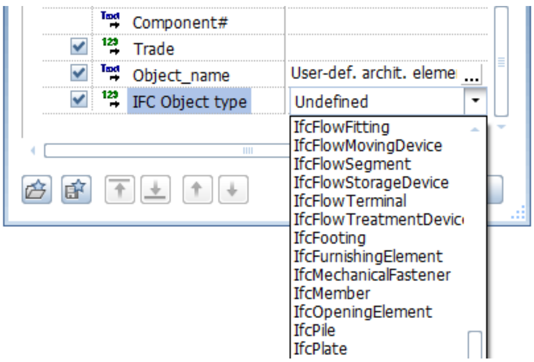
You can also access this tool by opening the **Change** menu and clicking **Bonus Tools - Object Manager**.

Note: You will learn more about attributes in 'Elements and attributes' (see page 130). This section will also show you how to use them.

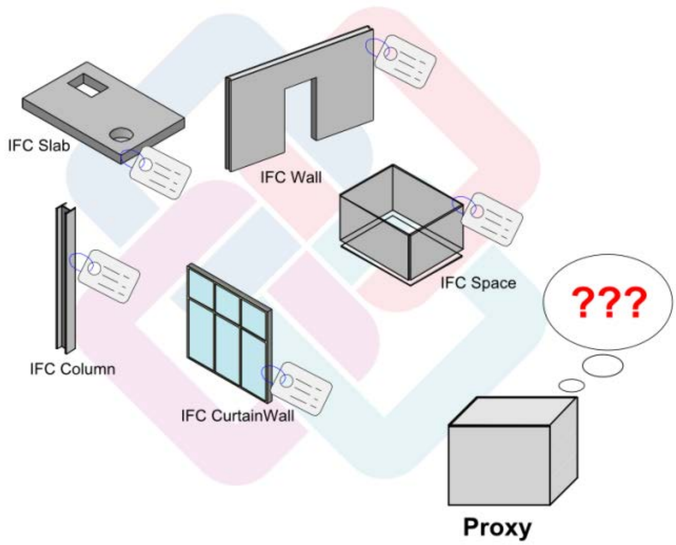
You can now see the attributes attached to the element. Normally, these attributes include the name, material and the geometric values, such as the area and volume. Click the **Assign new attribute** icon to open a dialog box where you can find all the attributes you can assign in **Allplan**. In the **Default** area, select the **IFC** group and the **IFC object type** attribute.



Click **OK** to confirm, adding the selected attribute to the end of the list. The value is still **Undefined.** You will change this in the second step. This step involves setting the type, that is to say, the component or object to which you want to convert the element. To do this, click within the **Undefined box** to open the drop-down list of all IFC objects currently supported by **Allplan**. Select the entry you need.



Allplan displays the attribute value you selected and transfers the element in accordance with this value. Bear in mind that after the transfer all components and elements without **IFC ObjectTypes** and all components and elements with the type being set to **Undefined** become "**proxies**" in the BIM model. In other words, these proxies are neither defined nor classified in the BIM model. As they cannot be identified, these elements are nothing more than empty objects without any functionality. To avoid this, use the appropriate tool right from the start or assign the appropriate **IFCObjectType** before you transfer the data.



The types in detail

Looking at the name in the selection list, you may have difficulties identifying the associated object. To make things easier for you, the following section lists all currently available object types by group. In addition, you can find a short description of the function and the special features for each object type.

- Elements of the unfinished structure and architectural elements:
  - **IFC Beam**: downstand beam, upstand beam, horizontal beam
  - **IFC Column**: column or pillar, vertical supporting element
  - **IFC Footing**: foundation, footing, usually spread
  - **IFC Pile**: pile, deep footing
  - **IFC Ramp**: straight or spiral ramp; can be a single component or composed of a number of constituent parts (flight, landing, railing ...). Unlike the other tools, this tool does not automatically assign the IFC ObjectType.
  - **IFC RampFlight**: straight ramp flight or entrance ramp. You should avoid using this type definition. Instead, use the more general definition, where the ramp shape is derived from the geometric values and additional attributes. Using the general definition, you can define the flight as a subordinate element.
  - **IFC Roof**: roof. This IFC object type represents the container including the constituent parts of the roof (covering, supporting structure).
  - **IFC Slab**: slab or floor slab. The load-bearing layer gets this IFC object type. You should create coverings and linings as separate components and assign the IFC ObjectType Covering to these components. Exceptions are landings of ramps and stairs, which get the IFC ObjectType Slab. You can assign the additional attribute ”Predefined Type = Landing” to these components.
  - **IFC Stair**: stair or stair flight; can be a single component or composed of a number of constituent parts (step, stringer, landing, railing ...).
  - **IFC StairFlight**: continuous straight stair flight. As with ramps, you should avoid using this type definition for stairs. Instead, use the more general definition.
  - **IFC Wall**: wall
  - **IFC WallStandardCase**: single-layer wall component with a simple geometric shape. You should avoid using this type

definition. Instead, use the more general definition, where the shape and structure are derived from the geometric values and additional attributes.

Allplan provides an appropriate tool for each of these objects. We strongly recommend that you create each object using the appropriate tool. When you assign an IFC object type to an ordinary 3D solid, this solid gets the corresponding type in the IFC file; however, this does not change its function in Allplan itself. Here, it is still an ordinary solid or a user-defined architectural element and the options you have are limited to those provided for 3D solids or user-defined architectural elements.

- Finish elements and surfaces:
  - **IFC Covering**: covering, lining, finish; should always interact with a room or a superordinate element of the unfinished structure.
  - **IFC CurtainWall**: curtain wall or facade in general. Here, the decisive factor is that the object is an object of the building envelope.
  - **IFC Door**: door, French door. Normally, this object is not an independent object. Instead, an opening element (IFC Opening) connects this object with the component in which it is inserted. As an alternative, this object can be part of an object group, which is usually a facade. You can use the ”FillsVoid” or ”Decomposed” relation to define how the objects interact.
  - **IFC FurnishingElement**: furnishings, equipment, furniture; can be movable or fixed and should always belong to a room.
  - **IFC Railing**: railing, safety fence, guard rail
  - **IFC Space**: room
  - **IFC TransportElement**: transport element that does not (yet) have its own IFC ObjectType, such as elevators or escalators.
  - **IFC Window**: window. Like a door, this object is usually not an independent object. Instead, an opening element (IFC Opening) connects this object with the component in which it is inserted. As an alternative, this object can be part of an object group, which is usually a facade or glass construction. You can use the ”FillsVoid” or ”Decomposed” relation to define how the objects interact.

Here, too, Allplan provides an appropriate tool for each of these objects. We strongly recommend that you create each object using the appropriate tool. As far as windows and doors are concerned, it is completely irrelevant whether you use smart symbols or SmartParts.

- Engineering elements:
  - **IFC ReinforcingBar**: bar reinforcement
  - **IFC ReinforcingMesh**: mesh reinforcement

  When creating engineering elements, that is to say reinforcement, you define various boundary conditions, specifications and properties automatically by selecting the bending shape, cross-section catalog ... and not by assigning object attributes. Therefore, you should only model engineering elements freely if you cannot create the shape you need in any other way.

- Elements helping you structure the data within the IFC schema:
  - **IFC Building**: building, building as a whole
  - **IFC BuildingStorey**: story, floor
  - **IFC Site**: site, plot

  You should not assign the IFC Building, IFC Site and IFC BuildingStorey types to objects even though these types are presented for selection and Allplan provides objects in the Urban Planning module that would match these types. However, these types are used only for the individual levels of the structure within the IFC definitions and specifications; they do not (yet) represent discrete elements.

- Elements and objects for technical building equipment (MEP) and for creating systems that can transport, distribute and store gas, water and energy:
  - **IFC DiscreteAccessory**: independent MEP component that is not installed in any superordinate object
  - **IFC DistributionChamberElement**: excavation, manhole or entrance hatch for checking and maintaining plenum spaces and shafts

- **IFC ElectricalElement**: constituent or element for energy supply, primarily electricity. As this is an all-purpose type definition, you should not use it any longer. Instead, use the more precise definitions that exist by now.
- **IFC EnergyConversionDevice**: system or device for converting energy, for example, a heat exchanger
- **IFC Fastener**: fastener or mounting for all sorts of elements transporting gas, water and energy
- **IFC FlowController**: flow controller
- **IFC FlowFitting**: pipe socket, connecting piece
- **IFC FlowMovingDevice**: system for transporting gas, water and energy
- **IFC FlowSegment**: piping part, segment or elbow
- **IFC FlowStorageDevice**: tank, device for storing liquids or gases
- **IFC FlowTerminal**: piece at the start or end of a system for transporting gas, water and energy; clamp, holder, fastener, shut-off
- **IFC FlowTreatmentDevice**: system for water treatment
- **IFC MechanicalFastener**: automatic fastener, shut-off

With Allplan's Technical Building Equipment module, you can create systems for heating, ventilation, sanitary facilities and electrical installations including all necessary components. However, most users work with their own MEP programs. Therefore, they only assign an object type of this kind if a 3D object within the building model requires a precisely defined MEP function.

- More general and superordinate object definitions:
  - **IFC BuildingElementPart**: constituent of a main component
  - **IFC BuildingElementProxy**: substitute for a component; used if the component does not (yet) have its own definition in the IFC schema
  - **IFC DistributionElement**: any element that transports or distributes gas, water and energy; that is to say, all MEP elements
  - **IFC ElementAssembly**: element group, component made up of constituent parts; is described more precisely by the ”is decomposed by” IFC definition

- **IFC EquipmentElement**: infrastructure element, equipment or equipment part, fixtures. You should not use the ”Equipment” type definition any longer. Instead, define the equipment object more precisely.
- **IFC Member**: bar-shaped, linear component in any position; it often has a load-bearing function within the building model. You should use this all-purpose type definition only if there is no definition that matches the object exactly.
- **IFC OpeningElement**: component opening in general; it is defined as an opening or niche in the attributes; it always requires a superordinate object in which it is inserted.
- **IFC Plate**: plate or disc; mostly planar component in any position; it acts as a boundary or it has a load-bearing function within the building model. You should use this all-purpose type definition only if there is no definition that matches the object exactly.
- **IFC Proxy**: universal substitute for all objects that do not (yet) have their own definitions in the IFC schema and that cannot be assigned to any class.

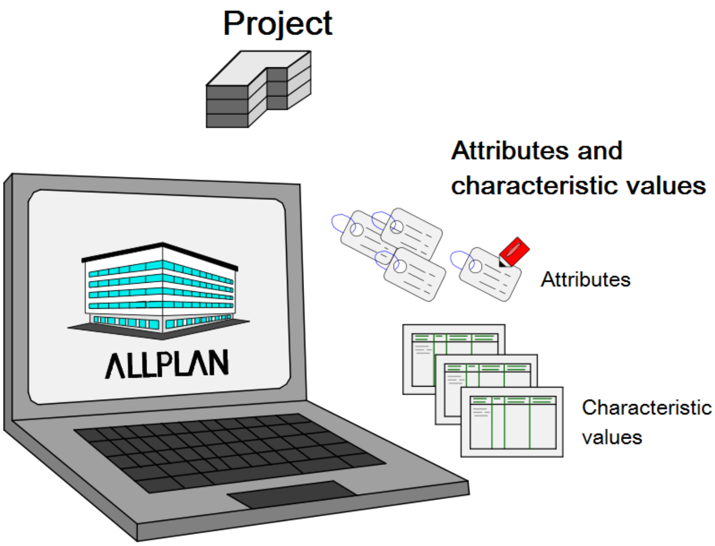
You should not use the ”IFC Proxy” type definition. Instead, select the most suitable type definition in the list. The ”most general” definitions you can use are IFC BuildingElement for architectural elements, IFC DistributionElement for MEP elements and IFC Element Assembly for composite objects. You should always think about whether it is useful to create independent objects and model them in 3D.

This is often not necessary, as you can attach plenty of information in the form of parameters and attributes to standard components. In no way do BIM and IFC mean that you have to individually model all components down to the last detail.

After having turned a 3D solid, smart symbol, SmartPart or user-defined architectural element into a defined component by assigning the corresponding IFC ObjectType, you should should give this component the necessary properties and information provided by the IAI and buildingSmart in a second step. These properties are combined in a property package (PSetCommon), which is explained in detail in the ’Attributes and properties’ section that follows. You can find a list of minimum requirements for each type in the ’Elements and attributes’ chapter. In addition, the appendix of this book provides an overview in table format.

Attributes and properties

Attributes, which are closely linked with the **Object Manager** module, are powerful and extensive tools in **Allplan.** Using attributes, you can attach details and values to any object in your drawing. These data can then be analyzed in various ways, transferred to other programs for further editing or displayed on screen, in layouts and in drawings. We recommend that you study these tools and options so that you can work with the full scope of features provided by **Allplan**.



Regarding BIM and the BIM model, attributes are particularly important. Attributes are one of the core aspects of BIM's underlying methods and ideas. BIM does not work without attributes. So there is no way around attributes. Allplan can neither transfer nor analyze any information or value that is not defined in the object geometry or as an attribute. Consequently, these details cannot be used by the other project participants in the BIM process.

Allplan comes with an extensive set of attributes arranged in groups. The most important attributes include the **Name**, **Function**, **Material** and **Component ID**. In addition, there are the **geometric values** of the object. These values are also saved as attributes. Other attributes include component-specific values and module-specific values (glazing area, reinforcement percentage, occupancy type ...).

Numerous attributes, such as name or material, belong to a number of different attribute groups. However, each attribute is defined just once. This definition is accessed by all groups. Therefore, the group from which you select the attribute is irrelevant when it comes to transferring the data.

If you require special attributes, you can create these attributes as **user-defined attributes** in addition to the default attributes provided. You can also arrange your own attributes in groups.

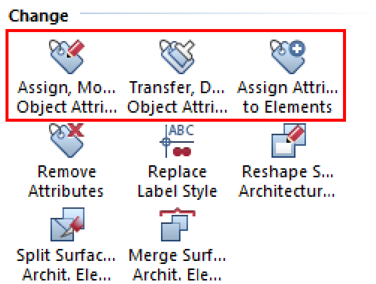
Note: Regardless of their name, user-defined attributes are not transferred as IFC attributes. They are combined in a separate attribute set called **Allplanattributes**.

Whether the default attributes are transferred as **Allplan** attributes or as IFC attributes does *NOT* depend on the attribute group to which they belong. What counts is whether the attribute you use is in the PropertySet of the element and whether the program can find a corresponding assignment.

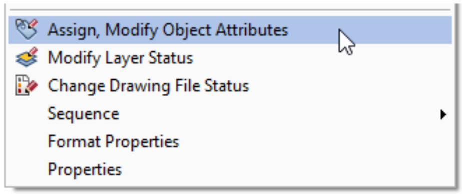
Assigning attributes

Allplan provides three different options you can use to give the objects the necessary attributes and properties and any additional information you want to transfer:

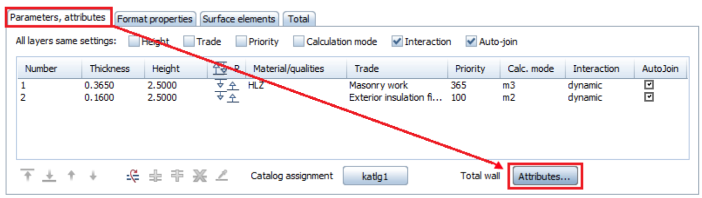
- You can use the **Assign, Modify Object Attributes**, **Transfer, Delete Object Attributes** and **Assign Attributes to Elements** tools in the **Object Manager** module you can find in the **Bonus Tool** family.



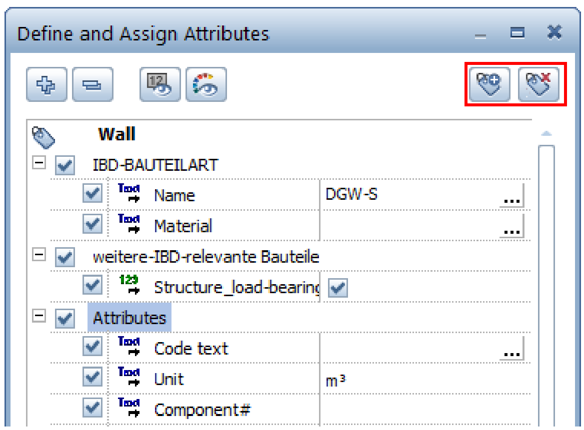
- You can use the **Assign, Modify Object Attributes** tool on the shortcut menu, which you can open by clicking the element in question with the right mouse button.



- You can click the **Attributes** button in the properties of the element in question. You can find this button in the dialog boxes of most architectural elements (room, wall ...).



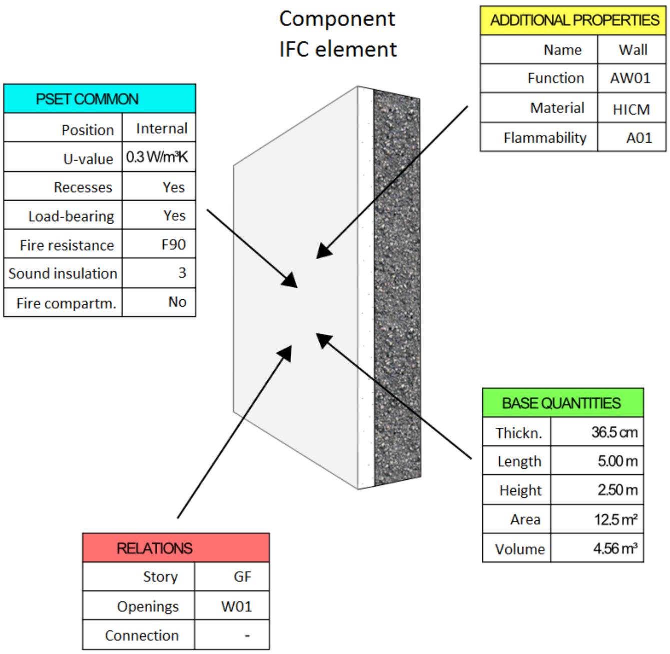
In the list that opens, you can change the values of the existing attributes, add further information and delete entries you no longer need.



Some of the attributes belong to the component definition itself. Therefore you cannot delete them. The geometric values (length, height, ...) and internal Allplan characteristics (component ID) are calculated and taken from the element's properties. You cannot change their values in the attribute dialog box. Consequently, the corresponding entries are grayed out in the list. Sometimes, you have a long list of attributes, in particular with advanced BIM models. To avoid confusion, you can hide these values using the **Show, hide fixed geometric attributes** and **Show, hide Allplan default attributes** icons. You can then see only the entries you can change or delete.

In an IFC building model that complies with the regulations specified by buildingSmart and IAI, each (architectural) element must have a minimum of specific properties and attributes that are defined in the corresponding **property package** (PSetCommon). Similarly, the minimum **geometric values** required are referred to as **BaseQuantities**. The number of minimum requirements varies from element to element.

In addition, there are the interactions with other components. These are usually superordinate objects, subordinate objects and adjacent objects. These interactions are referred to as **relations**. Like most geometric values, they are created and calculated automatically. They reflect the hierarchy in Allplan, where you can find PARENT (superordinate) and CHILD (subordinate) elements.



For example, the wall is the PARENT of an opening, whereas the opening is the CHILD of the wall. On the other hand, the wall is not the PARENT of a smart window symbol. Instead, the opening symbol is its PARENT, and the smart window symbol is the CHILD of this opening symbol.

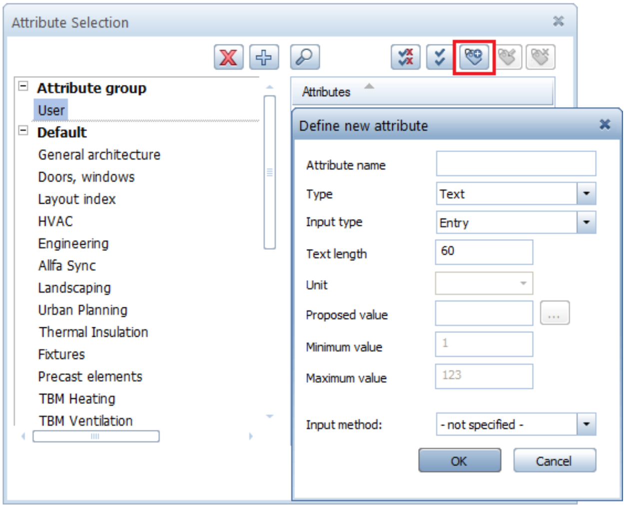
Creating your own attributes

The attributes that come with **Allplan** are usually not enough to cover all your needs, in particular with regard to BIM and the BIM model. Therefore, you can create user-defined attribute definitions and assign these user-defined attributes to objects. Before you start, you should discuss this topic with your planning partners. In particular, you should decide how many attributes you want to create and how to name the attributes. In addition, you should agree on the attribute type, ensuring consistency. We recommend creating a project-specific attribute list (for example, in Excel). Keep and maintain this list throughout the project, making sure it is always up to date.

To define new attributes in **Allplan**, you can use the familiar **Assign, Modify Object Attributes** tool. Click **New attribute** to open the dialog box for selecting attributes. In the **Attribute group** area on the left, select the category to which you want to add the new attribute. Usually, this is the **User** category. Then click **New attribute** again to define the details for the new attribute. You can define the following parameters for your attribute:

- Enter a meaningful **Name** for the attribute. Allplan distinguishes between small letters and capital letters. Make sure you enter the name correctly.
- Select the attribute **Type**, that is to say, the type and format of the information in the attribute. You can choose between **Text**, **Floating-point number**, **Integer** and **Date**. Text is an all-purpose format, because you can use it to enter both letters and numbers. However, you cannot calculate with text attributes.
- Select the **Input type**, controlling the values of the attribute. Apart from the general input type, you can select **ComboBox with entries**, **ComboBox without entries** and **CheckBox**. With a **ComboBox**, you create a drop-down list whose contents are either predefined and fixed (without entries) or user-definable (with entries). A **CheckBox** limits input to **Yes** or **No**.
- Specify the **Text length**, limiting the number of characters to the value you enter here. Any additional characters will be cut off.

- If you select a number format for the attribute type, you can set the **Unit**. This is important for geometric values.
- Specify the **Proposed value**. This is the default value the program uses when you assign this attribute to an object. In addition, you define the entries for the **ComboBox**. These are the entries Allplan presents for selection in the drop-down list.
- If you select a number format for the attribute type, you can limit the **value range** by defining a **Minimum value** and a **Maximum value**.
- If you want, you can define the **Input method**, which is similar to the input type.



Click **OK** to confirm the settings. Now you are back in the **Attribute Selection** dialog box. Allplan lists the new attribute with the other user-defined attributes. Now you can assign it to any object.

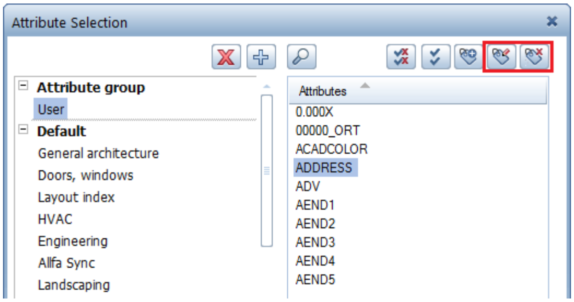
Modifying attributes

If you want to modify an existing attribute, the procedure is almost exactly the same as for creating a new attribute. However, there are two points you must keep in mind:

- You can change **only attributes you defined yourself**. Attributes in the **Allplan** default folder cannot be modified. As the user-defined attributes are in the office standard, modifying them requires administrator privileges (provided you are running Workgroup Manager).
- Apart from the **name**, Allplan primarily uses the **attribute number** to identify attributes. **Allplan** assigns this internal number to every attribute. If you rename an attribute (later), Allplan lists it with its new name in the attribute list of the objects to which you assigned it.

To change an attribute, select the attribute whose parameters you want to modify on the right side in the selection dialog box. Then click **Modify attribute**. The dialog box with the parameters opens. Now you can adjust them for your needs. However, bear in mind that changing the **type** or **unit** may cause Allplan to interpret the values of existing assignments differently or incorrectly. Therefore, we recommend modifying attributes as little as possible. It is worth spending time carefully thinking about the type and values of an attribute before you start defining it. So you do not have to modify it later.

In addition, you should check the attribute list time and again, deleting incorrect attributes or attributes you no longer require. To do this, select the attribute you want to delete on the right side in the selection dialog box. Then click **Remove attribute**. This deletes the attribute not only from the list but also from the attribute set of all the objects to which you assigned it.



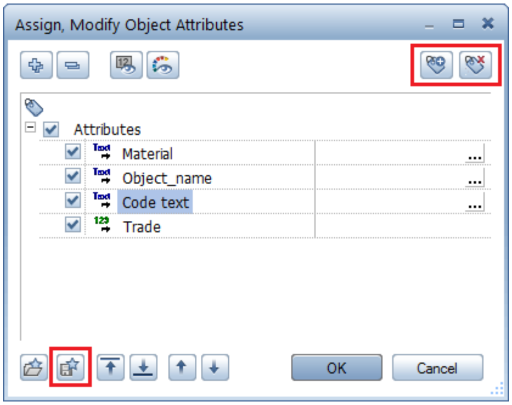
Note: As opposed to the **New attribute** and **Remove attribute** icons, the **+** and **X** icons create or delete entire attribute groups. Remember: you can delete and modify only groups you created yourself. Groups in the **Allplan** default folder cannot be deleted or modified. If you have selected a default group, the two icons are grayed out.

Working with attribute favorites

The more sophisticated and detailed your BIM model, the more extensive the values and parameters of the objects in the BIM model. Normally, every component group (wall, roof, room ...) has a set of specific attributes that are always the same. These attributes result from the default values generated automatically, from the definitions (PSets) based on the regulations specified by buildingSmart and from the project-specific or office-specific characteristics. Instead of compiling these attributes from scratch each time, you can use **attribute favorites** in **Allplan**. Using these favorites, you can attach an entire **set of attributes** to a component in one go. If you want, you can even save values with favorites.

When creating the elements of your building model, you should give them a minimum set of attributes, making sure all important details are transferred. You can find detailed information on these minimum requirements in the following section. To do this, you can define a corresponding favorite yourself or you can ask us to help you. We are glad to assist you. If you know which attributes you require for the components in your model, you can add the respective values to the favorite, too.

To create an **attribute favorite**, open the familiar **Attribute Selection** dialog box or the **Assign Attributes to Elements** tool. Using the **New attribute** and **Remove attribute** icons, combine the required attributes into the set you want to assign to a number of elements in one go. You can select the attribute without specifying any values. If you want, you can also define values at this stage. Of course, you can change these values later. If you have completed the set of attributes, save it by clicking **Save as as favorite** at bottom left in the dialog box.



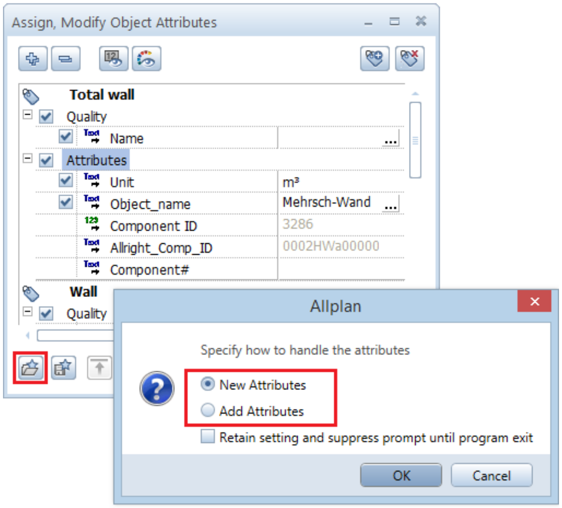
If all employees in your office are to access this favorite independently of the project, save it to the **office standard** (STD folder). Otherwise, select the **Favorites** subfolder of the **project**. Make sure you enter meaningful and unique names for the favorites, in particular when you are saving component-specific sets of attributes. This is the only way to ensure that you can identify them clearly later. As with other resources and definitions, saving attribute favorites requires corresponding privileges: the administrator can save favorites to the office standard (STD) and the project standard. The project owner can use only the latter.

Favorites include only the attributes whose values you can change, excluding fixed parameters and geometric values. Compared with favorites for components or objects, attribute favorites are all-purpose tools you can use across elements.

To apply favorites and thus assign the values to the components of your BIM model, you can use the **Assign, Modify Object Attributes** or **Assign Attributes to Elements** tool. You can also open the **Attribute dialog box** on the **shortcut menu**. Click **Load favorite** at bottom left and select the set of attributes you want to use. You can attach all the attributes in this set to the selected object or you can use only parts of the attributes you saved to the favorite. Next, **Allplan** asks you what to do with the existing parameters. You have two options:

- **New Attributes**: this option removes all the parameters from the element. This does not include parameters that are absolutely necessary or generated automatically. As a result, the element only has the attributes in the favorite.

- **Add Attributes**: this option retains the parameters of the element even if these parameters are not absolutely necessary. As a result, the element has the existing attributes plus the ones in the favorite.



In addition to these two options, the result after the assignment depends on two other factors: whether the **attribute status** is active or inactive in the favorite and whether a **value** is entered for the attribute in the favorite. This applies to each attribute you saved to the favorite. If you do not know these facts, you run the risk of overwriting existing values inadvertently.

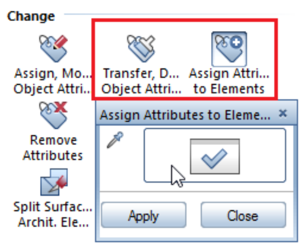
The **New attributes** option has the following effects:

- Allplan removes all attributes that are not defined in the favorite or that have the **remove attribute** status in the favorite.
- Allplan deletes the values of attributes if these attributes are defined and active in the favorite but they do not have a value in the favorite.
- Allplan overwrites the values of attributes if these attributes are active in the favorite and they also have a value in the favorite. This value then replaces the old one.
- Allplan retains the attributes and their values if these attributes are defined in the favorite but they are not active, that is to say, they have the **inactive** status in the favorite.

The **Add attributes** option has the following effects:

- Allplan removes the attributes that have the **remove attribute** status in the favorite.
- Allplan overwrites the values of attributes if these attributes are active in the favorite and they also have a fixed value in the favorite.
- Allplan retains the attributes without changing anything if they are not defined in the favorite or they have the **inactive** status in the favorite.
- Allplan adds new attributes with the status defined in the favorite.

If you use the **Assign Attributes to Elements** or **Transfer, Delete Object Attributes** tool, you can check and change the settings of the favorite before you apply it, thus making sure everything is correct. So if you are not sure about the definitions in the favorite, use one of these tools to check them. If you need to change something, you can do this without any problems and save the favorite again.



You may find it helpful to create a list of all your favorites with their definitions. The attribute sets provided by us are based on the minimum requirements specified by buildingSmart (PSets). The necessary attributes in these sets are set to inactive. So you do not run the risk of overwriting values inadvertently. However, do not forget to set these attributes to active before you save the attribute dialog box.

Check list VII: object attributes (see page 245)

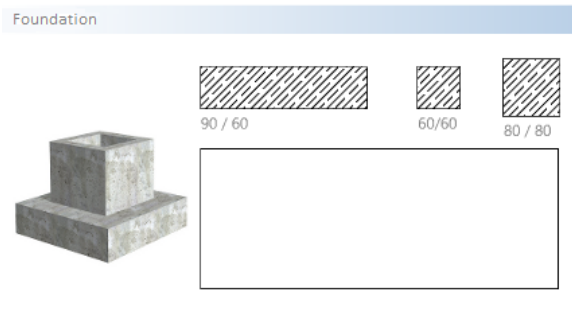
Elements and attributes

The following chapter lists the required minimum of attributes and geometric values for the components. These attributes and geometric values correspond to the specifications and definitions buildingSmart laid down for the current IFC 4 release. In addition to the minimum requirements, you can find a selection of attributes and values that are commonly used (based on the standards for IFC-compliant data exchange specified by the US Army Corps of Engineers). The relations listed result from the element position within the overall structure, which means that relations are not attributes as defined by Allplan.

Unfinished structure

Foundations, footing - IFCFooting

Foundation elements of various types and cross-sections created with the corresponding tools (**Strip Foundation,** **Slab Foundation,** **Block Foundation**).



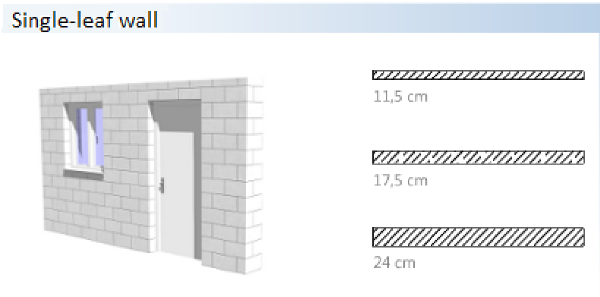
- Geometric attributes – BaseQuantities
  - Thickness – Width
  - Length – Length
  - Height – Height
  - Gross base area – GrossFootprintArea
  - Net base area – NetFootprintArea
  - Gross volume – GrossVolume
  - Net volume – NetVolume

- Element properties – Pset_FootingCommon
  - Material – Material
  - Foundation type – Reference
  - Alteration category – Status
- Element properties – Additional Properties
  - Name of foundation – Name

As far as different foundation types are concerned, IFC only differentiates between spread footing and deep footing; however, it does not identify them as discrete element types. IFCFooting defines spread footing; you can use the Reference attribute to specify and transfer the foundation type.

Single-layer walls – IFCWallStandardCase

Single-layer walls of which the cross-section does not change. Volume and surface are exported as swept solids.



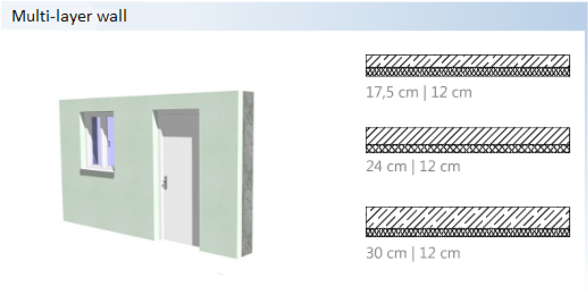
- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
  - Openings – VoidsElements
  - Connecting elements – Connections
- Geometric attributes – BaseQuantities
  - Thickness – Width
  - Length – Length
  - Height – Height
  - Area – Area
  - Volume – Volume

- Element properties – Pset_WallCommon
  - Exterior wall or interior wall – IsExternal
  - Room-high – ExtendedToStructure
  - Alteration category – Status
  - U-value – ThermalTransmittance
  - Load-bearing – LoadBearing
  - Fire resistance classification – FireRating
  - Flammable – Combustible
  - Fire behavior – SurfaceSpreadOfFlame
  - Sound insulation classification – AcousticRating
  - Defining fire compartment – Compartmentation
- Element properties – Additional Properties
  - Name of wall – Name
  - Function – LongName
  - Material – Material
  - Flammability rating – Flammability

According to the specifications specified by buildingSmart, you should not use the StandardCase type. Instead, replace it with the more general type definition.

Walls in general - IFCWallStandardCase

Multi-layer walls, walls of complex geometry and walls of which the dimensions change.



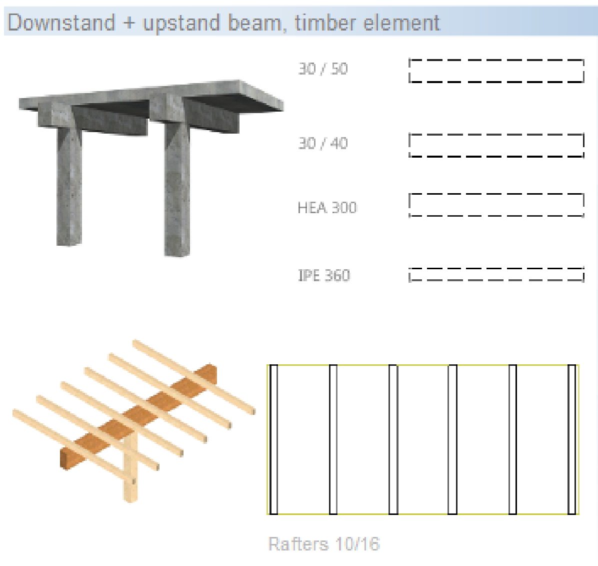
- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
  - Openings – VoidsElements
  - Connecting elements – Connections
- Geometric attributes – BaseQuantities
  - Thickness – Width
  - Length – Length
  - Height – Height
  - Area – Area
  - Volume – Volume
- Element properties – Pset_WallCommon
  - Exterior wall or interior wall – IsExternal
  - Room-high – ExtendedToStructure
  - Alteration category – Status
  - U-value – ThermalTransmittance
  - Load-bearing – LoadBearing
  - Fire resistance classification – FireRating
  - Flammable – Combustible
  - Fire behavior – SurfaceSpreadOfFlame
  - Sound insulation classification – AcousticRating
  - Defining fire compartment – Compartmentation

- Element properties – Additional Properties
  - Name of wall – Name
  - Function – LongName
  - Material – Material
  - Flammability rating – Flammability

The material of multi-layer walls is transferred separately for each layer. You must assign the element properties of the PSet to the wall as a whole. Otherwise, the data may not be transferred correctly.

Downstand beams and upstand beams – IFCBeam

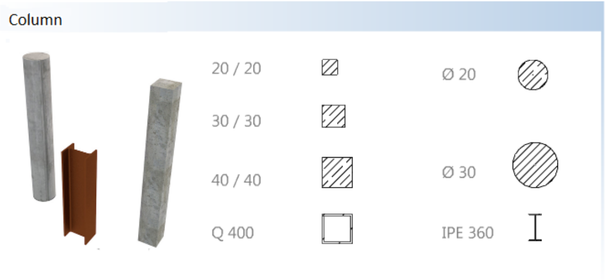
Elements created with the **Downstand Beam, Upstand Beam** tool in the **Basic: Walls, Openings, Components** module or the **Rafters, Beam, Roof Beam** tools in the **Frame Construction** module.



- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
  - Openings – VoidsElements
- Geometric attributes – BaseQuantities
  - Length – Length
  - Cross-sectional area – CrossSectionArea
  - Surface (unfolded) – OuterSurfaceArea
  - Volume – Volume
- Element properties – Pset_BeamCommon
  - Exterior component or interior component – IsExternal
  - Load-bearing – LoadBearing
  - U-value – ThermalTransmittance
  - Fire resistance classification – FireRating
  - Inclination – Slope
  - Span – Span
  - Angle – Roll
  - Beam type – Reference
  - Alteration category – Status
- Element properties – Additional Properties
  - Name of (downstand) beam – Name
  - Function – LongName
  - Material – Material

Columns, pillars - IFCColumn

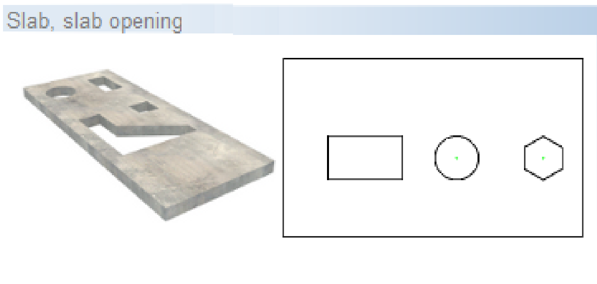
Architectural components created with the **Column** tool. These components are usually vertical. If you use the **Post** tool instead, you must assign the IFCObjectType Column manually.



- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
  - Openings – VoidsElements
- Geometric attributes – BaseQuantities
  - Height – Length
  - Cross-sectional area – CrossSectionArea
  - Surface (unfolded) – OuterSurfaceArea
  - Volume – Volume
- Element properties – Pset_ColumnCommon
  - Exterior component or interior component – IsExternal
  - Load-bearing – LoadBearing
  - Fire resistance classification – FireRating
  - U-value – ThermalTransmittance
  - Column type – Reference
  - Alteration category – Status
  - Inclination – Slope
  - Angle – Roll
- Element properties – Additional Properties
  - Name of column – Name
  - Function – LongName
  - Material – Material

Slabs, floor slabs – IFCSlab

Single-layer elements created with the **Slab** tool. Exceptions are landings of ramps and stairs, which get the IFC ObjectType Slab. You can assign the additional attribute "Predefined Type = Landing" to these components.



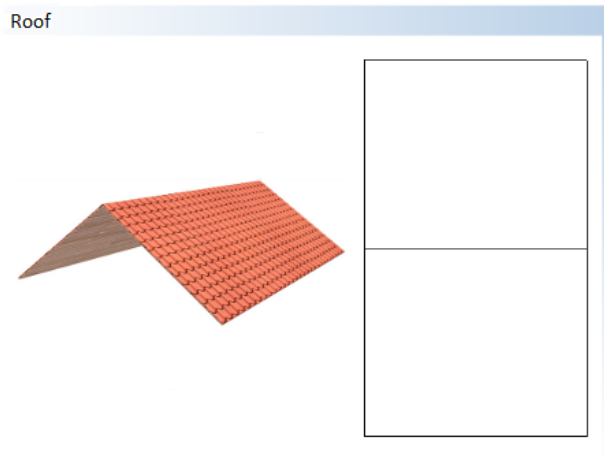
- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
  - Openings – VoidsElements
- Geometric attributes – BaseQuantities
  - Thickness – Width
  - Area – SideArea
  - Volume – Volume
- Element properties – Pset_SlabCommon
  - Exterior slab or interior slab – IsExternal
  - Load-bearing – LoadBearing
  - Slab type – Reference
  - Alteration category – Status
  - Fire resistance classification – FireRating
  - Flammable – Combustible
  - Fire behavior – SurfaceSpreadOfFlame
  - Inclination – Slope/PitchAngel
  - Sound insulation classification – AcousticRating
  - Defining fire compartment – Compartmentation
  - U-value – ThermalTransmittance

- Element properties – Additional Properties
  - Name of slab – Name
  - Function – LongName
  - Material – Material
  - Production year – ProductionYear
  - Concrete grade – ConcreteDensity

The material specified is not assigned to the element in its entirety; it is assigned to the ”slab layer” and transferred in this way even though you can create slabs only as single-layer elements in Allplan and the IFC ObjectType Slab applies only to the load-bearing layer.

Roofs - IFCRoof

Single-layer and multi-layer elements created with the **Roof Covering** tool.



- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
  - Openings – VoidsElements
- Geometric attributes – BaseQuantities
  - Area – SurfaceArea
  - Projected area – ProjectedArea

- Element properties – Pset_RoofCommon
  - Roof type – Reference
  - Alteration category – Status
  - Sound insulation classification – AcousticRating
  - U-value – ThermalTransmittance
  - Exterior component or interior component – IsExternal
  - Fire resistance classification – FireRating
- Element properties – Additional Properties
  - Name of roof – Name
  - Function – LongName
  - Solar installation – SolarPanel

Within the IFC schema, the IFC ObjectType Roof mainly serves as a container that includes the constituent parts of the roof (covering, supporting structure ...).

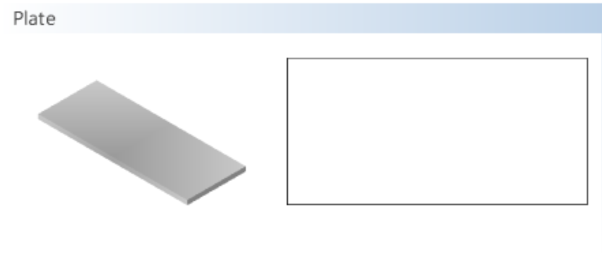
Members - IFCMember

Linear, column-like or beam-like components in any position that are created in the **Frame Construction** or **3D Modeling** module. **Allplan** does not provide a particular tool for creating members. To assign this element type, use the IFCObjectType attribute.

- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
  - Openings – VoidsElements
- Geometric attributes – BaseQuantities
  - Height – Length
  - Cross-sectional area – CrossSectionArea
  - Surface – OuterSurfaceArea
  - Volume – Volume
- Element properties – Pset_MemberCommon
  - Exterior component or interior component – IsExternal
  - Load-bearing – LoadBearing
  - Member type – Reference
  - Alteration category – Status
  - U-value – ThermalTransmittance
  - Fire resistance classification – FireRating
  - Inclination – Slope
  - Span – Span
  - Angle – Roll
- Element properties – Additional Properties
  - Name of member – Name
  - Function – LongName

Plates, discs – IFCPlate

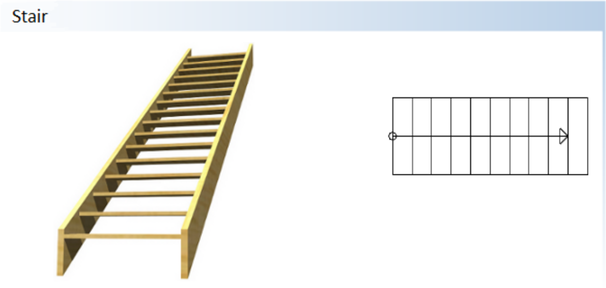
Planar, single-layer or multi-layer components in any position. **Allplan** does not provide a particular tool for creating plates. You can use the tools in the **3D Modeling** module and the  **User-Defined Archit. Element** and
 **Slab** tools in the **Architecture** family. To assign this element type, use the **IFCObjectType** attribute.



- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
  - Openings – VoidsElements
- Geometric attributes – BaseQuantities
  - Thickness – Width
  - Area – SideArea
  - Volume – Volume
- Element properties – Pset_PlateCommon
  - Exterior component or interior component – IsExternal
  - Load-bearing – LoadBearing
  - Plate type – Reference
  - Alteration category – Status
  - Sound insulation classification – AcousticRating
  - Fire resistance classification – FireRating
  - U-value – ThermalTransmittance
- Element properties – Additional Properties
  - Name of plate – Name
  - Function – LongName

Stairs - IFCStair

Freeform components created with the tools in the **Stairs** module. You can create a stair as a single component or from a number of constituent parts (step, stringer, landing, railing ...). In the latter case, the superordinate object gets the IFC ObjectType and the attributes. Thus, the superordinate object acts as a container.



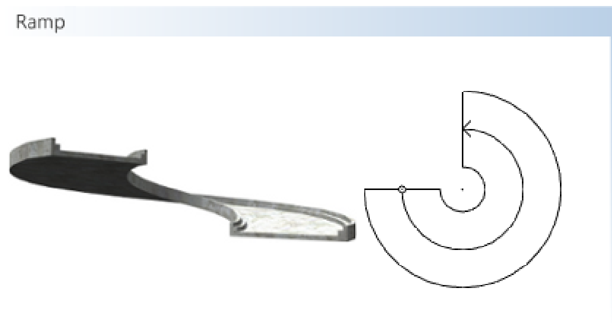
- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
- Geometric attributes – BaseQuantities
  - Length – Length
  - Volume – Volume
- Element properties – Pset_StairCommon
  - Number of risers – NumberOfRiser
  - Number of treads – NumberOfTreads
  - Rise – RiserHeight
  - Tread run – NumberOfTreads
  - Nosing – NosingLength
  - Offset of walking line – WalkingLineOffset
  - Minimum tread length on the inside – TreadLengthAtInnerSide
  - Tread length at offset – TreadLengthAtOffset
  - Minimum thickness of stair flight – WaistThickness
  - Exterior stair or interior stair – IsExternal
  - Stair type – Reference
  - Alteration category – Status
  - Escape route – FireExit

- Suitable for the disabled – HandicapAccessible
- Fire resistance classification – FireRating
- Required headroom – RequiredHeadroom
- Skidproof – HasNonSkidSurface

- Element properties – Additional Properties
  - Name of stair – Name
  - Function – LongName

Ramps – IFCRamp

Ramp-shaped components created with the **Straight Ramp** or **Spiral Ramp** tool or with any other tool (stair, slab, 3D modeling) you can use to enter a ramp-shaped outline. The ramp element type is not assigned automatically. You need to do this manually using the IFCObjectType attribute. You can create a ramp as a single component or from a number of constituent parts (flight, landing, railing ...). In the latter case, the superordinate object gets general attributes. Thus, the superordinate object acts as a container.

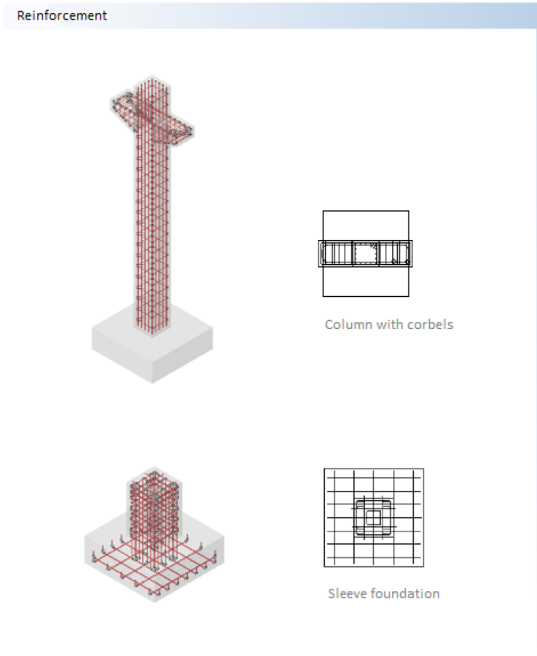


- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
- Geometric attributes – BaseQuantities
  - Length – Length
  - Area – SurfaceArea
  - Volume – Volume

- Element properties – Pset_RampCommon
  - Exterior component or interior ramp – IsExternal
  - Ramp type – Reference
  - Alteration category – Status
  - Escape route – FireExit
  - Skidproof – HasNonSkidSurface
  - Suitable for the disabled – HandicapAccessible
  - Required headroom – RequiredHeadroom
  - Required inclination – RequiredSlope
  - Fire resistance classification – FireRating
  - Height – Height
  - Diameter – Diameter
  - Inclination – Slope
- Element properties – Additional Properties
  - Name of ramp – Name
  - Function – LongName

Bar reinforcement - IFCReinforcingBar

Reinforcing bar elements and placements created with the tools in the **Bar Reinforcement** module in the **Engineering** family. As an alternative, you can use SmartParts you can find in the library (**Default - Engineering - Concrete - ...**). In this case, you must assign the appropriate IFC ObjectType to the component using the **Assign, Modify Object Attributes** tool. Bar reinforcement, on the other hand, automatically gets the correct object type.



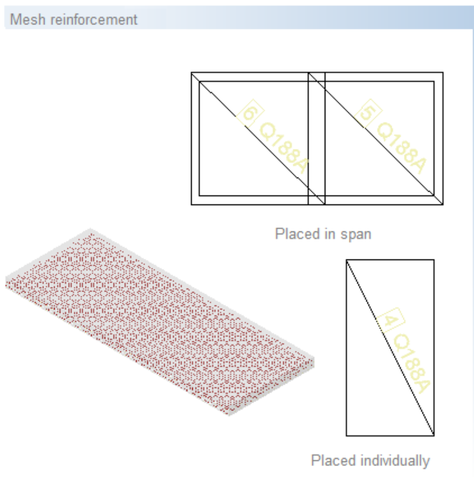
- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
- Geometric attributes – BaseQuantities
  - Diameter – NominalDiameter
  - Cross-sectional area – CrossSectionArea
  - Bar length – BarLength
  - Bar surface – BarSurface
- Element properties – Allplan_ReinforcingBar
  - Standard – ShapeCode
  - Bending pin diameter – BendingDiameter
  - Hook length – HookLength
  - Hook angle – HookAngle
  - Hooke, bending pin diameter – HookBendingDiameter
  - Weight per meter – WeightPerMeter
  - Number of pieces – CountOfBars

- Element properties – Additional Properties
  - Name of bar reinforcement – Name
  - Steel grade – Material

As opposed to the other components, you do not need to enter the properties and details you want to transfer for bar reinforcement using the **Assign, Modify Object Attributes** tool. Instead, Allplan calculates the data directly from the geometry or it enters these details as (necessary) properties during placement. The material is the only exception. You can specify it on the **Tools** menu. Select Options - **Reinforcement - Steel grade.**

Mesh reinforcement - IFCReinforcingMesh

Mesh placements, edge reinforcement and support reinforcement created with the tools in the **Mesh Reinforcement** module in the **Engineering** family.



- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
- Geometric attributes – BaseQuantities
  - Mesh width – MeshWidth
  - Mesh length – MeshLength
  - Transverse overlap – CrossOverlapping
  - Longitudinal overlap – LongitudinalOverlapping

- Element properties – Allplan_ReinforcingMesh
  - Mesh type – PredefinedTyp
  - Standard – ShapeCode
  - Longitudinal bar diameter – LongitudinalBarNominalDiameter
  - Cross bar diameter – TransverseBarNominalDiameter
  - Cross-sectional area of longitudinal bar – LongitudinalBarCrossSection Area
  - Cross-sectional area of cross bar – TransverseBarCrossSectionArea
  - Longitudinal bar spacing – LongitudinalBarSpacing
  - Cross bar spacing – TransverseBarSpacing

  Additional attributes for non-planar placements:
  - Code of bending pin – BendingShapeCode
  - Bending pin properties – BendingParameters
- Element properties – Additional Properties
  - Name of mesh – Name
  - Steel grade – Material
  - Mesh weight – WeightOfMesh

Like bar reinforcement, mesh reinforcement takes its properties and details from the geometry or from the mesh type and placing parameters. You do not need to define these properties using the **Assign, Modify Object Attributes** tool.

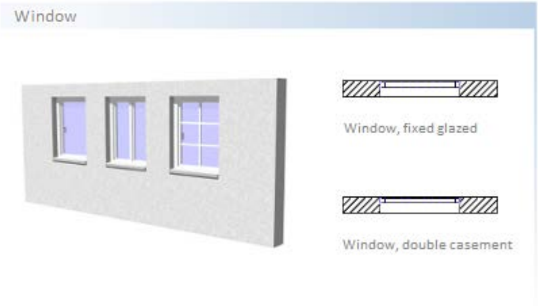
Finish

Within the IFC schema and its structures, building finishes are defined as secondary objects that do not belong to the (load-bearing) structure. Building finishes include not only furnishings in the classic sense, but also windows, glass facades and MEP elements.

Windows - IFCWindow

Elements created and inserted in window openings using the **Smart Window and Door Symbols**, **Window SmartPart** or **Smart Symbol** tool. These elements can also be constituent parts of a facade. French doors are created as doors in **Allplan**; thus, they are not transferred as windows. When you insert a window opening in a wall or a roof, the window opening acts only as a connection to the superordinate element; the inserted smart symbol or SmartPart gets the attributes. When you integrate a window opening in a facade, the facade acts as a container; the relevant group defines how the elements interact.

For each opening you create using the **Window** or **Skylight** tool, **Allplan** generates an opening object with information on the dimensions, the position within and the connection to the superordinate component. In **Allplan**, these opening objects are not visible as elements but as recesses in the superordinate element.



- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
  - Inserted in wall – FillsVoids (via OpeningElement)
  - Constituent of a facade – Decomposed
- Geometric attributes – BaseQuantities OpeningElement
  - Height – Height
  - Width – Width/Length
  - Area – NominalArea
  - Perimeter – Perimeter
- Element properties – Pset_WindowCommon
  - Exterior component or interior component – IsExternal
  - U-value – ThermalTransmittance
  - Fire resistance classification – FireRating
  - Safety classification – SecurityRating
  - Window type – Reference
  - Alteration category – Status
  - Sound insulation classification – AcousticRating
  - Smoke protection – SmokeStop

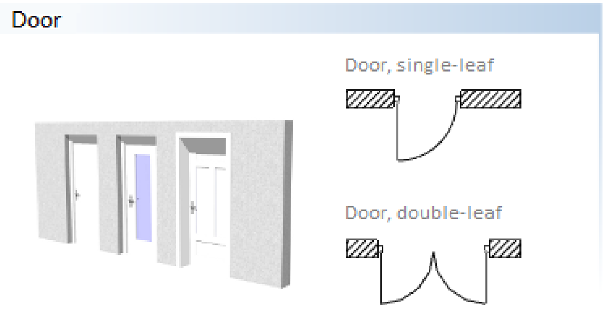
  - Air permeability – Infiltration
  - Window sill on the outside – HasSillExternal
  - Window sill on the inside – HasSillInternal
  - Automatic drive – HasDrive
  - Emergency exit – FireExit
  - Proportion of glazing – GlazingAreaFraction
- Glass properties – PSet_DoorWindowGlazingType
  - Number of panes – GlassLayers
  - Gas filling – FillGas
  - Glass color – GlasColor
  - Tempered – IsTempered
  - Laminated – IsLaminated
  - Coated – IsCoated
  - Wire glass – IsWired
  - Light reflectance value – VisibleLightReflectance
  - Luminous transmission – VisibleLightTransmittance
  - Absorption factor for solar radiation – SolarAbsorption
  - Reflection factor for solar radiation – SolarReflectance
  - Transmittance factor for solar radiation – SolarTransmittance
  - Total energy transmittance – SolarHeatGainTransmittance
  - U-value for summer/winter – ThermalTransmittanceSummer/Winter
  - Shading – ShadingCoefficient
- Manufacturer's information – Pset_ManufacturerTypeInformation
  - Item number – ArticleNumber
  - EAN, bar code – GlobalTradeItemNumber
  - Model number – ModelReference
  - Name of model – ModelLabel
  - Manufacturer – Manufacturer
  - Production year – ProductionYear
  - Place of installation – AssemblyPlace
- Element properties – Additional Properties
  - Name of window – Name
  - Function – LongName
  - Type – ConstructionType

All window properties and glazing properties are part of the smart symbol or SmartPart; the opening itself does not have any attributes. During transfer, the program creates the opening object as an IFCOpeningElement in addition to the smart symbol or SmartPart. However, the opening object is not visible. It connects the elements, that is, the component, opening, opening object and the smart symbol or SmartPart. The opening object and its dimensions define the geometric attributes (BaseQuantities) and the position within the component.

Doors - IFCDoor

Elements created and inserted in door openings using the **Smart Window and Door Symbols**, **Door SmartPart** or **Smart Symbol** tool. These elements can also be constituent parts of a facade. French doors are also transferred, as they are created as doors in **Allplan**. The door opening acts only as a connection to the superordinate element; the inserted smart symbol or SmartPart gets the attributes. When you integrate a door opening in a facade, the facade acts as a container; the relevant group defines how the elements interact.

For each wall opening you create using the **Door** tool, Allplan generates an opening object with information on the dimensions of the door, the position within and the connection to the superordinate component. These opening objects are not independent elements, but they are visible as recesses in the superordinate element.



- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
  - Inserted in wall – FillsVoids (via OpeningElement)

- Geometric attributes – BaseQuantities OpeningElement
  - Height – Height
  - Width – Width/Length
  - Area – NominalArea
  - Perimeter – Perimeter
- Element properties – Pset_DoorCommon
  - Exterior component or interior component – IsExternal
  - U-value – ThermalTransmittance
  - Fire resistance classification – FireRating
  - Safety classification – SecurityRating
  - Sound insulation classification – AcousticRating
  - Wear rating – DurabilityRating
  - Climate class – HygrothermalRating
  - Air permeability – Infiltration
  - Door type – Reference
  - Alteration category – Status
  - Suitable for the disabled – HandicapAccessible
  - Emergency exit – FireExit
  - Automatic drive – HasDrive
  - Self-closing – SelfClosing
  - Proportion of glazing – GlazingAreaFraction
  - Sound insulation classification – AcousticRating
  - Smoke protection – SmokeStop
- Glass properties – PSet_DoorWindowGlazingType
  - Number of panes – GlassLayers
  - Gas filling – FillGas
  - Glass color – GlasColor
  - Tempered – IsTempered
  - Laminated – IsLaminated
  - Coated – IsCoated
  - Wire glass – IsWired
  - Light reflectance value – VisibleLightReflectance
  - Luminous transmission – VisibleLightTransmittance
  - Absorption factor for solar radiation – SolarAbsorption
  - Reflection factor for solar radiation – SolarReflectance

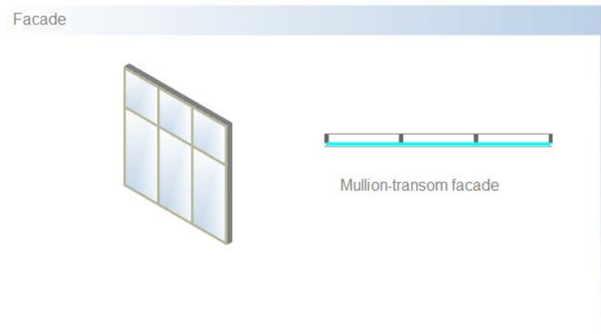
- Transmittance factor for solar radiation – SolarTransmittance
- Total energy transmittance – SolarHeatGainTransmittance
- U-value for summer/winter – ThermalTransmittanceSummer/Winter
- Shading – ShadingCoefficient

- Manufacturer's information – Pset_ManufacturerTypeInformation
  - Item number – ArticleNumber
  - EAN, bar code – GlobalTradeItemNumber
  - Model number – ModelReference
  - Name of model – ModelLabel
  - Manufacturer – Manufacturer
  - Production year – ProductionYear
  - Place of installation – AssemblyPlace
- Element properties – Additional Properties
  - Name of door – Name
  - Function – LongName
  - Type – ConstructionType
  - Door swing – OperationType

All door properties and glazing properties are part of the smart symbol or SmartPart; the opening itself does not have any attributes. During transfer, the program creates the opening object as an IFCOpeningElement in addition to the smart symbol or SmartPart. However, the opening object is not visible. It connects the elements, that is, the component, opening, opening object and the smart symbol or SmartPart. The opening object defines the geometric attributes of the door opening (BaseQuantities) and its position within the component.

Facades - IFCCurtainWall

Vertical or inclined elements modeled freely or created with the **Facade** tool. In addition, these elements are part of the external envelope that delimits the building. Facades are usually object groups consisting of different components (mullion, transom, panel ...) that are combined into a single component. Regardless of how you create the facade, you must use the IFCObjectType attribute to assign the facade element type to the component as a whole. Here, the facade acts as a container.



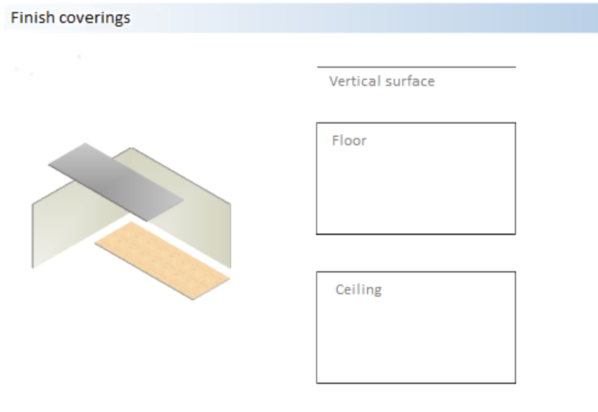
- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
- Geometric attributes – BaseQuantities
  - Length – Length
  - Height – Height
  - Width/thickness – Width
  - Area – Area
- Element properties – Pset_CurtainWallCommon
  - Exterior component or interior component – IsExternal
  - Fire behavior – SurfaceSpreadOfFlame
  - Flammable – Combustible
  - U-value – ThermalTransmittance
  - Facade type – Reference
  - Alteration category – Status
  - Fire resistance classification – FireRating
  - Sound insulation classification – AcousticRating

- Manufacturer’s information – Pset_ManufacturerTypeInformation
  - Item number – ArticleNumber
  - EAN, bar code – GlobalTradeItemNumber
  - Model number – ModelReference
  - Name of model – ModelLabel
  - Manufacturer – Manufacturer
  - Production year – ProductionYear
  - Place of installation – AssemblyPlace
- Element properties – Additional Properties
  - Name of facade – Name
  - Function – LongName
  - Material – MaterialName

The **Facade** tool assigns all facade properties and glazing properties to the facade as a whole. If you model the facade freely, you can combine the individual elements into a single element (smart symbol) with all necessary attributes. If you transfer the elements individually or as an element group, each single element gets the required IFCObjectType attribute.

Coverings, linings – IFCCovering

Elements created within a **Room** using the **Finish** or the **Floor**, **Ceiling** or **Vertical Surface** tool. Although finishing surfaces are discrete objects within the IFC schema, you should always use them in connection with a room or superordinate component.



- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
  - Associated room – ContainedInSpace
- Geometric attributes – BaseQuantities
  - Area – Area
- Element properties – Pset_CoveringCommon
  - Fire resistance classification – FireRating
  - Covering type – Reference
  - Alteration category – Status
  - Flammability rating – FlammabilityRating
  - Sound insulation classification – AcousticRating
  - Fragility – FragilityRating
  - Fire behavior – SurfaceSpreadOfFlame
  - Flammable – Combustible
  - U-value – ThermalTransmittance
  - Quality of finish – Finish

- Element properties – Additional Properties
  - Name of covering – Name
  - Function – LongName
  - Material – Material

IFC does not differentiate between the different covering types as separate element types. You can use the reference attribute to specify the type.

In the case of multi-layer coverings, the material and the layer thickness are transferred separately for each layer. In addition, the total thickness of all layers is also transferred.

The drawing file assignment and the geometric position define the room to which the coverings belong. If the room and the coverings are in the same drawing file and the finish element is within the room geometry, the program automatically assigns the finish element to this room, regardless of whether the finish element is independent or part of the room definition.

Railings, fences - IFCRailing

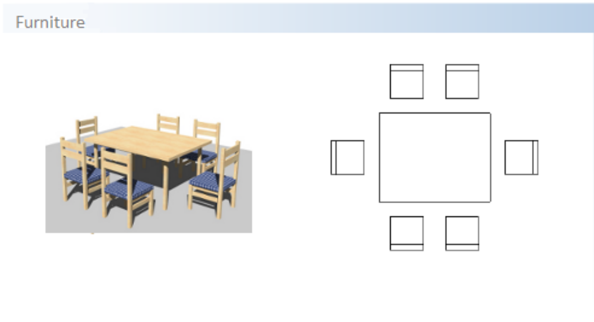
Discrete elements modeled freely or created with the **Railing** tool. In addition, these elements act as a guardrail system, safety fence, handrail or the like. The IFCRailing element type is not assigned automatically. You need to do this manually using the IFCObjectType attribute. As an alternative, you can transfer railings as constituent parts of a stair or ramp; provided the stair or ramp is an object group and not a single element.

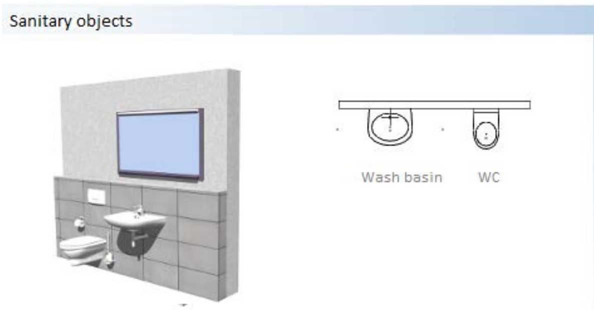
- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
  - Associated room – ContainedInSpace
- Geometric attributes – BaseQuantities
  - Length – Length
  - Area – Area
- Element properties – Pset_RailingCommon
  - Exterior component or interior component – IsExternal
  - Railing type – Reference
  - Alteration category – Status
  - Height – Height
  - Diameter – Diameter
- Element properties – Additional Properties
  - Name of railing – Name
  - Function – LongName
  - Material – MaterialName
  - Inclination – Slope

The  **Railing** tool assigns all properties to the railing element as a whole. When you model the railing freely, you can combine the individual elements into a single element (smart symbol) with all necessary attributes. But when you transfer the elements individually or as an element group, each individual element of the railing gets the required IFCObjectType attribute.

Furnishings, equipment – IFCFurnishingElement

These elements or element groups furnish a room. They can be movable or fixed. You can take these objects from the folders of the library and place them directly. As an alternative, you can model these objects freely in 3D and combine them into a **Smart Symbol** or **SmartPart.** Regardless of where the furnishing element comes from, you must use the IFCObjectType attribute to define the elementas a furnishing object.





- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
  - Associated room – ContainedInSpace
- Geometric attributes – FurnishingQuantities
  - Length – Length
  - Thickness – Width
  - Height – Height

- Element properties – Pset_FurnitureTypeCommon
  - Description – Description
  - Style – Style
  - Nominal height – NominalHeight
  - Nominal length – NominalLength
  - Nominal depth – NominalDepth
  - Primary color – MainColor
  - Built-in/movable – IsBuiltIn
- Manufacturer's information – Pset_ManufacturerTypeInformation
  - Item number – ArticleNumber
  - EAN, bar code – GlobalTradeItemNumber
  - Manufacturer – Manufacturer
  - Production year – ProductionYear
  - Name of model – ModelLabel
  - Model number – ModelReference
  - Place of installation – AssemblyPlace
- Element properties – Additional Properties
  - Name of furnishing element – Name
  - Function – LongName
  - Furniture type – Reference
  - Classification key – ItemReference

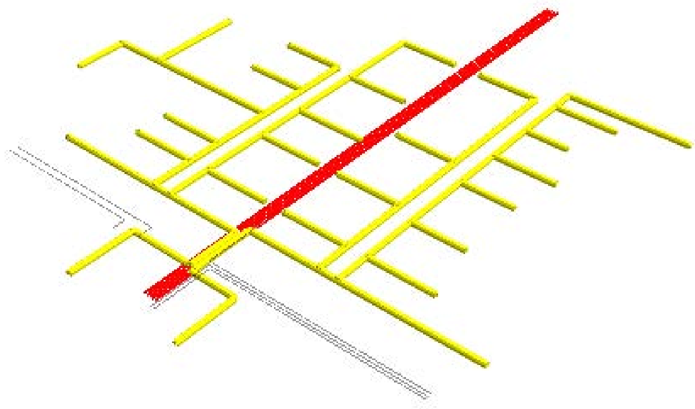
The IFC schema does not provide separate object definitions for all furnishing objects. We advise you to use the all-purpose IFCFurniture object type, which will combine and replace the other definitions in future. You can classify the object precisely within the object attributes by assigning the appropriate PSet (for example, PSetChairCommon) and the Reference attribute.

The drawing file, the link property and the geometric position of the elements define the room to which a furnishing object belongs. The program automatically assigns a furnishing object to a room if the object and the room are in the same drawing file, the object is linked with the room (this can be defined in the properties) and the object is within the room geometry.

MEP elements

Allplan provides its own tools for MEP planning (provided you have purchased the Technical Building Equipment module). But when it comes to defining these objects, users usually model only ”placeholders” to which they assign the appropriate IFC ObjectType and the necessary general properties using the **Assign, Modify Object Attributes** tool. This considerably reduces the number of ”undefined” objects during transfer to IFC.

Below is a list of available object types. Basic information is only included if it is defined by IFC.



- **IFC DiscreteAccessory – discrete MEP component**
- **IFC DistributionChamberElement – inspection manhole, excavation**
  - Type – Reference
  - Alteration category – Status
- **IFC DistributionElement – HVAC component in general**
- **IFC ElectricalElement – element for energy supply**
- **IFC EnergyConversionDevice – energy converter**
- **IFC Fastener – fastener, mounting**
- **IFC FlowController – flow controller**
- **IFC FlowFitting – connecting piece**
- **IFC FlowMovingDevice – piping system**
- **IFC FlowSegment – piping part**

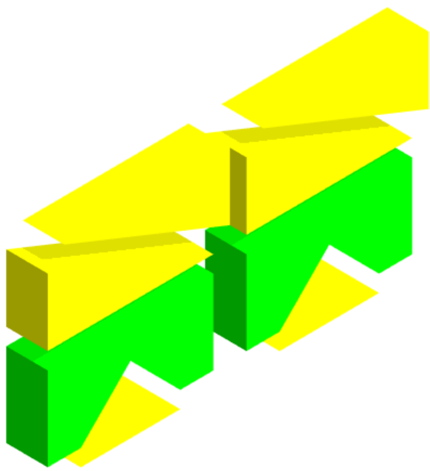
- **IFC FlowStorageDevice – tank, storage**
- **IFC FlowTerminal – start device or end device**
- **IFC FlowTreatmentDevice – filter, treatment element**
- **IFC MechanicalFastener – automatic fastener**
- **IFC TransportElement – transport element**
  - Type – Reference
  - Alteration category – Status
  - Maximum number of persons – CapacityPeople
  - Maximum weight – CapacityWeight
  - Escape route – FireExit

In addition to the object type, you should enter a name as an attribute. The program then transfers this name as the object name to IFC.

All-purpose elements

If you want to transfer objects and 3D solids as defined types to IFC without knowing their exact functions or meanings, you can select one of the "all-purpose definitions" from the list. You can also use this all-purpose definition for an object that does not (yet) have its own IFC object type.

The following list of available object types includes the required basic information if it is defined by IFC.



- **IFC BuildingElementPart – part of building element**
- **IFC BuildingElementProxy – any building element**
  - Component type – Reference
  - Alteration category – Status
  - Exterior component or interior component – IsExternal
  - Load-bearing – LoadBearing
  - U-value – ThermalTransmittance
  - Fire resistance classification – FireRating
- **IFC ElementAssembly – element group**
- **IFC EquipmentElement – infrastructure element**
- **IFC OpeningElement – component opening**
  - Opening type – Reference
  - Alteration category – Status
  - Function – Purpose
  - Emergency exit – FireExit
  - Protected opening (in case of fire) – ProtectedOpening
- **IFC Proxy – any object**

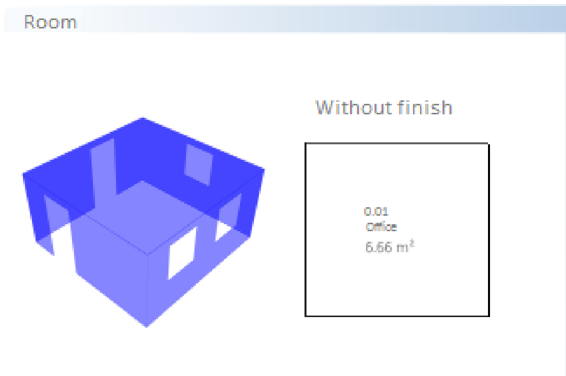
To define the precise function of an all-purpose object, you should use the Name attribute to assign an object name, which is included in the transfer to IFC. The Function attribute allows you to define the function precisely.

Rooms

Not being real objects, rooms are special cases in both the building model and the IFC schema. Rooms belong neither to the building finishes nor to the spatial hierarchy; instead, they are exactly between these two categories.

Rooms - IFCSpace

Element with a freeform outline created with the **Room** tool. In addition, the element complies with the minimum height specified. In **Allplan** a room is always defined by its net area and volume. Any (architectural) elements within the room geometry are subtracted if they exceed the minimum size specified. The components that enclose the room are ignored.



- Associations – Relations
  - Associated story in the building structure – ContainedInStructure
- Geometric attributes – BaseQuantities
  - Top level of finished floor – FinishFloorHeight
  - Bottom level of finished ceiling – FinishCeilingHeight
  - Height of floor structure – ElevationWithFlooring
  - Wall area – WallArea
  - Perimeter – Perimeter
  - Floor area – FloorArea
  - Volume – Volume
  - Cross-sectional area – GrossSectionArea

- Element properties – Pset_SpaceCommon
  - Room type – Reference
  - Exterior room or interior room – IsExternal
  - Net area_planned – NetPlannedArea
  - Base area_planned – GrossPlannedArea
  - Suitable for the disabled – HandicapAccessible
  - Publicly accessible – PubliclyAccessible
- Thermal requirements – Pset_SpaceThermalRequirements
  - Temperature_min – SpaceTemperatureMin (summer/winter)
  - Temperature_max – SpaceTemperatureMax (summer/winter)
  - Humidity – SpaceHumidity
  - Humidity_max – SpaceHumidityMax
  - Humidity_min – SpaceHumidityMin
  - Humidity_cooling – SpaceHumiditySummer
  - Humidity_heating– SpaceHumidityWinter
  - Natural ventilation – NaturalVentilation
  - Natural air change rate – NaturalVentilationRate
  - Mechanical air change rate – MechanicalVentilationRate
  - Air-conditioned – AirConditioning
  - Central air-conditioner – AirConditioningCentral
- Lighting requirements – Pset_SpaceLightingRequirements
  - Artificial light – ArtificialLighting
  - Illuminance – Illuminance
- Fire protection requirements – PSetSpaceFireSafetyRequirements
  - Fire hazard class – FireRiskFactor
  - Storage of flammable goods – FlammableStorage
  - Sprinkler protection – SprinklerProtection
  - Automatic sprinkler protection – SprinklerProtectionAutomatic
  - Emergency exit – FireExit
  - Air pressure equalization – AirPressurization

- Classification – IFC_ClassificationReference
  - DIN277 occupancy type – ItemReference
  - DIN277 area type – ClassificationName
- Element properties – Additional Properties
  - Name – Name
  - Function – LongName

Rooms are always transferred as invisible elements to IFC. Consequently, if you check the model in an IFC viewer after the export, you cannot see the rooms and finishing coverings until you explicitly select them using the appropriate dialog box.

Regardless of whether you created the finish coverings of the **Room** using the room properties or the **Floor**, **Ceiling** or **Vertical Surface** tool, the program always transfers the finish coverings as independent elements that are subordinate to the room. Therefore, you can show and hide them individually.

Attributes of the hierarchic levels

If you want to exchange the data model via the IFC interface, you must use the building structure with its structural levels to structure the project hierarchically. Although **Allplan** offers tools for most structural nodes, they are not suitable for creating and transferring the data model. This applies to both export and import.

The elements you create in the **Urban Planning** module with the **Plot**, **Building** and **Floor Level** tools and the **Story** tool in the **Architecture - Rooms, Surfaces, Stories** module do not comply with the specifications of the IFC schema. The interface does not consider these objects to be part of the model, thus excluding them from the transfer. This is to avoid errors in the data model and to keep the number of undefined elements (proxies) to a minimum.

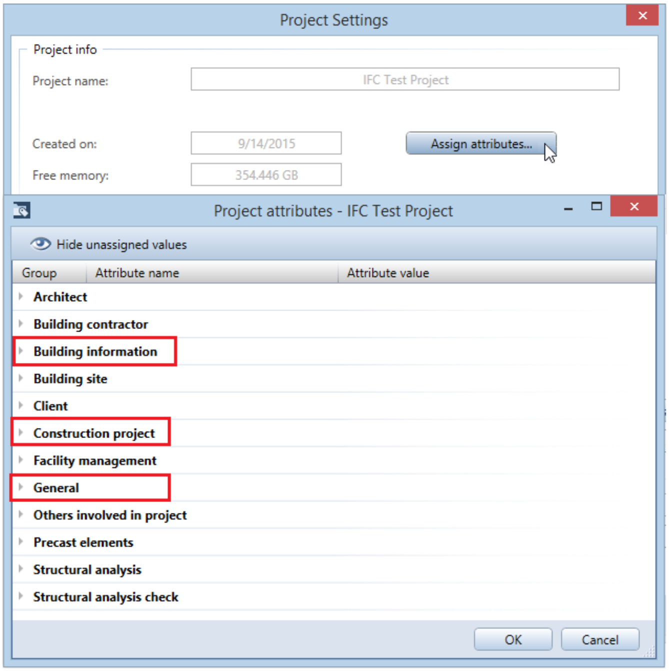
Rooms, which are the lowest level in the hierarchy, are exceptions.

To create rooms in **Allplan**, you can use the **Room** tool and assign the associated properties and attribute values.

Make sure you use only the **Site**, **Building** and **Story** structural levels of the building structure. To assign attributes to the individual structural nodes, use the project attributes in the properties of the project, where you can also specify values for the attributes and modify them. During transfer, these entries are automatically assigned to the appropriate structural nodes.

Entering project information

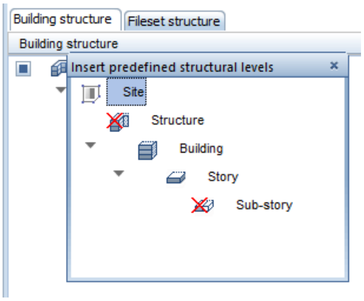
In order to access the project settings, open the **File** menu and click **New Project, Open Project**. Select the relevant project, open the shortcut menu and choose **Properties**. Click the **Assign attributes** button to open a dialog box listing all the attributes you can use for a project. With BIM and IFC in mind, use the entries in the **General**, **Construction project** and **Building information** groups. Attributes in any other group are neither applied to the structural levels nor transferred to IFC.



Like the chapter about the components, the following section lists the required minimum of attributes for the structural levels. These attributes correspond to the specifications buildingSmart laid down for the current IFC 4 release. In addition, you can find a selection of attributes and values that are commonly used (based on the standards for IFC-compliant data exchange specified by the US Army Corps of Engineers).

Site - IFCSite

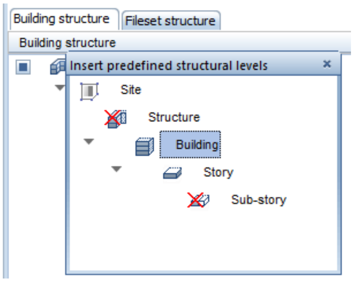
The site, which is below the project, represents the topmost structural level in the building structure.



- Element properties – Pset_SiteCommon
  - Site classification – Reference
  - Gross area – TotalArea
  - Site occupancy index – SiteCoverageRatio
  - Floor area ratio – FloorAreaRatio
  - Area available for building – BuildableArea
  - Maximum height of building – BuildingHeightLimit
- Element properties – Additional Properties
  - Project number – Name
  - Project name – LongName
  - Longitude – Longitude
  - Latitude – Latitude
  - Height above mean sea level – Elevation
  - Construction project, address – AddressLine
  - Construction project, town – Town
  - Construction project, region or state – Region
  - Construction project, ZIP code – PostalCode
  - Construction project, country – Country

Building – IFCBuilding

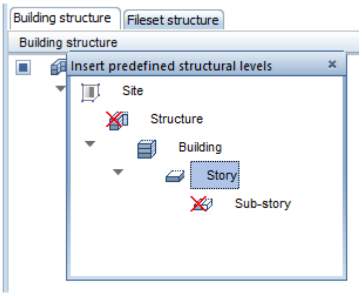
The building represents the second hierarchic level below the site. Do not use the 'Structure' structural level.



- Element properties – Pset_BuildingCommon
  - Building classification – Reference
  - Construction method – ConstructionMethod
  - Fire-protection rating of building – FireProtectionClass
  - Sprinkler protection – SprinklerProtection
  - Automatic sprinkler protection – SprinklerProtectionAutomatic
  - Building type – OccupancyType
  - Gross area, planned – GrossPlannedArea
  - Net area, planned – NetPlannedArea
  - Number of stories – NumberOfStoreys
  - Building identifier – BuildingID
  - Building identifier, permanent – IsPermanentID
  - Year of construction – YearOfConstruction
  - Last renovation – YearOfLastRefurbishment
  - Landmarked – IsLandmarked
- Element properties – Additional Properties
  - Project number – Name
  - Project name – LongName
  - Construction project, address – AddressLine
  - Construction project, town – Town
  - Construction project, region or state – Region
  - Construction project, ZIP code – PostalCode
  - Construction project, country – Country

Story - IFCBuildingStorey

You can find the **Story** structural level below the building. The story is the level that gets most drawing files.



- Element properties – Pset_BuildingStoreyCommon
  - Story classification – Reference
  - Gross area, planned – GrossPlannedArea
  - Net area, planned – NetPlannedArea
  - Entrance level – EntranceLevel
  - Above ground – AboveGround
  - Sprinkler protection – SprinklerProtection
  - Automatic sprinkler protection – SprinklerProtectionAutomatic
  - Load-bearing capacity of floor – LoadBearingCapacity
- Element properties – Additional Properties
  - Story number – Name
  - Story name – LongName
  - Story height – Height

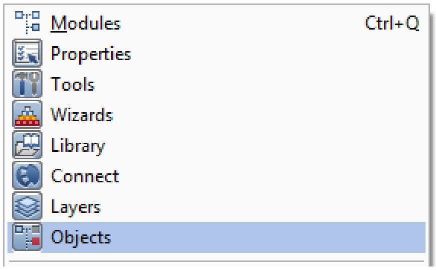
The drawing file assignment within the building structure defines how the (architectural) elements interact with the story, which is referred to as relations in the IFC attribute specifications. During transfer, the program automatically associates all elements in a drawing file assigned to a story with this story (ContainedInStructure). The building structure also defines how the individual hierarchic levels interact. These interactions are written as relations (ContainedIn ...) to the IFC file.

The objects palette

To check the model parts and their structure, you can use the objects palette, which is new in Allplan 2016. Of course, you can use all the other checking tools as usual. The objects palette gives you an overview of all elements that are currently available and visible in the workspace. You can both see and edit the main properties of the elements.

Consequently, the object palette is a useful tool that helps you detect and correct missing information or incorrect assignments within the model quickly and easily. You can thus improve the data quality right from the start and, what is even more important, before you transfer the data to external planning partners, which is to the benefit of all those involved. The same applies to the processes of revising, detailing and maintaining the model, that is to say, the actual BIM ("modeling of building data") within the planning process.

To open the **Objects** palette, select the **View menu – Toolbars – Objects**.



Like the other palettes, the objects palette can be arranged around the edge of the workspace or hidden automatically. The contents of the objects palette are dynamic, reflecting the current status of your drawing. In addition, the objects palette updates automatically as soon as you make changes.

List structure

Using the top part of the palette, you define the criteria according to which you want to sort the list contents. In addition, you can specify which parameters you want to display for the elements. To do this, Allplan provides four predefined options. Select the option you want to use by clicking the corresponding button:

1 **Sort by building structure**

The sorting criterion is the current building structure with the structural levels being at the top. The objects are sorted and listed in accordance with the structural levels. Starting with the project, the objects palette lists each level down to the individual drawing files. This structure reflects the actual building topology. If you are currently working with the fileset structure, the **Sort by building structure** button is grayed out.

2 **Sort by drawing file**

The sorting criterion is the drawing files, which are at the top. You can see all the drawing files that contain elements. In addition to the name, the program also displays the current status of each drawing file (current, open in edit mode, open in reference mode). Here, sorting is based on the building structure or the fileset structure, depending on your current selection.

3 **Sort by layer**

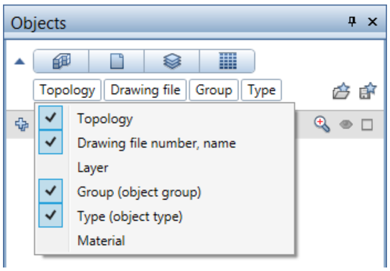
The sorting criterion is the layers, which are are at the top. You can see all the layers that are assigned to the elements. In addition to the short name, the program also displays the current status of each layer (current, modifiable, visible, hidden). You can find objects with different layers, such as multi-layer walls, in the ”varied” list.

4 **Sort by material**

The sorting criterion is the materials, which are at the top. The program lists the values you entered for the material in the object attributes. You can find all elements without materials, such as text or 2D lines, in the ”not defined” list.

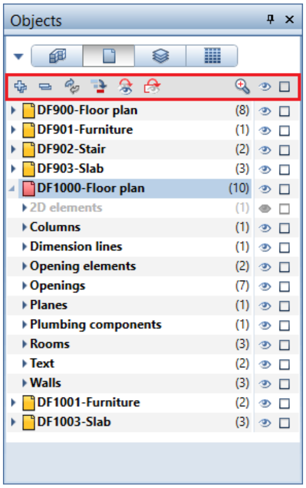
These four predefined options come with preset list levels. The **object groups** are at the second level. These object groups are defined by the internal Allplan object numbers. (You can find the assignments for the most common components in the appendix.) The **object types** are at the third (and last predefined) level. The program automatically defines these object types, which provide a finer structure than the object groups. However, the Allplan object types are NOT IDENTICAL to the IFC object types.

If you want to add further sorting criteria or change the sequence of the predefined criteria, click the arrow to the left of the predefined options to open custom sorting. The current settings are displayed as text boxes. As soon as you point to a text box, the cursor changes to a double-headed arrow, allowing you to drag the text box to a new position. This automatically changes the sequence of the list levels, as the text boxes reflect the hierarchical structure of the list levels: the box on the left represents the list level at the top and the box on the right represents the list level at the bottom. To add or remove criteria, open the shortcut menu by clicking the right mouse button. Looking at the check marks on the left, you can see which criteria are active.



Selecting and displaying objects

Using the object palette, you can quickly and easily select, show or hide individual objects or entire levels within the hierarchical list structure. To do this, you can use the icons above or to the right of the actual list. Click **+** or **–** to expand or reduce the level of detail in the list. There is a bidirectional link between what you see in the workspace and what you see in the palette. In other words, an object that is selected in the drawing file is also marked as selected in the palette.



You can select an object in the palette by clicking its selection square: as a result, the program selects this object plus all associated (sub-)objects and displays the objects in detection color in the viewport. Clicking the selection square again cancels the selection.

When you have selected several objects, the **Go to next active element** icon quickly takes you from element to element. **Hide everything that is not selected** shows only the selected objects in the workspace, making it easier for you to keep an overview and to find individual objects. Here, too, you can use the **Zoom in on selected objects** tool, which you know from the properties palette.

Using the **eye symbol**, you can control which objects are visible, regardless of whether the objects are selected or not. Click the eye symbol to toggle between **Visible** and **Invisible**. As the list has a hierarchical structure, all subordinate levels automatically inherit the settings from the superordinate level. Using the two icons on the far right, you can select or show and hide all the elements with a single click.

In addition, **Invert visibility** allows you to invert the current state: clicking this icon hides all objects that are currently visible and shows the ones that are currently invisible.

Changing object properties

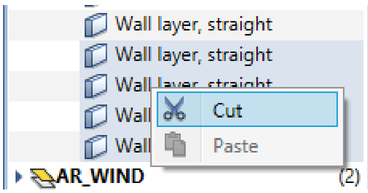
Apart from controlling the selection and visibility, you can not only check but also edit the properties of the objects listed in the objects palette. However, you can change only the parameters that are displayed in the palette and that are not values predefined by the program. Consequently, you can change

- the layer assigned to an object
- the material assigned to an object

First, select the parameter you want to change as the sorting criterion, that is to say, the layer or material. The list level you choose is irrelevant. In addition, make sure the list also includes the layer or material that is to be the "target" of the change, because you cannot define new layers or materials within the objects palette. Objects whose properties you want to change must be visible and on a layer that is set to current or modifiable at the time of the modification.

Like the building structure or the layer structure, the objects palette provides two options for changing the properties: you can use drag-and-drop operations or the shortcut menu. To do this, select the object(s) to which you want to assign a different layer or material.

- You can drag the object(s) to the level of the target layer or target material.
- You can open the shortcut menu, click "Cut", select the target level, open the shortcut menu again and click "Paste".



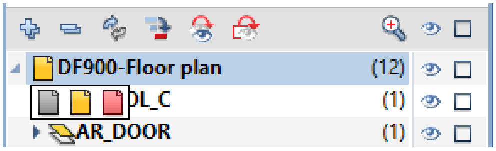
This is particularly useful if your model includes elements on undefined layers or elements without materials. Using the objects palette, you can find and modify these elements quickly and easily.

Changing the status

Last but not least, the objects palette allows you to change the document status and the layer status, complementing the **Open on a Project-Specific Basis** and **Select, Set Layers** dialog boxes. Like the model data, the dialog boxes are also bidirectional. Consequently, the dialog boxes update automatically to reflect any changes you make in the palette or vice versa.

To change the status, point to the icon to the left of the drawing file or layer whose status you want to change. The icon shows the current status. As soon as you point to this icon, the program opens a flyout showing all available options:

- For drawing files: **current**, **open in edit mode** or **open in reference mode**
- For layers: **current**, **modifiable, visible, frozen** or **hidden, frozen**



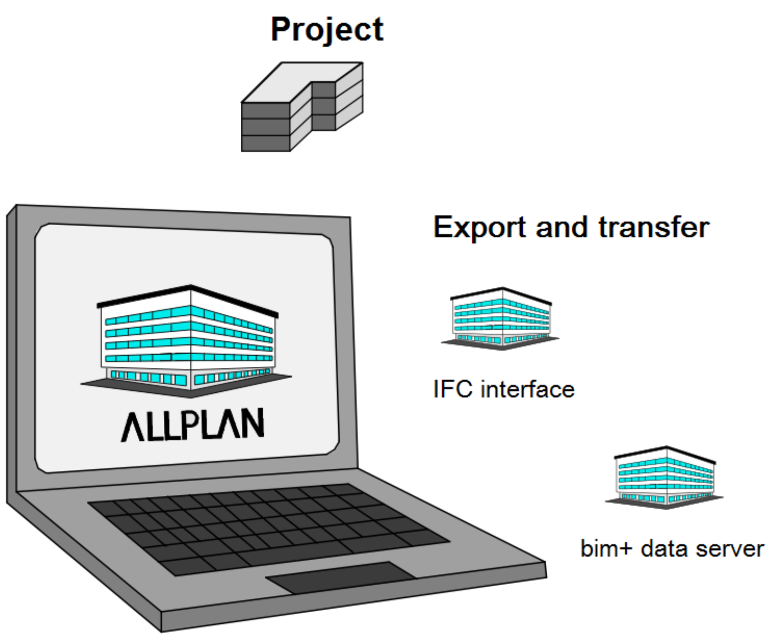
Select the status you want to set. The program immediately applies this status to the relevant objects in the workspace.

If you have observed all the points mentioned in the preceding chapters about data modeling and checked your model using the objects palette and the other tools provided, you now have a comprehensive and detailed **Allplan** data model, meeting all the requirements of a BIM model.

However, BIM only works if everyone involved in the project exchanges information and uses the project database. Cooperation, which means sharing and refining the model, is the core aspect of the BIM method. As long as your model exists only in your **Allplan** version, you can use it just for yourself. Thus, you can practice BIM only in a limited way (Little BIM). To fully exploit all the benefits afforded by BIM and its cyclical workflow, you must export the model from **Allplan** and give it to all those involved in the project.

Export fromAllplan

After you have created the model and assigned the necessary information to all the objects and components, you need to export the model from **Allplan** and transfer the data to your planning partners and other project participants, such as the client or the appropriate authorities. You can do this in **two different ways**: you can **convert the model to IFC format** and **export it using the corresponding interface** or you can **upload** the **Allplan** model **directly to the bim+ platform.** If you have not transferred the model before, you should always export it in its entirety, regardless of the method you choose. Once the entire model is available to all those involved, it may be enough to export individual layers or components over the course of the project.



Which way you choose primarily depends on the project environment and the other participants. Bear in mind that everyone should be able to access the model and thus the project database at any time. This is the most important point you need to consider. You should take this decision at the beginning of the project. We recommend using a check list including the important facts, such as the software programs used and the network environment. Once you have decided on the method, stick to it throughout the project.

Check list VIII: helping you to choose the export method (see page 247)

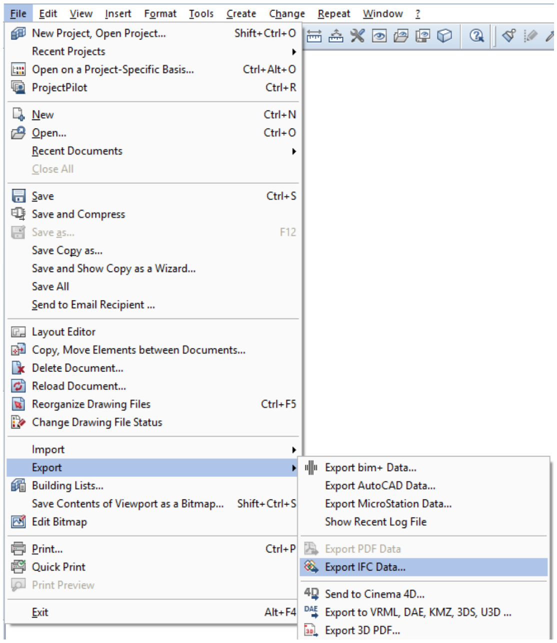
Regardless of the method you choose, the procedures are almost exactly the same. Open the **File** menu, point to **Export** and select **Export IFC Data** or **Export bim+ Data**. The IFC format focuses on transferring 3D-based building models. Therefore, you can access the tools for exporting and importing IFC data **only from drawing file mode**. If you work in the layout editor, you cannot select these tools; they are grayed out. Although you can export bim+ data from the layout editor, Allplan transfers **only drawing files**, that is to say, the 3D elements you created there.

Consequently, the drawing files or documents that are currently open and displayed on screen have no effect on the data that are actually transferred. Instead, you can select the data you want to export in a separate dialog box. However, it is a good idea to open all the drawing files you want to transfer before you export the data. In this case, the model currently displayed in **Allplan** is exactly the same as the one you give to your planning partners.

Note: Unlike drawing files, the selected layers have a direct impact on the objects that are transferred. Allplan exports components on visible layers only, allowing you to control what is exported. Multi-layer components are an exception. You will learn about their specific features later when you familiarize yourself with the export settings.

Exporting to IFC

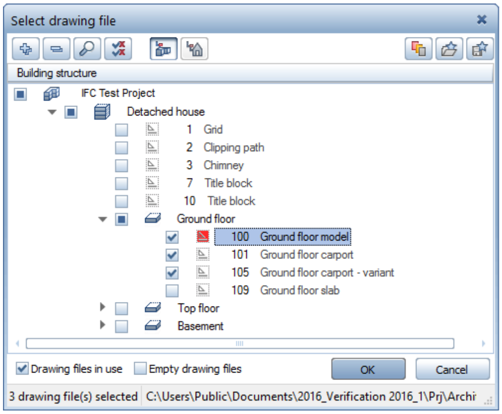
If you want to use an IFC file for export, open the **File** or the **Create** menu. Select **Export – Export IFC Data** or **Interfaces – Export IFC Data.**



The **Select drawing file** dialog box opens and you can see the building structure of the project. You can now select the drawing files and structural levels you want to export as an IFC file.

You can see check marks for all the drawing files in the IFC model. This is the default setting, allowing you to transfer the entire model. By choosing individual drawing files and structural nodes, you can select the parts you want to transfer. You can select data on the **left side of the building structure only**. The area on the right and the fileset structure are not available. Using **Select drawing files currently loaded**, you can select only the current drawing file and the drawing files that are open in edit mode.

In addition, you can use **Save current selection as a favorite** to save the current selection to a separate file, which you can retrieve whenever you need by clicking **Load favorite**. Using these tools, you can ensure that the program always exports the same drawing files, regardless of the current selection.

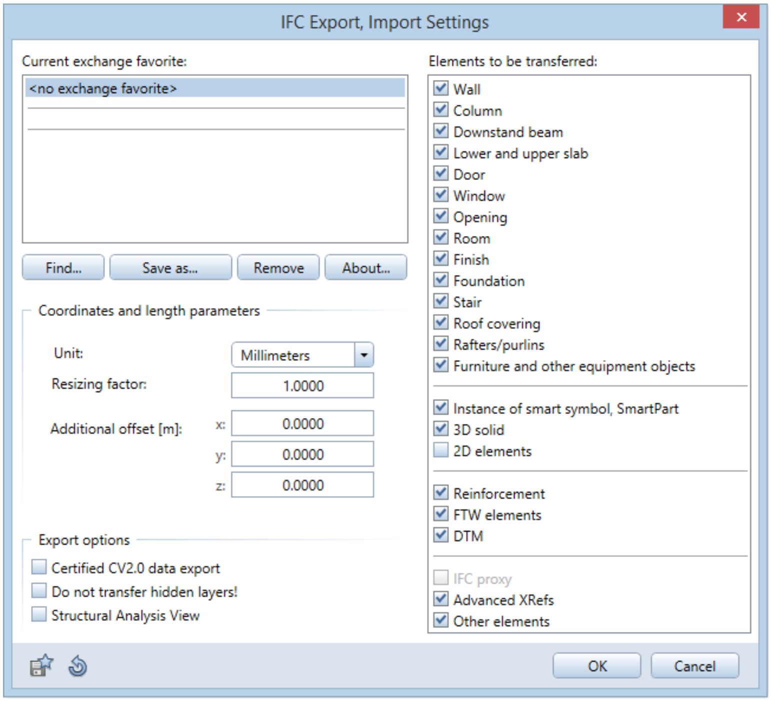


Click **OK** to confirm. In the next dialog box, you can define further settings for the file. Click **Browse...** to specify the folder and the name of the file. To set more options, click **Settings**.

IFC export settings

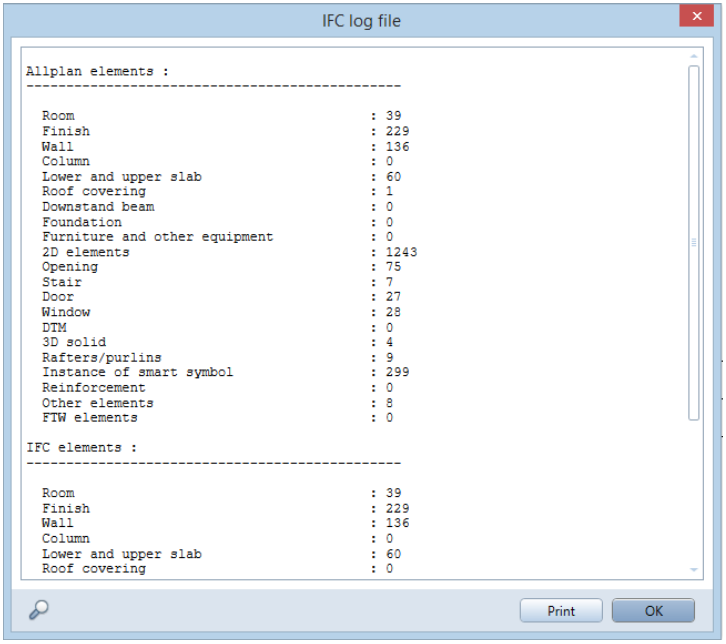
In the **Elements to be transferred** area, you can filter specific element types you (do not) want to transfer. This area lists only the elements you can transfer to IFC. In addition, you can use the export options to control what is transferred and how. The **Certified CV2.0 data export** option transfers only elements defined in the associated **Coordination View** subset, excluding 2D elements and proxies from export. This option is set by default. Using **Do not transfer hidden layers**, you can exclude individual construction layers of components from being transferred. For example, this is useful if you want to transfer only the load-bearing construction layers of the components. You can use the **Structural Analysis View** option if you want to export a model for structural analyses in the form of a line drawing - as is common in analyses of structures. However, this option locks all the other (filter) settings, as they are predefined by the view definition.

Using the **Coordinates and length parameters**, you can change the unit in the IFC file, resize the IFC file or define an additional offset to displace the coordinates in the IFC file. If you do not want to define these settings from scratch each time, you can save them as an **Exchange favorite** for future export operations. To do this, select the **Save as...** button below the **Current exchange favorite** area and specify the folder and name. The list of exchange favorites shows the settings you have already saved. You can use the **About...** button to add more information to the exchange favorite. For example, you can add details about its use.



When you have defined the necessary settings, close the dialog box and click **OK** to start exporting. A window opens, indicating how much data have been exported so far. After the transfer, the log file opens in a separate window.

The log file lists all the elements you have exported from **Allplan** to the IFC file. Click **Find** to check specific elements.



The log file is a temporary file. The program will overwrite this file the next time you export data. If you want to keep it, click the **Print** button to print it out or to save it in PDF format.

Now you can provide your planning partners with the finished IFC file for further editing. For example, you can send it by email or store it on the company network or on a (BIM) server on the World Wide Web. You can also save it to the bim+ platform, which will be described in detail on the following pages.

Exporting to bim+

If you want to use **bim+** for export, you require a **bim+ account.** To get it, you need to register once. You also need to register if you want to use the bim+ portal only to open and view an IFC file you were given by a planning partner or you created in **Allplan** (see page 188). The account also includes some demo projects you can use to test the functions and options provided by bim+.

The browser you use has considerable influence on the performance and quality of the representation. This applies to 3D applications in particular. Therefore, we recommend that you use a 64-bit browser version for the bim+ platform.

Creating a bim+ project

You should not use the demo projects as real projects or change the data therein. Therefore, you must create a new project within your account so that you can upload your own models from **Allplan**. You can create a new project after you have logged in to the bim+ platform (www.bimplus.net or www.portal.bimplus.net) or while you are uploading data from **Allplan**.

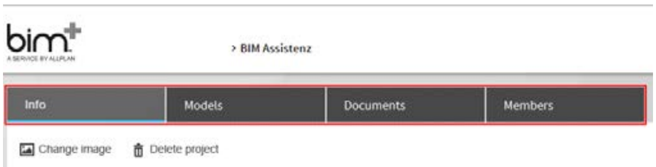
Open your browser and go to the bim+ web page. Log in to bim+ using your login details. This takes you to your personal area showing an overview of all projects. Each project is listed with its name, a preview and a short description. Click **Add project** to open the dialog box for creating new projects. Enter a name for the new project. If you want, you can also describe it briefly.

As soon as you confirm your entries by clicking the **Add project** button, the new project opens. You can now add data to the project and define further settings. To do this, you can use four tabs: **Info**, **Models**, **Documents** and **Members**.

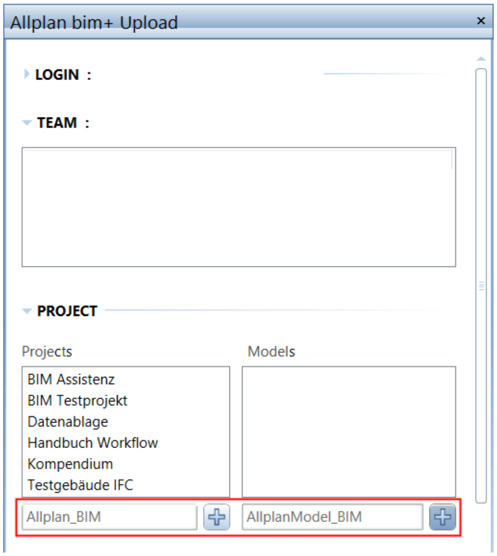
User administration is particularly important for interdisciplinary cooperation across all phases, which is the keystone of handling projects in a BIM-compliant manner. You can use the **Members** tab for user administration. The project partners require appropriate rights so that they all have full access to the projects. By inviting them to a specific project, you give them these rights. To do this, you can use the **Invite users** button. In doing so, you can give each project partner a particular role, which defines his or her area of responsibility (for example, viewer or editor).

You should assign access rights at the beginning of a project or when you upload the model for the first time. Otherwise, some project partners cannot access the data, which may cause unnecessary delays.

Using the **Manage models** button on the **Models** tab, you or other team members with the corresponding rights can add more models to the project without having to export them directly from **Allplan**. For example, the engineer in charge of technical building services can add ventilation lines or the structural engineer can add the structural model. However, you cannot upload native **Allplan** data over the Internet. You must always do this straight from **Allplan**.



As an alternative, you can create a new project directly when you export data from **Allplan**. This option is new in the current version. After you have opened the export dialog box, logged in and selected the appropriate team, you can see a list of all the projects to which you can add models. To create a new project, click the **+** icon below the Projects list and enter a name for the new project in the data entry box. Then click the icon below the Models list and enter a name for the new model. The default is the **Allplan** project name with the prefix Allplan_...or AllplanModel_.... Confirm your entries by clicking the **Upload** button. This creates the new project with the new model, which includes all currently selected **Allplan** data.



Notes: Using bim+, you can upload data straight from **Allplan** without having to convert the data in advance. In addition, bim+ supports the IFC format. As an alternative, you can work with the **SKP format**, which is used by SketchUp. bim+ can also import and display this format without conversion.

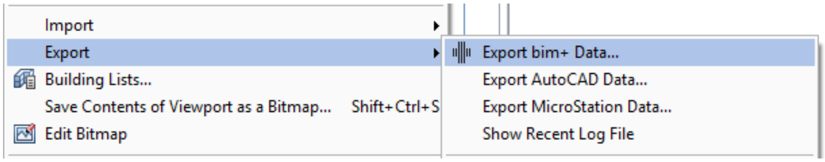
You cannot create an empty project using the **Allplan** dialog box. Allplan always adds the current data in the form of a model. Similarly, user administration and all further options can only be accessed over the bim+ platform.

The dialog box for creating a new project only appears when you export bim+ data from **Allplan** for the first time. If you have uploaded data before, the target project is preset in bim+. In this case, you only have two options: you can either create an additional version of the model in the project (**Revision**) or overwrite the existing model (**Update**).

Uploading Allplan models

As mentioned in the introduction to 'Export from Allplan' (see page 177), we recommend that you use the definitions and specifications laid down for the IFC format to create the data structure of a model you want to upload straight from **Allplan** to the bim+ platform. If you have observed all the points mentioned in the chapter about creating the model (see page 60), you can be sure that your model meets all these requirements.

To upload your building model to bim+, open the **File** menu, point to **Export** and click **Export bim+ Data.**

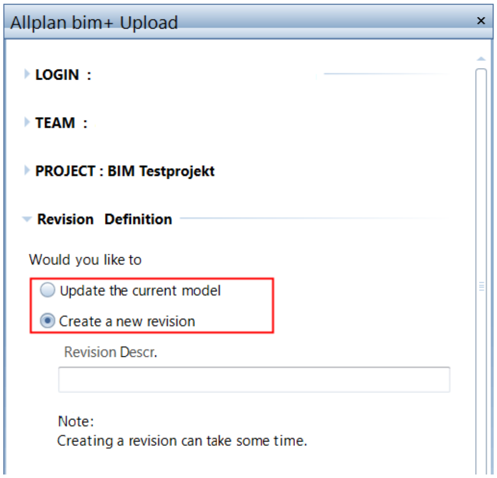


Unlike IFC export, the tool for uploading data to the bim+ platform does not open the dialog box for selecting drawing files. Instead, it always exports the current document and all documents that are open in edit mode, that is to say, all the data that are currently visible in the workspace. Therefore, you should check the selected documents **BEFORE** you open the export tool. You cannot change the selection later.

After you have logged in to your account and selected the appropriate **Team**, the steps that follow vary depending on whether you export data from the project for the first time or you have uploaded a building model to bim+ before.

When you export data for the first time, the dialog box displays a list of all the projects belonging to the selected team. As soon as you select a project, you can see a list of all the models in the selected project. You can either select an existing model and overwrite it with the current **Allplan** data or create a new model within the selected project by clicking the **+** icon and entering a name for the new model. As an alternative, you can create an all-new project with a new model as described in the previous chapter 'Creating a bim+ project'.

When you have exported bim+ data before, the target project is preset and the model is preselected. In the **Revision definition** area, you can decide whether you want to overwrite the model or add the current **Allplan** data as an additional version of the model. After having made up your mind, select the **Update the current model** option (equivalent to overwriting the existing model) or the **Create a new revision** option (equivalent to adding a version). If you opt for the latter, you can enter a name for the new model. To start the process, click the **Upload** button.



Note: When you overwrite a model, the program always deletes all the data and replaces the old data with the new data. Therefore, you should do this only if you are absolutely sure that you do not need the data anymore. To be on the safe side, back up the data in **Allplan** in advance. As opposed to IFC export, the program does not create a separate file when you upload data from **Allplan** directly to the bim+ platform. So there is nothing you can fall back on.

The progress bar at bottom right shows you how much data **Allplan** has already uploaded. As soon as the process is complete, you can see the message: **Project was transferred successfully**. Click OK to confirm this message. Unlike IFC export, the tool for uploading data to the bim+ platform does not create a log file.

Checking data

After you have exported your building model, you should check the file before you give it to others, making sure that all objects have been transferred correctly. This section contains some general notes. You will learn about the options for checking data in more detail on the following pages.

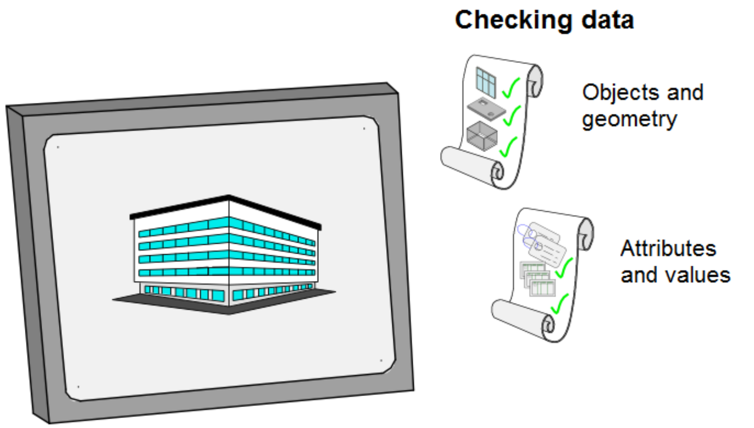
Whenever you exchange data or create and import IFC files, you convert data to a different format. This always changes the data, albeit marginally. Due to different programming and element descriptions, you can hardly ever convert the data one-to-one to a different format, regardless of the target format or the source format you use to convert data to **Allplan** files.

Logically, you can conclude that you cannot check the data by reimporting a file you created or by importing a file you received, because these files do not contain the original data.

If you want to check an IFC file in its original format before you convert or distribute it, you require a program that can directly read this format. You can do this in two different ways:

- You can use an **IFC Viewer**, allowing you to open and check the files in their original format.
- You can **upload the data to bim+ or a different data server**. In conjunction with appropriate applications, you can display and interactively explore a number of different formats.

Other (CAD) programs, on the other hand, automatically convert the data to their own, inherent format. You must use the bim+ platform to check your own data you created with the **Export bim+ Data** tool straight from **Allplan.** The reason for this is that you have never converted the data; the model is still in the native **Allplan** format.



We recommend using the **bim+ platform** for teamwork in general. The bim+ platform facilitates the **workflow of a BIM project**, providing you with a wide range of features for collaboration. Checking data is just one of them.

Regardless of the tool you use, you should always check the (IFC) files you created yourself or you received from planning partners in two respects:

- Check that the **geometry** of the building is correct and that the components are positioned correctly. In addition, make sure the model is complete.
- Check that the attribute sets (PSets) of the objects include all necessary **parameters, attributes and pieces of information**.

Depending on the program you use for checking, the options you have and the steps you take may differ. Consult the program's help for details. Therefore, IFC viewers are described only briefly whereas the options provided by bim+ are explained in more detail on the following pages.

IFC viewer

You can find a number of mostly free IFC viewers on the Internet. These viewers can differ in handling and user interface. With these viewers you can display and interactively explore IFC files as well as retrieve information on the individual elements. Some viewers offer additional functionality. For example, you can transfer data to other file formats or display conflicts within the components.

As IFC viewers are separate programs, you can use them independently of a CAD system to visualize building models. Therefore, they are also suitable for presenting models to clients or authorities who do not work with **Allplan**.

However, you cannot use IFC viewers to change the data, that is to say, the geometric information of the elements or the attributes and parameters of the elements. If you want to do this, you must open the data in a CAD system or in any other suitable program.

Note: In **IFC** the meaning of **layer** differs from that in **Allplan**. This might lead to misunderstandings. In conjunction with IFC a **layer** always describes the layer of a component. For example, you can define construction layers of walls or construction layers of finishing surfaces in **Allplan**. Whereas in **Allplan** the term **layer** describes a format property you can assign to each element. As a result, layers are imported and exported as element properties and transferred with the data structure.

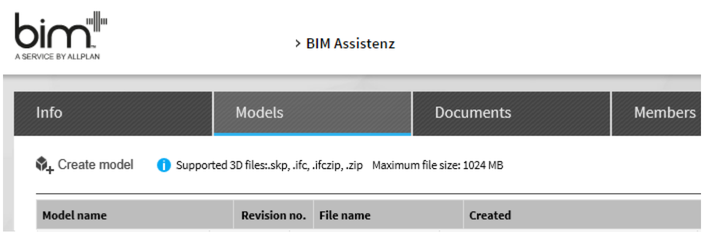
bim+ platform

Compared with any IFC viewer, the open **bim+** platform provides you with many more features and options. This applies to its connection to **Allplan**, the possible data formats and the tools you have. What's more, you can use the **bim+ platform** not only to check data but also to cooperate and communicate with your planning partners throughout the project.

Opening IFC models

If you want to use the **bim+ portal** to view an IFC file you or one of your planning partners created in **Allplan**, you can upload the file over the Internet and add it to a project. Unlike the tool for exporting data straight from **Allplan**, the bim+ portal requires an existing project to which you can add the file. If there is no project, you must create one first. The necessary steps are described in detail in the chapter 'Creating a bim+ project' (see page 183).

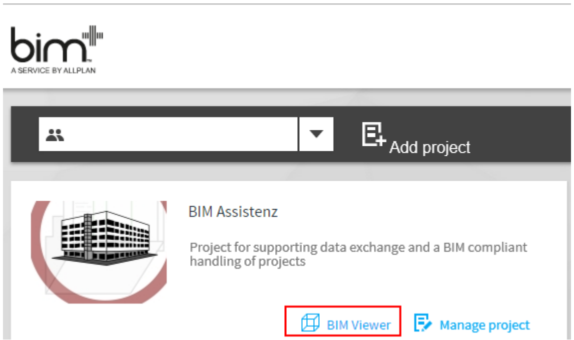
Open the target project for the IFC file in your personal area by clicking the **Manage project** button. Then open the **Models** tab and click the **Create model** button to add data. A dialog box opens. Select the file and enter a name for the model. Then click **Upload.** Once the process is complete, the program issues a message and adds the file as a new model to the project.



You can create as many models as you want within a project. You can also view them together. This allows you to open and compare the data of several IFC files from different sources. For example, you can add the data of technical building services, interior finish or structural analyses to the architectural model you created in **Allplan** (provided the data are in IFC files or in SKP files).

If you want to use the bim+ platform to check a model you exported straight from **Allplan**, you do not need to create a new model. Remember: you did this during export (as described in the preceding section). Consequently, this model is listed with the other models in the project and you can open it as you would any other model that is based on an IFC file or a SKP file.

To view and edit a project with all its models, open the project overview and click the **BIM Viewer** button below the project description. This opens all the files of the project in a separate 3D window.



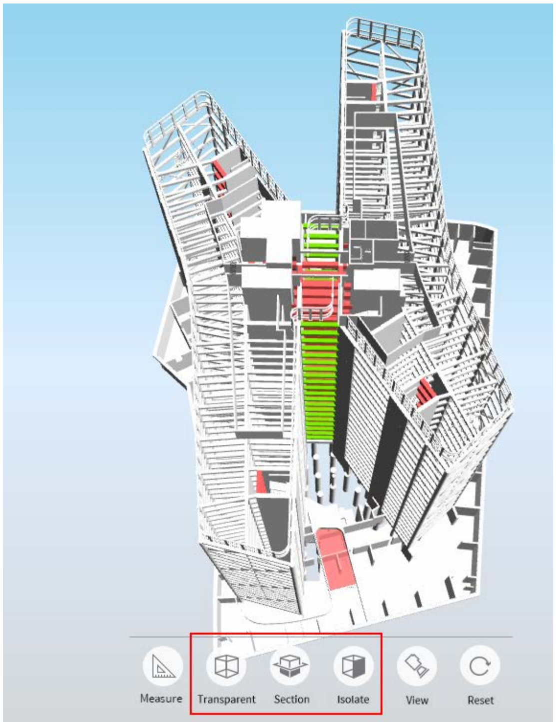
Navigation in BIM Viewer

By using the mouse and selecting predefined views, you can navigate in the BIM Viewer window as you would in **Allplan**'s animation window. You can **turn** with the right mouse button, **move** with the left mouse button and **zoom** with the middle mouse button. In addition, you can use the mouse wheel and the arrow keys at the keyboard as you would in any other Windows application. If you want to select a predefined view, you can choose between **front view**, **top view**, **side view** and **perspective view**.

Display modes

Using the toolbar at the bottom and the **Palette** on the left, you can define which parts of the building models are visible in **BIM Viewer**. In addition, you can control how these parts are displayed. Using the palette, you can show or hide each model and entire structural levels. In addition, you can show and hide the types (building, finish and room) for models created in **Allplan**. Using the toolbar, you can make selected elements **transparent** or you can **isolate** them by making all the other elements transparent. To do this, you can select **Transparent** on the toolbar and then click the element you want to make transparent or you can select an element and click **Isolate** to make all the other elements transparent. For example, you can make a wall or a slab transparent so that you can view the interior of the building. By clicking **Reset**, you can remove the transparency setting with just one click. As a result, all the elements to which you assigned this setting are restored to their original state.

Using **Section**, you can create sections through the buildings. These sections are parallel to the X, Y and Z dimensions and allow you to view the interior.



Project structure and model structure

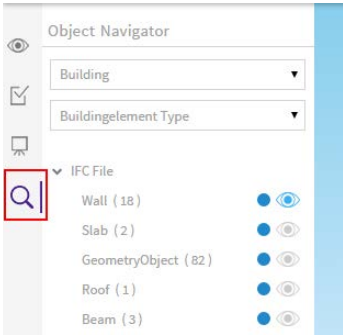
The **Palette** on the left shows the data structure of the open project and its models. If you cannot see this structure after you have opened the project, click the **eye symbol (Show project details)** at top left. The **Models** area includes the models, listing each model with its name and type. In addition, the different element types are listed separately for every model. If you want, you can show or hide every model in its entirety or make it transparent. To do this, use the two icons - **Toggle opacity** and **Toggle visibility** - to the right of the model name.

As indicated by its name, the **Building structure** area shows the hierarchy of the overall structure and of the models in accordance with the building structure in **Allplan** and the specifications for the IFC format. You can find a list of all the models below the bim+ project name. They are all at the same hierarchical level. To see the internal structure of a model, open an entry. This structure comprises the project name derived from the **Allplan** project or the IFC file and the **sites (IFCSite)**, **buildings (IFCBuilding)** and **stories (IFCBuildingStorey)**. The drawing file structure, on the other hand, is only available when you export data directly in the native **Allplan** format, as the drawing file structure is an inherent **Allplan** property, which provides an additional means of structuring data. The drawing file structure does not exist in any other CAD program or in IFC and BIM specifications. This also applies to the layer structure, which is completely different in BIM and IFC. Unlike most (simple) IFC viewers, the palette does not break down the model data to the level of objects and elements.

In the Building structure area, you can show or hide each structural level separately. By selecting a subordinate level, you automatically select its parent level as you would in the building structure in **Allplan.** However, visibility in general is controlled by the settings in the Models area, which override the settings in the building structure. Only the models selected in the Models area are visible in the viewer. Consequently, you can only see the building structures of the models selected.

Object navigator

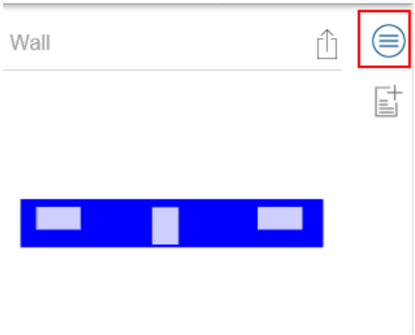
If you want to find and highlight specific elements within the overall model, you can click the elements directly with the mouse or use **object navigator**. To open it, click the magnifier icon on the left viewport border. The contents of object navigator are context-sensitive, taking into account the current visibility settings in the project details. Using a two-level filter, you can select the element type and a specific property by which you want to group and sort the results. Object navigator then lists all the objects that meet the filter criteria. The number in brackets indicates how often the object occurs. To highlight the elements in the model, click the **eye symbol** to the right of the element found. You can select the color by clicking **Set color for objects**.



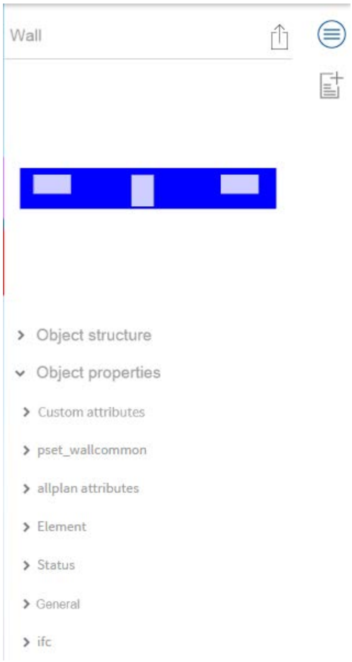
Element properties and attributes

BIM Viewer enables you to do much more than simply display and check data or merge models. One of its most important features is its ability to retrieve information on any of the objects in the model. As a result, BIM Viewer is ideally suited to checking data: you can check not only the geometry but also the alphanumeric information (see introduction to checking data).

To display the object parameters, select the element whose properties you want to check. Then click the **Properties icon** in the top right corner, thus opening the **Info palette.** As an alternative, you can open the palette first and then select the object on which you require information.

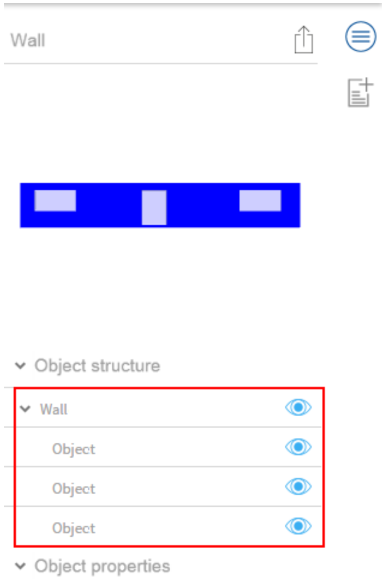


The program then shows a preview of the selection, listing all properties and parameters of the object you selected in the model. This includes the object's values and parameters (alphanumeric data), its position within the model and information on how it interacts with adjacent objects (geometry).

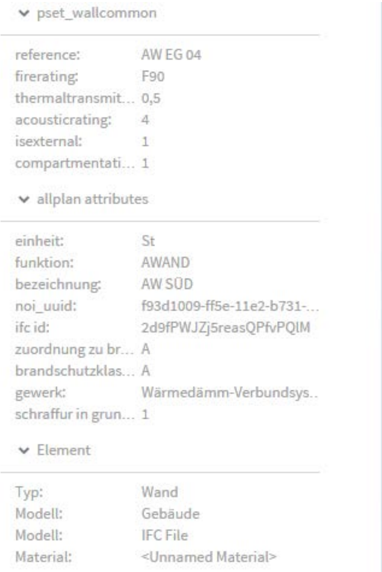


The **Info palette** has the following areas: **Preview, Object structure, Object properties** and **Attachments**, which can vary depending on the element selected. You can use the mouse buttons to navigate in the preview.

The **Object structure** area is only available if the element you selected has **subordinate elements** or if it is made up of several **subordinate objects**. For example, think of walls with openings, rooms with finish specifications or facades made of several components (mullion, transom, glass ...). Like the **Palette** for models, the tree structure in the object structure area shows the data structure and the **relations** of the objects and their subordinate objects.



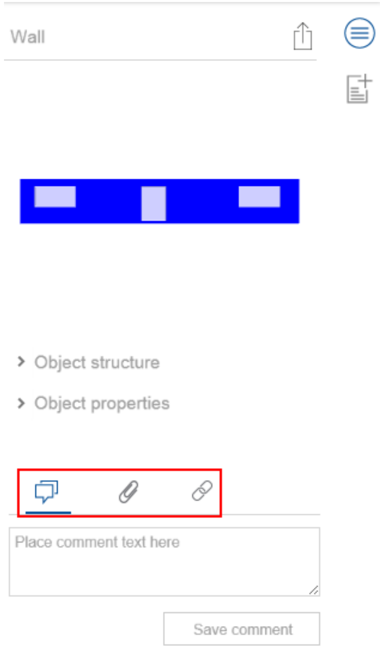
The **Object properties** area shows the information you assigned to an object in the form of parameters and attributes, including the values in the PSets and BaseQuantities. To avoid confusion, these details are split into subgroups. Some of these subgroups are equivalent to the IFC PropertySets (Custom attributes, PSetCommon, Status...). The **Element** area provides information on the component or the **object type** and the **model** to which it currently belongs. This is particularly useful if you have opened several models from different sources so that you can check them together. In this case, you can no longer see which element is from which IFC file.



Communication

Apart from displaying, checking and combining different building models and (IFC) files, you can use the **bim+ portal** to attach **additional information** or **comments** to objects. This is an essential feature, as it reflects one of the core aspects of the BIM philosophy. Without communication, it is simply not possible to handle projects in a BIM-compliant manner.

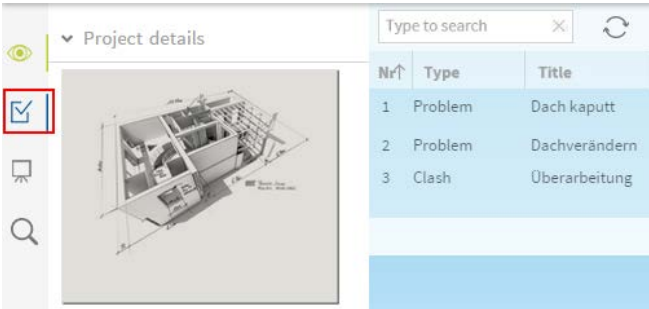
All those involved communicate and exchange information directly through the building model. As a result, any additions or changes are always up to date and available to everyone at any time.



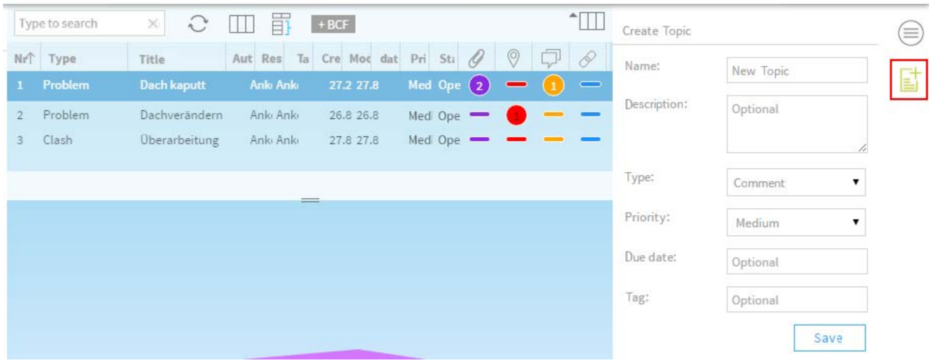
Everyone involved in the project can attach **notes** or **additional information** to the selected object using the **Comment**, **Attachment** and **Hyperlink** icons. The data you attach can be in any format. In addition to pure text, you can add images, PDF files or Excel spreadsheets. By inserting a link, you can refer to web pages with product specification sheets for the selected object.

Cooperation

By inserting notes and attachments in the Info palette of an object, you can not only **inform** your planning partners but also assign **tasks** to the team members in bim+. To do this, you can use the **Project topics**, which you can open in a list by clicking the **Show project topics** icon below the **eye symbol** of the project details.

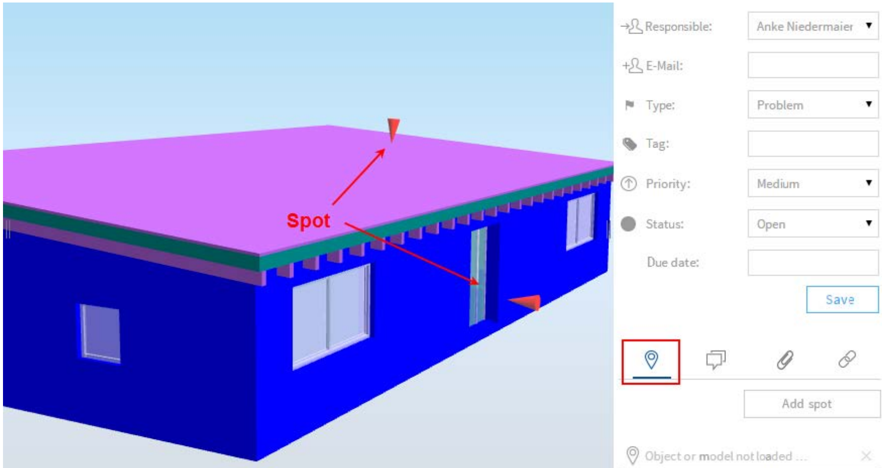


To create a new **topic**, click the corresponding icon at top right below the object properties. Enter a name for the new topic. If you want, you can also add a short description. Click **Save** to create the topic. You can then define it in more detail. Similarly, you can edit existing topics you have selected in the list.



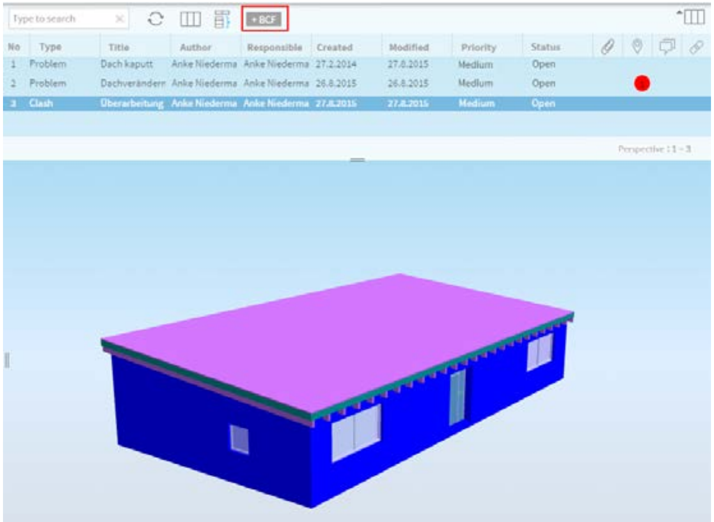
The program automatically enters the person who creates the topic as the **Author**. You can define a team member who is responsible for carrying out the tasks defined in the topic. This person is displayed in the **Responsible** field. In addition, you can define a **Priority** for the topic and specify its **Due data**. The program automatically informs all project participants of these tasks by email, so that they can update their own data.

Like elements, each topic can include additional information in the form of **attachments, comments** and **hyperlinks**. In addition, you can create **spots** for topics. With spots, you can mark the relevant object or objects within the overall model. So you can immediately find the objects that are associated with a topic. This function is essential for complex projects and large models, where it is nearly impossible to identify objects by pure text. To place a spot, click **Add spot** and then click in the model to place the spot where you need it.



In addition, it is important to define the **topic type**. You can choose between **Remark**, **Problem** and **Clash**. These types reflect the specifications and definitions buildingSmart laid down for the BCF format. The bim+ topics largely correspond to this format. Therefore, instead of creating a topic by hand, you can also import a BCF file. To do this, open the topic list, click the **+BCF** icon and select the file you want to use in the dialog box that opens. This converts the file contents to a bim+ topic. Similarly, you can export a bim+ topic to BCF format. To do this, select the relevant bim+ topic in the list.

Note: The project must include the model with the objects that are associated with a topic. Otherwise, bim+ can neither use nor display BCF files correctly. Therefore, load the model into your project before you import BCF files. You can find instructions on how to do this on the preceding pages.



In addition to helping you check data, the topic tool and its functions and options assist you throughout the whole construction project. You can use these features in any phase - be it data exchange, revision, updating or detailing.

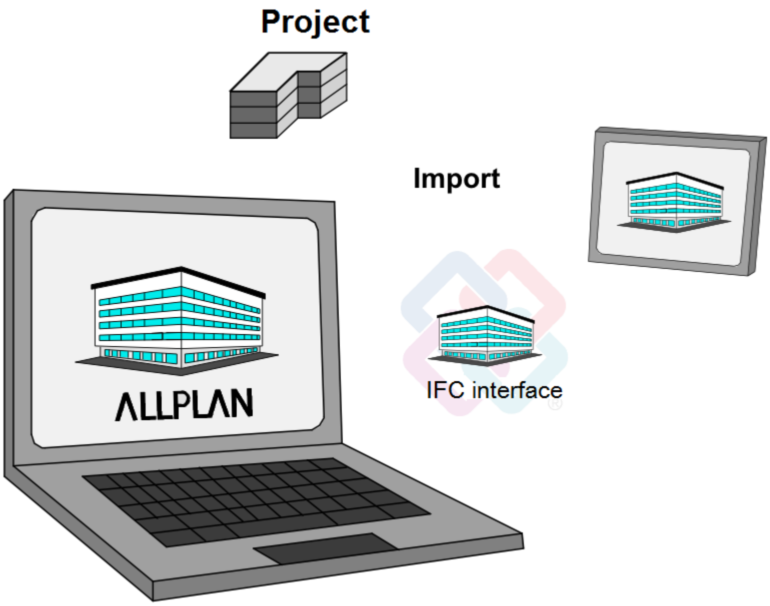
More bim+ functions

In addition to the tools mentioned above, the bim+ platform provides tools for creating and managing project-specific data. For example, you have the option to save and display model views as a sequence of images. You can select this tool by clicking the **Show project slideshow** icon below the project topics.

Apart from uploading models and attaching additional information to objects and topics, **document administration** within the project properties provides all project participants with documents of any kind, such as address lists of the project participants, specifications laid down by the client, photos of the construction site, site plans and so on. These documents can be in any format. You can access document administration on the **Documents** tab. To add documents, click **Upload file**. The project participants can view, download and open all the data stored in document administration.

Import to Allplan

Although you can check data in a viewer program, you cannot modify data, regardless of whether you have IFC files or native **Allplan** data. If you want to change, add and update data, you must do this in **Allplan** or in the program that is suited to the task at hand. This also applies if you want to merge IFC files into one model. Although you can open and check these files together in bim+ or in any other viewer program, they are still individual models.



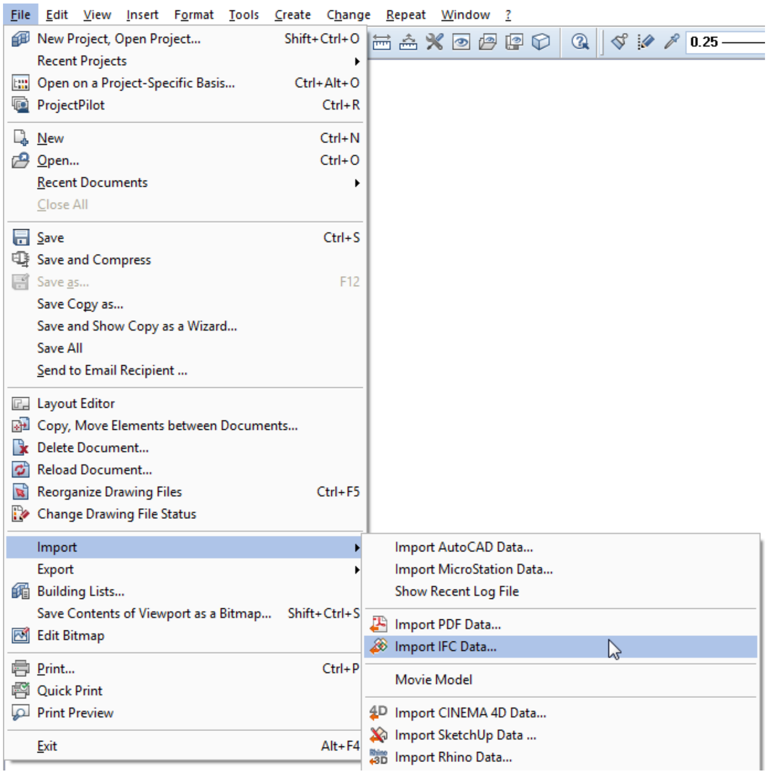
For example, you have received an IFC file with the ventilation lines from the engineer in charge of technical building services. Now you want to integrate this file into the model. Logically, the next step is to import the file into **Allplan**.

Importing

When it comes to importing an IFC file to **Allplan**, you can use an existing project or create a new project. Generally, it only makes sense to create a new project if you are not the person who is in charge of the BIM model, that is to say, the person who created and maintains it. If you want to import data of your planning partners or modify data in **Allplan**, you should always use the project you created and structured as described in the preceding sections. As you can import IFC data to empty drawing files only, you do not run the risk of overwriting existing files inadvertently.

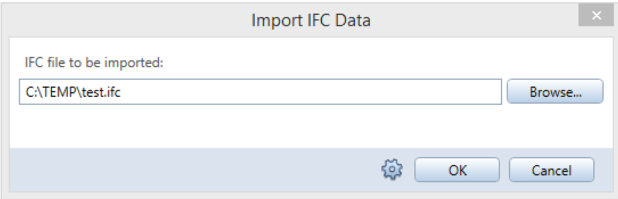
As opposed to exporting and creating a BIM building model, you do **not necessarily need a building structure** in the target project if you want to import data. The IFC model you are about to import always includes a component-oriented structure. Allplan automatically converts this structure to a building structure during import. Therefore, you do not need to create a building structure if you want to import the data to a new project. Quite the contrary, you should create the project without a building structure so that you can use the structure defined in the IFC file. If you import the IFC data to a project with a building structure, the program simply updates the existing structure based on the structural levels in the IFC file, thus adding any levels that may be missing.

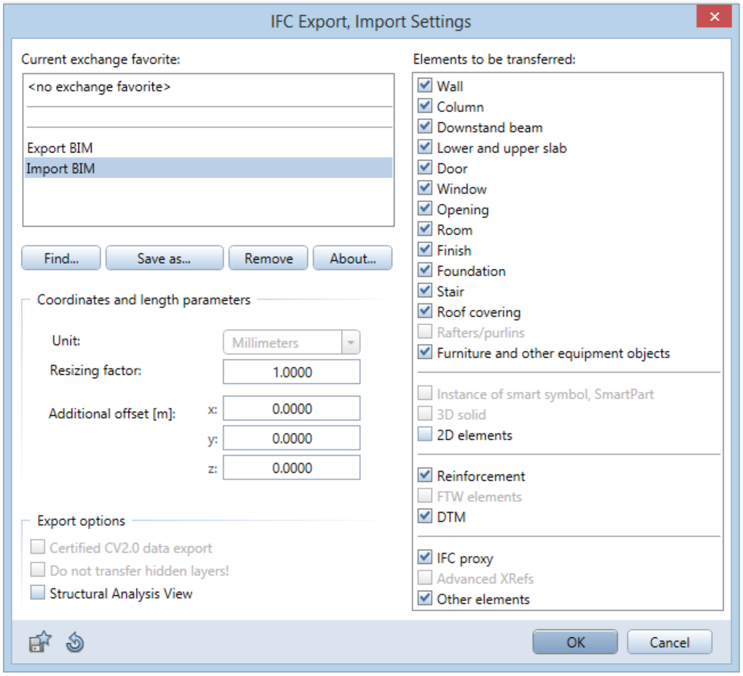
To start importing data into **Allplan**, open the **File** menu and select **Import - Import IFC Data** or open the **Create** menu and select **Interfaces - Import IFC Data**. In addition, you can also drag the data directly into the workspace.



In the dialog box that opens, click **Browse...** to select the folder and the name of the file you want to import. To set more import options, click **Settings**. If you have dragged the file into the workspace, the **Settings** dialog box opens immediately.

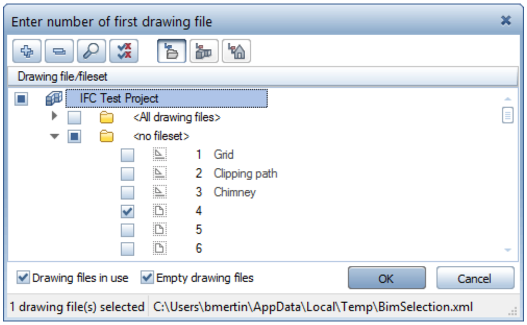
Using this dialog box, you can select the elements you want to import, specify their unit and size and define their position in the coordinate system. Here, too, you can click the **Save as...** button to save the settings as an **Exchange favorite**. The list of **Current exchange favorites** shows the favorites you have already saved. Click the **About...** button to add information on the settings of the favorite. For example, you can add information on how to use the settings.





When you have defined the necessary settings, close the dialog box and start the import by clicking **OK**. In the next dialog box, you can specify the number of the first drawing file. Starting with this drawing file, Allplan arranges the IFC data on empty drawing files in ascending order. Here, the drawing file that is currently open is irrelevant, as you cannot select it as the first drawing file.

The program itself suggests and selects the first empty drawing file that is followed by enough empty drawing files for importing the entire structure. Of course, you can change the first drawing file at any time. If there are not enough empty drawing files, the program will issue a message.

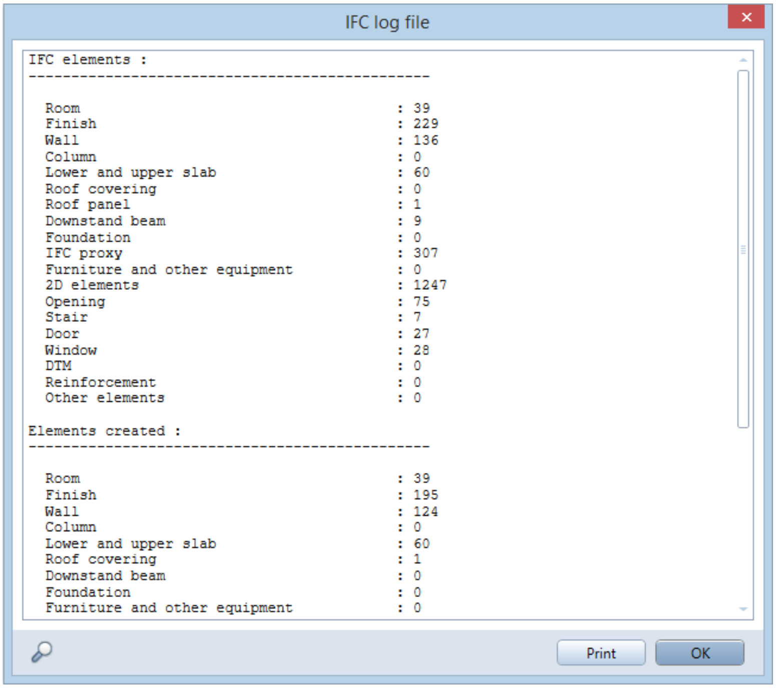


You can select only an empty drawing file for the first one. **Allplan** always arranges the IFC data on empty drawing files. So you do not run the risk of inadvertently overwriting existing data. Apart from defining the first drawing file, you cannot control what is placed on which drawing file. **Allplan** always adopts the structure as it is. If you want to place elements in specific documents, you can do this after you have imported the data. Use the **Copy, Move Elements between Documents** tool (on the **File** menu).

After you have selected the first drawing file, click **OK** to confirm the dialog box. Now **Allplan** imports the IFC data and creates a new building structure based on the IFC structure. If there is a building structure, Allplan integrates the IFC structure into the existing structure and adds any structural levels that are missing.

After Allplan has imported the data, it opens a separate window with the log file. This log file lists the elements in the IFC file by type and number, the elements imported into **Allplan** and the new elements. Using this log file, you can check whether all elements have been transferred correctly.

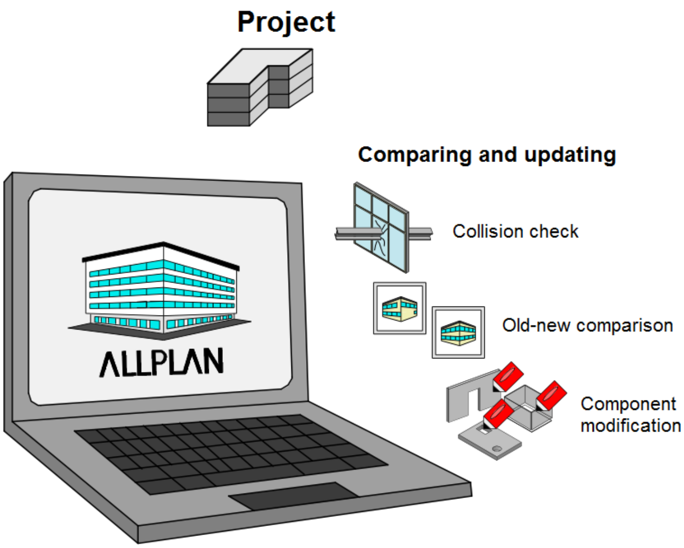
Click the **Print** button to print the file or to save it in PDF format. Allplan does not save the log file, overwriting it the next time you exchange data. Therefore, save it if you want to keep it.



Clicking **OK** takes you back to the workspace. Now you can check or edit the IFC data and thus the building model you imported. If you want, you can also update your original model based on the changes you imported.

Updating the model

Now we come to the last step in the planning cycle described in this book. In this step, you compare the imported model data with the existing model data and change and revise the data accordingly. After this, you can export the updated model again, giving it to the project participants who can then use it as a new database.



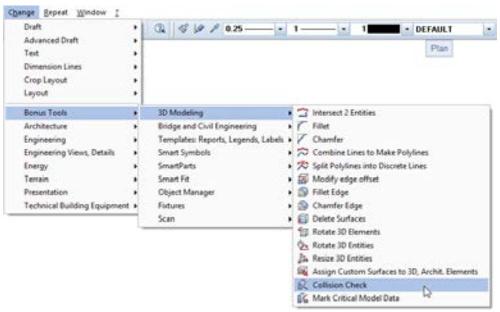
Allplan offers different tools for comparing data. To adjust objects and components and to add new ones, you can use the familiar **Allplan** tools in the architectural modules and the drafting modules as usual.

Comparing data

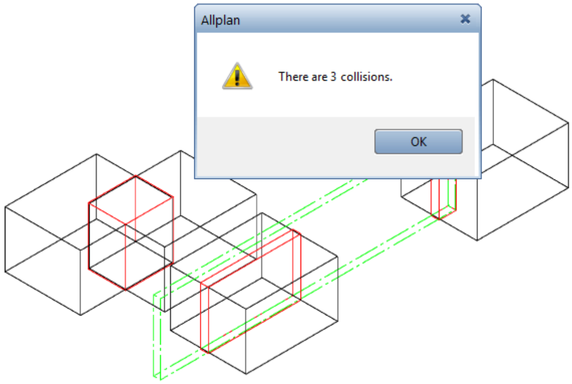
As you learned in the preceding section, Allplan always imports IFC files to empty drawing files. Consequently, the new data cannot interact with the data of the existing BIM model you created. You can use the **Collision Check** tool in the **3D Modeling** module to correlate and check the two databases, thus identifying the changes you need to make.

To do this, open the building structure and select the matching drawing files with the correlative data you want to check. With large buildings and complex models in particular, we recommend that you check the data step by step: for example, you can do this drawing file by drawing file or story by story. Check the whole model by comparing the old data with the new data. You can then revise and update the model accordingly. If you use this approach to work your way through the entire model, you will never lose track of changes, which is particularly important for complex projects.

You can select the tool for checking data on the **Change** menu - **Bonus Tools - 3D Modeling**.



After you have opened this tool, you can select specific elements or areas you want to check for collisions. To select these elements, just click them or use the filter tools. By pressing **CTRL+A**, you can select everything displayed on screen in one go. **Allplan** checks the data for collisions, marking each collision found with a **3D box** in the **detection color** specified, which is usually red. This 3D box is so big that it encloses the colliding elements. In addition, Allplan displays a message showing you how many collisions it has found and marked. If you press **ESC** to quit the tool and confirm the prompt asking whether you want to save the collisions, the program creates and displays the 3D boxes as discrete objects in the current drawing file.



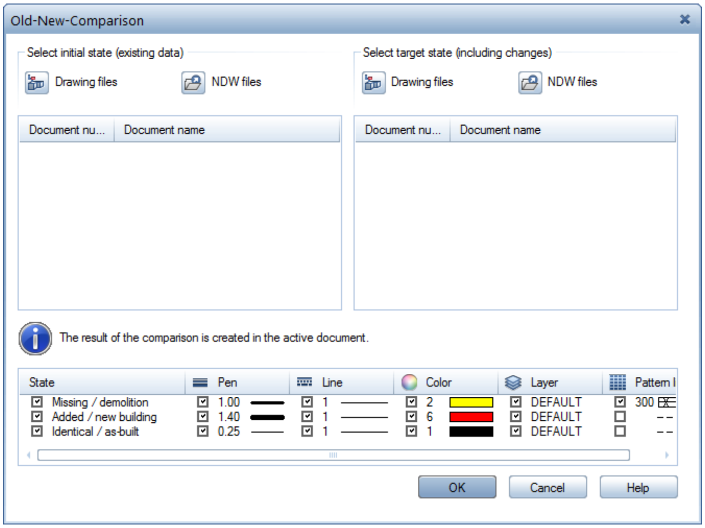
This is very useful for revising the model afterwards. As its name indicates, the tool for checking collisions simply checks the data. It does *not* update the data automatically. For example, take the planning done by the engineer in charge of technical building services: using this tool, you can create collision objects at the points where the ventilation lines meet walls or slabs in the architectural model. You or another team member can then update the model, creating slits or openings in the required places.

Note: Allplan checks only **3D objects** for collisions, ignoring 2D elements. In addition to **components**, **user-defined architectural elements** and **3D solids**, Allplan also checks **fixtures**, **bar reinforcement**, **SmartParts** and **smart symbols** containing 3D elements.

Note: All collision objects Allplan creates in one go get the **same group number**. Consequently, you can select and thus delete them together by pressing and holding down the **SHIFT key while clicking** an object.

If you want to compare and adjust data, you can also use the **Old-New-Comparison...** tool on the **Tools** menu. This tool is helpful if the data you have been given by external partners are based on your model and include only minor changes. In addition, you can also use this tool to display the changes visually on screen.

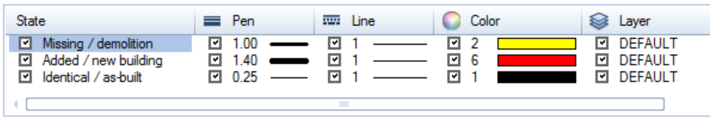
When checking for collisions, the current selection of drawing files is of particular importance. When comparing data, on the other hand, you can ignore the selection of drawing files. Here, you select the data you want to compare in a separate dialog box. However, we recommend opening one of the documents at least in reference mode so that you can place the result of the comparison correctly. After you have selected the tool, a dialog box with two area opens.



Select the documents you want to compare in this dialog box. You can select **drawing files** or **custom NDW documents**. However, you should not use NDW documents in conjunction with BIM. Clicking the corresponding icon opens the familiar selection dialog box where you can select the required drawing files.

Select the data of your model in the area on the left and select the data generated by your external partner in the area on the right. Then click **OK** to confirm. In the bottom part of the dialog box, you can specify which changes you want to see and define the format properties (pen, line, color, layer, pattern line):

- **Missing** (demolition) indicates objects that exist only in your data.
- **Added** (new building) indicates objects that exist only in the data of your planning partner.
- **Identical** (as-built) indicates everything that is identical in both databases.



Normally, you can clear the last check box, as the identical elements are not important. It is the changes and new elements you want to see. When you have finished, click **OK** to confirm the dialog box. The result of the comparison is attached to the crosshairs and you can place it in the workspace.

Modifying data

Both the **Collision Check** tool and the **Old-New-Comparison** tool help you keep track of changes so that you can revise and update your model. However, these tools do *not* change the data automatically. You or another team member must do this afterwards.

To do this, you can use all the familiar **Allplan** tools you used when you created the model. If you want to directly use objects you imported, such as the ventilation lines of the engineer in charge of technical building services, you can move these objects straight to the original drawing file of your BIM model. To do this, you can use the **Clipboard** (**CTRL+X** and **CTRL+ALT+V**) or the **Copy, Move Elements between Documents** tool (on the **File** menu). You can then edit these objects as if you created them yourself. Make sure they get the correct **IFC ObjectType** (if it was lost during import). In addition, check that these objects have the necessary parameters and information in the form of **attributes** and **properties**.

When revising and updating the model, you also need to observe all the points mentioned in the preceding sections about creating the model. By doing this, you ensure that your building model always stays compliant with BIM. After modifications, you can give your updated BIM model as a new database to all those involved in the project. To do this, create an IFC file or upload the model to the bim+ portal as described in 'Export from Allplan' (see page 177).

Within the planning phase, this cyclical workflow consisting of repetitive steps is the actual BIM process, that is to say, the modeling of building data. This workflow is part of the entire project. Apart from being compliant with BIM, it basically reflects normal planning work.

Step-by-step instructions showing you how to plan a project in compliance with BIM:

- Structure the project and the data
- Create the building model
- Assign parameters and attributes; attach additional information
- Export the BIM model and give it to all those involved
- Check the model data and the components
- Revise and adjust the model; external planning partners add their data
- Import the external data into the project
- Compare the models and their components
- Add the changes to the original model
- Export the updated BIM model again and give it to all those involved
- ...

FAQs on IFC and BIM

You should not encounter any major problems after you have worked through this manual and familiarized yourself with BIM and the IFC interface.

However, due to varying boundary conditions, external influences and data quality, you may face inconsistencies or difficulties when you import data, export data or work with the data. There are some points you need to bear in mind if you want to obtain correct results.

This chapter gives you the answers to frequently asked questions and presents solutions to a number of problems that may occur. In addition, we will gladly offer you advice and assistance in every possible way. Just let us know if there is anything we can do for you.

Exchanging plans

BIM and IFC are designed primarily for working together on the building model. Therefore, the associated interfaces transfer 3D data. Plans are still required for work on site and for the final documentation. In addition, they are often requested by clients. You can derive plans from the building model. However, these plans are 2D line drawings.

You can export these drawings together with the building model or as DWG files, DGN files or PDF files from **Allplan** and give them along with the building model to your planning partners.

As the building model and the layouts are transferred to scale with the correct coordinates, everything is in its correct place after your planning partners have imported the data into their programs. As a result, they get not only the 3D data with the respective parameters but also any additional information you entered in 2D, including all the plan sets with drawings and project details.

You cannot exchange IFC data

You are trying to create or import an IFC file, but **Allplan** does not react and does not issue an error message either. This is usually caused by damaged files in the user folder.

To fix them, you need to create new files. Exit **Allplan** and open the **Services application**. Clicking **Service - Windows Explorer - My own CAD documents (USR)** takes you directly to the user folder. As an alternative, you can also open this folder using Windows Explorer. You can find the path to the folder in the **Services application** window.

The user folder includes the `EDMDatabase` subfolder with the damaged files. Open this subfolder and delete all the files so that the subfolder is empty. Please do not delete the subfolder itself as it is required by the program.

After this, start **Allplan** again. The files you deleted are created again. This solves the problem. Now IFC data exchange should run smoothly.

You cannot open IFC files

You have received an IFC file from a planning partner, but you cannot import it into **Allplan** or open it with an IFC viewer. This can be caused by a missing description in the header of the file.

To check this, open the file using a text editor (NotePad, TextPad, ...). The first lines contain the header, which usually consists of the version, file name and file description: FILE_DESCRIPTION((' xxxxxxx '),' xxxx ').

If this entry is empty, please enter FILE_DESCRIPTION(('IFC2x3 Coordination View'),'2;1') and save the file.

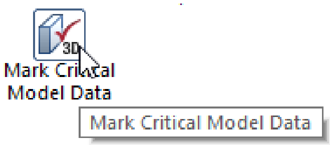
This solves the problem. Now you can try to import or open the file again.

Components are not exported correctly

You have used the descriptions in this guide to create an IFC file in **Allplan**, but the components are not imported or displayed correctly in an IFC viewer. This can be caused by incorrect or imprecise components in **Allplan**.

Imprecisions and errors of this kind may occur when you modify the geometry of architectural elements, work with large coordinate values or angles that deviate from the perpendicular.

In addition to measuring geometric values exactly, you can check problematic data using the **Mark Critical Model Data** tool on the Change menu of the 3D Modeling module in the Bonus Tools family.



If the model includes "critical" data, you need to fix these data before you start exporting. To do this, use the **Restore 3D View** tool, which you can find in the **Change** area in the **Architecture** modules.

By recalculating and updating all selected components, this tool corrects minor imprecisions and solves errors of this kind.

If the model includes large coordinates, think about whether you require the exact X and Y values. If you do not require them, move the data towards the origin in **Allplan** before you create the IFC file. You can use the **Move** tool on the **Edit** toolbar.

But if the exact values are important, you need to define offset coordinates in addition to the move. The program uses this offset to internally reverse the move, so that **Allplan** still displays and uses the original values when you export or measure the data. In order to enter an offset, open the **File** menu and click **New Project, Open Project** or **ProjectPilot** to open the **Project Properties**.

Offset coordinates always apply to the entire project. Enter the value that is equivalent to the value of the move but change the sign. For example, if you move the coordinates by 100 m in the X direction and by -50 m in the Y direction, the offset is -100 for X and 50 for Y.

After you have revised the model in this way, the program writes the components correctly to the IFC file.

The project only has a fileset structure

Basically, **Allplan** provides two options for structuring data, which you can use in parallel and independently of each other. The first one - the fileset structure - has existed since the beginning.

Allplan 2006 introduced the **building structure**, which you can use to divide project data into individual, hierarchic structural levels. The building structure reflects the topology of a real building. Instead of filesets, you assign drawing files to the individual structural levels.

If you work with the fileset structure in Allplan and select the **Export IFC Data** tool (on the **File** menu - **Export**), Allplan will issue a message indicating that this requires a building structure. You must create a building structure before you can export the data.

If you have used filesets for your data, you can convert this structure to a building structure. If you have structured your data by story, you can derive the building structure directly. As an alternative, **Allplan** offers a selection of predefined structures for different project types, which you can use and adjust accordingly.

To create a building structure (later), select the **Open on a Project-Specific Basis** tool and switch to the **Building structure** tab. If you have not yet created a structure, Allplan will issue a message prompting you to specify how to create the structure.

Some drawing files are not transferred

If the resulting BIM model does not include all drawing files, although the project has a building structure, this structure may not be in compliance with IFC. In this case, the drawing files and their contents are not transferred.

In accordance with the regulations defining the structure of IFC files, the mandatory building structure must consist of predefined structural levels. If the structure meets these requirements, it is referred to as being **IFC-compliant**.

In other words, you can only use specific structural levels that must be arranged in a specific sequence, reflecting the topology of a building. For example, a story cannot be superordinate to a structure.

You can use the following structural levels to create an IFC-compliant structure: **SITE, STRUCTURE, BUILDING, STORY** and **SUB-STORY**. You can assign drawing files only to sites, buildings and stories.

In addition to checking the building structure manually, you can also use the **Restrictions of building structure** tool to find out whether the building structure meets the requirements of IFC. To do this, select the project node, open the shortcut menu, select **Restrictions of building structure** and click the **IFC-compliant structure** button. Any structural levels or drawing file assignments that do not comply with these regulations are marked with a red cross. Solve these conflicts by moving drawing files and adjusting the building structure so that it meets the requirements of IFC. When you have finished, export the data again.

You cannot select the 'Export IFC Data' tool

If the  **Export** IFC Data tool (on the **File** menu - **Export**) is grayed out and you cannot create an IFC file, you are currently working in the layout editor.

As layouts are two-dimensional line drawings, you cannot write them to IFC files. IFC is a format for exchanging 3D building models. Therefore, you can use it to transfer drawing files with 3D data, but you cannot transfer layouts. The same applies to all 2D elements, such as texts and dimension lines.

In order to export IFC data, switch back to **drawing file mode** by closing the layout editor. Now you can select the tool.

If you want to provide your planning partners with additional information or layouts in 2D, create a separate file in addition to the IFC file. For example, you can use a file in DWG format. Your planning partners can then import the two files into their CAD program using the corresponding interfaces.

As the files include the coordinate values, they are placed on top of each other so that they are congruent. As a result, your planning partners can process the 2D information and the 3D data without any problems.

Appendix I - Check Lists

Appendix I includes various forms, lists and documents assisting you in planning and handling your projects in a BIM-compliant manner using **Allplan**. These check lists, which are only suggestions, help you introduce and implement BIM in every respect.

If you have worked through this book, you have certainly come across the references to these check lists. If you want, you can copy these check lists and use them as they are or you can create your own lists based on these templates.

Apart from this book, our Internet portal **Allplan Connect** also offers these lists. You can download them as PDF files.

Check lists:

- I: evaluating the current situation at your office
- II: exchanging data and formats
- III: building structure
- IV: plane model and component heights
- V: layers and format definitions
- VI: line styles, area styles
- VII: object attributes, attribute favorites
- VIII: helping you to choose the export method

Check list I: evaluating the current situation at your office

A Software used

1 CAD programs

☐ Allplan Version ______ No. of workstations _____
☐ AutoCAD ADT Version ______ No. of workstations _____
☐ REVIT Version ______ No. of workstations _____
☐ ArchiCAD Version ______ No. of workstations _____
☐ VectorWorks Version ______ No. of workstations _____
☐ ________ Version ______ No. of workstations _____

2 Programs for tendering, awarding and invoicing

☐ Allplan BCM Version ________ No. of workstations _____
☐ NEVARIS Version ________ No. of workstations _____
☐ CALIFORNIA Version ________ No. of workstations _____
☐ ARRIBA Version ________ No. of workstations _____
☐ ________ Version ________ No. of workstations _____

3 Facility management programs

☐ Allplan Allfa
☐ OTHER PROGRAMS ________
☐ NOT INSTALLED

B Network environment

1 Data storage

☐ Predefined structure

☐ Locally to stand-alone computers

☐ Centrally to data server

☐ Online, cloud-based

2 Cooperation

☐ Stand-alone computers

☐ Workgroup, teamwork

☐ Workgroup, teamwork online

C Office standard

☐ Not defined

☐ 2D templates

☐ 2D templates and 3D templates with objects and components

☐ BIM-compliant sample project with a building structure

D Method of working

☐ CAD program as a drawing tool; everything is in 2D

☐ 2D elements and components

☐ Intelligent components and objects; assigning attributes

☐ Consistent building model across all phases

E BIM knowledge of employees

EMPLOYEE			BIM KNOWLEDGE		
Name	First name	Department, Function	Excellent	Basic	No

Check list II: exchanging data and formats

Construction project: **Project name** ______________________________

Project number ______________________________

Project manager ______________________________

Employee ______________________________

A Project must be handled in compliance with BIM

☐ Yes, requested by client ☐ No

B BIM coordinator, person in charge of model

☐ Client
☐ External project controller
☐ Project manager
☐ Another planning office

C How to exchange data

☐ Centraler data server ☐ Online, cloud-based ☐ Sending files

D Planning offices involved in project

OFFICE	SOFTWARE			
	Program used	Version	File format	IFC interface
Architectural planning				
				☐ Yes ☐ No
	Test file exchanged ☐ Successfully	☐ Not successfully		☐ Not done
Tendering, awarding, invoicing				
				☐ Yes ☐ No
	Test file exchanged ☐ Successfully	☐ Not successfully		☐ Not done
Structural analyses				
				☐ Yes ☐ No
	Test file exchanged ☐ Successfully	☐ Not successfully		☐ Not done
Technical building services, air-conditioning				
				☐ Yes ☐ No
	Test file exchanged ☐ Successfully	☐ Not successfully		☐ Not done

Technical building services, sanitary installations				
				☐ Yes ☐ No
	Test file exchanged ☐ Successfully ☐ Not successfully ☐ Not done			
Technical building services, electrical installations				
				☐ Yes ☐ No
	Test file exchanged ☐ Successfully ☐ Not successfully ☐ Not done			
Interior fittings				
				☐ Yes ☐ No
	Test file exchanged ☐ Successfully ☐ Not successfully ☐ Not done			
Outdoor facilities				
				☐ Yes ☐ No
	Test file exchanged ☐ Successfully ☐ Not successfully ☐ Not done			
Facility Management				
				☐ Yes ☐ No
	Test file exchanged ☐ Successfully ☐ Not successfully ☐ Not done			

Check list III: building structure

Construction project: **Project name** ______________________________

Project number ______________________________

A Data structure

☐ Building structure only

☐ Building structure and fileset structure

☐ Plane model

B Structural levels in building structure

☐ Site	______________
	______________
☐ Structure	______________
	______________
☐ Building	______________
	______________
	______________
☐ Story	Foundations
	Basement
	Ground floor
	First upper floor
	Second upper floor
	______________
	______________
☐ Sub-story	______________
	______________
	______________

C Drawing files assigned to structural levels

STRUCTURAL LEVELS	DRAWING FILES		
	from number	to number	Height setting
Project	NOT ALLOWED		
Site			
Structure	NOT ALLOWED		
Building			
Story			
Foundations			
Basement			
Ground floor			
First upper floor			

Second upper floor			
Sub-story	NOT ALLOWED		

Check list IV: plane model and component heights

Construction project: **Project name** ______________________________

Project number ______________________________

A Height values of plane model

Model name ________________________________

STORY	HEIGHT VALUES		
	Bottom level	Top level	Roofscape
Building as a whole			
Foundations			
Basement			
Ground floor			
First upper floor			
Second upper floor			

B Height settings of components

COMPONENT	HEIGHT VALUES			
	Plane	Offset	Absolute value	Component height
FOUNDATIONS				
Bottom level				
Top level				
FLOOR SLAB				
Bottom level				
Top level				
EXTERIOR WALLS				
Bottom level				
Top level				
INTERIOR WALLS				
Bottom level				
Top level				
COLUMNS				
Bottom level				
Top level				

SLABS				
Bottom level				
Top level				
ROOF				
Bottom level				
Top level				
Bottom level				
Top level				

Check list V: layers and format definitions

Construction project: **Project name** ______________________________

Project number ______________________________

A Resource setting

☐ Office-specific ☐ Project-specific

B Layer structure

☐ Like office standard
☐ Given by client
☐ Free

C Format definitions

☐ From layer ☐ Pen
☐ Line
☐ Color
☐ Line style

☐ From element

D List of layers

LAYER			DEFINITION			
Short name	Full name	Number	**Pen**	**Line**	Color	Contents

Check list VI: line styles, area styles

Construction project: **Project name** ______________________________

Project number ______________________________

A Resource setting

☐ Office-specific ☐ Project-specific

B Format definitions

☐ From layer ☐ From element

C Definitions

Drawing types:

☐ Schematic design drawing
☐ Design drawing
☐ Building drawing
☐ Working drawing
☐ Presentation drawing
☐ Reinforcement drawing
☐ General arrangement drawing
☐ ____________________

Scales:

☐ 1:1
☐ 1:10
☐ 1:50 AM
☐ 1:100
☐ 1:500
☐ 1:1000
☐ 1:2500
☐ _______

D Line styles

LINE STYLE		DEFINITION			
Name	Number	Layer	Drawing type	Scale 1:X	Used for
Thick continuous line	301	DE_GEN AR_GEN	☐	☐	Intersected edges
Dashed line	304	SU_REFPL AR_BEAM	☐	☐	Soffit Hidden edges
			☐	☐	
			☐	☐	
			☐	☐	

E Area styles

AREA STYLE		DEFINITION		
Name	Number	Drawin g type	Scale 1:X	Used for
Reinforced concrete	301	☐	☐	Columns, walls, downstand beams
Masonry	303	☐	☐	Interior walls only -> bricks
Lime-sand brick	103	☐	☐	Exterior walls, load-bearing -> lime-sand brick
As-built data	307	☐	☐	Only existing components without information on the material
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	

Check list VII: object attributes, attribute favorites

Construction project: **Project name** ________________________________

Project number ________________________________

A Attributes defined by

☐ buildingSmart, IFC ☐ Client ☐ Yourself

B User-defined attributes

ATTRIBUTE		DEFINITION			
Name	Number	Type	Unit	Input type	Explanation
IFC ObjectType	684	C	-	ComboBox	Automatically assigned to components
Safety classification	1392	C	RC	ComboBox	In compliance with DIN EN 1627 For windows and doors
Structure_load-bearing	573	C	-	CheckBox	

C Attribute favorites

<table>
<tr><th>NAME</th><th colspan="3">CONTENTS</th></tr>
<tr><td></td><td>Attribute</td><td>Value</td><td>Used for</td></tr>
<tr><td>Footing</td><td>Name
Code text
Material</td><td>FO

Concrete</td><td>Block foundations, strip foundations, slab foundations</td></tr>
<tr><td>Column</td><td>Name
Code text
Material
Classification
Structure_load-bearing
Fire resistance classification
Function
Inclination</td><td>COLUMN

External
Yes
FXX

0°</td><td>Columns
Posts, vertical components made of wood
Wall piers</td></tr>
<tr><td>Beam</td><td>Name
Code text
Material
Classification
Structure_load-bearing
Fire resistance classification
Function
Span</td><td>BE

Reinforced concrete
External
Yes
F90
Beam
xxx m</td><td>Downstand beams, upstand beams
Purlins, horizontal components made of wood
Upstands
Ring beam</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

Check list VIII: helping you to choose the export method

The following points help you find the method of exchanging data that is best suited to the present project. You should discuss these points with your planning partners before you decide on the method. Of course, you can also use the two methods in combination.

1 Export to bim+

- You export the data straight from **Allplan** in its native format.
- You do not need to convert the data.
- Allplan neither creates nor saves a discrete file.
- You require an Internet connection to upload the data.
- Every **Allplan** license includes a free account.
- You do not need any add-ons.
- Registered users can access the data online at any time.
- You can add IFC models and SKP models.
- You can attach comments, attachments and tasks to objects.
- You cannot reimport **Allplan** data (yet).

2 Export to IFC

- Allplan converts the data to the software-neutral IFC format.
- The structure and content of the model meet the specifications of buildingSmart.
- Allplan creates a discrete file you can save freely.
- You can transfer the file on a storage medium, by email or using the cloud.
- You can also upload the file to a data server or bim+.
- You require a free viewer program to open the file in its native format.
- Depending on the program you use, you can attach comments and attachments to the objects, albeit limited.
- You can import IFC files to numerous applications with the corresponding interface.
- You can reimport the data into **Allplan** without problems.

Regardless of the method you choose, you must use the appropriate software program to edit the model. Neither the IFC file nor the Allplan model in bim+ can be edited directly. You always have to reimport the data.

Appendix II - Attributes

Appendix II includes tables listing

- Object numbers of components
- Attributes and PSets

... and all Allplan attributes and IFC attributes sorted by category:

- Attributes for the building topology
- Attributes for the unfinished structure
- Attributes for the finish
- Attributes for engineering
- Attributes for the IFC ObjectTypes

Object numbers of components

Component - Object	Allplan object number	Allplan object name
Walls in general – IFCWall	1	Wall
	2	Wall as a whole
Downstand beams and upstand beams – IFCBeam	6	Downstand beam
	901	Rafter
	904	Roof beam
	909	Beam
Columns – IFCColumn	3	Column
Slabs – IFCSlab	4	Slab
Roofs – IFCRoof	1000	Roof covering
	1003	Roof covering
Members – IFCMember	9	Timber element
	908	Post
	930	Timber element in general
Plates – IFCPlate	4	Slab
	5	User-defined archit. element
Bar reinforcement – IFCReinforcingBar	257	Bar reinforcement
Mesh reinforcement – IFCReinforcingMesh	257	Mesh reinforcement
Stairs – IFCStair	73	Stair
	72	Stair component
	71	Stair step element
Ramps – IFCRamp	1766	SmartPart
	73	Stair
Windows – IFCWindow	991	Smart window symbol
	1766	SmartPart
	0	Smart symbol

Component - Object	Allplan object number	Allplan object name
Facades – IFCCurtainWall	1764	Facade
Coverings – IFCCovering	62	Vertical surface
	63	Ceiling
	64	Floor surface
Railings – IFCRailing	1765	Railing
Furnishings, equipment – IFCFurnishingElement	0	Smart symbol
	1766	SmartPart
	3005	Furniture
Rooms – IFCSpace	61	Room

Overview of Attributes and PSets

Base Quantities (geometric attributes)

Element	IFC attribute	Allplan attribute	Attribute number	Allplan group
Foundation - IFCFooting	*Width*	Thickness	221 (199)	AR_Quantities
	Length	Length	220	AR_Quantities
	Height	Relative height	222	AR_Quantities
	NetVolume	Net volume	226	AR_Quantities
Wall - IFCWall	*GrossVolume*	Volume	223	AR_Quantities
	NetVolume	Net volume	226	AR_Quantities
	GrossSideArea	Area	229	AR_Quantities
	NetSideArea	Area	229	AR_Quantities
	NominalLength	Length	220	AR_Quantities
	NominalWidth	Thickness	221	AR_Quantities
	GrossFootprintArea	Base area	224	AR_Quantities
	NominalHeight	Relative height	222	AR_Quantities
Downstand beam - IFCBeam	*GrossFootprint(Section)Area*	Cross-section area		Section
	Length	Length	220	AR_Quantities
	GrossVolume	Volume	223	AR_Quantities
	NetVolume	Net volume	226	AR_Quantities
	OuterSurfaceArea	Surface	722	AR_Quantities
Column - IFCColumn	*Height*	Relative height	222	AR_Quantities
	GrossVolume	Volume	223	AR_Quantities
	NetVolume	Net volume	226	AR_Quantities
	OuterSurfaceArea	Surface	722	AR_Quantities
	GrossFloor(Section)Area	Floor surface	293	AR_Quantities

Element	IFC attribute	Allplan attribute	Attribute number	Allplan group
Slab - IFCSlab	*GrossVolume*	Volume	223	AR_Quantities
	NetVolume	Net volume	226	AR_Quantities
	GrossSideArea	Area	229	AR_Quantities
Roof - IFCRoof	*SurfaceArea*	Area	229	AR_Quantities
	ProjectedArea	Projected area	1397	IFC
Members - IFCMember	*Height*	Relative height	222	AR_Quantities
	GrossVolume	Volume	223	AR_Quantities
	NetVolume	Net volume	226	AR_Quantities
	OuterSurfaceArea	Surface	722	AR_Quantities
	GrossFloor(Section)Area	Floor surface	293	AR_Quantities
Plates - IFCPlate	*GrossVolume*	Volume	223	AR_Quantities
	NetVolume	Net volume	226	AR_Quantities
	GrossSideArea	Area	229	AR_Quantities
	Width	Relative height	222	AR_Quantities
Stairs - IFCStair	*Length*	Length	220	AR_Quantities
	Volume	Volume	223	AR_Quantities
Ramps - IFCRamp	*Length*	Length	220	AR_Quantities
	GrossSideArea	Area	229	AR_Quantities
	Volume	Volume	223	AR_Quantities
Windows - IFCWindow	*OverallWidth/Length*	Length	220	AR_Quantities
	OverallHeight	Relative height	222	AR_Quantities
	NominalArea	Area	229	AR_Quantities
	Perimeter	Perimeter	228	AR_Quantities
Doors - IFCDoor	*OverallWidth/Length*	Length	220	AR_Quantities
	OverallHeight	Relative height	222	AR_Quantities
	NominalArea	Area	229	AR_Quantities
	Perimeter	Perimeter	228	AR_Quantities

Element	IFC attribute	Allplan attribute	Attribute number	Allplan group
Facades - IFCCurtainWall	*Length*	Length	220	AR_Quantities
	Height	Relative height	222	AR_Quantities
	Width	Thickness	221	AR_Quantities
	GrossArea	Area	229	AR_Quantities
Coverings - IFCCovering	*GrossArea*	Area	230	AR_Quantities
	TotalThickness	Thickness_absolute	199	AR_Quantities
Railings - IFCRailing	*Length*	Length	220	AR_Quantities
	Area	area	229	AR_Quantities
Furnishings, equipment - IFCFurnishing	*Length*	Length	220	AR_Quantities
	Width	Thickness	221	AR_Quantities
	Height	Relative height	222	AR_Quantities
Rooms - IFCSpace	*FinishFloorHeight*	TLFF	112+MT_Boden (∑ 211)	Formula
	FinishCeilingHeight	BLFD	113-MT_Decke (∑ 211)	Formula
	ElevationWithFlooring	Height of floor structure	MT_Boden (∑ 211)	Formula
	GrossWallArea	Wall area		
	NetVolume	Net volume	226	AR_Quantities
	NetFloorArea	Floor surface	293	AR_Quantities
	GrossVolume	Volume	223	AR_Quantities
	CrossSectionArea	Cross-section area		
	NetPerimeter	Perimeter	228	AR_Quantities
	NetWallArea	Wall area		

PSet Common (general element properties)

Element	IFC attribute	Allplan attribute	Attribute number	Allplan group
Foundation - IFCFooting	*Material.Name*	Material	508	AR_General
	Reference	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
Wall - IFCWall	*LoadBearing*	Structure_load-bearing	573	AR_General, IFC
	IsExternal	Classification	618	IFC
	AcousticRating	Sound insulation classification	1373	IFC
	Status	Alteration category	49	AR_General, IFC, ...
	FireRating	Fire resistance classification	935	IFC
	Combustible	Flammable	1371	IFC
	SurfaceSpreadOfFlame	Fire behavior	1372	IFC
	Compartmentation	Defining fire compartment	1396	General, IFC
	ThermalTransmittance	U-value	981	IFC
	ExtendedToStructure	Room-high		
Downstand beam - IFCBeam	*Reference*	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
	LoadBearing	Structure_load-bearing	573	AR_General, IFC
	IsExternal	Classification	618	IFC
	FireRating	Fire resistance classification	935	IFC
	ThermalTransmittance	U-value	981	IFC
	Slope	Inclination	909	IFC, Thermal Insulation
	Span	Span	1374	IFC
	Roll	Angle		

Element	IFC attribute	Allplan attribute	Attribute number	Allplan group
Column - IFCColumn	*Reference*	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
	LoadBearing	Structure_load-bearing	573	AR_General, IFC
	IsExternal	Classification	618	IFC
	FireRating	Fire resistance classification	935	IFC
	ThermalTransmittance	U-value	981	IFC
	Slope	Inclination	909	IFC, Thermal Insulation
	Roll	Angle		
Slab - IFCSlab	*Reference*	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
	LoadBearing	Structure_load-bearing	573	AR_General, IFC
	IsExternal	Classification	618	IFC
	AcousticRating	Sound insulation classification	1373	IFC
	FireRating	Fire resistance classification	935	IFC
	Combustible	Flammable	1371	IFC
	SurfaceSpreadOfFlame	Fire behavior	1372	IFC
	Compartmentation	Defining fire compartment	1396	General, IFC
	PitchAngle	Inclination	909	IFC, Thermal Insulation
	ThermalTransmittance	U-value	981	IFC
Roof - IFCRoof	*Reference*	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
	AcousticRating	Sound insulation classification	1373	IFC
	ThermalTransmittance	U-value	981	IFC
	IsExternal	Classification	618	IFC
	FireRating	Fire resistance classification	935	IFC

Element	IFC attribute	Allplan attribute	Attribute number	Allplan group
Members - IFCMember	*Reference*	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
	LoadBearing	Structure_load-bearing	573	AR_General, IFC
	IsExternal	Classification	618	IFC
	ThermalTransmittance	U-value	981	IFC
	FireRating	Fire resistance classification	935	IFC
	Slope	Inclination	909	IFC, Thermal Insulation
	Span	Span	1374	IFC
	Roll	Angle		
Plates - IFCPlate	*Reference*	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
	LoadBearing	Structure_load-bearing	573	AR_General, IFC
	IsExternal	Classification	618	IFC
	FireRating	Fire resistance classification	935	IFC
	AcousticRating	Sound insulation classification	1373	IFC
	ThermalTransmittance	U-value	981	IFC
Stairs - IFCStair	*Reference*	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
	NumberOfRiser	Rise number	88	AR_Quantities
	NumberOfTreads	Treads		AR_Quantities
	RiserHeight	Rise	89	AR_Quantities
	TreadLength	Tread run	90	AR_Quantities
	NosingLength	Nosing		
	WalkingLineOffset	Offset of walking line		
	TreadLengthAtInnerLine	Minimum tread length on the inside		

Element	IFC attribute	Allplan attribute	Attribute number	Allplan group
	TreadLenghtAtOffset	Tread length at offset		
	WaistThickness	Minimum thickness of stair flight		
	RequiredHeadroom	Required headroom	1377	IFC
	IsExternal	Classification	618	IFC
	FireRating	Fire resistance classification	935	IFC
	FireExit	Emergency exit	1381	IFC, windows and doors
	HandicapAccessible	Suitable for the disabled	1375	IFC
	HasNonSkidSurface	Skidproof	1406	AR_General, IFC
Ramps - IFCRamp	*Reference*	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
	RequiredHeadroom	Required headroom	1377	IFC
	RequiredSlope	Required inclination	1378	IFC
	HandicapAccessible	Suitable for the disabled	1375	IFC
	IsExternal	Classification	618	IFC
	Slope	Inclination	909	IFC, Thermal Insulation
	Diameter	Diameter	759	AR_Quantities
	FireExit	Emergency exit	1381	IFC, windows and doors
	FireRating	Fire resistance classification	935	IFC
	HasNonSkidSurface	Skidproof	1406	AR_General, IFC
Windows - IFCWindow	*GlazingAreaFraction*	Proportion of glazing	621	IFC
	ThermalTransmittance	U-value	981	IFC
	Reference	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
	IsExternal	Classification	618	IFC
	AcousticRating	Sound insulation classification	1373	IFC

Element	IFC attribute	Allplan attribute	Attribute number	Allplan group
	FireRating	Fire resistance classification	935	IFC
	SecurityRating	Safety classification	1392	IFC
	SmokeStop	Smoke protection	1379	IFC
	Infiltration	Air permeability		
	HasSillExternal	Window sill on the outside		
	HasSillInternal	Window sill on the inside		
	HasDrive	Automatic drive		
	FireExit	Emergency exit	1381	IFC, windows and doors
Doors - IFCDoor	*GlazingAreaFraction*	Proportion of glazing	621	IFC
	ThermalTransmittance	U-value	981	IFC
	Reference	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
	IsExternal	Classification	618	IFC
	AcousticRating	Sound insulation classification	1373	IFC
	FireRating	Fire resistance classification	935	IFC
	FireExit	Emergency exit	1381	IFC, windows and doors
	SmokeStop	Smoke protection	1379	IFC
	SecurityRating	Safety classification	1392	IFC
	DurabilityRating	Door_wear rating	27519	Windows, doors
	HygrothermalRating	Door_climate class	27515	Windows, doors
	Infiltration	Air permeability		
	GlazingAreaFraction	Proportion of glazing	621	IFC
	SelfClosing	Self-closing	1380	IFC
	HasDrive	Automatic drive		
	ThermalTransmittance	U-value	981	IFC
	HandicapAccessible	Suitable for the disabled	1375	IFC

Element	IFC attribute	Allplan attribute	Attribute number	Allplan group
Facades - IFCCurtainWall	*Reference*	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
	FireRating	Fire resistance classification	935	IFC
	AcousticRating	Sound insulation classification	1373	IFC
	ThermalTransmittance	U-value	981	IFC
	IsExternal	Classification	618	IFC
	FireExit	Emergency exit	1381	IFC
	Combustible	Flammable	1371	IFC
	SurfaceSpreadOfFlame	Fire behavior	1372	IFC
Coverings - IFCCovering	*Reference*	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
	FireRating	Fire resistance classification	935	IFC
	Flammability	Flammability rating	1398	General, IFC
	AcousticRating	Sound insulation classification	1373	IFC
	FragilityRating	Fragility		
	SurfaceSpreadOfFlame	Fire behavior	1372	IFC
	Combustible	Flammable	1371	IFC
	ThermalTransmittance	U-value	981	IFC
	Finish	Quality of finish	1394	General, IFC
Railings - IFCRailing	*Reference*	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
	IsExternal	Classification	618	IFC
	Height	Relative height	222	AR_Quantities
	Diameter	Diameter	759	AR_Quantities

Element	IFC attribute	Allplan attribute	Attribute number	Allplan group
Furnishings, equipment – IFCFurnishing Element	*Beschreibung*	Description		
	Style	Style	1121	Cadastral plan
	NominalHeight	Nominal height		
	NominalLength	Nominal length		
	NominalDepth	Nominal depth		
	MainColor	Primary color		
	IsBuiltIn	Built-in, movable		
Rooms - IFCSpace	*Reference*	Code text	83	AR_General
	IsExternal	Classification	618	IFC
	HandicapAccesible	Suitable for the disabled	1375	IFC
	PubliclyAccessible	Publicly accessible		
	GrossPlannedArea	Base area_planned		
	NetPlannedArea	Net area_planned		
Site - IFCSite	*Reference*	Code text	83	AR_General
	TotalArea	Gross area	550	Project
	SiteCoverageRatio	Site occupancy index	557	Urban planning
	FloorAreaRatio	FAI	555	Urban planning
	BuildableArea	Area available for building	548	Project
	BuildingHeightLimit	Maximum height of building	549	Project
Building - IFCBuilding	*Reference*	Code text	83	AR_General
	ConstructionMethod	Construction method	463	Project
	FireProtectionClass	Fire-protection rating of building		
	SprinklerProtection	Sprinkler protection	1399	AR_General, IFC
	SprinklerProtection Automatic	Automatic sprinkler protection		

Element	IFC attribute	Allplan attribute	Attribute number	Allplan group
	GrossPlannedArea	Gross floor area	465	Project
	NetPlannedArea	Net floor area		
	OccupancyType	Building type	462	Project
	BuildingID	Building ID	696	Project
	IsPermanentID	Building identifier, permanent		
	YearOfConstruction	Year of construction	1111	Project
	YearOfLastRefurbishment	Last renovation		
	IsLandmarked	Landmarked		
Story – IFCStorey	*Reference*	Code text	83	AR_General
	GrossPlannedArea	Gross floor area	465	Project
	NetPlannedArea	Net floor area		
	EntranceLevel	Entrance level		
	AboveGround	Above ground		
	SprinklerProtection	Sprinkler protection	1399	General, IFC
	SprinklerProtection Automatic	Automatic sprinkler protection		
	LoadBearingCapacity	Load-bearing capacity of floor		

Additional PSet (special element properties)

Element	IFC PropertySet	IFC attribute	Allplan attribute	Attribute number	Allplan group
Windows - IFCWindow	Pset_DoorWindow GlazingType	*GlassLayers*	Number of panes		
	Pset_DoorWindow GlazingType	*FillGas*	Gas filling		
	Pset_DoorWindow GlazingType	*GlassColor*	Glass color		
	Pset_DoorWindow GlazingType	*IsTempered*	Tempered		
	Pset_DoorWindow GlazingType	*IsLaminated*	Laminated		
	Pset_DoorWindow GlazingType	*IsCoated*	Coated		
	Pset_DoorWindow GlazingType	*IsWired*	Wire glass		
	Pset_DoorWindow GlazingType	*VisibleLight Reflectance*	Light reflectance value		
	Pset_DoorWindow GlazingType	*VisibleLight Transmittance*	Luminous transmission		
	Pset_DoorWindow GlazingType	*SolarAbsorption*	Absorption factor for solar radiation		
	Pset_DoorWindow GlazingType	*SolarTransmittance*	Transmittance factor for solar radiation		
	Pset_DoorWindow GlazingType	*SolarHeatGain Transmittance*	Total energy transmittance		
	Pset_DoorWindow GlazingType	*ThermalTransmittance Summer/Winter*	U-value	981	IFC
	Pset_DoorWindow GlazingType	*ShadingCoefficient*	Shading	620	IFC

Element	IFC PropertySet	IFC attribute	Allplan attribute	Attribute number	Allplan group
	Pset_Manufacturer TypeInformation	*ArticleNumber*	Item number	241	FM Manager
	Pset_Manufacturer TypeInformation	*GlobalTradeItem Number*	EAN, bar code		
	Pset_Manufacturer TypeInformation	*ModelReference*	Model number	1382	IFC
	Pset_Manufacturer TypeInformation	*ModelLabel*	Name of model	1383	IFC
	Pset_Manufacturer TypeInformation	*Manufacturer*	Manufacturer	1136	IFC, Cadastral Plan
	Pset_Manufacturer TypeInformation	*ProductionYear*	Production year	1393	IFC
	Pset_Manufacturer TypeInformation	*AssemblyPlace*	Place of installation		
Doors - IFCDoor	Pset_DoorWindow GlazingType	*GlassLayers*	Number of panes		
	Pset_DoorWindow GlazingType	*FillGas*	Gas filling		
	Pset_DoorWindow GlazingType	*GlassColor*	Glass color		
	Pset_DoorWindow GlazingType	*IsTempered*	Tempered		
	Pset_DoorWindow GlazingType	*IsLaminated*	Laminated		
	Pset_DoorWindow GlazingType	*IsCoated*	Coated		
	Pset_DoorWindow GlazingType	*IsWired*	Wire glass		
	Pset_DoorWindow GlazingType	*VisibleLight Reflectance*	Light reflectance value		
	Pset_DoorWindow GlazingType	*VisibleLight Transmittance*	Luminous transmission		

Element	IFC PropertySet	IFC attribute	Allplan attribute	Attribute number	Allplan group
	Pset_DoorWindow GlazingType	*SolarAbsorption*	Absorption factor for solar adiation		
	Pset_DoorWindow GlazingType	*SolarTransmittance*	Transmittance factor for solar radiation		
	Pset_DoorWindow GlazingType	*SolarHeatGain Transmittance*	Total energy transmittance		
	Pset_DoorWindow GlazingType	*ThermalTransmittan ce Summer/Winter*	U-value	981	IFC
	Pset_DoorWindow GlazingType	*ShadingCoefficient*	Shading	620	IFC
	Pset_Manufacturer TypeInformation	*ArticleNumber*	Item number	241	FM Manager
	Pset_Manufacturer TypeInformation	*GlobalTradeItem Number*	EAN, bar code		
	Pset_Manufacturer TypeInformation	*ModelReference*	Model number	1382	IFC
	Pset_Manufacturer TypeInformation	*ModelLabel*	Name of model	1383	IFC
	Pset_Manufacturer TypeInformation	*Manufacturer*	Manufacturer	1136	IFC, Cadastral Plan
	Pset_Manufacturer TypeInformation	*ProductionYear*	Production year	1393	IFC
	Pset_Manufacturer TypeInformation	*AssemblyPlace*	Place of installation		

Element	IFC PropertySet	IFC attribute	Allplan attribute	Attribute number	Allplan group
Facade - IFCCurtain Wall	Pset_Manufacturer TypeInformation	*ArticleNumber*	Item number	241	FM Manager
	Pset_Manufacturer TypeInformation	*GlobalTradeItem Number*	EAN, bar code		
	Pset_Manufacturer TypeInformation	*ModelReference*	Model number	1382	IFC
	Pset_Manufacturer TypeInformation	*ModelLabel*	Name of model	1383	IFC
	Pset_Manufacturer TypeInformation	*Manufacturer*	Manufacturer	1136	IFC, Cadastral Plan
	Pset_Manufacturer TypeInformation	*ProductionYear*	Production year	1393	IFC
	Pset_Manufacturer TypeInformation	*AssemblyPlace*	Place of installation		
Furnishings, equipment - IFCFurnishing	Pset_Manufacturer TypeInformation	*ArticleNumber*	Item number	241	FM Manager
	Pset_Manufacturer TypeInformation	*GlobalTradeItem Number*	EAN, bar code		
	Pset_Manufacturer TypeInformation	*ModelReference*	Model number	1382	IFC
	Pset_Manufacturer TypeInformation	*ModelLabel*	Name of model	1383	IFC
	Pset_Manufacturer TypeInformation	*Manufacturer*	Manufacturer	1136	IFC, Cadastral Plan
	Pset_Manufacturer TypeInformation	*ProductionYear*	Production year	1393	IFC
	Pset_Manufacturer TypeInformation	*AssemblyPlace*	Place of installation		

Element	IFC PropertySet	IFC attribute	Allplan attribute	Attribute number	Allplan group
Rooms - IFCSpace	IFC_Classification Reference	*ItemReference*	Nutzungsart_DIN 277	235	DIN 277, IFC
	IFC_Classification Reference	*Name*	Flächenart_DIN2 77	232	DIN 277
	Pset_SpaceThermal Requirements	*SpaceTemperature Max*	Temperature_ma x	1405	IFC, General
	Pset_SpaceThermal Requirements	*SpaceTemperature Min*	Temperature_min	1404	IFC, General
	Pset_SpaceThermal Requirements	*SpaceHumidity*	Humidity	1401	IFC, General
	Pset_SpaceThermal Requirements	*SpaceHumidityMax*	Humidity_max		
	Pset_SpaceThermal Requirements	*SpaceHumidityMin*	Humidity_min		
	Pset_SpaceThermal Requirements	*SpaceHumidity Summer*	Humidity _cooling		
	Pset_SpaceThermal Requirements	*SpaceHumidity Winter*	Humidity _heating		
	Pset_SpaceThermal Requirements	*NaturalVentilation*	Natural ventilation	1402	IFC, General
	Pset_SpaceThermal Requirements	*NaturalVentilation Rate*	Natural air change rate		
	Pset_SpaceThermal Requirements	*Mechanical VentilationRate*	Mechanical air change rate		
	Pset_SpaceThermal Requirements	*AirConditioning*	Air-conditioned	1403	IFC, General
	Pset_SpaceThermal Requirements	*AirConditioning Central*	Central air-conditioner		
	Pset_SpaceLighting Requirements	*ArtificialLighting*	Artificial light	1400	IFC, General
	Pset_SpaceLighting Requirements	*Illuminance*	Illuminance		
	Pset_SpaceFire SafetyRequirements	*FireRiskFactor*	Fire hazard class	1398	General, IFC
	Pset_SpaceFire SafetyRequirements	*SprinklerProtection*	Sprinkler protection	1399	General, IFC

Element	IFC PropertySet	IFC attribute	Allplan attribute	Attribute number	Allplan group
	Pset_SpaceFire SafetyRequirements	*SprinklerProtection Automatic*	Automatic sprinkler protection		
	Pset_SpaceFire SafetyRequirements	*FireExit*	Emergency exit	1381	IFC
	Pset_SpaceFire SafetyRequirements	*AirPressurization*	Air pressure equalization		

Additional Attributes (additional element properties)

Element	IFC attribute	Allplan attribute	Attribute number	Allplan group
Foundation - IFCFooting	*Name*	Name	507	AR_General, IFC
Wall - IFCWall	*Name*	Name	507	AR_General, IFC
	LongName	Function	506	AR_General, IFC
	Material.Name	Material	508	AR_General
	Flammability	Flammability rating	1398	General, IFC
Downstand beam - IFCBeam	*Name*	Name	507	AR_General, IFC
	LongName	Function	506	AR_General, IFC
	Material.Name	Material	508	AR_General
Column - IFCColumn	*Name*	Name	507	AR_General, IFC
	LongName	Function	506	AR_General, IFC
	Material.Name	Material	508	AR_General
Slab - IFCSlab	*Name*	Name	507	AR_General, IFC
	LongName	Function	506	AR_General, IFC
	Material.Name	Material	508	AR_General
	ProductionYear	Production year	1393	IFC
	ConcreteDensity	Concrete grade	1063	Precast elements

Element	IFC attribute	Allplan attribute	Attribute number	Allplan group
Roof - IFCRoof	*Name*	Name	507	AR_General, IFC
	LongName	Function	506	AR_General, IFC
	SolarPanel	Solar installation		
Members - IFCMember	*Name*	Name	507	AR_General, IFC
	LongName	Function	506	AR_General, IFC
Plates - IFCPlate	*Name*	Name	507	AR_General, IFC
	LongName	Function	506	AR_General, IFC
Stairs - IFCStair	*Name*	Name	507	AR_General, IFC
	LongName	Function	506	AR_General, IFC
Ramps - IFCRamp	*Name*	Name	507	AR_General, IFC
	LongName	Function	506	AR_General, IFC
Windows - IFCWindow	*Name*	Name	507	AR_General, IFC
	LongName	Function	506	AR_General, IFC
	ConstructionType	Type	764	IFC, Engineering
Doors - IFCDoor	*Name*	Name	507	AR_General, IFC
	LongName	Function	506	AR_General, IFC
	ConstructionType	Type	764	IFC, Engineering
	OperationType	Door swing	162	
Facades - IFCCurtainWall	*Name*	Name	507	AR_General, IFC
	LongName	Function	506	AR_General, IFC
	Material.Name	Material	508	AR_General

Element	IFC attribute	Allplan attribute	Attribute number	Allplan group
Coverings - IFCCovering	*Name*	Name	507	AR_General, IFC
	LongName	Function	506	AR_General, IFC
	Material.Name	Material	508	AR_General
Railings - IFCRailing	*Name*	Name	507	AR_General, IFC
	LongName	Function	506	AR_General, IFC
	Material	Material	508	AR_General
	Slope	Inclination	909	IFC, Thermal Insulation
Furnishings, equipment - IFCFurnishing	*Name*	Name	507	AR_General, IFC
	LongName	Function	506	AR_General, IFC
	Reference	Code text	83	AR_General
	ItemReference	Classification key	1395	General, Object Manager
Rooms - IFCSpace	*Name*	Name	507	AR_General, IFC
	LongName	Function	506	AR_General, IFC
Site - IFCSite	*Name*	Project number	936	Project
	LongName	Project name	405	Project
	Longitude	Longitude	1217	Project
	Latitude	Latitude	1218	Project
	Elevation	Height above mean sea level	585	Project
	AddressLine	Construction project address	1094	Project
	Town	Construction project ZIP code/city	923	Project
	Region	Region, state	290	Project
	PostalCode	Construction project ZIP code/city	923	Project
	Country	Country	289	Project

Element	IFC attribute	Allplan attribute	Attribute number	Allplan group
Building - IFCBuilding	*Name*	Project number	936	Project
	LongName	Project name	405	Project
	AddressLine	Construction project address	1094	Project
	Town	Construction project ZIP code/city	923	Project
	Region	Region, state	290	Project
	PostalCode	Construction project ZIP code/city	923	Project
	Country	Country	289	Project
Story – IFCStorey	*Name*	Project number	936	Project
	LongName	Project name	405	Project
	Height	Relative height		

All Allplan attributes and IFC attributes

The pages that follow list all Allplan and IFC attributes including the associated PSets, attribute names and attribute numbers.

Attributes for the building topology

You can use the project properties to assign topology attributes. When you export the data, these attributes are automatically assigned to the appropriate structural levels.

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
Site - IFCSite	Short name (number)	*Name*		Project number	936	Project
	Description/ Full name	*LongName*		Project name	405	Project
	Longitude	*Longitude*		Longitude	1217	Project
	Latitude	*Latitude*		Latitude	1218	Project
	Height above mean sea level	*Elevation*		Height above mean sea level	585	Project
	Address	*AddressLine*		Construction project address	1094	Project
	City	*Town*		Construction project ZIP code/city	923	Project
	Region, state	*Region*		Region, state	290	Project
	ZIP code	*PostalCode*		Construction project ZIP code/city	923	Project
	Country	*Country*		Country	289	Project
	Site classification	*Reference*	Pset_SiteCommon	Code text	83	AR_General
	Area available for building	*BuildableArea*	Pset_SiteCommon	Area available for building	548	Project
	Site occupancy index	*SiteCoverageRatio*	Pset_SiteCommon	Site occupancy index_max	557	Urban planning
	Floor area ratio	*FloorAreaRatio*	Pset_SiteCommon	Floor area ratio_max	555	Urban planning
	Maximum height of building	*BuildingHeightLimit*	Pset_SiteCommon	Maximum height of building	549	Project
	Gross area	*TotalArea*	Pset_SiteCommon	Gross area	550	Project

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
Building - IFCBuilding	Part of site	*Decomposes*	Relations			
	Short name (number)	*Name*		Project number	936	Project
	Description/ full name	*LongName*		Project name	405	Project
	Address	*AddressLine*		Construction project address	1094	Project
	City	*Town*		Construction project ZIP code/city	923	Project
	Region, state	*Region*		Region, state	290	Project
	ZIP code	*PostalCode*		Construction project ZIP code/city	923	Project
	Country	*Country*		Country	289	Project
	Building classification	*Reference*	Pset_BuildingCommon	Code text	83	AR_General
	Construction method	*ConstructionMethod*	Pset_BuildingCommon	Construction method	463	Project
	Fire-protection rating of building	*FireProtectionClass*	Pset_BuildingCommon			
	Sprinkler protection	*SprinklerProtection*	Pset_BuildingCommon	Sprinkler protection	1399	General, IFC
	Automatic sprinkler protection	*SprinklerProtection Automatic*	Pset_BuildingCommon			
	Gross area, planned	*GrossPlannedArea*	Pset_BuildingCommon	Gross floor area	465	Project
	Net area, planned	*NetPlannedArea*	Pset_BuildingCommon			
	Building ID	*BuildingID*	Pset_BuildingCommon	Building ID	696	Project
	Occupancy type	*OccupancyType*	Pset_BuildingCommon	Building type	462	Project
	Year of construction	*YearOfConstruction*	Pset_BuildingCommon	Year of construction	1111	Project
	Year of last renovation	*YearOfLast Refurbishment*	Pset_BuildingCommon			
	Landmarked	*IsLandmarked*	Pset_BuildingCommon			

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
Story - IFCBuildingStorey	Part of building	*Decomposes*	Relations			
	Short name (number)	*Name*		Project number	936	Project
	Description/ full name	*LongName*		Project name	405	Project
	Gross floor height	*GrossHeight*				
	Net floor height	*NetHeight*				
	Story classification	*Reference*	Pset_StoreyCommon	Code text	83	AR_General
	Gross area, planned	*GrossPlannedArea*	Pset_StoreyCommon	Gross floor area	465	Project
	Net area, planned	*NetPlannedArea*	Pset_StoreyCommon			
	Entrance level	*EntranceLevel*	Pset_StoreyCommon			
	Story above ground	*AboveGround*	Pset_StoreyCommon			
	Sprinkler protection	*SprinklerProtection*	Pset_StoreyCommon	Sprinkler protection	1399	General, IFC
	Automatic sprinkler protection	*SprinklerProtection Automatic*	Pset_StoreyCommon			
	Load-bearing capacity of floor	*LoadBearingCapacity*	Pset_StoreyCommon			

Attributes for the unfinished structure

BaseQuantities are geometric values the element is given automatically. Relations are the results of assignments to structural levels or PARENT_CHILD connections.

Component – Object	Attribute description	IFC attribute	IFC PSet	Allplan attribute	Attribute number	Category
Foundation - IFCFooting	Foundation name (number)	*Name*		Name	507	AR_General, IFC
	Thickness	*Width*	BaseQuantities	Thickness	221 (199)	AR_Quantities
	Length	*Length*	BaseQuantities	Length	220	AR_Quantities
	Relative height	*Height*	BaseQuantities	Relative height	222	AR_Quantities
	Gross base area	*GrossFootprintArea*	BaseQuantities			AR_Quantities
	Net base area	*NetFootprintArea*	BaseQuantities	Area	229	AR_Quantities
	Gross volume	*GrossVolume*	BaseQuantities	Volume	223	AR_Quantities
	Net volume	*NetVolume*	BaseQuantities	Net volume	226	AR_Quantities
	Material	*Material.Name*	Pset_FootingCommon	Material	508	AR_General
	Foundation type	*Reference*	Pset_FootingCommon	Code text	83	AR_General
	Status	*Status*	Pset_FootingCommon	Alteration category	49	AR_General, IFC, ...
Wall - IFCWall	Wall name (number)	*Name*		Name	507	AR_General, IFC
	Description/ full name	*LongName*		Function	506	AR_General, IFC
	Associated story	*ContainedInStructure :: IfcBuildingStorey*	Relations			
	Openings	*HasOpenings :: IfcOpeningElement*	Relations			
	Thickness	*Width*	BaseQuantities	Thickness	221	AR_Quantities
	Length	*Length*	BaseQuantities	Length	220	AR_Quantities
	Relative height	*Height*	BaseQuantities	Relative height	222	AR_Quantities
	Gross area	*GrossSideArea*	BaseQuantities	Area	229	AR_Quantities
	Net area	*NetSideArea*	BaseQuantities	Area	229	AR_Quantities
	Gross volume	*GrossVolume*	BaseQuantities	Volume	223	AR_Quantities
	Net volume	*NetVolume*	BaseQuantities	Net volume	226	AR_Quantities

Component – Object	Attribute description	IFC attribute	IFC PSet	Allplan attribute	Attribute number	Category
	General wall properties (PsetCommon) must be assigned to the wall as a whole.					
	Wall type	*Reference*		Code text	83	AR_General
	Status	*Status*	Pset_WallCommon	Alteration category	49	AR_General, IFC, ...
	Material	*Material.Name*		Material	508	AR_General
	Load-bearing/ non-bearing	*LoadBearing*	Pset_WallCommon	Structure_load-bearing	573	AR_General, IFC
	Exterior wall / interior wall	*IsExternal*	Pset_WallCommon	Classification	618	IFC
	Sound insulation classification	*AcousticRating*	Pset_WallCommon	Sound insulation classification	1373	IFC
	Fire behavior	*SurfaceSpreadOfFlame*	Pset_WallCommon	Fire behavior	1372	IFC
	Flammable	*Combustible*	Pset_WallCommon	Flammable	1371	IFC
	Fire resistance classification	*FireRating*	Pset_WallCommon	Fire resistance classification	935	IFC
	Defining fire compartment	*Compartmentation*	Pset_WallCommon	Defining fire compartment	1396	General, IFC
	U-value	*ThermalTransmittance*	Pset_WallCommon	U-value	981	IFC
	Room-high	*ExtendedToStructure*	Pset_WallCommon			

Component – Object	Attribute description	IFC attribute	IFC PSet	Allplan attribute	Attribute number	Category
Beam, downstand beam - IFCBeam	Name (number) of beam	*Name*		Name	507	AR_General, IFC
	Description/ full name	*LongName*		Function	506	AR_General, IFC
	Associated story	*ContainedInStructure :: IfcBuildingStorey*	Relations			
	Openings	*HasOpenings :: IfcOpeningElement*	Relations			
	Length	*Length*	BaseQuantities	Length	220	AR_Quantities
	Cross-section area	*CrossSectionArea*	BaseQuantities	(using the section)		
	Surface	*OuterSurfaceArea*	BaseQuantities	Surface	722	AR_Quantities
	Gross volume	*GrossVolume*	BaseQuantities	Volume	223	AR_Quantities
	Net volume	*NetVolume*	BaseQuantities	Net volume	226	AR_Quantities
	Material of beam	*Material.Name*		Material	508	AR_General
	Beam type	*Reference*	Pset_BeamCommon	Code text	83	AR_General
	Status	*Status*	Pset_BeamCommon	Alteration category	49	AR_General, IFC, …
	Load-bearing/ non-bearing beam	*LoadBearing*	Pset_BeamCommon	Structure_load-bearing	573	AR_General, IFC
	Exterior beam / interior beam	*IsExternal*	Pset_BeamCommon	Classification	618	IFC
	Fire resistance classification	*FireRating*	Pset_BeamCommon	Fire resistance classification	935	IFC
	U-value	*ThermalTransmittance*	Pset_BeamCommon	U-value	981	IFC
	Inclination	*Slope*	Pset_BeamCommon	Inclination	909	Thermal Insulation, IFC
	Span	*Span*	Pset_BeamCommon	Span	1374	IFC
	Angle	*Roll*	Pset_BeamCommon			

Component – Object	Attribute description	IFC attribute	IFC PSet	Allplan attribute	Attribute number	Category
Column - IFCColumn	Name (number) of column	*Name*		Name	507	AR_General, IFC
	Description/ full name	*LongName*		Function	506	AR_General, IFC
	Associated story	*ContainedInStructure :: IfcBuildingStorey*	Relations			
	Openings	*HasOpenings :: IfcOpeningElement*	Relations			
	Length	*Length*	BaseQuantities	Relative height	222	AR_Quantities
	Cross-section area	*CrossSectionArea*	BaseQuantities	Floor surface	293	AR_Quantities
	Surface	*OuterSurfaceArea*	BaseQuantities	Surface	722	AR_Quantities
	Gross volume	*GrossVolume*	BaseQuantities	Volume	223	AR_Quantities
	Net volume	*NetVolume*	BaseQuantities	Net volume	226	AR_Quantities
	Material of column	*Material.Name*		Material	508	AR_General
	Column type	*Reference*	Pset_ColumnCommon	Code text	83	AR_General
	Status	*Status*	Pset_ColumnCommon	Alteration category	49	AR_General, IFC, ...
	Load-bearing/ non-bearing column	*LoadBearing*	Pset_ColumnCommon	Structure_load-bearing	573	AR_General, IFC
	Exterior column / interior column	*IsExternal*	Pset_ColumnCommon	Classification	618	IFC
	Fire resistance classification	*FireRating*	Pset_ColumnCommon	Fire resistance classification	935	IFC
	U-value	*ThermalTransmittance*	Pset_ColumnCommon	U-value	981	IFC
	Inclination	*Slope*	Pset_ColumnCommon	Inclination	909	Thermal Insulation, IFC
	Angle	*Roll*	Pset_ColumnCommon			

Component – Object	Attribute description	IFC attribute	IFC PSet	Allplan attribute	Attribute number	Category
Slab - IFCSlab	Name (number) of slab	*Name*		Name	507	AR_General, IFC
	Description/ full name	*LongName*		Function	506	AR_General, IFC
	Associated story	*ContainedInStructure :: IfcBuildingStorey*	Relations			
	Openings	*HasOpenings :: IfcOpeningElement*	Relations			
	Thickness	*Width*	BaseQuantities	Relative height	222	AR_Quantities
	Gross area	*GrossSideArea*	BaseQuantities	Area	229	AR_Quantities
	Net area	*NetSideArea*		Area	229	AR_Quantities
	Gross volume	*GrossVolume*	BaseQuantities	Volume	223	AR_Quantities
	Net volume	*NetVolume*	BaseQuantities	Net volume	226	AR_Quantities
	Slab type	*Reference*	Pset_SlabCommon	Code text	83	AR_General
	Status	*Status*	Pset_SlabCommon	Alteration category	49	AR_General, IFC, ...
	Load-bearing/ non-bearing Load-bearing/ non-bearing slab	*LoadBearing*	Pset_SlabCommon	Structure_load-bearing	573	AR_General, IFC
	Exterior component	*IsExternal*	Pset_SlabCommon	Classification	618	IFC
	Sound insulation classification	*AcousticRating*	Pset_SlabCommon	Sound insulation classification	1373	IFC
	Fire resistance classification	*FireRating*	Pset_SlabCommon	Fire resistance classification	935	IFC
	Flammable	*Combustible*	Pset_SlabCommon	Flammable	1371	IFC
	Fire behavior	*SurfaceSpreadOfFlame*	Pset_SlabCommon	Fire behavior	1372	IFC
	Defining fire compartment	*Compartmentation*	Pset_SlabCommon	Defining fire compartment	1396	General, IFC
	Inclination	*Slope*	Pset_SlabCommon	Inclination	909	Thermal Insulation, IFC
	U-value	*ThermalTransmittance*	Pset_SlabCommon	U-value	981	IFC

Component – Object	Attribute description	IFC attribute	IFC PSet	Allplan attribute	Attribute number	Category
	Concrete density	*ConcreteDensity*		Concrete grade	1095	Precast elements
Roof - IFCRoof	Name (number) of roof	*Name*		Name	507	Yes
	Description/ full name	*LongName*		Function	506	AR_General, IFC
	Associated story	*ContainedInStructure :: IfcBuildingStorey*	Relations			
	Openings	*HasOpenings :: IfcOpeningElement*	Relations			
	Roof elements	*IsDecomposedBy :: IfcBuildingElement*				
	Gross area	*GrossSurfaceArea*	BaseQuantities	Area	228	AR_Quantities
	Net area	*NetSurfaceArea*	BaseQuantities	Area	229	AR_Quantities
	Projected area	*ProjectedArea*	BaseQuantities	Projected area	1397	General, IFC
	Roof type	*Reference*	Pset_RoofCommon	Code text	83	AR_General
	Status	*Status*	Pset_RoofCommon	Alteration category	49	AR_General, IFC, ...
	Exterior component	*IsExternal*	Pset_RoofCommon	Classification	618	IFC
	Fire resistance classification	*FireRating*	Pset_RoofCommon	Fire resistance classification	935	IFC
	U-value	*ThermalTransmittance*	Pset_RoofCommon	U-value	981	IFC
	Solar installation	*SolarPanel*				

Component – Object	Attribute description	IFC attribute	IFC PSet	Allplan attribute	Attribute number	Category
Members - IFCMember	Member name (number)	*Name*		Name	507	AR_General, IFC
	Description/ full name	*LongName*		Function	506	AR_General, IFC
	Associated story	*ContainedInStructure :: IfcBuildingStorey*	Relations			
	Openings	*HasOpenings :: IfcOpeningElement*	Relations			
	Length	*Length*	BaseQuantities	Relative height	222	AR_Quantities
	Cross-section area	*CrossSectionArea*	BaseQuantities	Floor surface	293	AR_Quantities
	Surface	*OuterSurfaceArea*	BaseQuantities	Surface	722	AR_Quantities
	Gross volume	*GrossVolume*	BaseQuantities	Volume	223	AR_Quantities
	Bar Type	*Reference*	Pset_MemberCommon	Code text	83	AR_General
	Status	*Status*	Pset_MemberCommon	Alteration category	49	AR_General, IFC, ...
	Load-bearing/ non-bearing member	*LoadBearing*	Pset_MemberCommon	Structure_load-bearing	573	AR_General, IFC
	Exterior member / interior member	*IsExternal*	Pset_MemberCommon	Classification	618	IFC
	U-value	*ThermalTransmittance*	Pset_MemberCommon	U-value	981	IFC
	Fire resistance classification	*FireRating*	Pset_MemberCommon	Fire resistance classification	935	IFC
	Inclination	*Slope*	Pset_MemberCommon	Inclination	909	Thermal Insulation, IFC
	Span	*Span*	Pset_MemberCommon	Span	1374	IFC
	Angle	*Roll*	Pset_MemberCommon			

Component – Object	Attribute description	IFC attribute	IFC PSet	Allplan attribute	Attribute number	Category
Plates - IFCPlate	Name (number) of plate	*Name*		Name	507	AR_General, IFC
	Description/ full name	*LongName*		Function	506	AR_General, IFC
	Associated story	*ContainedInStructure :: IfcBuildingStorey*	Relations			
	Openings	*HasOpenings :: IfcOpeningElement*	Relations			
	Thickness	*Width*	BaseQuantities	Relative height	222	AR_Quantities
	Gross area	*GrossSurfaceArea*	BaseQuantities	Area	229	AR_Quantities
	Net area	*NetSurfaceArea*	BaseQuantities			AR_Quantities
	Gross volume	*GrossVolume*	BaseQuantities	Volume	223	AR_Quantities
	Net volume	*NetVolume*	BaseQuantities	Net volume	226	AR_Quantities
	Panel type	*Reference*	Pset_PlateCommon	Code text	83	AR_General
	Status	*Status*	Pset_PlateCommon	Alteration category	49	AR_General, IFC, ...
	Load-bearing/ non-bearing plate	*LoadBearing*	Pset_PlateCommon	Structure_load-bearing	573	IFC
	Exterior component	*IsExternal*	Pset_PlateCommon	Classification	618	IFC
	Sound insulation classification	*AcousticRating*	Pset_PlateCommon	Sound insulation classification	1373	IFC
	Fire resistance classification	*FireRating*	Pset_PlateCommon	Fire resistance classification	935	IFC
	U-value	*ThermalTransmittance*	Pset_PlateCommon	U-value	981	IFC
	Inclination	*Slope*		Inclination	909	Thermal Insulation, IFC

Component – Object	Attribute description	IFC attribute	IFC PSet	Allplan attribute	Attribute number	Category
Stairs - IFCStair	Name (number) of stair	*Name*		Name	507	AR_General, IFC
	Description/ full name	*LongName*		Function	506	AR_General, IFC
	Associated story	*ContainedInStructure :: IfcBuildingStorey*	Relations			
	Stair elements (flight, landing, ...)	*IsDecomposedBy :: IfcBuildingElement*				
	Length	*Length*	BaseQuantities	Length	220	AR_Quantities
	Gross volume	*GrossVolume*	BaseQuantities	Volume	223	AR_Quantities
	Net volume	*NetVolume*	BaseQuantities	Net volume	226	AR_Quantities
	Stair type	*Reference*	Pset_StairCommon	Code text	83	AR_General
	Status	*Status*	Pset_StairCommon	Alteration category	49	AR_General, IFC, ...
	Number of risers	*NumberOfRiser*	Pset_StairCommon	Rise number	88	AR_Quantities
	Number of treads	*NumberOfTreads*	Pset_StairCommon	Treads		AR_Quantities
	Rise	*RiserHeight*	Pset_StairCommon	Rise	89	AR_Quantities
	Tread	*TreadLength*	Pset_StairCommon	Tread run	90	AR_Quantities
	Nosing	*NosingLength*	Pset_StairCommon			
	Offset of walking line	*WalkingLineOffset*	Pset_StairCommon			
	Minimum tread length on the inside	*TreadLengthAtInnerLine*	Pset_StairCommon			
	Tread length at offset	*TreadLenghtAtOffset*	Pset_StairCommon			
	Minimum thickness of stair flight	*WaistThickness*	Pset_StairCommon			
	Required headroom	*RequiredHeadroom*	Pset_StairCommon	Required headroom	1377	IFC
	Exterior component	*IsExternal*	Pset_StairCommon	Classification	618	IFC
	Fire resistance classification	*FireRating*	Pset_StairCommon	Fire resistance classification	935	IFC

Component – Object	Attribute description	IFC attribute	IFC PSet	Allplan attribute	Attribute number	Category
	Escape route	*FireExit*	Pset_StairCommon	Emergency exit	1376	IFC
	Suitable for the disabled	*HandicapAccessible*	Pset_StairCommon	Suitable for the disabled	1375	IFC
	Skidproof	*HasNonSkidSurface*	Pset_StairCommon	Skidproof	1406	AR_General, IFC
Ramps - IFCRamp	Name (number) of ramp	*Name*		Name		AR_General, IFC
	Description/ full name	*LongName*		Function	506	AR_General, IFC
	Associated story	*ContainedInStructure :: IfcBuildingStorey*	Relations			
	Ramp elements (flight, landing, ...)	*IsDecomposedBy :: IfcBuildingElement*				
	Length	*Length*	BaseQuantities	Length	220	AR_Quantities
	Relative height	*Height*	Pset_RampCommon	Height	222	AR_Quantities
	Gross volume	*GrossVolume*	BaseQuantities	Volume	223	AR_Quantities
	Net volume	*NetVolume*	BaseQuantities	Net volume	226	AR_Quantities
	Gross area	*GrossSurfaceArea*	BaseQuantities	Area	229	AR_Quantities
	Ramp type	*Reference*	Pset_RampCommon	Code text	83	AR_General
	Status	*Status*	Pset_RampCommon	Alteration category	49	AR_General, IFC, ...
	Required headroom	*RequiredHeadroom*	Pset_RampCommon	Required headroom	1377	IFC
	Required inclination	*RequiredSlope*	Pset_RampCommon	Required inclination	1378	IFC
	Suitable for the disabled	*HandicapAccessible*	Pset_RampCommon	Suitable for the disabled	1375	IFC
	Exterior component	*IsExternal*	Pset_RampCommon	Classification	618	IFC
	Escape route	*FireExit*	Pset_RampCommon	Emergency exit	1376	IFC, windows and doors
	Inclination	*Slope*	Pset_RampCommon	Inclination	909	Thermal Insulation, IFC
	Diameter	*Diameter*	Pset_RampCommon	Diameter	759	AR_Quantities

Component – Object	Attribute description	IFC attribute	IFC PSet	Allplan attribute	Attribute number	Category
	Fire resistance classification	*FireRating*	Pset_RampCommon	Fire resistance classification	935	IFC
	Skidproof	*HasNonSkidSurface*	Pset_RampCommon	Skidproof	1406	AR_General, IFC

Attributes for the finish

BaseQuantities are geometric values the element is given automatically or by the superordinate opening element. Relations are the results of assignments to structural levels or PARENT_CHILD connections.

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
Windows - IFCWindow	Description/ Full name	*LongName*		Function	506	AR_General, IFC
	Name (number) of window	*Name*		Name	507	AR_General, IFC
	Associated story and room	*ContainedInStructure :: IfcBuildingStorey*	Relations			
	Inserted in wall	*FillsVoids :: IfcWall (via IfcOpeningElement)*	Relations			
	Window type	*IsTypedBy :: IfcWindowType*		Object name	498	AR_General
	Relative height	*Height*	BaseQuantities Opening	Relative height	222	AR_Quantities
	Width	*Depth*	BaseQuantities Opening	Length	220	AR_Quantities
	Area	*Area*	BaseQuantities Opening	Area	229	AR_Quantities
	Perimeter	*Perimeter*	BaseQuantities Opening	Perimeter	228	AR_Quantities
	Window type	*Reference*	Pset_WindowCommon	Code text	83	AR_General
	Status	*Status*	Pset_WindowCommon	Alteration category	49	AR_General, IFC, ...
	Exterior component	*IsExternal*	Pset_WindowCommon	Classification	618	IFC
	Sound insulation classification	*AcousticRating*	Pset_WindowCommon	Sound insulation classification	1373	IFC
	Fire resistance classification	*FireRating*	Pset_WindowCommon	Fire resistance classification	935	IFC
	Safety classification	*SecurityRating*	Pset_WindowCommon	Safety classification	1392	IFC
	Smoke protection	*SmokeStop*	Pset_WindowCommon	Smoke protection	1379	IFC
	Air permeability	*Infiltration*	Pset_WindowCommon			

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
	Window sill on the outside	*HasSillExternal*	Pset_WindowCommon			
	Window sill on the inside	*HasSillInternal*	Pset_WindowCommon			
	Automatic drive	*HasDrive*	Pset_WindowCommon			
	Proportion of glazing	*GlazingAreaFraction*	Pset_WindowCommon	Proportion of glazing	621	IFC
	U-value	*ThermalTransmittance*	Pset_WindowCommon	U-value	981	IFC
	Emergency exit	*FireExit*	Pset_DoorCommon	Emergency exit	1381	IFC
	Type	*ConstructionType*		Type	764	IFC, Engineering
	Item number	*ArticleNumber*	Pset_Manufacturer TypeInformation	Item number	241	FM Manager
	EAN, bar code	*GlobalTradeItem Number*	Pset_Manufacturer TypeInformation			
	Model number	*ModelReference*	Pset_Manufacturer TypeInformation	Model number	1382	IFC
	Name of model	*ModelLabel*	Pset_Manufacturer TypeInformation	Name of model	1383	IFC
	Manufacturer	*Manufacturer*	Pset_Manufacturer TypeInformation	Manufacturer	1136	IFC, Cadastral Plan
	Production year	*ProductionYear*	Pset_Manufacturer TypeInformation	Production year	1393	IFC
	Place of installation	*AssemblyPlace*				
	Number of panes	*GlassLayers*	Pset_DoorWindow GlazingType	Number of panes		
	Gas filling	*FillGas*	Pset_DoorWindow GlazingType			
	Glass color	*GlassColor*	Pset_DoorWindow GlazingType			

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
	Tempered	*IsTempered*	Pset_DoorWindow GlazingType			
	Lamination	*IsLaminated*	Pset_DoorWindow GlazingType	Laminated		
	Coating	*IsCoated*	Pset_DoorWindow GlazingType	Coated		
	Wire glass	*IsWired*	Pset_DoorWindow GlazingType	Wire glass		
	Light reflectance value	*VisibleLight Reflectance*	Pset_DoorWindow GlazingTyp			
	Luminous transmission	*VisibleLight Transmittance*	Pset_DoorWindow GlazingTyp			
	Absorption factor for solar radiation	*SolarAbsorption*	Pset_DoorWindow GlazingTyp			
	Transmittance factor for solar radiation	*SolarTransmittance*	Pset_DoorWindow GlazingTyp			
	Total energy transmittance	*SolarHeatGain Transmittance*	Pset_DoorWindow GlazingTyp			
	U-value	*ThermalTransmittance Summer/Winter*	Pset_DoorWindow GlazingTyp	U-value	981	IFC
	Shading	*ShadingCoefficient*	Pset_DoorWindow GlazingType	Shadow	620	IFC

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
Doors - IFCDoor	Description/ full name	*LongName*		Function	506	AR_General, IFC
	Name (number) of door	*Name*		Name	507	AR_General, IFC
	Associated story and room	*ContainedInStructure :: IfcBuildingStorey/ IfcSpace*	Relations			
	Inserted in wall	*FillsVoids :: IfcWall (via IfcOpeningElement)*	Relations			
	Door type	*IsTypedBy :: IfcDoorType*		Object name	498	AR_General
	Relative height	*Height*	BaseQuantities Opening	Relative height	222	AR_Quantities
	Width	*Depth*	BaseQuantities Opening	Length	220	AR_Quantities
	Area	*Area*	BaseQuantities Opening	Area	229	AR_Quantities
	Perimeter	*Perimeter*	BaseQuantities Opening	Perimeter	228	AR_Quantities
	Door type	*Reference*	Pset_DoorCommon	Code text	83	AR_General
	Status	*Status*	Pset_DoorCommon	Alteration category	49	AR_General, IFC, ...
	Exterior component	*IsExternal*	Pset_DoorCommon	Classification	618	IFC
	Sound insulation classification	*AcousticRating*	Pset_DoorCommon	Sound insulation classification	1373	IFC
	Fire resistance classification	*FireRating*	Pset_DoorCommon	Fire resistance classification	935	IFC
	Emergency exit	*FireExit*	Pset_DoorCommon	Emergency exit	1381	IFC
	Smoke protection	*SmokeStop*	Pset_DoorCommon	Smoke protection	1379	IFC
	Wear rating	*DurabilityRating*	Pset_DoorCommon	Door_wear rating	27519	Windows, doors

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
	Climate class	*HygrothermalRating*	Pset_DoorCommon	Door_climate class	27515	Windows, doors
	Air permeability	*Infiltration*	Pset_DoorCommon			
	Safety classification	*SecurityRating*	Pset_DoorCommon	Safety classification	1392	IFC
	Proportion of glazing	*GlazingAreaFraction*	Pset_DoorCommon	Proportion of glazing	621	IFC
	Door closer	*SelfClosing*	Pset_DoorCommon	Self-closing	1380	IFC
	Automatic drive	*HasDrive*	Pset_DoorCommon			
	U-value	*ThermalTransmittance*	Pset_DoorCommon	U-value	981	IFC
	Suitable for the disabled	*HandicapAccessible*	Pset_DoorCommon	Suitable for the disabled	1375	IFC
	Type	*ConstructionType*		Type	764	IFC, Engineering
	Opening type	*OperationType*		Door swing	162	(assigned automatically)
	Item number	*ArticleNumber*	Pset_Manufacturer TypeInformation	Item number	241	FM Manager
	EAN, bar code	*GlobalTradeItem Number*	Pset_Manufacturer TypeInformation			
	Model number	*ModelReference*	Pset_Manufacturer TypeInformation	Model number	1382	IFC
	Name of model	*ModelLabel*	Pset_Manufacturer TypeInformation	Name of model	1383	IFC
	Manufacturer	*Manufacturer*	Pset_Manufacturer TypeInformation	Manufacturer	1136	IFC, Cadastral Plan
	Production year	*ProductionYear*	Pset_Manufacturer TypeInformation	Production year	1393	IFC
	Place of installation	*AssemblyPlace*	Pset_Manufacturer TypeInformation			
	Number of panes	*GlassLayers*	Pset_DoorWindow GlazingType	Number of panes		

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
	Gas filling	*FillGas*	Pset_DoorWindow GlazingType			
	Glass color	*GlassColor*	Pset_DoorWindow GlazingType			
	Lamination	*IsLaminated*	Pset_DoorWindow GlazingType	Laminated		
	Coating	*IsCoated*	Pset_DoorWindow GlazingType	Coated		
	Tempering	*IsTempered*	Pset_DoorWindow GlazingType	Tempered		
	Wire glass	*IsWired*	Pset_DoorWindow GlazingType	Wire glass		
	Light reflectance value	*VisibleLight Reflectance*	Pset_DoorWindow GlazingTyp			
	Luminous transmission	*VisibleLight Transmittance*	Pset_DoorWindow GlazingTyp			
	Absorption factor for solar radiation	*SolarAbsorption*	Pset_DoorWindow GlazingTyp			
	Transmittance factor for solar radiation	*SolarTransmittance*	Pset_DoorWindow GlazingTyp			
	Total energy transmittance	*SolarHeatGain Transmittance*	Pset_DoorWindow GlazingTyp			
	U-value	*ThermalTransmittance Summer/Winter*	Pset_DoorWindow GlazingTyp	U-value	981	IFC
	Shading	*ShadingCoefficient*	Pset_DoorWindow GlazingType	Shadow	620	IFC

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
Curtain wall – IFC CurtainWall	Description/ full name	*LongName*		Function	506	AR_General, IFC
	Name (number) of curtain wall	*Name*		Name	507	AR_General, IFC
	Associated building/ story	*ContainedInStructure :: IfcBuilding/ IfcBuildingStorey*	Relations			
	Fadade parts/ elements	*IsDecomposedBy :: IfcBuildingElement*				
	Type of curtain facade	*IsTypedBy :: IfcCurtainWallType*		Object name	498	AR_General
	Length	*Length*	BaseQuantities	Length	220	AR_Quantities
	Relative height	*Height*	BaseQuantities	Relative height	222	AR_Quantities
	Width	*Width*	BaseQuantities	Thickness	221	AR_Quantities
	Gross area	*GrossArea*	BaseQuantities	Area	229	AR_Quantities
	Net area	*NetArea*	BaseQuantities	Area	230	AR_Quantities
	Material name of curtain facade layer	*Material.Name*		Material	508	AR_General
	Type of curtain facade	*Reference*	Pset_CurtainWall Common	Code text	83	AR_General
	Status	*Status*	Pset_CurtainWall Common	Alteration category	49	AR_General, IFC, ...
	Fire resistance classification	*FireRating*	Pset_CurtainWall Common	Fire resistance classification	935	IFC
	Sound insulation classification	*AcousticRating*	Pset_CurtainWall Common	Sound insulation classification	1373	IFC
	U-value	*ThermalTransmittance*	Pset_CurtainWall Common	U-value	981	IFC

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
	Exterior component	*IsExternal*	Pset_CurtainWall Common	Classification	618	IFC
	Emergency exit	*FireExit*	Pset_CurtainWall Common	Emergency exit	1381	IFC
	Flammable	*Combustible*	Pset_CurtainWall Common	Flammable	1371	IFC
	Fire behavior	*SurfaceSpreadOfFlame*	Pset_CurtainWall Common	Fire behavior	1372	IFC
	Item number	*ArticleNumber*	Pset_Manufacturer TypeInformation	Item number	241	FM Manager
	EAN, bar code	*GlobalTradeItem Number*	Pset_Manufacturer TypeInformation			
	Model number	*ModelReference*	Pset_Manufacturer TypeInformation	Model number	1382	IFC
	Name of model	*ModelLabel*	Pset_Manufacturer TypeInformation	Name of model	1383	IFC
	Manufacturer	*Manufacturer*	Pset_Manufacturer TypeInformation	Manufacturer	1136	IFC, Cadastral Plan
	Production year	*ProductionYear*	Pset_Manufacturer TypeInformation	Production year	1393	IFC
	Place of installation	*AssemblyPlace*	Pset_Manufacturer TypeInformation			

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
Coverings - IFCCovering	Description/ full name	*LongName*		Function	506	AR_General, IFC
	Name (number) of covering	*Name*		Name	507	AR_General, IFC
	Associated story	*ContainedInStructure :: IfcBuildingStorey*	Relations			
	Associated room	*ContainedInStructure :: IfcSpace*	Relations			
	Covering type	*IsTypedBy :: IfcCoveringType*		Object name	498	AR_General
	Status	*Status*	Pset_RailingCommon	Alteration category	49	AR_General, IFC, ...
	Gross area	*GrossArea*	BaseQuantities	Area	229	AR_Quantities
	Net area	*NetArea*	BaseQuantities	Area	230	AR_Quantities
	Covering type	*Reference*	Pset_CoveringCommon	Code text	83	AR_General
	Status	*Status*	Pset_CoveringCommon	Alteration category	49	AR_General, IFC, ...
	Fire resistance classification	*FireRating*	Pset_CoveringCommon	Fire resistance classification	935	IFC
	Flammability rating	*Flammability*	Pset_CoveringCommon	Flammability rating	1398	General, IFC
	Sound insulation classification	*AcousticRating*	Pset_CoveringCommon	Sound insulation classification	1373	IFC
	Fragility	*FragilityRating*	Pset_CoveringCommon			
	Fire behavior	*SurfaceSpreadOfFlame*	Pset_CoveringCommon	Fire behavior	1372	IFC
	Flammable	*Combustible*	Pset_CoveringCommon	Flammable	1371	IFC
	U-value	*ThermalTransmittance*	Pset_CoveringCommon	U-value	981	IFC
	Quality of finish	*Finish*	Pset_CoveringCommon	Quality of finish	1394	General, IFC

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
Railings - IFCRailing	Description/ full name	*LongName*		Function	506	AR_General, IFC
	Name (number) of railing	*Name*		Name	507	AR_General, IFC
	Associated story	*ContainedInStructure :: IfcBuildingStorey*	Relations			
	Associated room	*ContainedInStructure :: IfcSpace*	Relations			
	Railing type	*IsTypedBy :: IfcRailingType*		Object name	498	AR_General
	Length	*Length*	BaseQuantities	Length	220	AR_Quantities
	Material of railing	*Material.Name*	Pset_RailingCommon	Material	508	AR_General
	Railing type/ horizontal	*Reference*	Pset_RailingCommon	Code text	83	AR_General
	Status	*Status*	Pset_RailingCommon	Alteration category	49	AR_General, IFC, ...
	Exterior component	*IsExternal*	Pset_RailingCommon	Classification	618	IFC
	Relative height	*Height*	Pset_RailingCommon	Height	222	AR_Quantities
	Diameter	*Diameter*	Pset_RailingCommon	Diameter	759	AR_Quantities

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
Furnishings, equipment - IFCFurnishing Element	Description/ full name	*LongName*		Function	506	AR_General, IFC
	Name (number) of furniture	*Name*		Name	507	AR_General, IFC
	Associated story	*ContainedInStructure :: IfcBuildingStorey*	Relations			
	Associated room	*ContainedInStructure :: IfcSpace*	Relations			
	Furniture type	*Reference*		Code text	83	AR_General
	Classification key	*ItemReference*		Classification key	1395	General, Object Manager
	Relative height	*Height*	BaseQuantities	Relative height	222	
	Depth	*Depth*	BaseQuantities	Length	220	
	Width	*Width*	BaseQuantities	Thickness	221	
	Description	*Beschreibung*	Pset_Furniture TypeCommon			
	Style	*Style*	Pset_Furniture TypeCommon	Type	1121	Cadastral plan
	Nominal height	*NominalHeight*	Pset_Furniture TypeCommon			
	Nominal length	*NominalLength*	Pset_Furniture TypeCommon			
	Nominal depth	*NominalDepth*	Pset_Furniture TypeCommon			
	Primary color	*MainColor*	Pset_Furniture TypeCommon			
	Built-in, movable	*IsBuiltIn*	Pset_Furniture TypeCommon			

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
	Item number	*ArticleNumber*	Pset_Manufacturer TypeInformation	Item number	241	IFC, FM Manager
	EAN, bar code	*GlobalTradeItem Number*	Pset_Manufacturer TypeInformation			
	Model number	*ModelReference*	Pset_Manufacturer TypeInformation	Model number	1382	IFC
	Name of model	*ModelLabel*	Pset_Manufacturer TypeInformation	Name of model	1383	IFC
	Manufacturer	*Manufacturer*	Pset_Manufacturer TypeInformation	Manufacturer	1136	IFC, Cadastral Plan
	Production year	*ProductionYear*	Pset_Manufacturer TypeInformation	Production year	1393	IFC
	Place of installation	*AssemblyPlace*	Pset_Manufacturer TypeInformation			

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
Rooms - IFCSpace	Associated story	*Decomposes :: IfcBuildingStorey*	Relations			
	Assigned to room group	*HasAssignments :: IfcZone*	Relations	Room group		
	Short name (number)	*Name*		Name (number)	507	AR_General, IFC
	Description/ full name	*LongName*		Function	506	AR_General, IFC
	Finish elevation	*ElevationWithFlooring*	BaseQuantities			
	Interior room or exterior room	*InteriorOrExteriorSpace*		Classification	618	IFC
	Classification key	*ItemReference*	Pset_Space ClassificationReference	Nutzungsart_DIN 277	235	DIN 277, IFC
	Name within the classification	*Name*	Pset_Space ClassificationReference	Flächenart_DIN2 77	232	DIN 277
	Gross room height	*Height*		Relative height	222	AR_Quantities
	Net room height	*FinishCeilingHeight*				AR_Quantities
	Height of floor structure	*FinishFloorHeight*	BaseQuantities			
	Net perimeter	*NetPerimeter*	BaseQuantities	Perimeter	228	AR_Quantities
	Net room area	*NetFloorArea*	BaseQuantities	Floor surface	293	AR_Quantities
	Net volume	*NetVolume*	BaseQuantities	Volume	223	AR_Quantities
	Wall area	*GrossWallArea*	BaseQuantities			
	Cross-sectional area	*GrossSectionArea*	BaseQuantities			
	Room type	*Reference*	Pset_SpaceCommon	Code text	83	AR_General
	Exterior room	*IsExternal*	Pset_SpaceCommon	Classification	618	IFC

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
	Publicly accessible	*PubliclyAccessible*	Pset_SpaceCommon			
	Base area_planned	*GrossPlannedArea*	Pset_SpaceCommon			
	Net area_planned	*NetPlannedArea*	Pset_SpaceCommon			
	Suitable for the disabled	*HandicapAccesible*	Pset_SpaceCommon	Suitable for the disabled	1375	IFC
	Fire hazard class	*FireRiskFactor*	Pset_SpaceFireSafety Requirements	Flammability rating	1398	General, IFC
	Sprinkler protection	*SprinklerProtection*	Pset_SpaceFireSafety Requirements	Sprinkler protection	1399	General, IFC
	Automatic sprinkler protection	*SprinklerProtectionAuto matic*	Pset_SpaceFireSafety Requirements			
	Emergency exit	*FireExit*	Pset_SpaceFireSafety Requirement	Emergency exit	1381	IFC
		AirPressurization	Pset_SpaceFireSafety Requirement			
	Articial light	*ArtificialLighting*	Pset_SpaceLighting Requirements	Artificial light	1400	General, IFC
	illuminance	*Illuminance*	Pset_SpaceLighting Requirements			
	Minimum room temperature	*SpaceTemperatureMax*	Pset_SpaceThermal Requirements	Temperature_ma x	1405	General, IFC
	Maximum room temperature	*SpaceTemperatureMin*	Pset_SpaceThermal Requirements	Temperature_min	1404	General, IFC
	Humidity	*SpaceHumdity*	Pset_SpaceThermal Requirements	Humidity	1401	General, IFC
	Humidity_max	*SpaceHumdityMax*	Pset_SpaceThermal Requirements			
	Humidity_min	*SpaceHumdityMin*	Pset_SpaceThermal Requirements			

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute	Attribute number	Category
	Humidity_cooling	*SpaceHumidity_Summer*	Pset_SpaceThermal Requirements			
	Humidity _heating	*SpaceHumidity_Winter*	Pset_SpaceThermal Requirements			
	Ventilation	*NaturalVentilation*	Pset_SpaceThermal Requirements	Natural ventilation	1402	General, IFC
	Natural air change rate	*NaturalVentilationRate*	Pset_SpaceThermal Requirements			
	Mechanical air change rate	*MechanicalVentilation Rate*	Pset_SpaceThermal Requirements			
	Air-conditioning	*AirConditioning*	Pset_SpaceThermal Requirements	Air-conditioned	1403	General, IFC
	Central air-conditioner	*AirConditioningCentral*	Pset_SpaceThermal Requirements			
Room group - IFCZone	Rooms assigned	*HasAssignments :: Ifcspace*	Relations			
	Short name (number)	*Name*		Name (number)	507	AR_General, IFC
	Description/ full name	*LongName*		Function	506	AR_General, IFC

Attributes for engineering

BaseQuantities are geometric values the element is given automatically or by the superordinate opening element. Relations are the results of assignments to structural levels or PARENT_CHILD connections.

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute
Bar reinforcement - IFCReinforcingBar	Diameter	*NominalDiameter*	BaseQuantities	Diameter
	Cross-section area	*CrossSection*	BaseQuantities	
	Bar length	*BarLength*	BaseQuantities	Mesh length or bar length
	Bar surface	*BarSurface*	BaseQuantities	Surface
	Standard	*ShapeCode*	Allplan_ReinforcingBar	Name Cross-section catalog
	Bending pin diameter	*BendingDiameter*	Allplan_ReinforcingBar	Bending dimensions
	Hook length	*HookLength*	Allplan_ReinforcingBar	Stirrup length
	Hook angle	*HookAngle*	Allplan_ReinforcingBar	Stirrup width
	Bending pin diameter of hook	*HookBendingDiameter*	Allplan_ReinforcingBar	Bending dimensions
	Weight per meter	*WeightPerMeter*	Allplan_ReinforcingBar	Steel weight
	Number	*CountOfBars*	Allplan_ReinforcingBar	Number of meshes of bars
	Bar name	*Name*		Name of cross-section catalog
	Steel grade	*Material*		Steel grade of cross-section catalog

Component - Object	Attribute description	IFC attribute	PSet	Allplan attribute
Mesh reinforcement - IFCReinforcingMesh	Mesh width	*MeshWidth*	BaseQuantities	Mesh width
	Mesh length	*MeshLength*	BaseQuantities	Mesh length or bar length
	Transverse overlap	*CrossOverlapping*	BaseQuantities	Transverse mesh overlap
	Longitudinal overlap	*LongitudinalOverlapping*	BaseQuantities	Longitudinal mesh overlap
	Mesh type	*PredefinedType*	Allplan_ReinforcingMesh	Mesh type
	Standard	*ShapeCode*	Allplan_ReinforcingMesh	Name of cross-section catalog
	Diameter of longitudinal bar	*LongitudinalBarNominalDiameter*	Allplan_ReinforcingMesh	Type of longitudinal bar diameter
	Diameter of cross bar	*TransverseBarNominalDiameter*	Allplan_ReinforcingMesh	Type of cross bar diameter
	Cross-sectional area of longitudinal bar	*LongitudinalBarCrossSectionArea*	Allplan_ReinforcingMesh	
	Cross-sectional area of cross bar	*TransverseBarCrossSectionArea*	Allplan_ReinforcingMesh	
	Longitudinal bar spacing	*LongitudinalBarSpacing*	Allplan_ReinforcingMesh	Offset to longitudinal bar
	Cross bar spacing	*TransverseBarSpacing*	Allplan_ReinforcingMesh	Offset to cross bar
	Code of bending pin	*BendingShapeCode*	Allplan_ReinforcingMesh	Bending dimensions
	Bending pin properties	*BendingParameters*	Allplan_ReinforcingMesh	Bending dimensions
	Mesh name	*Name*		Mesh name
	Steel grade	*Material*		Steel grade of cross-section catalog
	Mesh Weight	*WeightOfMesh*		Weight of mesh of bar

Attributes for the IFC ObjectTypes

The following section lists the required minimum of attributes for freely assignable object types, provided they are defined in IFC (PSetCommon).

Element	IFC attribute	Allplan attribute	Attribute number	Allplan group
Inspection manhole – IFCDistribution ChamberElement	*Reference*	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
Transport element – IFCTransportElement	*Reference*	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
	CapacityPeople	Maximum number of persons		
	CapacityWeight	Maximum weight		
	FireExit	Escape route	1376	IFC
Any building element – IFCBuildingElementProxy	*Reference*	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
	LoadBearing	Structure_load-bearing	573	AR_General, IFC
	FireRating	Fire resistance classification	935	IFC
	ThermalTransmittance	U-value	981	IFC
Component opening– IFCOpeningElement	*Reference*	Code text	83	AR_General
	Status	Alteration category	49	AR_General, IFC, ...
	Purpose	Function		
	FireExit	Emergency exit	1381	IFC
	ProtectedOpening	Protected opening		

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