humantech

D2.1 – BIMxD IDM with classes and attributes according to ISO 29481 and respective standards

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Acronyms and definitions

Acronym	Meaning
2D/3D	Two/Three Dimensional
AR	Augmented Reality
BCF	BIM Collaboration Format
BIM	Building Information Modeling
BIMxD	Extended Dynamic BIM
BPMN	Business Process Model and Notation
DSDT	Dynamic Semantic Digital Twin
GUI	Graphical User Interface
HT	HumanTech
IDM	Information Delivery Manual
IDS-RAM	IDS Reference Architecture Model
IFC	Industry Foundation Classes
IoT	Internet of Things
LiDAR	Light Detection And Ranging
PC	Point Cloud
PCD	Point Cloud Data
RGB-D	Red, Green, Blue plus Depth
ROS	Robot Operating System
UAV	Unmanned Aerial Vehicle
UC	Use Case
UGV	Unmanned Ground Vehicle
VR	Virtual Reality
WP	Work Package
XR	Extended Reality

Abstract

This deliverable presents the IDM (Information Delivery Manual) for the HumanTech BIMxD platform specification. It represents the outcome of task T2.1, which focuses on BIMxD Formats and Specifications.

The task commenced in M8 and reaches its conclusion in M13 with the delivery of the IDM. The development of the IDM incorporates extensive work and technical discussions carried out in WP3 and WP4, concerning the definition of exchange requirements within HumanTech workflows for the BIMxD platform. Additionally, input from WP7 pilots and use cases has been considered to ensure effective application.

The deliverable encompasses an in-depth analysis of existing BIM and openBIM Formats and Specifications, with a particular emphasis on interoperable information exchange processes. The analysis covers the representation of fundamental components of AEC stages and identifies missing specifications for areas such as robots, human-robotic task planning, worker pose and action, and state of tasks. These aspects align with international BIM standards including ISO 19650 series, EN 17412, ISO 12006 series, ISO 16739, and others.

This deliverable serves as an initial stage in the broader activities of WP2, presenting the initial information requirements for the BIMxD platform in terms of IFC classes, attributes, properties, and BCF protocols. Furthermore, it is closely connected to deliverables D2.4 and D2.5, which will provide detailed and extended requirements using additional openBIM standards and services such as bSDD.

The IDM is presented in accordance with the specifications and schema of ISO 29481 Part 1-2-3, with explanatory notes included to enhance comprehension of the described process.

Executive Summary

The deliverable D2.1 provides an overview of the IDM context. Here is a breakdown of the chapters covered in the deliverable:

Chapter 1: Introduction

In this chapter, the general context of the IDM is presented. It includes an overview of the national standards related to Information Management, specifically referencing the ISO 29481 series.

Chapter 2: IDM Content

The general content of the IDM is described in this chapter. It covers the definition of IDM content, taking into account the innovative approach proposed within the Human Tech Project.

Chapter 3: BIMxD Platform Templates

This chapter focuses on the templates used in the BIMxD platform of the Human Tech Project. These templates serve as a common reference across different use cases studied within the project.

Chapters 4-7: Sub-processes of IDM

These chapters provide in-depth descriptions of different sub-processes of the IDM. Each sub-process is covered in its own Process Map, and the corresponding Exchange Requirements are listed in tables.

Chapters 8: Conclusion

In this chapters the general conclusions are described and the following activities and deliverables linked to this one are mentioned.

The HumanTech project

The European construction industry faces three major challenges: increase the safety and wellbeing of its workforce, improve its productivity, and become greener, making efficient use of resources.

To address these challenges, HumanTech proposes to develop **human-centred cutting-edge technologies** such as wearables for workers' safety and support and robots that can harmoniously coexist with human workers while contributing to the ecological transition of the sector.

HumanTech aims to achieve major advances in cutting-edge technologies that will enable a safe, rewarding, and digital work environment for a new generation of highly skilled construction workers and engineers.

These advances will include:

- **Robotic devices equipped with vision and intelligence** that allow them to navigate autonomously and safely in highly unstructured environments, collaborate with humans and dynamically update a semantic digital twin of the construction site in which they are.
- **Smart, unobtrusive workers protection and support equipment**. From exoskeletons activated by body sensors for posture and strain to wearable cameras and XR glasses that provide real-time workers' location and guidance for them to perform their tasks efficiently and accurately.
- An entirely new breed of **Dynamic Semantic Digital Twins (DSDTs) of construction sites** that simulate in detail the current state of a construction site at the geometric and semantic level, based on an extended Building Information Modelling (BIM) formulation that contains all relevant structural and semantic dimensions (BIMxD). BIMxDs will act as a common reference for all human workers, engineers, and autonomous machines.

The **HumanTech consortium** is formed by 22 organisations — leading research institutes and universities, innovative hi-tech SMEs, and large enterprises, construction groups and a construction SME representative — from 10 countries, bringing expertise in 11 different disciplines. The consortium is led by the German Research Center for Artificial Intelligence's Augmented Vision department.

Contents

1. Introduction

This deliverable presents the IDM (Information Delivery Manual) for the HumanTech BIMxD platform specifications. It represents the outcome of task T2.1 of WP2 “BIMxD Formats and Standardization”, which focuses on BIMxD Formats and Specifications. The development of the IDM incorporates extensive work and technical discussions carried out in WP3 “Dynamic Semantic Digital Twin Generation” and WP4 “Wearable Technologies for Construction”, concerning the definition of exchange requirements within HumanTech workflows for the BIMxD platform. Additionally, input from WP7 “Pilots, Evaluation and Validation”, such as pilots and use cases has been considered to demonstrate effective application of the established requirements.

Building information modelling (BIM) offers a digital technology for managing information throughout the life cycle of constructed facilities. By consolidating diverse sets of information into a common environment, BIM reduces the reliance on paper documentation. In the context of the BIMxD workflow, which encompasses innovative technological solutions and model uses, a specific description is necessary to ensure a shared understanding. The IDM, following ISO 29481 methodology, facilitates the optimal utilization of BIM, including the proposed BIMxD. When the required information is available in BIMxD to support construction processes such as pilots, and its quality is satisfactory, the overall process is significantly enhanced.

To achieve these improvements, it is crucial to establish a common understanding of the proposed processes within the HumanTech project, particularly in the context of BIMxD. This encompasses comprehending the information required for and resulting from the execution of these processes. Such understanding extends beyond BIMxD models, encompassing activities involving the exchange of information, such as work planning and robot activities.

1.1. Building Information Modeling and international standards

The adoption of BIM is continuously expanding and gaining significance in the construction industry worldwide. As a result, there is an ongoing effort to establish more consistent standards within the field of Information Management. This aims to standardize the BIM methodology and improve its effectiveness and accuracy across various countries and projects within the construction sector.

It is important to remember that while technical standards are voluntary, they become binding when referenced in contracts or invoked by laws. In cases of disputes, they serve as clear evidence of industry best practices in a specific sector if acknowledged by the judiciary. In this context ISO 19650 series play a significant role.

ISO series 19650, titled "Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) - Information management using building information modelling," provides a comprehensive framework for information management using BIM throughout the project lifecycle.

It is a set of rules designed to ensure compliance with a specific standard of quality for digital processes and data control in the design, construction, and management of an asset. The ISO 19650 series allows project teams to minimize time-consuming activities and increase predictability in terms of costs and timelines for executing a project. This is achieved through a common approach to information management and by adhering to the fundamental principles of the BIM methodology.

In summary, the proper implementation of ISO 19650 facilitates:

- Control over the information required by the client and the methods for verifying such information, as well as defining processes, deadlines, and economic and temporal resources to be invested in the realization, management, and maintenance of an asset.
- Alignment between the needs defined in the contract phase and the results achieved at the end of the process.
- Exchange of information among the various actors involved in each phase of the lifecycle of an asset.

The ISO 19650 series is widely recognized as the primary reference for the BIM methodology. In parallel, numerous national and international standards have been developed as complementary measures to further specify and implement various aspects of the BIM methodology. These standards encompass not only theoretical frameworks but also practical and technical considerations.

Some notable examples include ISO 29481, which provides guidelines for the exchange of information within the BIM environment. ISO 16739 focuses on the development of a data model that can be used as an open schema, enabling interoperability between different software and systems. Additionally, ISO 12006 establishes a classification

system, facilitating consistent categorization and organization of information within the BIM context.

These standards, alongside the ISO 19650 series, collectively contribute to a comprehensive framework for implementing and utilizing BIM effectively in construction projects.

By adhering to international and national volunteer standards, organizations can benefit from improved project outcomes, reduced rework, enhanced collaboration, and better decision-making. The standard promotes consistency in information exchange, facilitates the integration of BIM with other project processes, and supports the effective management of digital information throughout the lifecycle of a built asset.

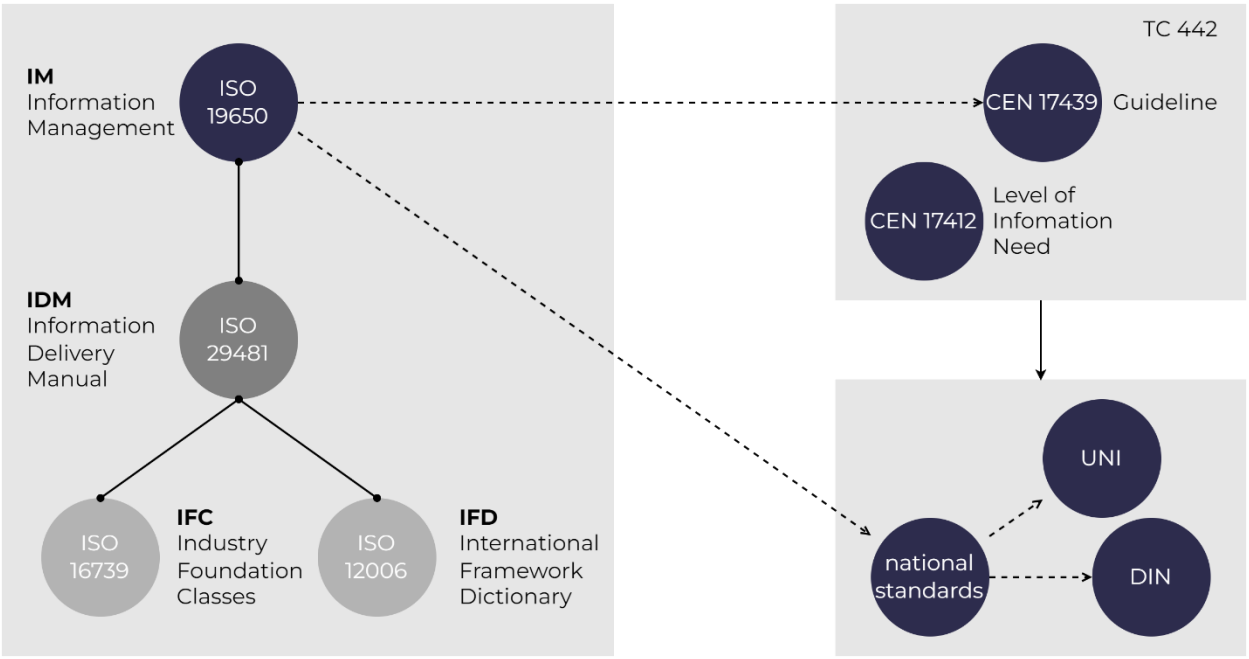


Figure 1 Relationship between process regulations published by the three levels of standardization bodies (International, European, National).

1.2. ISO 29481 - IDM general overview

As mentioned earlier, BIM plays a crucial role in integrating diverse sets of information used in the construction industry into a unified information environment. However, achieving this requires a shared understanding of the building processes and the necessary information for their execution. ISO 29481 is a standard that provides a methodology for developing an Information Delivery Manual (IDM). The IDM methodology specified in ISO 29481-1 should be followed for all aspects related to the development and utilization of IDM.

After Information Development Manual (IDM) has been developed by buildingSMART to have a methodology to capture and specify processes and information flow during the lifecycle of a facility. It is an approach that focuses on optimizing the creation, organization, and dissemination of information during the various stages of the AEC phases. The IDM is used to document existing or new processes and describe the associated information that have to be exchanged between parties.

In the context of the construction phase and BIM, ISO 29481 serves as a valuable resource for guiding IDM practices. It provides industry-specific guidelines and best practices for information documentation. It offers valuable insights and recommendations for managing information effectively throughout the construction phase, ensuring its accuracy, consistency, and accessibility. By adhering to the guidelines outlined in ISO 29481, project stakeholders can ensure that information is effectively documented, exchanged, and utilized during the construction process, leading to improved collaboration and project outcomes.

One of the key goals of IDM is to enhance the quality and usability of information. This involves developing standardized processes and guidelines for information creation, ensuring consistency and accuracy. Another crucial aspect of IDM is the effective management of information throughout its lifecycle. Collaboration and coordination among different stakeholders are integral to successful IDM implementation. By establishing clear communication workflow, defining roles and responsibilities, and fostering a collaborative culture, organizations can streamline information development processes and improve overall efficiency. Collaboration also facilitates knowledge sharing and helps prevent duplication of efforts.

In conclusion, IDM is an approach that enables organizations to effectively manage their information assets. By implementing IDM practices, organizations can enhance the quality, accessibility, and usability of information, leading to improved decision-making, increased productivity, and enhanced stakeholder satisfaction.

ISO 29481 acknowledges the unique challenges faced during the construction phase, where a wealth of information is generated and shared among different stakeholders. In an ambitious project like HumanTech, this standard provides guidance on documentation planning, content creation, revision control, information exchange, and

interoperability, aiming to facilitate smooth information flow and collaboration among all scenarios that interface with the BIMxD platform.

In general, with the adoption of BIM methodologies, IDM becomes even more essential. BIM enables the creation and management of comprehensive digital representations of a construction project's physical and functional aspects. IDM practices, ensure that the right information is readily available to the relevant stakeholders throughout the AEC phases, minimizing errors, and enhancing project outcomes.

IDM involves leveraging various tools and technologies that facilitate information management and collaboration. These can include BIM authoring software, document management systems, common data environments (CDE), and data exchange formats like Industry Foundation Classes (IFC)[1] or BIM Collaboration Format (BCF)[2]. By adopting IDM practices and utilizing the framework described by ISO 29481, construction professionals can streamline their information workflows, improve coordination among project teams, enhance data integrity, and ultimately deliver projects more efficiently and with higher quality.

An information delivery manual comprises the following:

- an interaction map/transaction map and/or a process map;
- one or more exchange requirements.

The interaction map defines the roles involved and the transactions between roles. For each defined transaction, one role is initiator while another is executor. The corresponding transaction map defines the messages in a transaction and the rules that apply on the sequence of execution.

The process map shows a swim lane for each role and defines within the lane the relevant sequence of activities to be executed by that role. Activities undertaken by different roles may have relations that require an exchange of information in the form of a message. Such messages correspond to a message in a transaction shown in a transaction map.

1 https://www.buildingsmart.org/standards/bsi-standards/industry-foundation-classes/
2 https://www.buildingsmart.org/standards/bsi-standards/bim-collaboration-format-bcf/

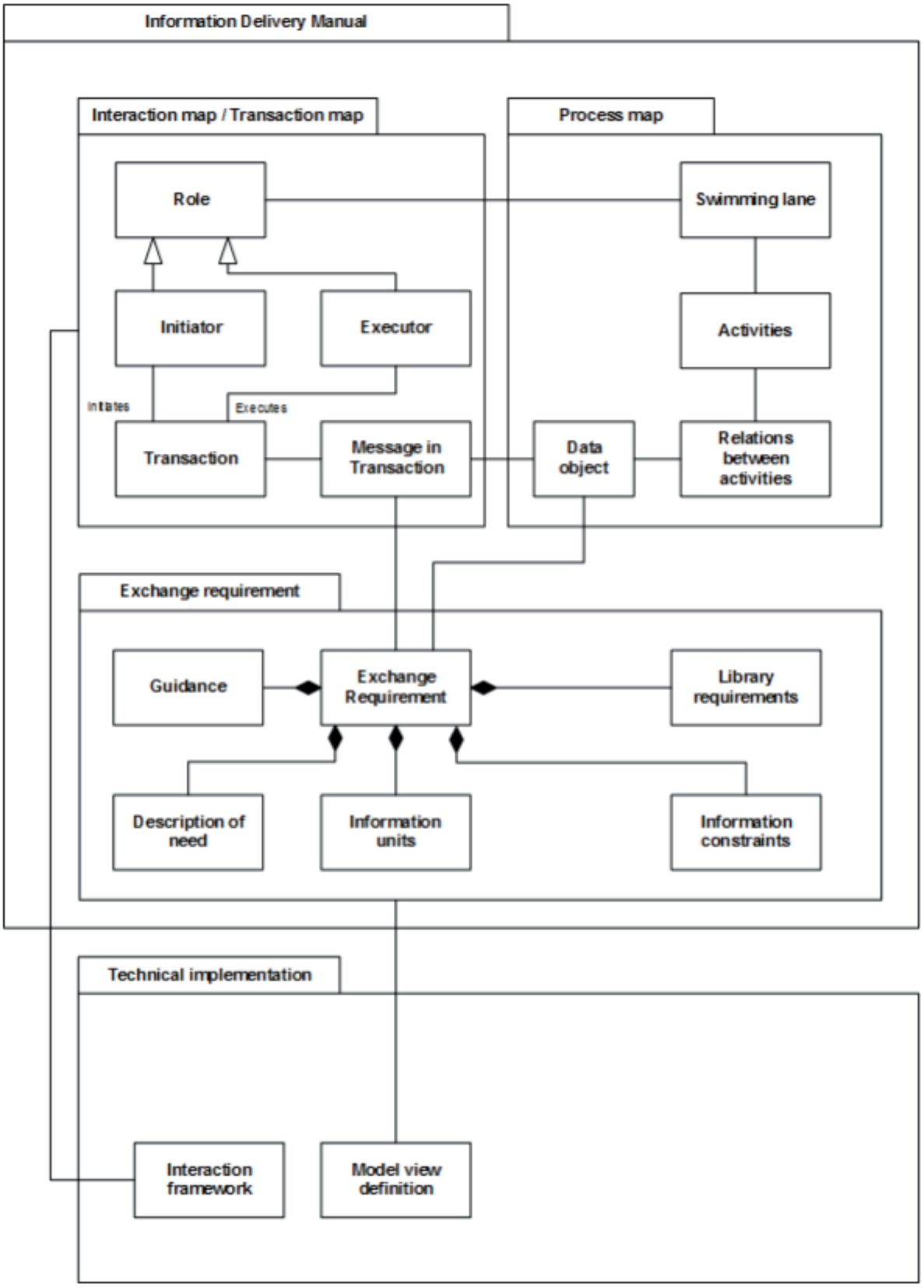


Figure 2 IDM basic framework ISO 29481 Part 1

Within the HumanTech Project, and the structure of the WP2, the deliverable D2.1 is focused on the IDM Process Map, and on an initial implementation of the Exchange

requirements that will be further implement in the deliverables D2.4 “bSDD specification from BIMxD” and D2.5 “IFC schema extension. Definition”. The following technical implementation will be explored in the deliverable D2.2 “Opensource BIM authoring tools: Framework and Software Module” and D2.3 “BIMxD platform”.

1.3. IDM - Process map structure

1.3.1. User requirements and technical solutions

The Information Delivery Manual (IDM) is then defined as a comprehensive document that outlines the processes and procedures for managing information generally throughout the lifecycle of a construction project, or in this case of a specific phases of it. Each part serves a specific purpose in guiding stakeholders on effective information management practices.

ISO 29481-1 describes the methodology and components of IDM in detail. It includes an illustrative diagram that visually represents the different components of IDM and their relationships. Within the IDM framework, two main perspectives are identified: user requirements and technical solutions. These perspectives encompass several zones that define the distinct components of IDM and their characteristics.

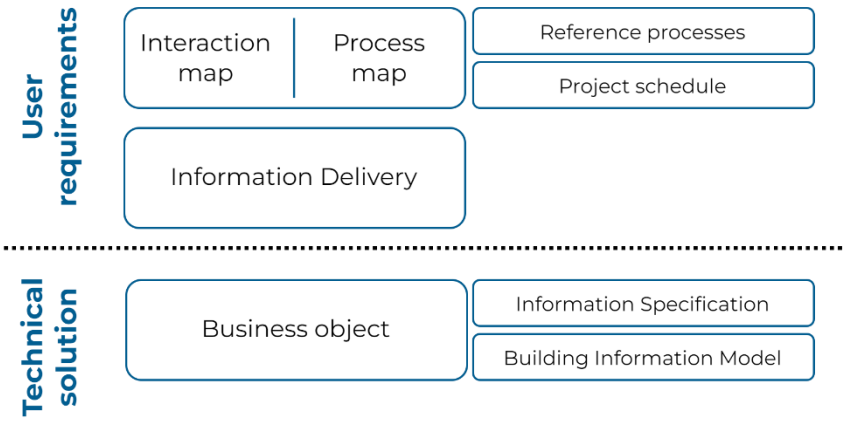


Figure 3 IDM zones – ISO 29481 Part 2

Within the user-requirements perspective, these zones are:

- interaction maps, describing the roles and interactions between them,
- process maps, describing the overall process in which information exchange occurs,
- information delivery, describing the information exchange needs,
- reference processes (stored exchange descriptions),

- the project schedule (occurrences of processes in the context of a project).

The technical-solution perspective includes:

- the business objects comprising the Exchange Requirement model,
- the Information Specification, describing the schema on which the information exchange is based,
- the Building Information Model.

The interaction map is based on general principles of business communication.

Goals and Objectives:

The IDM should clearly define the objectives of information exchange within the project. It outlines the purpose of the IDM, identifies the stakeholders involved, and sets the goals for effective information delivery. They are generally called BIM objectives and BIM uses (or Model Uses).

Roles and Responsibilities:

This section describes the roles and responsibilities of individuals and teams involved in information exchange. IDM draws a distinction between a role that makes a request (initiator) and the role that gives effect to that request (executor). If there is such a required communication between two roles, then it is termed a transaction.

Information Requirements:

The IDM specifies the information requirements for each stage of the project. It identifies the specific data and documents needed, such as drawings, specifications, and schedules. This section ensures that all stakeholders are aware of the required information and can plan accordingly.

Documentation Standards:

IDM establishes documentation standards to ensure consistency and clarity in the information exchanged. It defines file naming conventions, document formats, and metadata requirements. Adhering to these standards promotes efficient information retrieval and reduces the risk of miscommunication.

Information Exchange and Collaboration:

This section outlines the processes and procedures for information exchange and collaboration among project stakeholders. It describes the communication channels, protocols, and tools to be used, such as email, file-sharing platforms, or Building

Information Modeling (BIM) software. It also emphasizes the importance of clear and timely communication.

Revision Control:

The IDM specifies how revisions to information should be managed. It defines versioning protocols, change control procedures, and approval workflows. This ensures that stakeholders have access to the most up-to-date information and prevents confusion resulting from outdated or conflicting data.

Information Delivery Formats:

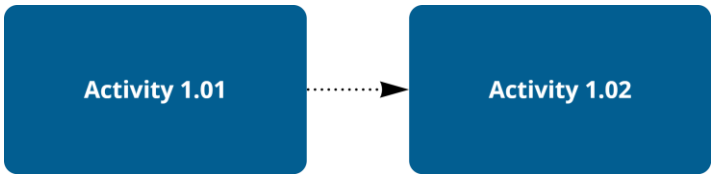
IDM addresses the formats in which information should be delivered. It may require specific file formats or digital standards, such as Industry Foundation Classes (IFC) for BIM data. This ensures compatibility and interoperability among different software and tools used by various stakeholders.

1.3.2. Process Map

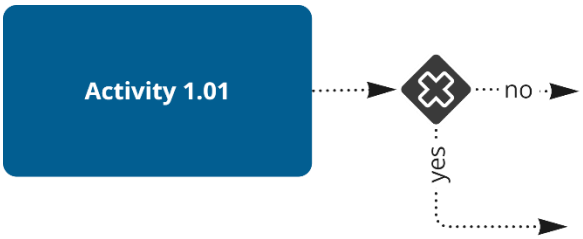
An IDM encompasses a Process Map that is crucial for comprehending the complete workflow. The main objective of a process map is to outline the sequence of activities within a specific business process, highlighting the roles performed by the involved stakeholders, along with the required, utilized, and produced information.

A brief explanation of its structure and symbols is following provided. The process map presents a visual representation of the information management workflow, highlighting the sequence of activities, their relationships and in particular the consistency of the information exchange. It uses flowcharts, diagrams, or other graphical representations based on the BPMN standard. To read the process map effectively, pay attention to:

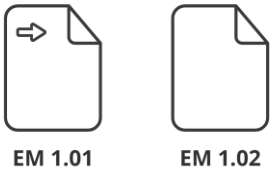
Flow and Sequence: Follow the flow of activities from the beginning to the end, ensuring that the information flows logically through the different stages of the project.



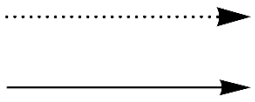
Decision Points: Where choices or approvals are required. Understand the criteria for making these decisions and the subsequent flow of information.



Inputs and Outputs: Note the inputs required for each activity and the outputs generated. This helps in understanding the information dependencies and the flow of data between different stages.



Dependencies and Relationships: Identify dependencies between activities and any critical relationships that may impact the information management process. This helps in identifying potential bottlenecks or areas that require close coordination.



By understanding the important components of an IDM and how to read the process map, stakeholders can effectively implement information management practices, ensuring the successful delivery of accurate and timely information throughout the construction project.

2. IDM of the BIMxD platform

2.1. IDM breakdown into Pilot connected to the BIMxD platform

In the context of the HumanTech project, the use of the BIMxD platform plays a significant role in the information workflow. It enables automation in BIM modeling, construction monitoring through a semantic digital twin, robot-assisted demolition, and bridge inspection. To streamline these processes effectively, the general Information Delivery Manual (IDM) has been divided into specific IDM pilots that can be separated and considered as sub-processes of the entire HumantTech Project workflow. As separated and consistent sub-processes, they clearly clarify the transactions, the roles and the exchange models with the referred information requirements. Moreover they

can be referred to a subset of the Pilot of the WP7. This choice allows to test in the following month of the HumanTech project, to develop the technical implementation of the IDM.

By dividing the IDM into distinct pilots, each pilot can be treated as a separate and consistent sub-process within the overall HumanTech project workflow. This separation allows for clear definition of transactions, roles, and exchange models concerning the associated information requirements. Additionally, these pilots can be referred to as subsets of the WP7 pilot.

This decision to divide the IDM into pilots enables the testing and technical implementation of the IDM in the upcoming months of the HumanTech project as well as being easly readable by stakeholders and interested parties. Moreover, by developing the technical implementation of the IDM in this manner, the project can ensure that the information requirements are met effectively and that the desired automation processes are successfully implemented.

IDM Pilot I explores the dynamic semantic digital twin process map, which involves creating a virtual representation of the asset and leveraging real-time data to enhance 4D and 5D on site management, construction progress monitoring, construction logistic, safety analysis abd decision-making during the construction stage. By delineating the requirements and procedures specific to this pilot, stakeholders can streamline the integration of BIM models, point cloud, and robotics enabling a more efficient and data-driven approach.

IDM Pilot III addresses the remote-controlled demolition process map, which involves utilizing robots and advanced technologies to carry out demolition activities. By dividing the IDM into this pilot, the requirements for safely and effectively executing remote-controlled demolitions are established, considering factors such as robotic capabilities, safety protocols, and project-specific considerations.

IDM Pilot IV is dedicated to the bridge inspection and monitoring process map. This pilot emphasizes the automation of inspection tasks using robotic systems, point cloud and sensors. By breaking down the IDM for bridge inspection and monitoring, the specific requirements for capturing and analyzing data, identifying defects, and producing intervention plans are defined, ensuring accurate and comprehensive assessments of bridge conditions.

In addition, the attached documentation provides detailed exchange requirements and definitions for each IDM pilot. These documents outline the specific guidelines, procedures, and technical specifications necessary to ensure successful implementation of the automation processes in BIM modeling for construction monitoring, robot-assisted demolition, and bridge inspection. By referring to these documents, project stakeholders can gain a comprehensive understanding of the requirements and effectively align their efforts towards achieving automation goals. This documentation serves as a valuable resource in driving the seamless integration of BIM models, robotics, and advanced technologies within each IDM pilot scenario.

2.2. Content of the IDMs workflow

In accordance with the standardized structure described in ISO 29481 Part 1 for the Information Delivery Manual (IDM), the Interaction Map and Process Map (PM) are proposed as part of the traditional method. They serve to enhance the understanding and communication of the information workflow.

2.2.1. Interaction Map and Process Map

The Interaction Map and Process Map (PM) consist of the following components:

- **Graph**: The Interaction Map is presented in the form of a graph or diagram. It visually represents the interactions between entities or stakeholders involved in the process, providing a clear visualization of the information flow and the relationships among the parties.
- **Description of the Activities and Transactions of the PM:** The Process Map (PM) provides a detailed description of the activities and transactions within the information workflow. It outlines each step of the process, including the sequence, dependencies, and responsibilities of the entities or stakeholders.
- **Description of the Data Model (Exchange Model of the PM):** The Process Map also includes a description of output of each activities: the data model, which is referred to as the Exchange Model of the PM. This component specifies the structure, format, and content of the data exchanged between entities or stakeholders during the information workflow.

2.2.2. Exchange Requirements

Regarding the explanation of the Exchange Requirements for each Data Model, an advanced and innovative approach has been adopted, aligning with the progressive

objectives of the HumanTech projects and adhering to the latest standards in the field of Information management. This approach considers the recent developments published after the ISO 29481 series, ensuring compliance with the most up-to-date industry practices. Furthermore, the proposed approach not only facilitates the software implementation (related for example to the Task 2.2) but also considers the adoption of new openBIM standards. For instance, the use of IDS (Information Delivery Specification)[3] is being widely implemented in the information exchange workflow. By incorporating these new openBIM standards, the implementation process becomes smoother and more streamlined, ensuring seamless information exchange within the project.

The proposed method follows a reference method with several steps. In the first step, general information and backgrounds are established, considering the IFC scheme and relevant classification for the entire HumanTech project and its stakeholders. The second step organizes general components into two sub-areas: Project Components and Model Components. Project Components include templates for Project Phases, Roles, and Model Uses (BIM Uses or BIM Use Cases), consolidating the definitions found in the Process Maps (e.g. Roles are the pool) and are handled together in this step. Model Components have individual subsections, such as objects, geometry requirements (Level of Geometry), and properties (Level of Information). Data requirements are defined once for the HumanTech project and supplemented with additional specifications, such as mapping in IFC, classification, and comprehensive descriptions, which are subsequently utilized throughout the process.

Once templates for assigning the requirements are established, the next step involves the Assignment of Model Uses. In this step, the Model Uses and project phases defined in Step 2 are linked to one another. This step is fundamental because in the traditionally, the Information Delivery Manual (IDM) and Process Maps lack explicit establishment of Model Uses, which are fundamental pillars of the BIM methodology introduced in ISO 19650 Part 1-2-3. The information is presented in the form of a matrix, where all the defined model uses are listed vertically on the left side. The matrix offers three basic settings to choose from for each combination. These settings are represented by symbols: "-" indicates that the model use is not assigned to that phase, "O" signifies that

3 https://technical.buildingsmart.org/projects/information-delivery-specification-ids/

the combination of model use and project phase is assigned to the BIM project, but no specific information requirements are defined for it, and "X" indicates that additional data requirements can be used for that particular combination of model use and project phase.

The process of defining the information requirements or determining the specific information to be linked to a particular combination of model use and project phase is carried out in the subsequent step called "Assign Pilot requirements."

Moving forward, the information defined in the model components is assigned to the respective Exchange Model, which is the product of the transaction of the Process Map. These Exchange Models are assigned and referred to specific roles and, therefore, specific disciplines. All further data that are linked to the respective Exchange Model includes objects, geometries, property sets, and properties. Material and immaterial objects are individually assigned to the discipline model, with the Level of Geometry and Information, as per ISO 17412, being associated with material and immaterial components.

In the last step, the requirements can be linked to various combinations of project phases and model uses, as set in the second step.

The data export serves as the connection to the technical implementation, providing support for different applications. Under the menu items of Software Templates, Checking Rules, and IDS structure, various data outputs can be generated. All project requirements can be separately exported based on project phases, roles, and Model Uses.

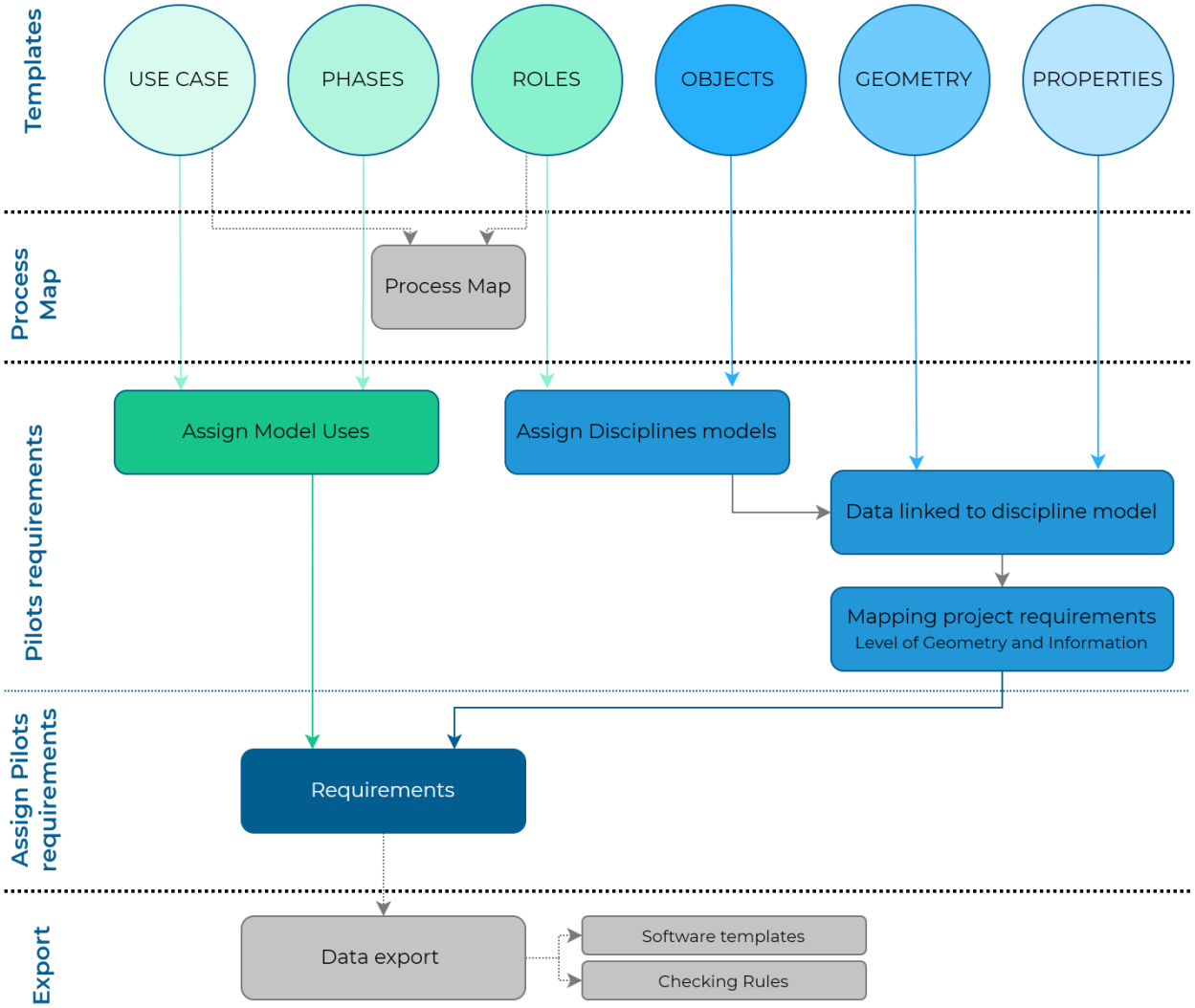


Figure 4 The schema represents the method to assign exchange requirements to the exchange model of the Process Map specify for each IDM.

Following a comprehensive description of the Templates components is provided.

Model Uses of the Process: In order to drive the information exchange, it is crucial to identify the model uses, which represent specific scenarios and goals that require the sharing of information. These Model uses can include design coordination, clash detection, and construction monitoring, among others. Understanding the model uses helps determine the types and formats of information that need to be exchanged.

Phase The information exchange workflow comprises multiple phases, each involving different actors. Common phases include design, construction, handover, and operation/maintenance.

Roles: Rols can include multiple actors of the Process, in the Process Map they are identified within the pool. Generally they can include architects, engineer, contractors, etc. they are strictly connected to the workflow described in the IDM. Clearly defining

the roles and responsibilities of each actor within the workflow ensures seamless information exchange.

List of Exchange Models: Exchange models are the effective products of the various activities performed by the actors during the outlined processes. These models define the data exchange protocols, standards, and formats that should be followed. Examples of exchange models include BCF for asset data handover and IFC for interoperability across different software platforms.

Element Components and Mapping Towards IFC: Element components refer to specific building elements or objects for which information is exchanged, such as walls, floors, doors, windows, and mechanical systems. Mapping these element components to the appropriate entities defined in the Industry Foundation Classes (IFC) schema is essential. This mapping ensures consistency and interoperability when sharing information across different software platforms. In this section normally referred only to BIM model, in the section further specification are added also in terms of task, materials and protocols for exchanging information, such as BCF.

Geometry (Levels of Geometry) and Property set and Properties (Level of Information): The information exchange workflow takes into account the levels of geometry and information required at different stages. According to ISO 17412, an international standard providing guidelines for data and information exchange in the construction industry, compliance with the standard's requirements is important. which It defines the Level of Information Need, which is determined by a combination of three types of data: geometric, alphanumeric, and documentary. Geometric information pertains to the representation of shapes and is expressed through five independent foundations. Alphanumeric information comprises various attributes used for identifying and explaining the content of the information. Documentary information is related to possible attached sets of documents, such as certificates of conformity or installation manuals.

For each of the three types of information and their respective aspects, it is necessary to determine whether they are required or not, as well as the exploitable content of the necessary information. This includes adhering to data formats, naming conventions, and information content specified by the standard. Determining the appropriate levels of geometry and information ensures that the exchanged data meets the specific needs of each model use.

2.2.3. Format of the contents

In order to meet the requirements of sharing documentation within the context of the European project and to ensure comprehensive understanding by humans, the content is currently presented in the form of text and tables. However, in the technical implementation, the content is provided in computational formats such as bSDD and IDS. This approach aims to achieve the goals of the computational approach in the Human Tech project and facilitate the exchange of computer-readable information. Additionally, these formats enable structured organization and categorization of data elements, thereby enabling seamless data exchange and integration between different software systems. It is important to note that while the content is transformed into these computational formats, the alignment of meaning is preserved. The visual representation and interpretation of the information can still be maintained, while also providing the advantage of being machine-readable for computational processes.

3. HumanTech Templates

3.1. Phases and Model Uses

In accordance with the information presented in the previous chapters of deliverable D2.1, a crucial initial step, preceding any activities and common to both the creation of the Process Map and the understanding of the Exchange Requirements, involves defining the AEC phases and Model Uses that need to be accomplished.

The following tables provide a comprehensive overview of the Phases and Model Uses within the context of the Human Tech project, specifically related to the BIMxD platform. These tables not only present the Phases and Model Uses but also provide detailed descriptions for better understanding.

Code	Phase Title	Phase Description
P04	Design Phase	Phase in which project team establishes means of satisfying project Basis of Design requirements with technical solutions, evaluates alternatives through value analysis or similar process.
P06	Implementation Phase	Phase to implement the coordinated design through construction planning, prefabrication, and field execution characterized by constructor 'means and methods,' and Basis of Construction strategies, controlled by quality assurance and control protocols.
P08	Operations Phase	Phase in which owner or a designated agent occupies, uses, and manages and maintains a facility, which may also include partial or whole facility renovation, repair, reconditioning or re-modeling activities as part of the project use lifecycle.

P09	Closure Phase	Phase which includes facility closure, preparation for unknown future use, demolition in whole or part, foreclosure, sale, or similar dispensation initiated by the decision that the facility no longer meets the needs of the Owner and cannot be feasibly reconfigured for continued use by that Owner.

Table 1 Phases involved in the HumanTech project and consequently in the IDM for the BIMxD platform.

Code	model use Title	Description
UC 00	Surveying	Capture of essential aspects of the stock by means of suitable measurements and transferring into a 3D view. Input data can be obtained from existing documents, land surveys, 3D scans, photogrammetry or a combination those.
UC 14	Clash Detection	A Model Use representing the use of 3D Models to coordinate different disciplines (e.g. structural and mechanical) and to identify/resolve possible clashes between virtual elements prior to actual construction or fabrication
UC 22	Construction Planning	A Model Use where the BIM model is used to plan, organise or test construction activities against constraints (e.g. time, human resources and materials). Support of the planning and communication of logistic flow of construction by means of 4D and 5D models.
UC 23	Cost Estimation	Establishing structured and component-related quantities (volumes, areas, lengths, bill of materials) with the aid of the model as a basis for cost estimates and cost calculations.
UC 32	Site Safety Review	Integrating the project site logistics, materials and equipment use, vehicles, with load and delivery planning schedule data with BIM provides a means to see, prevent, and resolve conflicts. This information is easier to communicate In BIM. The model can be used for approvals, reviews, and safety training.
UC 33	Occupational Health and Safety Planning	Represent safety-relevant aspects (e.g. restricted areas, access restrictions, escape routes, firefighting, operational processes, etc.) in the model, possibly in connection with temporary construction conditions or facilities. Carrying out security-relevant documentation and control processes during construction, for example using digital forms on mobile devices.
UC 45	Existing Conditions Modelling	Representation, if necessary, assessment of the condition of the building by locating defects in model, or information about the details of the carried-out inspections.

UC 47	Construction Monitoring	Authoring a model of both permanent and temporary facilities on a site during multiple phases of the construction process to communicate the physical site conditions and plan the overall logistics. It may also be linked with the construction activity schedule to convey space and sequencing requirements. Additional information incorporated into the model can include labor resources, materials with associated deliveries, and equipment location. Because the 3D model components can be directly linked to the schedule, site management functions such as visualized planning, short-term re-planning, and resource analysis can be analyzed over different spatial and temporal data.

Table 2 model use involved in the HumanTech project and consequently in the IDM for the BIMxD platform.

3.2. Objects

In the context of the Human Tech project, the following Objects related to the BIMxD platform are described. Each Object is accompanied by a generic Name and a corresponding code for better identification. In cases where additional clarity is required, an additional description is provided. The mapping of these Objects to the IFC data model is presented for both IFC 4.0 ADD2 and IFC 4.3 versions. The latter version, currently undergoing ISO 16739 voting, holds particular importance for the infrastructure domain.

There are two primary physical groups of Object components: one related to the building domain and another related to the bridge domain.

Additionally, the Tasks, following both the IFC schema and the BCF schema, are listed. Finally, a list of how material should be defined in the BIM models is provided.

Objects Building

Name	Code	Type	Description	IFC 4.3	IFC 4 Add2
Architectural Field	1	Group			
Wall	1-01	Object		IfcWall	IfcWall
Floor	1-02	Object		IfcCovering.PredefinedType.FLOORING	IfcCovering.PredefinedType.FLOORING
Door	1-03	Object		IfcDoor	IfcDoor
Window	1-04	Object		IfcWindow	IfcWindow
Roof	1-05	Object		IfcRoof	IfcRoof
Curtain Wall	1-06	Object		IfcCurtainWall	IfcCurtainWall
Stair	1-07	Object		IfcStair	IfcStair
Ceiling	1-08	Object		IfcCovering.PredefinedType.CEILING	IfcCovering.PredefinedType.CEILING
Railing	1-09	Object		IfcRailing.PredefinedType.BALUSTRADE	IfcRailing.PredefinedType.BALUSTRADE
Ramp	1-10	Object		IfcRamp	IfcRamp
Structural Field	2	Group			
Beam	2-01	Object		IfcBeam	IfcBeam
Footing	2-02	Object		IfcFooting	IfcFooting
Pile	2-03	Object		IfcPile	IfcPile
Member	2-04	Object		IfcMember	IfcMember
Column	2-05	Object		IfcColumn	IfcColumn
Plate	2-06	Object		IfcPlate	IfcPlate

Name	Code	Type	Description	IFC 4.3	IFC 4 Add2
Reinforcing Bar	2-07	Object		IfcReinforcingBar	IfcReinforcingBar
Stair	2-08	Object		IfcStair	IfcStair
Ramp structural	2-09	Object		IfcRamp	IfcRamp
Slab	2-10	Object		IfcSlab.PredefinedType.FLOOR	IfcSlab.PredefinedType.FLOOR
MEP Field	3	Group			
AirTerminal	3-01	Object		IfcAirTerminal	IfcAirTerminal
Boiler	3-02	Object		IfcBoiler	IfcBoiler
Chiller	3-03	Object		IfcChiller	IfcChiller
Compressor	3-04	Object		IfcCompressor	IfcCompressor
Condencer	3-05	Object		IfcCondenser	IfcCondenser
Damper	3-06	Object		IfcDamper	IfcDamper
Duct	3-07	Object		IfcDuctSegment	IfcDuctSegment
Duct Fitting	3-08	Object		IfcDuctFitting	IfcDuctFitting
Heat Exchanger	3-09	Object		IfcHeatExchanger	IfcHeatExchanger
Lamp	3-10	Object		IfcLamp	IfcLamp
Unitary Equipment	3-11	Object		IfcUnitaryEquipment	IfcUnitaryEquipment
Pipe	3-12	Object		IfcPipeSegment	IfcPipeSegment
Pipe fitting	3-13	Object		IfcPipeFitting	IfcPipeFitting
Pump	3-14	Object		IfcPump	IfcPump
Tank	3-15	Object		IfcTank	IfcTank

Name	Code	Type	Description	IFC 4.3	IFC 4 Add2
Valve	3-16	Object		IfcValve	IfcValve
Light Fixture	3-21	Object		IfcBuiltElement	IfcBuildingElementProxy
Task	4	Group	A task is a specific activity or assignment that needs to be completed as part of a project. It's a discrete unit of work contributing to the overall objectives.		
BCF	4-01	Object			
Task object	4-02	Group	An IfcTask is an identifiable unit of work to be carried out in a construction project.		
Adjustment	4-02.01	Object	Making changes to the physical configuration of something.	IfcTask.PredefinedType.USERDEFINED[ADJUSTMENT]	IfcTask.PredefinedType.USERDEFINED[ADJUSTMENT]
Attendance	4-02.02	Object	Attendance or waiting on other things happening.	IfcTask.PredefinedType.ATTENDANCE	IfcTask.PredefinedType.ATTENDANCE
Calibration	4-02.03	Object	Making changes to the operational configuration of something.	IfcTask.PredefinedType.USERDEFINED[CALIBRATION]	IfcTask.PredefinedType.USERDEFINED[CALIBRATION]
Construction	4-02.04	Object	Constructing or building something.	IfcTask.PredefinedType.CONSTRUCTION	IfcTask.PredefinedType.CONSTRUCTION
Demolition	4-02.05	Object	Demolishing or breaking down something.	IfcTask.PredefinedType.DEMOLITION	IfcTask.PredefinedType.DEMOLITION
Dismantle	4-02.06	Object	Taking something apart carefully so that it can be recycled or reused.	IfcTask.PredefinedType.DISMANTLE	IfcTask.PredefinedType.DISMANTLE

Name	Code	Type	Description	IFC 4.3	IFC 4 Add2
Disposal	4-02.07	Object	Disposing or getting rid of something.	IfcTask.PredefinedType.DISPOSAL	IfcTask.PredefinedType.DISPOSAL
Emergency	4-02.08	Object	Tasks required when responding to, or ensuring the ability to respond to, an emergency situation.	IfcTask.PredefinedType.USERDEFINED[EMERGENCY]	IfcTask.PredefinedType.USERDEFINED[EMERGENCY]
Inspection	4-02.09	Object	Check if something is installed and is operating within expected parameters.	IfcTask.PredefinedType.USERDEFINED[INSPECTION]	IfcTask.PredefinedType.USERDEFINED[INSPECTION]
Installation	4-02.10	Object	Installing something (equivalent to construction but more commonly used for engineering tasks).	IfcTask.PredefinedType.INSTALLATION	IfcTask.PredefinedType.INSTALLATION
Logistic	4-02.11	Object	Transportation or delivery of something.	IfcTask.PredefinedType.LOGISTIC	IfcTask.PredefinedType.LOGISTIC
Maintenance	4-02.12	Object	Tasks required to keep an object in good working order.	IfcTask.PredefinedType.MAINTENANCE	IfcTask.PredefinedType.MAINTENANCE
Move	4-02.13	Object	Moving things from one place to another.	IfcTask.PredefinedType.MOVE	IfcTask.PredefinedType.MOVE
Operation	4-02.14	Object	A procedure undertaken to start up the operation an artifact.	IfcTask.PredefinedType.OPERATION	IfcTask.PredefinedType.OPERATION
Removal	4-02.15	Object	Removal of an item from use and taking it from its place of use.	IfcTask.PredefinedType.REMOVAL	IfcTask.PredefinedType.REMOVAL
Renovation	4-02.16	Object	Bringing something to an 'as-new' state.	IfcTask.PredefinedType.RENOVATION	IfcTask.PredefinedType.RENOVATION

Name	Code	Type	Description	IFC 4.3	IFC 4 Add2
Safety	4-02.17	Object	Tasks required to ensure safe use of the object. For example electrical 'lock-out' instructions.	IfcTask.PredefinedType.USERDEFINED[SAFETY]	IfcTask.PredefinedType.USERDEFINED[SAFETY]
Shutdown	4-02.18	Object	The set of tasks required for an orderly shut down without adverse impacts, typically applied to systems.	IfcTask.PredefinedType.USERDEFINED[SHUTDOWN]	IfcTask.PredefinedType.USERDEFINED[SHUTDOWN]
Startup	4-02.19	Object	The set of tasks required to begin or restart operation without adverse impacts, typically applied to systems.	IfcTask.PredefinedType.USERDEFINED[STARTUP]	IfcTask.PredefinedType.USERDEFINED[STARTUP]
Testing	4-02.20	Object	The set of tasks required to evaluate the performance of an object, to ensure if something is installed and is operating within expected parameters.	IfcTask.PredefinedType.USERDEFINED[TESTING]	IfcTask.PredefinedType.USERDEFINED[TESTING]
Troubleshooting	4-02.21	Object	The set of tasks required to diagnose commonly encountered performance problems, typically applied to element types and systems.	IfcTask.PredefinedType.USERDEFINED[TROUBLESHOOTING]	IfcTask.PredefinedType.USERDEFINED[TROUBLESHOOTING]
Spatial Element Field	6	Group	A spatial element is the generalization of all spatial elements that might be used to define a spatial structure or to define spatial zones.		
Storey	6-01	Object	The building storey has an elevation and typically	IfcBuildingStorey	IfcBuildingStorey

Name	Code	Type	Description	IFC 4.3	IFC 4 Add2
			represents a (nearly) horizontal aggregation of spaces that are vertically bound.		
Room	6-02	Object	A space represents an area or volume bounded actually or theoretically. Spaces are areas or volumes that provide for certain functions within a building.	IfcSpace	IfcSpace

Objects Bridge

	Name	Code	Type	IFC 4.3	IFC 4 Add2
Spatial Structure		0	Group		
	Site	0-00	Object	IfcSite	IfcSite
	Bridge	0-01	Object	IfcBridge	IfcBuilding
	Road	0-02	Object	IfcRoad	IfcBuilding
	Substructure	0-02	Object	IfcBridgePart	IfcBuildingStorey
	Substructure	0-03	Object	IfcBridgePart	IfcBuildingStorey
	Superstructure	0-04	Object	IfcBridgePart	IfcBuildingStorey
	Surfacestructure	0-05	Object	IfcBridgePart	IfcBuildingStorey
	Abutment	0-06	Object	IfcBridgePart	IfcBuildingStorey
	Pier	0-07	Object	IfcBridgePart	IfcBuildingStorey
	Foundation	0-08	Object	IfcBridgePart	IfcBuildingStorey
	Deck	0-09	Object	IfcBridgePart	IfcBuildingStorey
	Deck_Segment	0-10	Object	IfcBridgePart	IfcBuildingStorey
Geometrical Domain		A	Group	Geometrical Domain	Geometrical Domain
Drainage Domain		D	Group	Drainage Domain	Drainage Domain
	Stormwater Drainage Piping	D-01.1	Object	IfcLamp	IfcLamp
	Pump	D-02	Object	IfcPump	IfcPump
	Tank	D-03	Object	IfcTank	IfcTank
	Valve	D-04	Object	IfcValve	IfcValve
Geotechnical Domain		G	Group	Geotechnical Domain	Geotechnical Domain
	Embankment	G-01.1	Object	IfcEarthworksFill.PredefinedType.EMBANKMENT	IfcBuildingElementProxy

	Name	Code	Type	IFC 4.3	IFC 4 Add2
	Excavation	G-02.1	Object	IfcEarthworksCut.PredefinedType.EXCAVATION	IfcBuildingElementProxy
Hydraulic Domain		J	Group	Hydraulic Domain	Hydraulic Domain
	Trench	J-01.1	Object		
Transportation Domain		R	Group	Transportation Domain	Transportation Domain
	Wearing Course	R-01.1	Object	IfcCourse.PredefinedType.USERDEFINED[WEARINGCOURSE]	
	Binder Course	R-01.2	Object	IfcCourse.PredefinedType.USERDEFINED[BINDERCOURSE]	
	Base Course	R-01.3	Object	IfcCourse.PredefinedType.USERDEFINED[BASECOURSE]	IfcBuildingElementProxy
	Subbase course	R-01.4	Object	IfcCourse.PredefinedType.USERDEFINED[SUBBASE]	
	Guardrail	R-02.1	Object	IfcRailing.PredefinedType.GUARDRAIL	IfcRailing.PredefinedType.GUARDRAIL
	Guardrail Beam	R-02.2	Object	IfcRailing.PredefinedType.USERDEFINED[BEAM_RAILING]	IfcBuildingElementProxy
	Guardrail Wrapend	R-02.3	Object	IfcRailing.PredefinedType.USERDEFINED[RAILING_WRAPEND]	IfcBuildingElementProxy
	Guardrail Support	R-02.4	Object	IfcMember.PredefinedType.USERDEFINED[RAILING.SUPPORT]	IfcBuildingElementProxy
Structural Domain		S	Group	Structural Domain	Structural Domain
	WingWall	S-01	Object	IfcWall.PredefinedType.SOLIDWALL	IfcWall
	StemWall	S-01.1	Object	IfcWall.PredefinedType.RETAININGWALL	IfcWall.PredefinedType.USERDEFINED[RETAINING WALL]
	BackWall	S-01.3	Object	IfcWall.PredefinedType.RETAININGWALL	IfcWall.PredefinedType.USERDEFINED[RETAINING WALL]
	PierStem	S-02.1	Object	IfcColumn.PredefinedType.PIERSTEM	IfcColumn.PredefinedType.USERDEFINED[PIERSTEM]
	Pier cap	S-03.1	Object	IfcBeam.PredefinedType.PIERCAP	IfcBeam.PredefinedType.USERDEFINED[PIERCAP]
	Pile driven	S-04.1	Object	IfcPile.PredefinedType.DRIVEN	IfcPile.PredefinedType.BORED

	Name	Code	Type	IFC 4.3	IFC 4 Add2
	Pile Cap	S-05.1	Object	IfcFooting.PredefinedType.PILE_CAP	IfcFooting.PredefinedType.PILE_CAP
	Mat Foundation	S-06.1	Object	IfcSlab.PredefinedType.BASESLAB	IfcSlab.PredefinedType.BASESLAB
	Approach slab	S-06.2	Object	IfcSlab.PredefinedType.APPROACH_SLAB	IfcSlab.PredefinedType.USERDEFINED[APPROACH_SLAB]
	Deck	S-06.3	Object	IfcSlab.PredefinedType.FLOOR	IfcSlab.PredefinedType.FLOOR
	Brace	S-07.1	Object	IfcMember.PredefinedType.BRACE	IfcMember.PredefinedType.BRACE
	Girder Segment	S-08.1	Object	IfcBeam.PredefinedType.GIRDER_SEGMENT	IfcBeam.PredefinedType.USERDEFINED[GIRDER_SEGMENT]
	Girder	S-08.2	Object	IfcElementAssembly.PredefinedType.GIRDER	IfcElementAssembly.PredefinedType.GIRDER
	Transversal Beam	S-08.4	Object	IfcBeam.PredefinedType.USERDEFINED[TRANSVERSAL_BEAM]	IfcBeam.PredefinedType.USERDEFINED[TRANSVERSAL_BEAM]
	Edge beam	S-08.5	Object	IfcBeam.PredefinedType.EDGEBEAM	IfcBeam.PredefinedType.USERDEFINED[EDGEBEAM]
	Cross Bracing	S-09.3	Object	IfcElementAssembly.PredefinedType.CROSS_BRACING	IfcElementAssembly.PredefinedType.USERDEFINED[CROSS_BRACING]
	Stud	S-10.1	Object	IfcMechanicalFastener.PredefinedType.STUDSHEARCONNECTOR	IfcMechanicalFastener.PredefinedType.STUDSHEARCONNECTOR
	Dowel	S-10.2	Object	IfcMechanicalFastener.PredefinedType.DOWEL	IfcMechanicalFastener.PredefinedType.DOWEL
	Bolt	S-10.3	Object	IfcMechanicalFastener.PredefinedType.ANCHORBOLT	IfcMechanicalFastener.PredefinedType.ANCHORBOLT
	Weld	S-11.2	Object	IfcFastener.PredefinedType.WELD	IfcFastener.PredefinedType.WELD
	Bearing Support	S-12.1	Object	IfcMember.PredefinedType.USERDEFINED[BEARING_SUPPORT]	IfcMember.PredefinedType.USERDEFINED[BEARING_SUPPORT]
	Bearing Cylindrical	S-13.1	Object	IfcBearing.PredefinedType.ELASTOMERIC	IfcBuildingElementProxy.PredefinedType.USERDEFINED[BEARING.ELASTOMERIC]
	Tendon	S-14.1	Object	IfcTendonConduit.PredefinedType.COUPLER	IfcTendon.PredefinedType.USERDEFINED[CONDUIT.COUPLER]
	Tendon Duct	S-14.2	Object	IfcTendonConduit.PredefinedType.DUCT	IfcTendon.PredefinedType.USERDEFINED[DUCT]
	Anchor Head	S-14.3	Object	IfcTendonAnchor.PredefinedType.FIXED_END	IfcTendonAnchor.PredefinedType.FIXED_END

	Name	Code	Type	IFC 4.3	IFC 4 Add2
	Anchor Blister	S-14.4	Object	IfcMember.PredefinedType.USERDEFINED[ANCHOR_BLISTER]	IfcMember.PredefinedType.USERDEFINED[ANCHOR_BLISTER]
	Deck Joint	S-15.01	Object	IfcDiscreteAccessory.PredefinedType.EXPANSION_JOINT_DEVICE	IfcDiscreteAccessory.PredefinedType.USERDEFINED[EXPANSION_JOINT_DEVICE]

Task

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
Task properties	**04-**	**Group**				
Name	04-1	Property				IfcElement Attributes.Name
Status	04-2	Property		Label	*.Status	IfcTask atributes.Status
WorkMethod	04-3	Property	The method of work used in carrying out a task.	Label	IfcTask attributes.WorkMethod	IfcTask Attributes.WorkMethod
IsMilestone	04-4	Property	Identifies whether a task is a milestone task	Boolean		IfcTask Attributes.IsMilestone
Priority	04-5	Property	A value that indicates the relative priority of the task (in comparison to the priorities of other tasks).	Real		IfcTask Attributes.Priority
TaskTime	04-6	Property	Time related information for the task.	Time		IfcTask Attributes.TaskTime
BCF properties	**05**	**Group**				
BCF ProjectFile	**05.1**	**Group**				
ProjectId	05.1.1	Property	ProjectId of the project	Identifier		
Name	05.1.2	Property	Name of the project.	Label		
BCF Header	**05.2**	**Group**				

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
IfcProject	05.2.1	Property	IfcGuid Reference to the project to which this topic is related in the IFC file	Identifier		
IfcSpatialStructureElement	05.2.2	Property	IfcGuid Reference to the spatial structure element, e.g. IfcBuildingStorey, to which this topic is related.	Identifier		
IsExternal	05.2.3	Property	Is the IFC file external or within the bcfzip. (Default = true).	Boolean		
Filename	05.2.4	Property	The BIM file related to this topic. For IFC files this is the first item in the FILE_NAME entry in the IFC file's header.	Label		
Date	05.2.5	Property	Date of the BIM file. For IFC files this is the second entry of the FILE_NAME entry in the IFC file's header. When the timestamp given in the header does not provide timezone, it is interpreted as UTC.	Date.Year, month and day (YYYY-MM-DD)		
Reference	05.2.6	Property	URI to IfcFile.	Text		
BCF Topic	**05.3**	**Group**				
Guid	05.3.01	Property	Guid of the topic, in lowercase	Identifier		
ServerAssignedId	05.3.02	Property	A server controlled, user friendly and project-unique issue identifier. Clients provided values will be	Label		

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
			disregarded by the server			
TopicType	05.3.03	Property	Type of the topic	Label		
Clash		Value				
Inquiry		Value				
Issue		Value				
Remark		Value				
Request		Value				
TopicStatus	05.3.04	Property	Status of the topic	Label		
Closed	05.3.04.a	Value				
Open	05.3.04.b	Value				
Solved	05.3.04.c	Value				
ReferenceLink	05.3.05	Property	List of references to the topic, for example, a work request management system or an URI to a model.	Text		
Title	05.3.06	Property	Title of the topic.	Label		
Priority	05.3.07	Property	Topic priority (Predefined list in “extensions.xml”).	Label		
Index	05.3.08	Property	Number to maintain the order of the topics. This property is deprecated and will be removed in a future release.	Text		
Labels	05.3.09	Property	Tags for grouping Topics (Predefined list in “extensions.xml”).	Label		
CreationDate	05.3.10	Property	Date when the topic was created.	Date.Year, month and day		

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
				(YYYY-MM-DD)		
CreationAuthor	05.3.11	Property	User who created the topic.	Text		
ModifiedDate	05.3.12	Property	Date when the topic was last modified. Exists only when Topic has been modified after creation.	Date.Year, month and day (YYYY-MM-DD)		
ModifiedAuthor	05.3.13	Property	User who modified the topic. Exists only when Topic has been modified after creation.	Text		
DueDate	05.3.14	Property	Date until when the topics issue needs to be resolved.	Date.Year, month and day (YYYY-MM-DD)		
AssignedTo	05.3.15	Property	The user to whom this topic is assigned to. Recommended to be in email format (Predefined list in “extensions.xml”).	Text		
Description	05.3.16	Property	Description of the topic.	Text		
Stage	05.3.17	Property	Stage this topic is part of (Predefined list in “extensions.xml”).	Label		
BCF BIMSnippet	**05.4**	**Group**				
SnippetType	05.4.1	Property	Type of the Snippet	Label		
IsExternal	05.4.2	Property	Is the BimSnippet external or within the bcfzip.	Boolean		
Reference	05.4.3	Property	URI to BimSnippet.	Text		

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
ReferenceSchema	05.4.4	Property	URI to BimSnippetSchema	Text		
BCF DocumentReferences	**05.5**	**Group**				
Guid	05.5.1	Property	Guid attribute for identifying the reference uniquely	Identifier		
DocumentGuid	05.5.2	Property	Guid of the referenced document	Identifier		
Url	05.5.3	Property	Url of an external document.	Text		
Description	05.5.4	Property	Human readable description of the document reference	Text		
BCF RelatedTopic	**05.6**	**Group**				
RelatedTopic/Guid	05.6.1	Property	List of GUIDs of the referenced topics.	Identifier		
BCF Comment	**05.7**	**Group**				
Date	05.7.1	Property	Date of the comment	Date.Year, month and day (YYYY-MM-DD)		
Author	05.7.2	Property	Comment author	Text		
Comment	05.7.3	Property	The comment text, must not be empty if provided	Text		
Viewpoint	05.7.4	Property	Back reference to the viewpoint GUID.	Identifier		
ModifiedDate	05.7.5	Property	The date when comment was modified	Date.Year, month and day (YYYY-MM-DD)		
ModifiedAuthor	05.7.6	Property	The author who modified the comment	Text		
BCF Viewpoint	**05.8**	**Group**				

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
Viewpoint	05.8.1	Property	Filename of the viewpoint (.bcfv)	Label		
Snapshot	05.8.2	Property	Filename of the snapshot (png or jpeg)	Label		
Index	05.8.3	Property	Parameter for sorting	Real		

Materials

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
Material properties	06-02	Group				
Common Material properties	06-02.01	Group	A set of thermal material properties.		Pset_MaterialCommon	Pset_MaterialCommon
MolecularWeight	06-02.01.1	Property	Molecular weight of material (typically gas).	Molecular Weight	Pset_MaterialCommon.MolecularWeight	Pset_MaterialCommon.MolecularWeight
Porosity	06-02.01.2	Property	The void fraction of the total volume occupied by material (Vbr - Vnet)/Vbr.	Ratio (normalised, 0-1)	Pset_MaterialCommon.Porosity	Pset_MaterialCommon.Porosity
MassDensity	06-02.01.3	Property	Material mass density.	Mass Density	Pset_MaterialCommon.Mass Density	Pset_MaterialCommon.Mass Density
Thermal material properties	06-02.02	Group	A set of thermal material properties.		Pset_MaterialThermal	Pset_MaterialThermal
SpecificHeatCapacity	06-02.02.1	Property	Defines the specific heat capacity of a material.	Heating Value	Pset_MaterialThermal.SpecificHeatCapacity	Pset_MaterialThermal.SpecificHeatCapacity
BoilingPoint	06-02.02.2	Property	The boiling point of the material (fluid).	ThermodynamicTemperature	Pset_MaterialThermal.BoilingPoint	Pset_MaterialThermal.BoilingPoint
FreezingPoint	06-02.02.3	Property	The freezing point of the material (fluid).	ThermodynamicTemperature	Pset_MaterialThermal.FreezingPoint	Pset_MaterialThermal.FreezingPoint

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
ThermalConductivity	06-02.02.4	Property	The thermal conductivity of the object.	Thermal Conductivity	Pset_MaterialThermal.ThermalConductivity	Pset_MaterialThermal.ThermalConductivity
Mechanical material properties	06-02.03	Group	A set of thermal material properties.		Pset_MaterialMechanical	Pset_MaterialMechanical
DynamicViscosity	06-02.03.1	Property	A measure of the viscous resistance of the material.	Dynamic Viscosity	Pset_MaterialMechanical.DynamicViscosity	Pset_MaterialMechanical.DynamicViscosity
YoungModulus	06-02.03.2	Property	A measure of the Young's modulus of elasticity of the material.	Modulus Of Elasticity	Pset_MaterialMechanical.YoungModulus	Pset_MaterialMechanical.YoungModulus
ShearModulus	06-02.03.3	Property	A measure of the shear modulus of elasticity of the material.	Modulus Of Elasticity	Pset_MaterialMechanical.ShearModulus	Pset_MaterialMechanical.ShearModulus
PoissonRatio	06-02.03.4	Property	A measure of the lateral deformations in the elastic range.	Ratio (positive, >0)	Pset_MaterialMechanical.PoissonRatio	Pset_MaterialMechanical.PoissonRatio
ThermalExpansionCoefficient	06-02.03.5	Property	Quantity characterizing the variation with thermodynamic temperature T of the distance l between two points of a body, under given conditions (IEC 113-04-27). The ratio is defined per Kelvin.	Thermal Expansion Coefficient	Pset_MaterialMechanical.ThermalExpansionCoefficient	Pset_MaterialMechanical.ThermalExpansionCoefficient
Shape Material Properties	06-02.00	Group	Association of material with some shape parameters or assignments to identified parts of a component.			
Material Shape Name	06-02.00.2	Property	The name by which the material shape is known.	Label	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
Material of the Shape	06-02.00.3	Property	Reference to the material from which the material shape is constructed.	Identifier	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material
Material Shape Category	06-02.00.4	Property	Category of the material shape, e.g. the role it has in the material shape set it belongs to.	Label	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category
LayerThickness	06-02.00.5	Property	The thickness of the material layer. The meaning of "thickness" depends on its usage.	Length (positive, >0)	IfcMaterial* Attributes.LayerThickness	IfcMaterial* Attributes.LayerThickness
IsVentilated	06-02.00.6	Property	Indication of whether the material layer represents an air layer (or cavity).	Logical	IfcMaterial* Attributes.IsVentilated	IfcMaterial* Attributes.IsVentilated
Material Shape Description	06-2.00	Property	Definition of the material shape in descriptive terms.	Text	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description

Geometry and Properties

Geometry

Name	Code	Type	Description	IFC 4.3	IFC 4 Add2
Geometry General	03-00	Group	-		
LOG 100		Geometry (LoG)	The model is created either as a simple mass model or on the basis of the room and function program and does not necessarily have to contain individual room-forming model elements. It is used for brainstorming, urban classification and communication with the client. The model elements can also be represented schematically in the model with symbols or other general illustrations. An exact typing of the model elements is not yet necessary at this point. The rooms and the building envelope must be modeled.		
LOG 200		Geometry (LoG)	The model elements are modeled in the model as general objects, assemblies or systems with approximate quantities, approximate size, location, and orientation. The model also contains the spatial model, which is defined automatically via the space-limiting model elements.		
LOG 300		Geometry (LoG)	The model elements are modeled in the model as systems, objects or assemblies with specific quantities, specific size, location and orientation, layer structure and the breakthroughs. The model contains the continued spatial model.		
LOG 400		Geometry (LoG)	The model elements are shown in the model as systems, objects or assemblies with exact quantities, specific size, location, and orientation, including assembly, installation and manufacturer information.		
LOG 500		Geometry (LoG)	The model elements are a verified illustration of the installed components with regard to size, quantities, appearance, location and orientation.		
Geometry Wall (load bearing)	03-01	Group	-		
LOG 100 - Wall (load bearing)		Geometry (LoG)	The position of the walls is shown either schematically or geometrically with an approximate, yet flexible geometry (e.g. uniform thickness). A mass model often represents the entire structure in this planning phase.		
LOG 200 - Wall (load bearing)		Geometry (LoG)	The load-bearing walls are modeled in their approximate shape, size and location (e.g. thickness according to the wall category). If there are multiple layers, only the load-bearing layers are modeled. The location and size of the possible openings are also shown approximately if they are statically relevant.		
LOG 300 - Wall (load bearing)		Geometry (LoG)	The load-bearing walls are modeled according to level 300, only the statically relevant layers are taken into account. If the wall contains reinforcements and other structurally relevant built-in parts, these are also modeled based on the static calculations.		
LOG 400 - Wall (load bearing)		Geometry (LoG)	All components, layers, connections, openings, openings for windows and / or doors and reinforcements (if included), details for prefabrication and assembly (if required) are modeled in detail in 3D. The model element contains all geometrical details for the production.		
LOG 500 - Wall (load bearing)		Geometry (LoG)	Complete modeling of the walls, without reinforcement and assembly details, in the concrete, built state as part of the object documentation and for archiving the stock.		
Geometry Wall (non bearing)	03-01	Group	-		
LOG 100 - Wall (non bearing)		Geometry (LoG)	The position of the walls is shown either schematically or geometrically with an approximate, yet flexible geometry (e.g. uniform thickness). A mass model often represents the entire structure in this planning phase.		

Name	Code	Type	Description	IFC 4.3	IFC 4 Add2
LOG 200 - Wall (non bearing)		Geometry (LoG)	The walls are modeled in their approximate shape, size and location (e.g. thickness according to the wall category). The layer structure is still flexible. The location and size of the possible openings are also shown approximately if they are statically relevant.		
LOG 300 - Wall (non bearing)		Geometry (LoG)	The walls are modeled in their exact shape, size and location. The wall layer structure is also modeled exactly. The openings for doors and windows and other larger wall openings are modeled in their exact shape, size and location.		
LOG 400 - Wall (non bearing)		Geometry (LoG)	All components, layers, connections, openings, openings for windows and / or doors and reinforcements (if included), details for prefabrication and assembly (if required) are modeled in detail in 3D. The model element contains all geometrical details for the production.		
LOG 500 - Wall (non bearing)		Geometry (LoG)	Complete modeling of the walls, without reinforcement and assembly details, in the concrete, built state as part of the object documentation and for archiving the stock.		
Geometrie Cable Carrier	03-02	Group	-		
LOG 100 - Cable Carrier		Geometry (LoG)	No representation or schematic representation of the space required for the routing of the cable carriers. Representation over a replacement geometry "dummy body" with approximate position and geometry for the space requirement.		
LOG 200 - Cable Carrier		Geometry (LoG)	Generic modeling of the main cable carriers with approximate location, geometry and dimensions.		
LOG 300 - Cable Carrier		Geometry (LoG)	Exact modeling of the cable carrier with regard to the position, geometry and dimensions, possibly with modeling of the main cable.		
LOG 400 - Cable Carrier		Geometry (LoG)	Transfer of the manufacturer-specific information based on the geometric modeling in LoG 350, if necessary transfer of the geometries from the BIM libraries of the manufacturers.		
LOG 500 - Cable Carrier		Geometry (LoG)	Acceptance of the built state as part of the object documentation and for archiving the inventory.		
Geometry Beam	03-03	Group	-		
LOG 100 - Beam		Geometry (LoG)	The position of the beam is shown either schematically or geometrically with an approximate, yet flexible geometry. A mass model often represents the entire structure in this planning phase.		
LOG 200 - Beam		Geometry (LoG)	The beam are modeled in their approximate shape, size and location. The location and size of the possible openings are also shown approximately.		
LOG 300 - Beam		Geometry (LoG)	The beam are modeled in their exact shape, size and location. Openings and openings are modeled in their exact shape, size and location.		
LOG 400 - Beam		Geometry (LoG)	The beam contain all manufacturing details. All components, layers, connections, openings, openings and reinforcements (if included), details for prefabrication and assembly (if required) are modeled in detail.		
LOG 500 - Beam		Geometry (LoG)	Complete modeling of the beams, without reinforcement and assembly details, in the concrete, built state. Part of the object documentation and for archiving the inventory.		
Geometry Column	03-04	Group	-		
LOG 100 - Column		Geometry (LoG)	The position of the column is shown either schematically or geometrically with an approximate, yet flexible geometry. A mass model often represents the entire structure in this planning phase.		
LOG 200 - Column		Geometry (LoG)	The column are modeled in their approximate shape, size and location.		

Name	Code	Type	Description	IFC 4.3	IFC 4 Add2
LOG 300 - Column		Geometry (LoG)	The column are modeled in their exact shape, size and position including their connections, openings and recesses.		
LOG 400 - Column		Geometry (LoG)	The column contain all manufacturing details. All components, connections, openings and the details for prefabrication and assembly (if required) and the entire reinforcement in bending form are modeled in detail in 3D.		
LOG 500 - Column		Geometry (LoG)	Complete modeling of the column, without reinforcement and assembly details, in the concrete, built state. Part of the object documentation and for archiving the stock.		
Geometry Slab	03-05	Group	-		
LOG 100 - Slab		Geometry (LoG)	The position of the slab is represented either schematically or geometrically with an approximate, yet flexible geometry. A mass model often represents the entire structure in this planning phase.		
LOG 200 - Slab		Geometry (LoG)	The slab are modeled in their approximate shape, size and location. The slab structure is still flexible. The location and size of the possible openings are also shown approximately.		
LOG 300 - Slab		Geometry (LoG)	The slab are modeled in their exact shape, size and location. The slab structure is also modeled exactly. Openings and openings are modeled in their exact shape, size and location.		
LOG 400 - Slab		Geometry (LoG)	The slab contain all the details of the manufacture. All components, layers, connections, openings, openings and reinforcements (if included), details for prefabrication and assembly (if required) are modeled in detail.		
LOG 500 - Slab		Geometry (LoG)	Complete modeling of the slab, without reinforcement and assembly details, in the concrete, built state. Part of the object documentation and for archiving the inventory.		
Geometry Door	03-06	Group	-		
LOG 100 - Door		Geometry (LoG)	The position of the doors is represented either schematically or geometrically with an approximate, yet flexible geometry. A mass model often represents the entire structure in this planning phase.		
LOG 200 - Door		Geometry (LoG)	The doors are modeled in their approximate shape, size and location. The opening type and direction is specified.		
LOG 300 - Door		Geometry (LoG)	The doors are modeled in their exact shape, size, with all frame details, opening sashes.		
LOG 350 - Door		Geometry (LoG)	The doors are modeled in their exact shape, size, with all frame details, opening sashes and other connections.		
LOG 400 - Door		Geometry (LoG)	The doors contain all manufacturing details. All components, connections and the details for prefabrication and assembly are modeled in detail. If necessary, the manufacturer's BIM objects are used.		
LOG 500 - Door		Geometry (LoG)	Complete modeling of the doors in the exact, built condition. Part of the object documentation and for archiving the stock.		
Geometry Roof	03-07	Group	-		
LOG 100 - Roof		Geometry (LoG)	The position of the roof is represented either schematically or geometrically with an approximate, yet flexible geometry. A mass model often represents the entire structure in this planning phase.		
LOG 200 - Roof		Geometry (LoG)	The roof is modeled in its approximate shape, size and location. The roof structure is still flexible. The location and size of the possible openings are also shown approximately.		
LOG 300 - Roof		Geometry (LoG)	The roof is modeled in its exact shape, size and location. The roof structure is also modeled exactly. Openings and openings are modeled in their exact shape, size and location.		
LOG 400 - Roof		Geometry (LoG)	The roof contains all the details about the production. All components, layers, connections, openings, openings and		

Name	Code	Type	Description	IFC 4.3	IFC 4 Add2
			reinforcements (if available), details for prefabrication and assembly (if necessary) are modeled in detail.		
LOG 500 - Roof		Geometry (LoG)	Complete modeling of the roof, without reinforcement and assembly details, in the concrete, built state. Part of the object documentation and for archiving the inventory.		
Geometry Window	03-07	Group	-		
LOG 100 - Window		Geometry (LoG)	The position of the windows is represented either schematically or geometrically with an approximate, yet flexible geometry. A mass model often represents the entire structure in this planning phase.		
LOG 200 - Window		Geometry (LoG)	The windows are modeled in their approximate shape, size and location.		
LOG 300 - Window		Geometry (LoG)	The windows are modeled in their exact shape, size, with all frame details, opening sashes.		
LOG 350 - Window		Geometry (LoG)	The windows are modeled in their exact shape, size, with all frame details, opening sashes and other connections.		
LOG 400 - Window		Geometry (LoG)	The windows contain all the details about the production. All components, manufacturer information, connections and the details for prefabrication and assembly are modeled in detail. Possibly. the BIM objects of the manufacturers are used.		
LOG 500 - Window		Geometry (LoG)	Complete modeling of the windows in the concrete, built state. Part of the object documentation and for archiving the inventory.		
Geometry Footing	03-08	Group	-		
LOG 100 - Footing		Geometry (LoG)	The position of the footing is only described by the area it will occupy. The entire footing is abstracted onto a continuous floor slab, since the concrete position, the dimensions and the type / design of the individual foundations are still undetermined.		
LOG 200 - Footing		Geometry (LoG)	The footing is modeled in its approximate shape, size (dimensions) and location.		
LOG 300 - Footing		Geometry (LoG)	The footing is modeled in its specific shape, size and position including its openings and cutouts. Surfaces, depressions and slopes are modeled.		
LOG 400 - Footing		Geometry (LoG)	The reinforcement is detailed. Reinforcing bars in their bending shapes, connections, connections, bends and seals are modeled. The model element contains all geometrical details for the production. reinforcement		
LOG 500 - Footing		Geometry (LoG)	Complete modeling of the foundation as it was built. Becomes part of the object documentation and the archiving of the inventory.		
Geometry Pile	03-09	Group	-		
LOG 100 - Pile		Geometry (LoG)	The entire footing is abstracted onto a continuous surface, since the concrete location, the dimensions and the type / design of the individual footing are still undetermined.		
LOG 200 - Pile		Geometry (LoG)	The footing is modeled in its approximate shape, size and location.		
LOG 300 - Pile		Geometry (LoG)	The footing is modeled in its specific shape, size and location including the openings and recesses. Surfaces, depressions and slopes are modeled.		
LOG 400 - Pile		Geometry (LoG)	The reinforcement of the footing is detailed. Reinforcing bars in their bending shapes, connections, connections, bends and seals are modeled. The model element contains all geometrical details for the production.		
LOG 500 - Pile		Geometry (LoG)	Complete modeling of the built footing. This becomes part of the object documentation and the archiving of the inventory.		

Name	Code	Type	Description	IFC 4.3	IFC 4 Add2
Geometry MEP Terminal	03-10	Group	-		
LOG 100 - Flow Terminal		Geometry (LoG)	No representation or schematic representation of the space requirement of the building technology component. Representation of a replacement geometry "dummy body" with an approximate position and geometry for the space requirement, especially for large components.		
LOG 200 - Flow Terminal		Geometry (LoG)	The building technology components are modeled in their approximate shape, size and location and, if necessary, connected to the main connection lines (if these have already been modeled in LoG 200). The maintenance room to be reserved is marked spatially.		
LOG 300 - Flow Terminal		Geometry (LoG)	The building technology components are modeled in their exact shape, size and location. The connections to the cable routing are also taken into account. Essential structural details such as suspensions or set-ups must also be modeled.		
LOG 400 - Flow Terminal		Geometry (LoG)	Transfer of the manufacturer-specific information based on the geometric modeling in LoG 350, if necessary transfer of the geometries from the BIM libraries of the manufacturers.		
LOG 500 - Flow Terminal		Geometry (LoG)	Acceptance of the built state as part of the object documentation and for archiving the inventory.		
Shape Material Definition	03-20	Group			
Layer	03-20.01	Group	A single and identifiable part of an element which is constructed of a number of layers (one or more)		
Material Layer Class	03-20.01.0	Property		IfcMaterialDefinition.IfcMaterialLayer	IfcMaterialDefinition.IfcMaterialLayer
IfcMaterialLayerSet	03-20.01.1	Geometry (LoG)	A designation by which materials of an element constructed of a number of material layers is known and through which the relative positioning of individual layers can be expressed.		
IfcMaterialLayer	03-20.01.2	Geometry (LoG)	A single and identifiable part of an element which is constructed of a number of part (one or more) each having an individual material.		
Material profile	03-20.02	Group	A single and identifiable cross section of an element which is constructed of a number of profiles (one or more).		
Material Profile Class	03-20.02.0	Property		IfcMaterialDefinition. IfcMaterialProfile	IfcMaterialDefinition.IfcMaterialProfile
IfcMaterialProfileSet	03-20.02.1	Geometry (LoG)	A designation by which individual material(s) of a prismatic element (for example, beam or column) constructed of a single or multiple material profiles is known.		
IfcMaterialProfile	03-20.02.2	Geometry (LoG)	A single and identifiable part of an element which is constructed of a number of part (one or more) each having an individual material.		
Material constituent	03-20.03	Group	A single and identifiable part of an element which is constructed of a number of part (one or more) each having an individual material.		
Material Constituent Class	03-20.03.0	Property		IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)	A collection of individual material constituents, each assigning a material to a part of an element.		
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)	A single and identifiable part of an element which is constructed of a number of part (one or more) each having an individual material.		

Properties

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
Common Properties	02-00	Group				
Acoustic Rating		Property	Acoustic rating for this object. It is provided according to the national building code. It indicates the sound transmission resistance of this object by an index ratio (instead of providing full sound absorbtion values).	Label	*.AcousticRating	*.AcousticRating
Combustible		Property	Indication whether the object is made from combustible material (TRUE) or not (FALSE).	Boolean	*.Combustible	*.Combustible
Compartmentation		Property	Indication whether the object is designed to serve as a fire compartmentation (TRUE) or not (FALSE).	Boolean	*.Compartmentation	*.Compartmentation
Fire Rating		Property	Fire rating for the element. It is given according to the national fire safety classification.	Label	*.FireRating	*.FireRating
Is External		Property	Indication whether the element is designed for use in the exterior (TRUE) or not (FALSE). If (TRUE) it is an external element and faces the outside of the building.	Boolean	*.IsExternal	*.IsExternal
Load Bearing		Property	Indicates whether the object is intended to carry loads (TRUE) or not (FALSE).	Boolean	*.LoadBearing	*.LoadBearing
Reference		Property	Reference ID for this specified type in this project (e.g. type 'A-1'), Also referred to as "construction type". It should be provided as an alternative to the name of the "object type", if the software does not support object types.	Identifier	*.Reference	*.Reference
Roll		Property	Rotation against the longitudinal axis - relative to the global Z direction for all beams that are non-vertical in regard to the global coordinate system (Profile direction equals global Z is Roll = 0.) The shape information is provided in addition to the shape representation and the geometric parameters used within. In cases of inconsistency between the geometric parameters and the shape properties, provided in the attached property, the geometric parameters take precedence. For geometry editing applications, like CAD: this value should be write-only. Note: new property in IFC4	Plane Angle	*.Roll	*.Roll
Slope		Property	Slope angle - relative to horizontal (0.0 degrees). The shape information is provided in addition to the shape representation and the geometric parameters used within. In cases of inconsistency between the geometric parameters and the shape properties, provided in the attached property, the geometric parameters take precedence. For geometry editing applications, like CAD: this value should be write-only.	Plane Angle	*.Slope	*.Slope
Span		Property	Clear span for this object. The shape information is provided in addition to the shape representation and the geometric parameters used within. In cases of inconsistency between the geometric parameters and the shape properties, provided in the attached property, the geometric parameters take precedence. For	Length (positive, >0)	*.Span	*.Span

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
			geometry editing applications, like CAD: this value should be write-only.			
Status		Property	Status of the element, predominately used in renovation or retrofitting projects. The status can be assigned to as "New" - element designed as new addition, "Existing" - element exists and remains, "Demolish" - element existed but is to be demolished, "Temporary" - element will exists only temporary (like a temporary support structure).	Label	*.Status	*.Status
Surface Spread Of Flame		Property	Indication on how the flames spread around the surface, It is given according to the national building code that governs the fire behaviour for materials.	Label	*.SurfaceSpreadOfFlame	*.SurfaceSpreadOfFlame
Thermal Transmittance		Property	Thermal transmittance coefficient (U-Value) of an element.	Thermal Transmittance	*.ThermalTransmittance	*.ThermalTransmittance
Identity Properties	02-00	Group				
Identification code	02-00.1	Property	Assignment of a globally unique identifier within the entire software world.		IfcObject Attributes.GlobalId	IfcObject Attributes.GlobalId
Name object	02-00.2	Property	Optional name for use by the participating software systems or users.	Label	IfcObject Attributes.Name	IfcObject Attributes.Name
Placement of the object	02-00.3	Property	This establishes the object coordinate system and placement of the product in space.		IfcObject Attributes.ObjectPlacement	IfcObject .ObjectPlacement
Geometry Representation Reference	02-00.4	Property	Reference to the representations of the product, being either a representation or as a special case a shape representations.		IfcObject Attributes.Representation	IfcObject Attributes.Representation
Door / Window Properties	02-02	Group			Pset_DoorCommon	Pset_DoorCommon
Fire Exit		Property	Indication whether this object is designed to serve as an exit in the case of fire (TRUE) or not (FALSE). Here it defines an exit door in accordance to the national building code.	Boolean	#.FireExit	#.FireExit
Glazing Area Fraction		Property	Fraction of the glazing area relative to the total area of the filling element. It shall be used, if the glazing area is not given separately for all panels within the filling element.	Ratio (positive, >0)	#.GlazingAreaFraction	#.GlazingAreaFraction
Handicap Accessible		Property	Indication that this object is designed to be accessible by the handicapped. It is giving according to the requirements of the national building code.	Boolean	#.HandicapAccessible	#.HandicapAccessible
Infiltration		Property	Infiltration flowrate of outside air for the filler object based on the area of the filler object at a pressure level of 50 Pascals. It shall be used, if the length of all joints is unknown.	Volumetric Flow Rate	#.Infiltration	#.Infiltration
Security Rating		Property	Index based rating system indicating security level. It is giving according to the national building code.	Label	#.SecurityRating	#.SecurityRating
Self Closing		Property	Indication whether this object is designed to close automatically after use (TRUE) or not (FALSE).	Boolean	#.SelfClosing	#.SelfClosing
Smoke Stop		Property	Indication whether the object is designed to provide a smoke stop (TRUE) or not (FALSE).	Boolean	#.SmokeStop	#.SmokeStop

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
Specific Property Set Doors	02-02	Group			Pset_SpecificPropertySetDoors	Pset_SpecificPropertySetDoors
Number Of Wings		Property	Number of wings	Label	#.NumberOfWings	#.NumberOfWings
1-wing		Value				
2-wings		Value				
multi-wings		Value				
Opening Direction		Property	Opening Direction	Label	#.OpeningDirection	#.OpeningDirection
LH		Value	The door panel (for swinging doors) opens always into the direction of the positive Y axis of the local placement. The determination of whether the door opens to the left or to the right is done at the level of the IfcDoorType. Here it is a left side opening door given by IfcDoorType.OperationType = SingleSwingLeft			
LHR		Value	If the door panel (for swinging doors) opens to the right, and into the opposite directions, the local placement of the door need to change. The door style is given by IfcDoorType.OperationType = SingleSwingRight.			
RH		Value	If the door panel (for swinging doors) opens to the right, a separate door style needs to be used (here IfcDoorTypee.OperationType = SingleSwingRight) and it always opens into the direction of the positive Y axis of the local placement.			
RHR		Value	If the door should open to the other side, then the local placement has to be changed. It is still a left side opening door, given by IfcDoorType.OperationType = SingleSwingLeft			
Opening Type		Property	Opening Type	Label	#.OpeningType	#.OpeningType
Double Swing		Value	Door with one panel that swings in both directions.			
Folding Door		Value	Door with one panel that is folding.			
Revolving		Value	An entrance door consisting of four leaves set in a form of a cross and revolving around a central vertical axis (the four panels are described by a single IfcDoor panel property).			
Single Swing		Value	Door with one panel that opens (swings).			
Sliding Door		Value	Door with one panel that is sliding.			
Protection Request Door		Property	Protection request door	Label	#.ProtectionRequestDoor	#.ProtectionRequestDoor
Fire protection door		Value				
Fire-Smoke protection door		Value				
Smoke protection door		Value				
Soundproof door		Value				
Without special protection requirement		Value				
Upper Door Closer		Property	Indication of whether the door has an upper door closer (TRUE) or not (False).	Boolean	#.UpperDoorCloser	#.UpperDoorCloser

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
Light Fixture Type Properties	02-03	Group			Pset_LightFixtureTypeCommon	Pset_LightFixtureTypeCommon
Light Fixture Mounting Type		Property	A list of the available types of mounting for light fixtures from which that required may be selected.	Label	#.LightFixtureMountingType	#.LightFixtureMountingType
Light Fixture Placing Type		Property	A list of the available types of placing specification for light fixtures from which that required may be selected.	Label	#.LightFixturePlacingType	#.LightFixturePlacingType
Maintenance Factor		Property	The arithmetical allowance made for depreciation of lamps and reflective equipment from their initial values due to dirt, fumes, or age.	Real	#.MaintenanceFactor	#.MaintenanceFactor
Manufacturers Specific Information		Property	Manufacturer specific information.	Text		
Number Of Sources		Property	Number of sources.	Integer	#.NumberOfSources	#.NumberOfSources
Total Wattage		Property	Wattage on whole lightfitting device with all sources intact.	Power	#.TotalWattage	#.TotalWattage
Slab Properties	02-04	Group			Pset_SlabCommon	Pset_SlabCommon
Pitch Angle		Property	Angle of the slab to the horizontal when used as a component for the roof (specified as 0 degrees or not asserted for cases where the slab is not used as a roof component). The shape information is provided in addition to the shape representation and the geometric parameters used within. In cases of inconsistency between the geometric parameters and the shape properties, provided in the attached property, the geometric parameters take precedence. For geometry editing applications, like CAD: this value should be write-only.	Plane Angle	#.PitchAngle	#.PitchAngle
Roof Properties	02-05	Group			Pset_RoofCommon	Pset_RoofCommon
Projected Area		Property	Area of the roof projected onto a 2D horizontal plane.	Area		
Total Area		Property	Total exposed area of the roof.	Area		
Stair/Ramp properties	02-06	Group			Pset_StairCommon	Pset_StairCommon
Handicap Accessible	02-06.4	Property	Indication that this object is designed to be accessible by the handicapped. It is giving according to the requirements of the national building code.	Boolean	#.HandicapAccessible	#.HandicapAccessible
RiserHeight		Property	Vertical distance from tread to tread. The riser height is supposed to be equal for all steps of a stair or stair flight.	Length (positive, >0)	#.RiserHeight	#.RiserHeight
Riser Number		Property	Total number of the risers included in the stair or stair flight.	Real	#.NumberOfRiser	#.NumberOfRiser
TreadLength		Property	Horizontal distance from the front of the thread to the front of the next tread. The tread length is supposed to be equal for all steps of the stair or stair flight at the walking line.	Length (positive, >0)	#.TreadLength	#.TreadLength
Treads Number		Property	Total number of treads included in the stair or stairflight.	Real	#.NumberOfTreads	#.NumberOfTreads
MEP Common Type Properties	02-07	Group				
Flow Rate Range	02-07.2	Property	Allowable range of volume of fluid being pumped against the resistance specified.	Mass Flow Rate	*.FlowRateRange	*.FlowRateRange

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
WorkingPressure	02-07.3	Property	Working pressure.	Pressure	*.WorkingPressure	*.WorkingPressure
PressureRange	02-07.4	Property	Allowable maximum and minimum working pressure (relative to ambient pressure).	Pressure	*.PressureRange	*.PressureRange
Temperature Range	02-07.5	Property	Allowable maximum and minimum working pressure (relative to ambient pressure).	ThermodynamicTemperature	*.TemperatureRange	*.TemperatureRange
Air Terminal Properties	02-08	Group			Pset_AirTerminalTypeCommon	Pset_AirTerminalTypeCommon
AirTerminalShape	02-08.02	Property	Shape of the air terminal. Slot is typically a long narrow supply device with an aspect ratio generally greater than 10 to 1.	Label	#.AirTerminalShape	#.AirTerminalShape
FaceType	02-08.03	Property	Identifies how the terminal face of an AirTerminal is constructed.	Label	#.FaceType	#.FaceType
SlotWidth	02-08.04	Property	Slot width.	Length (positive, >0)	#.SlotWidth	#.SlotWidth
SlotLength	02-08.05	Property	Slot length.	Length (positive, >0)	#.SlotLength	#.SlotLength
NumberOfSlots	02-08.06	Property	Indicates the number of slots.	Integer	#.NumberOfSlots	#.NumberOfSlots
FlowPattern	02-08.07	Property	Flow pattern.	Label	#.FlowPattern	#.FlowPattern
DischargeDirection	02-08.08	Property	Discharge direction of the air terminal.	Label	#.DischargeDirection	#.DischargeDirection
ThrowLength	02-08.09	Property	The horizontal or vertical axial distance an airstream travels after leaving an AirTerminal before the maximum stream velocity is reduced to a specified terminal velocity under isothermal conditions at the upper value of the AirFlowrateRange.	Length (positive, >0)	#.ThrowLength	#.ThrowLength
AirDiffusionPerformanceIndex	02-08.10	Property	The Air Diffusion Performance Index (ADPI) is used for cooling mode conditions. If several measurements of air velocity and air temperature are made throughout the occupied zone of a space, the ADPI is the percentage of locations where measurements were taken that meet the specifications for effective draft temperature and air velocity.	Real	#.AirDiffusionPerformanceIndex	#.AirDiffusionPerformanceIndex
FinishType	02-08.11	Property	The type of finish for the air terminal.	Label	#.FinishType	#.FinishType
FinishColour	02-08.12	Property	The finish colour of the object.	Label	#.FinishColour	#.FinishColour
AirTerminalMountingType	02-08.13	Property	The way the air terminal is mounted to the ceiling, wall, etc.	Label	#.AirTerminalMountingType	#.AirTerminalMountingType
CoreType	02-08.14	Property	Identifies the way the core of the AirTerminal is constructed.	Label	#.CoreType	#.CoreType
CoreSetHorizontal	02-08.15	Property	Degree of horizontal (in the X-axis of the LocalPlacement) blade set from the centerline.		#.CoreSetHorizontal	#.CoreSetHorizontal
CoreSetVertical	02-08.16	Property	Degree of vertical (in the Y-axis of the LocalPlacement) blade set from the centerline.		#.CoreSetVertical	#.CoreSetVertical
HasIntegralControl	02-08.17	Property	If TRUE, a self powered temperature control is included in the AirTerminal.	Boolean	#.HasIntegralControl	#.HasIntegralControl
FlowControlType	02-08.18	Property	Type of flow control element that may be included as a part of the construction of the air terminal.	Label	#.FlowControlType	#.FlowControlType

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
HasSoundAttenuator	02-08.19	Property	If TRUE, the object has sound attenuation.	Boolean	#.HasSoundAttenuator	#.HasSoundAttenuator
HasThermalInsulation	02-08.20	Property	If TRUE, the air terminal has thermal insulation.	Boolean	#.HasThermalInsulation	#.HasThermalInsulation
NeckArea	02-08.21	Property	Neck area of the air terminal.	Area	#.NeckArea	#.NeckArea
EffectiveArea	02-08.22	Property	Effective discharge area of the air terminal.	Area	#.EffectiveArea	#.EffectiveArea
AirFlowrateVersusFlowControlElement	02-08.23	Property	Air flowrate versus flow control element position at nominal pressure drop.		#.AirFlowrateVersusFlowControlElement	#.AirFlowrateVersusFlowControlElement
Pipe Segment Properties	02-09	Group			Pset_PipeSegmentTypeCommon	Pset_PipeSegmentTypeCommon
NominalDiameter	02-09.02	Property	Nominal diameter or width of the object.	Length (positive, >0)	#.NominalDiameter	#.NominalDiameter
InnerDiameter	02-09.03	Property	The actual inner diameter of the object.	Length (positive, >0)	#.InnerDiameter	#.InnerDiameter
OuterDiameter	02-09.04	Property	The actual outer diameter of the object.	Length (positive, >0)	#.OuterDiameter	#.OuterDiameter
Length	02-09.05	Property	The length of the object.	Length (positive, >0)	#.Length	#.Length
Duct Segment Properties	02-10	Group			Pset_DuctSegmentTypeCommon	Pset_DuctSegmentTypeCommon
CrossSectionShape		Property	Cross sectional shape. Note that this shape is uniform throughout the length of the segment. For nonuniform shapes, a transition fitting should be used instead.	Label	#.CrossSectionShape	#.CrossSectionShape
LongitudinalSeam		Property	The type of seam to be used along the longitudinal axis of the duct segment.	Text	#.LongitudinalSeam	#.LongitudinalSeam
NominalDiameterOrWidth		Property	The nominal diameter or width of the duct segment.	Length (positive, >0)	#.NominalDiameterOrWidth	#.NominalDiameterOrWidth
NominalHeight		Property	The nominal height of the object. The size information is provided in addition to the shape representation and the geometric parameters used within. In cases of inconsistency between the geometric parameters and the size properties, provided in the attached property set, the geometric parameters take precedence.	Length (positive, >0)	#.NominalHeight	#.NominalHeight
Reinforcement		Property	The type of reinforcement, if any, used for the duct segment.	Label	#.Reinforcement	#.Reinforcement
ReinforcementSpacing		Property	The spacing between reinforcing elements.	Length (positive, >0)	#.ReinforcementSpacing	#.ReinforcementSpacing
Tank Type Properties	02-11	Group			Pset_TankTypeCommon	Pset_TankTypeCommon
Access Type		Property		Label	#.AccessType	#.AccessType
loose cover		Value	PEnum_TankAccessType.LOOSECOVER			
man hole		Value	PEnum_TankAccessType.MANHOLE			
none		Value	PEnum_TankAccessType.NONE			
not known		Value	PEnum_TankAccessType.NOTKNOWN			
other		Value	PEnum_TankAccessType.OTHER			
secured cover		Value	PEnum_TankAccessType.SECUREDCOVER			
secured cover with man hole		Value	PEnum_TankAccessType.SECUREDCOVERWITHMANHOLE			
unset		Value	PEnum_TankAccessType.UNSET			

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
Effective Capacity		Property	The total effective or actual volumetric capacity of the tank.	Volume	#.EffectiveCapacity	#.EffectiveCapacity
Material		Property	Material from which the tank is constructed.	Text		
Material Thickness		Property	Thickness of the material from which the tank is constructed.	Length (positive, >0)		
Nominal Capacity		Property	The total nominal or design volumetric capacity of the tank.	Volume	#.NominalCapacity	#.NominalCapacity
Nominal Depth		Property	The nominal depth of the tank. Note: Not required for a horizontal cylindrical tank.	Length (positive, >0)	#.NominalDepth	#.NominalDepth
Nominal Length Or Diameter		Property	The nominal length or, in the case of a vertical cylindrical tank, the nominal diameter of the tank.	Length (positive, >0)	#.NominalLengthOrDiameter	#.NominalLengthOrDiameter
Nominal Width Or Diameter		Property	The nominal width or, in the case of a horizontal cylindrical tank, the nominal diameter of the tank. Note: Not required for a vertical cylindrical tank.	Length (positive, >0)	#.NominalWidthOrDiameter	#.NominalWidthOrDiameter
Operating Weight		Property	Operating weight of the tank including all of its contents.	Mass	#.OperatingWeight	#.OperatingWeight
Valve Type Properties	02-12	Group			Pset_ValveTypeCommon	Pset_ValveTypeCommon
Body Material		Property	Material from which the body of the valve is constructed.	Text		
Close Off Rating		Property	Close off rating.	Pressure	#.CloseOffRating	#.CloseOffRating
Flow Coefficient		Property	Flow coefficient (the quantity of fluid that passes through a fully open valve at unit pressure drop), typically expressed as the Kv or Cv value for the valve.	Real	#.FlowCoefficient	#.FlowCoefficient
Operating Mechanism Material		Property	Material from which the operating mechanism (gate, globe, plug, needle, clack etc.) of the valve is constructed	Text		
Size		Property	The size of the connection to the valve (or to each connection for faucets, mixing valves, etc.).	Length (positive, >0)	#.Size	#.Size
Test Pressure		Property	The maximum pressure to which the valve has been subjected under test.	Pressure	#.TestPressure	#.TestPressure
Valve Mechanism		Property	The mechanism by which the valve function is achieved where: BALL: Valve that has a ported ball that can be turned relative to the body seat ports. BUTTERFLY: Valve in which a streamlined disc pivots about a diametric axis. CONFIGUREDGATE: Screwdown valve in which the closing gate is shaped in a configured manner to have a more precise control of pressure and flow change across the valve. GLAND: Valve with a tapered seating, in which a rotatable plug is retained by means of a gland and gland packing. GLOBE: Screwdown valve that has a spherical body. LUBRICATEDPLUG: Plug valve in which a lubricant is injected under pressure between the plug face and the body. NEEDLE: Valve for regulating the flow in or from a pipe, in which a slender cone moves along the axis of flow to close against a fixed conical seat. PARALLELSLIDE: Screwdown valve that has a machined plate that slides in formed grooves to form a seal. PLUG: Valve that has a ported plug that can be turned relative to the body seat ports. WEDGEGATE: Screwdown valve that has	Label	#.ValveMechanism	#.ValveMechanism

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
			a wedge shaped plate fitting into tapered guides to form a seal.			
Valve Operation		Property		Label	#.ValveOperation	#.ValveOperation
Valve Pattern		Property		Label	#.ValvePattern	#.ValvePattern
Pump Type Properties	02-13	Group			Pset_PumpTypeCommon	Pset_PumpTypeCommon
Casing Material		Property	Material from which the casing of the pump is constructed	Text		
Connection Size		Property	The connection size of the to and from the pump.	Length (positive, >0)	#.ConnectionSize	#.ConnectionSize
Flow Rate Range		Property	Allowable range of volume of fluid being pumped against the resistance specified.	Mass Flow Rate	#.FlowRateRange	#.FlowRateRange
Flow Resistance Range		Property	Allowable range of frictional resistance against which the fluid is being pumped.	Pressure	#.FlowResistanceRange	#.FlowResistanceRange
Impeller Material		Property	Material from which the impeller of the pump is constructed. In the case of a positive displacement pump, the piston acts as the impeller	Text		
Impeller Seal Material		Property	Material from which the impeller shaft seal of the pump is constructed.	Text		
Net Positive Suction Head		Property	Minimum liquid pressure at the pump inlet to prevent cavitation.	Pressure	#.NetPositiveSuctionHead	#.NetPositiveSuctionHead
Nominal Rotation Speed		Property	Pump rotational speed under nominal conditions.	Rotational Frequency	#.NominalRotationSpeed	#.NominalRotationSpeed
Temperature Range		Property	Allowable operational range of the fluid temperature.	ThermodynamicTemperature	#.TemperatureRange	#.TemperatureRange
Wall Properties	02-14	Group			Pset_WallCommon	Pset_WallCommon
Description		Property		Label	#.Description	IfcElement Attributes.Description
Extend To Structure		Property	Indicates whether the object extend to the structure above (TRUE) or not (FALSE).	Boolean	#.ExtendToStructure	#.ExtendToStructure
System-generated quantities	03-01	Group			BaseQuantities	BaseQuantities
Height	02-05.01	Property	Characteristic height Total nominal height of the object.	Length (positive, >0)	#.Height	#.Height
Length	02-05.02	Property	The length of the object. Not taking into account any cut-out's or other processing features.	Length (positive, >0)	#.Length	#.Length
Width	02-05.03	Property	The width of the object. Only given, if the object has constant thickness (prismatic).	Length (positive, >0)	#.Width	#.Width
Perimeter	02-05.04	Property	Perimeter of the object.	Length (positive, >0)	#.Perimeter	#.Perimeter
CrossSectionArea	02-05.05	Property	Total area of the cross section (or profile) of the object.	Area	#.CrossSectionArea	#.CrossSectionArea
OuterSurfaceArea	02-05.06	Property	Total area of the surfaces of the object (not taking into account the end cap areas), normally generated as perimeter * length in case of extrusions.	Area	#.OuterSurfaceArea	#.OuterSurfaceArea
GrossSurfaceArea	02-05.07	Property	Total gross area of the object, normally generated as perimeter * length + 2 * cross section area. It is the sum of OuterSurfaceArea + (2 x CrossSectionArea) and shall only be given, if	Area	#.GrossSurfaceArea	#.GrossSurfaceArea

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
			the OuterSurfaceArea and CrossSectionArea cannot be established separately.			
GrossVolume	02-05.08	Property	Total gross volume of the object. Openings, recesses, enclosed objects and projections are not taken into account.	Volume	#.GrossVolume	#.GrossVolume
NetVolume	02-05.09	Property	Total net volume of the object, taking into account possible processing features (cut-out's, etc.) or openings and recesses.	Volume	#.NetVolume	#.NetVolume
GrossWeight	02-05.10	Property	Total Gross Weight of the object without any add-on parts and not taking into account possible processing features (cut-out's, etc.) or openings and recesses.	Mass.kg	#.GrossWeight	#.GrossWeight
NetWeight	02-05.11	Property	Total net weight of the object without add-on parts, taking into account possible processing features (cut-out's, etc.) or openings and recesses.	Mass.kg	#.NetWeight	#.NetWeight
GrossArea	02-05.12	Property	Gross Area of the object. Openings, recesses, projections and cut-outs are not taken into account.	Area	#.GrossArea	#.GrossArea
NetArea	02-05.13	Property	Total net area of the object. Openings, recesses and cut-outs are taken into account by subtraction, projections by addition.	Area	#.NetArea	#.NetArea
Quantity MEP Common	03-02	Group				
TotalSurfaceArea	03-02.3	Property	Total surface area of the element.	Area	#.TotalSurfaceArea	#.TotalSurfaceArea
Specific Property Set Reinforced Concrete	04-01	Group	Additional properties for all components made of reinforced concrete.		Pset_ConcreteElementGeneral	Pset_ConcreteElementGeneral
AssemblyPlace	04-01.01	Property	Enumeration defining where the assembly is intended to take place, either in a factory, other offsite location or on the building site.	Label	Pset_ConcreteElementGeneral.AssemblyPlace	Pset_ConcreteElementGeneral.AssemblyPlace
CastingMethod	04-01.02	Property	The method of casting the concrete into its designed form.	Label	Pset_ConcreteElementGeneral.CastingMethod	Pset_ConcreteElementGeneral.CastingMethod
StructuralClass	04-01.03	Property	The structural class defined for the concrete structure (e.g. 'I').	Label	Pset_ConcreteElementGeneral.StructuralClass	Pset_ConcreteElementGeneral.StructuralClass
StrengthClass	04-01.04	Property	Classification of the concrete strength in accordance with the concrete design code which is applied in the project.	Label	Pset_ConcreteElementGeneral.StrengthClass	Pset_ConcreteElementGeneral.StrengthClass
ExposureClass	04-01.05	Property	Classification of exposure to environmental conditions, usually specified in accordance with the concrete design code which is applied in the project.	Label	Pset_ConcreteElementGeneral.ExposureClass	Pset_ConcreteElementGeneral.ExposureClass
ReinforcementVolumeRatio	04-01.06	Property	The required ratio of the effective mass of the reinforcement to the effective volume of the concrete of a reinforced concrete structural element.	Mass Density	Pset_ConcreteElementGeneral.ReinforcementVolumeRatio	Pset_ConcreteElementGeneral.ReinforcementVolumeRatio
ReinforcementAreaRatio	04-01.07	Property	The required ratio of the effective area of the reinforcement to the effective area of the concrete At any section of a reinforced concrete structural element.	Area Density	Pset_ConcreteElementGeneral.ReinforcementAreaRatio	Pset_ConcreteElementGeneral.ReinforcementAreaRatio
DimensionalAccuracyClass	04-01.08	Property	Classification designation of the dimensional accuracy requirement according to local standards.	Label	Pset_ConcreteElementGeneral.DimensionalAccuracyClass	Pset_ConcreteElementGeneral.DimensionalAccuracyClass

Name	Code	Type	Description	Unit	IFC 4.3	IFC 4 Add2
ConstructionToleranceClass	04-01.09	Property	Classification designation of the on-site construction tolerances according to local standards.	Label	Pset_ConcreteElementGeneral.ConstructionToleranceClass	Pset_ConcreteElementGeneral.ConstructionToleranceClass
ConcreteCover	04-01.10	Property	The protective concrete cover at the reinforcing bars according to local building regulations.	Length (positive, >0)	Pset_ConcreteElementGeneral.ConcreteCover	Pset_ConcreteElementGeneral.ConcreteCover
ConcreteCoverAtMainBars	04-01.11	Property	The protective concrete cover at the main reinforcing bars according to local building regulations.	Length (positive, >0)	Pset_ConcreteElementGeneral.ConcreteCoverAtMainBars	Pset_ConcreteElementGeneral.ConcreteCoverAtMainBars
ConcreteCoverAtLinks	04-01.12	Property	The protective concrete cover at the reinforcement links according to local building regulations.	Length (positive, >0)	Pset_ConcreteElementGeneral.ConcreteCoverAtLinks	Pset_ConcreteElementGeneral.ConcreteCoverAtLinks
ReinforcementStrengthClass	04-01.13	Property	Classification of the reinforcement strength in accordance with the concrete design code which is applied in the project. The reinforcing strength class often combines strength and ductility.	Label	Pset_ConcreteElementGeneral.StrengthClass	Pset_ConcreteElementGeneral.StrengthClass
Condition Properties	05-01	Group			Pset_Condition	Pset_Condition
AssessmentCondition	02-11.02	Property	The overall condition of a product based on an assessment of the contributions to the overall condition made by the various criteria considered. The meanings given to the values of assessed condition should be agreed and documented by local agreements. For instance, is overall condition measured on a scale of 1 - 10 or by assigning names such as Good, OK, Poor.	Label	Pset_Condition.AssessmentCondition	Pset_Condition.AssessmentCondition
AssessmentDescription	02-11.03	Property	Qualitative description of the condition.	Text	Pset_Condition.AssessmentDescription	Pset_Condition.AssessmentDescription
AssessmentType	02-11.04	Property	Category of latest condition assessment report of the asset.	Label	Pset_Condition.AssessmentType	Pset_Condition.AssessmentType
AssessmentMethod	02-11.05	Property	External reference to assessment method or application used to perform the assessment.	Text	Pset_Condition.AssessmentMethod	Pset_Condition.AssessmentMethod
LastAssessmentReport	02-11.06	Property	Reference to latest condition (state of health) report.	Label	Pset_Condition.LastAssessmentReport	Pset_Condition.LastAssessmentReport
NextAssessmentDate	02-11.07	Property	Date of next condition inspection	Date	Pset_Condition.NextAssessmentDate	Pset_Condition.NextAssessmentDate
AssessmentFrequency	02-11.08	Property	Indicates how often the equipment should be assessed, to have a clear estimation on its working state, based on which the maintenance staff can decide whether it requires maintenance or requires to be updated or replaced.	Time	Pset_Condition.AssessmentFrequency	Pset_Condition.AssessmentFrequency

4. IDM Pilot I - Dynamic semantic digital twin

BIM models have revolutionized construction, but their static nature limits their representation of the project's current state. The Dynamic Semantic Digital Twin (DSDT) overcomes this limitation by providing frequent updates through autonomous scanning and object detection. This dynamic form unlocks new model uses, including construction progress tracking, asset and hazard identification, and emergency exit mapping. With real-time information displayed via XR-headsets, the DSDT enhances decision-making and worker safety. In this introduction, we explore the transformative potential of the DSDT in addressing BIM model limitations and enabling dynamic construction project management.

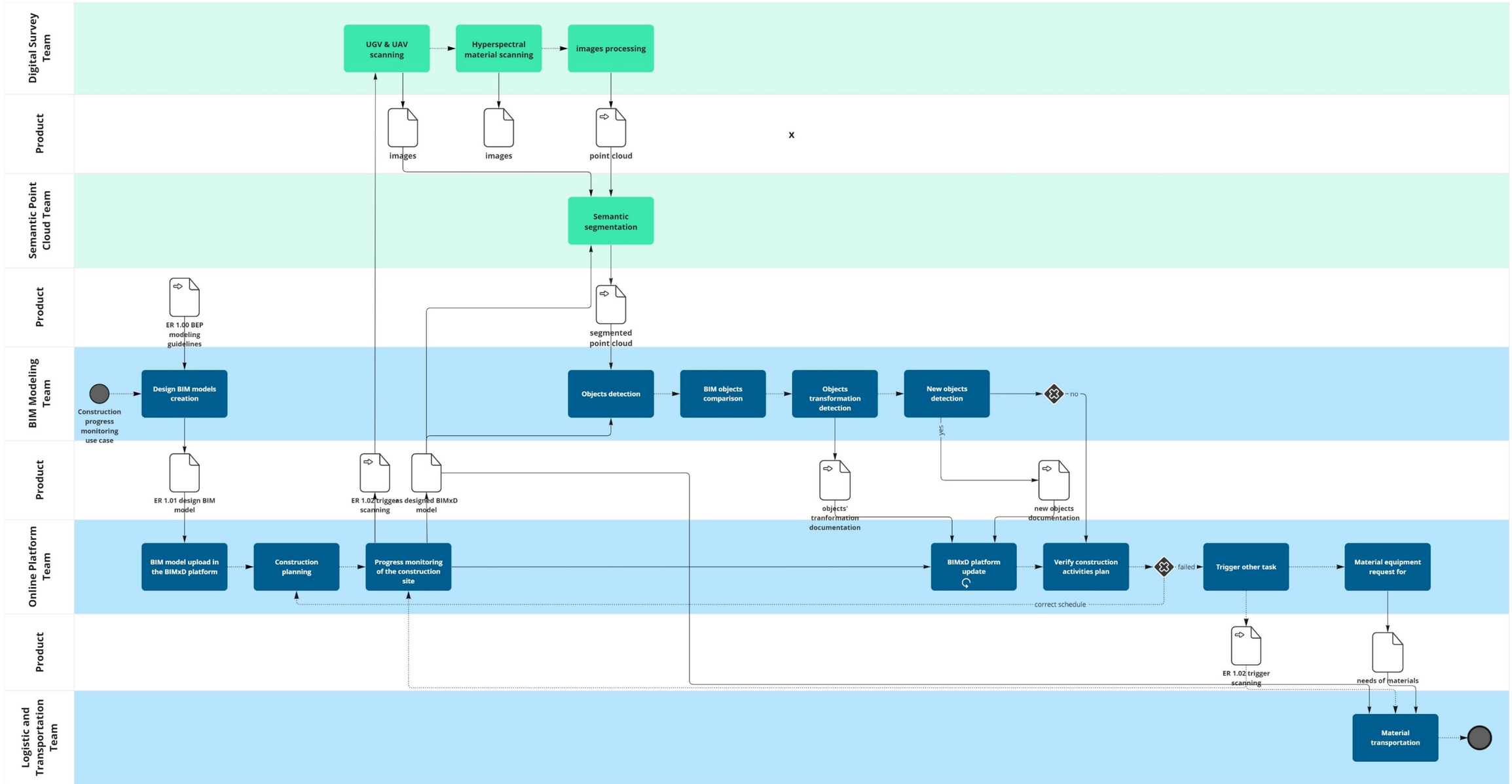
4.1. Assign Model Uses to phases

Linked to the First setting is to assign of the Model Uses towards the Phases.

Code		P04	P06	P08	P09
	Model use & Phases	Design Phase	Implementation Phase	Operations Phase	Closure Phase
UC 00	Surveying	-	X	X	-
UC 14	Clash Detection	X	X	-	-
UC 22	Construction Planning	X	X	-	-
UC 23	Cost Estimation	X	-	X	-
UC 32	Site Safety Review	-	X	-	-
UC 33	Occupational Health and Safety Planning	O	X	-	-
UC 45	Existing Conditions Modelling	O	X	X	-
UC 47	Construction Monitoring	-	X	X	-

Table 3 The UseCases / Phases matrix represents the 'Asign Model Uses', the BIM uses and HT project phases are linked with one another

4.2. Process Map of the Pilot I



Pilot I - Dynamic semantic digital twin Process Map

4.3. Activities of the PM Dynamic semantic digital twin

Code	Activity Title	Activity Description	Activity Actor
AC 1.01	Design BIM models creation	It involves creating different disciplines' Building Information Modeling (BIM) models for the design phase and federating them. During the design phase of a construction project, various disciplines such as architecture, structural engineering, mechanical engineering, electrical engineering, and others create their respective BIM models.	BIM Modeling Team
AC 1.02	BIM model upload in the BIMxD platform	It refers to the process of uploading the BIM models to the BIMxD platform, which is a cloud-based platform that allows stakeholders to access and interact with the BIM models.	Online Platform Team
AC 1.03	Construction planning	The federated models uploaded in the BIMxD platform are used to plan, organise or test construction activities against constraints such as time (4D planning), human resources and materials, 4D and 5D planning.	Online Platform Team
AC 1.04	Construction progress monitoring	It involves tracking and evaluating the progress of construction activities in real-time, comparing it to the planned schedule, identifying any delays or issues, and taking corrective actions as necessary.	Online Platform Team
AC 1.05	UGV & UAV scanning	Following the trigger scanning schedules, Unmanned Ground Vehicles (UGVs) and Unmanned Aerial Vehicles (UAVs) equipped with sensors and cameras are used to scan and collect data from the construction site, capturing detailed information about the physical environment.	Digital Survey Team
AC 1.06	Hyperspectral material scanning	It uses hyperspectral imaging techniques to analyze the characteristics of materials or surfaces in the construction site and to identify specific properties or components.	Digital Survey Team

Code	Activity Title	Activity Description	Activity Actor
AC 1.07	Images processing	This activity aims to post-process the outputs of the digital survey in order to register a point cloud and to have results of the material of the constructed assets.	Digital Survey Team
AC 1.09	Semantic segmentation	It is a process that involves analyzing and categorizing individual points within a point cloud dataset based on their semantic meaning or class labels.	Semantic Point Cloud Team
AC 1.10	Object Detection	A phase in which images and the segmented point clouds are used to identify and localize specific objects using machine learning algorithms and computer vision techniques.	BIM Modeling Team
AC 1.11	BIM objects comparison	It compares the detected objects in images and point clouds within different BIM objects or components a project, assessing their properties, dimensions, placement, and other attributes to ensure consistency and accuracy.	BIM Modeling Team
AC 1.12	Objects' transformation detection	Modification and transformation of BIM objects in the construction site are detected in terms of shape, size, position, orientation, or other attributes.	BIM Modeling Team
AC 1.13	New objects detection	It identifies and detects newly added or modified objects within the construction site, comparing them to the previous state updated in the BIMxD platform to capture changes or discrepancies.	BIM Modeling Team
AC 1.14	BIMxD platform update	Update information of the construction site within the BIMxD platform.	Online Platform Team
AC 1.15	Verify construction activities plan	Involves reviewing and validating the construction activities plan against the project requirements, specifications, and constraints in the BIMxD platform.	Online Platform Team
AC 1.16	Trigger other task	It automatically initiates and activates specific tasks or processes based on predefined conditions or events.	Online Platform Team

Code	Activity Title	Activity Description	Activity Actor
AC 1.17	Material equipment request for	Involves requesting the necessary equipment for a construction project to be transported to the construction site, ensuring the availability of resources required for the work.	Logistic and Transportation Team
AC 1.18	Material transportation	Involves requesting the necessary material for a construction project to be transported to the construction site, ensuring the availability of resources required for the work.	Logistic and Transportation Team

Table 1 Pilot I - Dynamic semantic digital twin Process Map Activities

4.4. Exchange Model of the PM Dynamic semantic digital twin

Code	Title	Description	Actor	Actor receiver
EM 1.00	BEP of modeling guidelines	BEP stands for BIM Execution Plan, which is a comprehensive document that outlines the processes, standards, and protocols for creating and managing a BIM model. They provide instructions and requirements for the creation and utilization of the BIM model throughout the design and construction phases.	-	BIM Modeling Team
EM 1.01	Design BIM model	A Design BIM model is a digital representation of a building or infrastructure project during the design phase. It includes information about the project's geometry, spatial relationships, components, materials, and other relevant data.	BIM Modeling Team	Online Platform Team

Code	Title	Description	Actor	Actor receiver
EM 1.02	Trigger scanning	Trigger scanning refers to the process of initiating a 3D scanning operation at a specific point or event during a construction project. Trigger scanning is performed when significant changes occur, such as completing a construction phase or before the installation of new elements.	Online Platform Team	Digital Survey Team
EM 1.03	As-designed Design BIMxD model	The As-Designed Design BIMxD model is an enhanced version of the design BIM model managed in the BIMxD platform. It incorporates additional documentation, annotations, and specifications related to the design intent, construction sequencing, and material specifications. The BIMxD model aims to provide a comprehensive source of information for construction teams to follow during the project execution.	Online Platform Team	BIM Modeling Team Semantic Point Cloud Team
EM 1.04	UAV images	UAV images refer to aerial photographs or data captured by drones or unmanned aircraft.	Digital Survey Team	Semantic Point Cloud Team
EM 1.05	Hyperspectral images	Hyperspectral images are images captured using sensors that measure a wide range of electromagnetic wavelengths. They are used for tasks such as vegetation mapping, material identification, and environmental monitoring.	Digital Survey Team	Semantic Point Cloud Team
EM 1.06	Point Cloud	A point cloud is a large collection of 3D data points that represent the surface geometry of a construction asset and its objects.	Digital Survey Team	Semantic Point Cloud Team

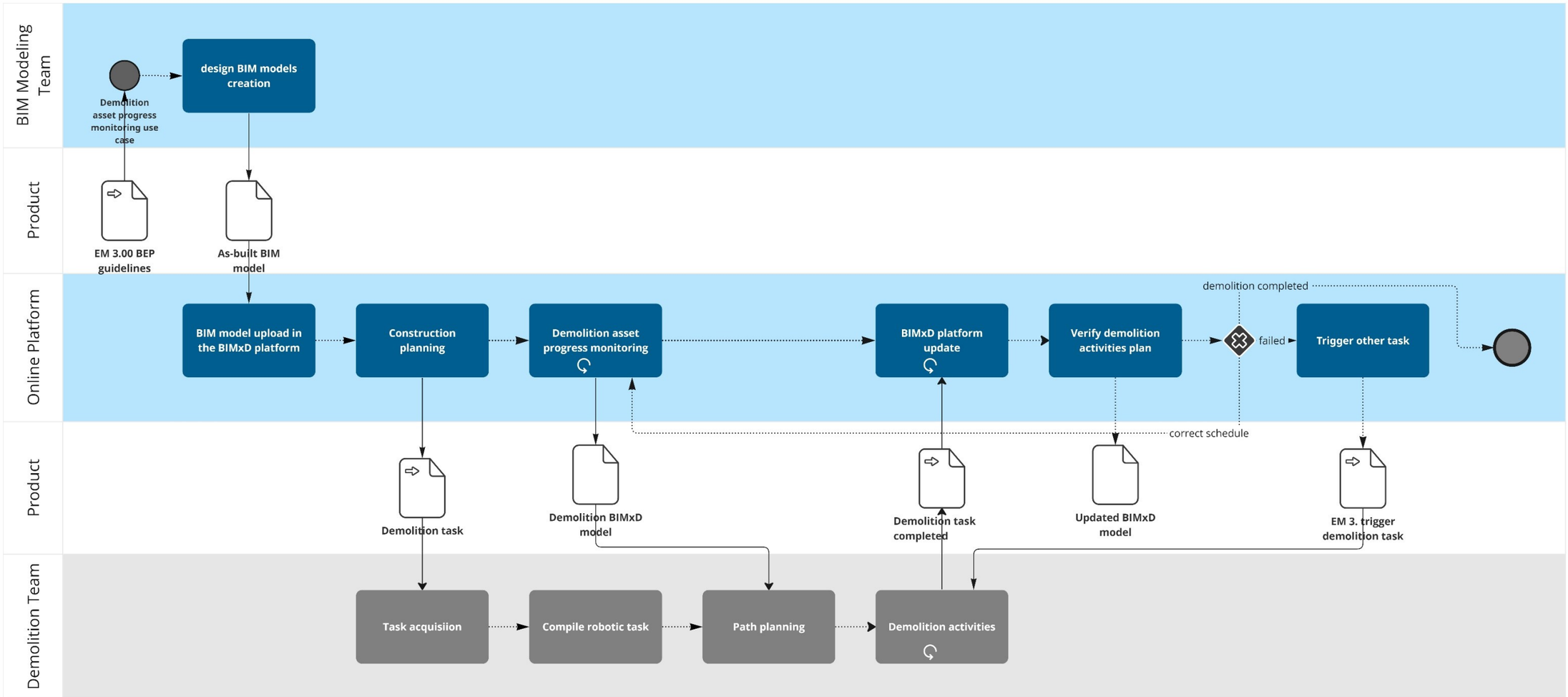
Code	Title	Description	Actor	Actor receiver
EM 1.07	Segmented Point Cloud	A segmented point cloud is a subset of a larger point cloud where specific construction objects have been separated and labelled into distinct groups or segments.	Semantic Point Cloud Team	BIM Modeling Team
EM 1.08	Objects' transformation documentation	It is the documentation of changes or modifications of the objects within a construction project.	BIM Modeling Team	Online Platform Team
EM 1.09	New Objects' documentation	It is the documentation of the information about newly added or installed objects within a construction project.	BIM Modeling Team	Online Platform Team
EM 1.10	Updated trigger scanning	Updated trigger scanning refers to performing additional 3D scanning operations at specific points or events during a construction project after the initial trigger scanning.	Online Platform Team	Online Platform Team
EM 1.11	Needs of material	The needs of material refer to the requirements or demands for specific materials during a construction project. It involves assessing the quantities, types, specifications, and delivery schedules of materials needed to complete various tasks and stages of the project.	Online Platform Team	Logistic and Transportation Team

Table 2 Pilot I - Dynamic semantic digital twin Process Map Exchange Model

5. IDM Pilot III. Remote controlled demolition

In the realm of demolition projects, the integration of robots and advanced technology has brought about significant advancements. In the HT project, the combination of BIM model in conjunction with robotic systems enables efficient and precise demolition operations, leveraging the power of data-driven decision-making. By integrating the as-built BIM model, demolition tasks and real-time updates in the BIMxD model, this collaborative approach ensures seamless communication and coordination between project stakeholders and the robots. This shortens project timelines, enhances safety measures, and provides an accurate representation of the structure pre- and post-demolition. This communication is then based on an information exchange based of the open standards such as IFC and BCF, to assure an interoperable approach.

5.1. Process Map of the Pilot III



Pilot III - Remote controlled demolition Process Map

5.2. Activities of the Pilot III

Code	Activity Title	Activity Description	Activity Actor
AC 3.01	Design BIM models creation	It involves creating different disciplines' Building Information Modeling (BIM) models for the design phase and federating them. During the design phase of a construction project, various disciplines such as architecture, structural engineering, mechanical engineering, electrical engineering, and others create their respective BIM models.	BIM Modeling Team
AC 3.02	BIM model upload in the BIMxD platform	It refers to the process of uploading the BIM models to the BIMxD platform, which is a cloud-based platform that allows stakeholders to access and interact with the BIM models.	Online Platform Team
AC 3.03	Construction planning	the federated models uploaded in the BIMxD platform are used to plan, organise or test construction activities against constraints such as time (4D planning), human resources and materials, 4D and 5D planning.	Online Platform Team
AC 3.04	Demolitionprogress monitoring	It involves tracking and evaluating the progress of construction activities in real-time, comparing it to the planned schedule, identifying any delays or issues, and taking corrective actions as necessary.	Online Platform Team
AC 3.05	Task acquisition	The BIMxD platform facilitates the acquisition of the demolition task by the robot.	Demolition Team
AC 3.06	Compile robotic task	This involves determining the sequence of actions and operations that the robot needs to perform during the demolition process. The compilation process takes into account factors such as safety protocols, environmental considerations, and efficiency in executing the demolition tasks.	Demolition Team

Code	Activity Title	Activity Description	Activity Actor
AC 3.07	Path planning	Path planning is the process of determining the optimal path or trajectory for the robot to follow while performing the demolition activities. Based on the BIMxD platform, It involves analyzing the environment, including obstacles and structural elements, to plan a path that allows the robot to efficiently and safely navigate through the workspace.	Demolition Team
AC 3.08	Demolition activities	With the planned path and tasks in place, the robot begins executing the demolition activities.	Demolition Team
Ac 3.09	BIMxD platform update	Update information of the demolition site within the BIMxD platform.	Online Platform Team
AC 3.10	Verify demolition activities plan	Involves reviewing and validating the demolition activities plan against the demolition activities performed in the BIMxD platform.	Online Platform Team
AC 3.11	Trigger other task	It automatically initiates and activates specific tasks or processes based on predefined events of demolition.	Online Platform Team

Table 1 Pilot III - Remote controlled demolition Process Map Activities

5.3. Exchange Model of the Pilot III

Code	Title	Description	Actor	Actor receiver
EM 3.00	BEP modeling guidelines	BEP stands for BIM Execution Plan, which is a comprehensive document that outlines the processes, standards, and protocols for creating and managing a BIM model. They provide instructions and requirements for the creation and utilization of the BIM model throughout the design and construction phases.	-	BIM Modeling Team

Code	Title	Description	Actor	Actor receiver
EM 3.01	As-built BIM model	The as-built BIM model, which represents the current state of the structure to be demolished.This model contains accurate and up-to-date information about the existing structure, including its geometry, materials, and other relevant data.	BIM Modeling Team	Online Platform Team
EM 3.02	Demolition Task	Based on the as-built BIM model, the BIM online platform assigns a demolition task to the robot. The platform communicates the specific objectives, constraints, and requirements of the demolition project to the robot operator. This includes information about the targeted structures or components to be demolished, safety considerations, and any special instructions.	Online Platform Team	Demolition Team
EM 3.03	Demolition BIMxD model	BIMxD model is generated based on the as-built BIM model and the assigned demolition task. The demolition BIMxD model overlays the demolition-specific information onto the as-built model, highlighting the structures or components to be demolished and providing additional data such as load conditions, material properties, or necessary precautions during demolition.	Online Platform Team	Demolition Team

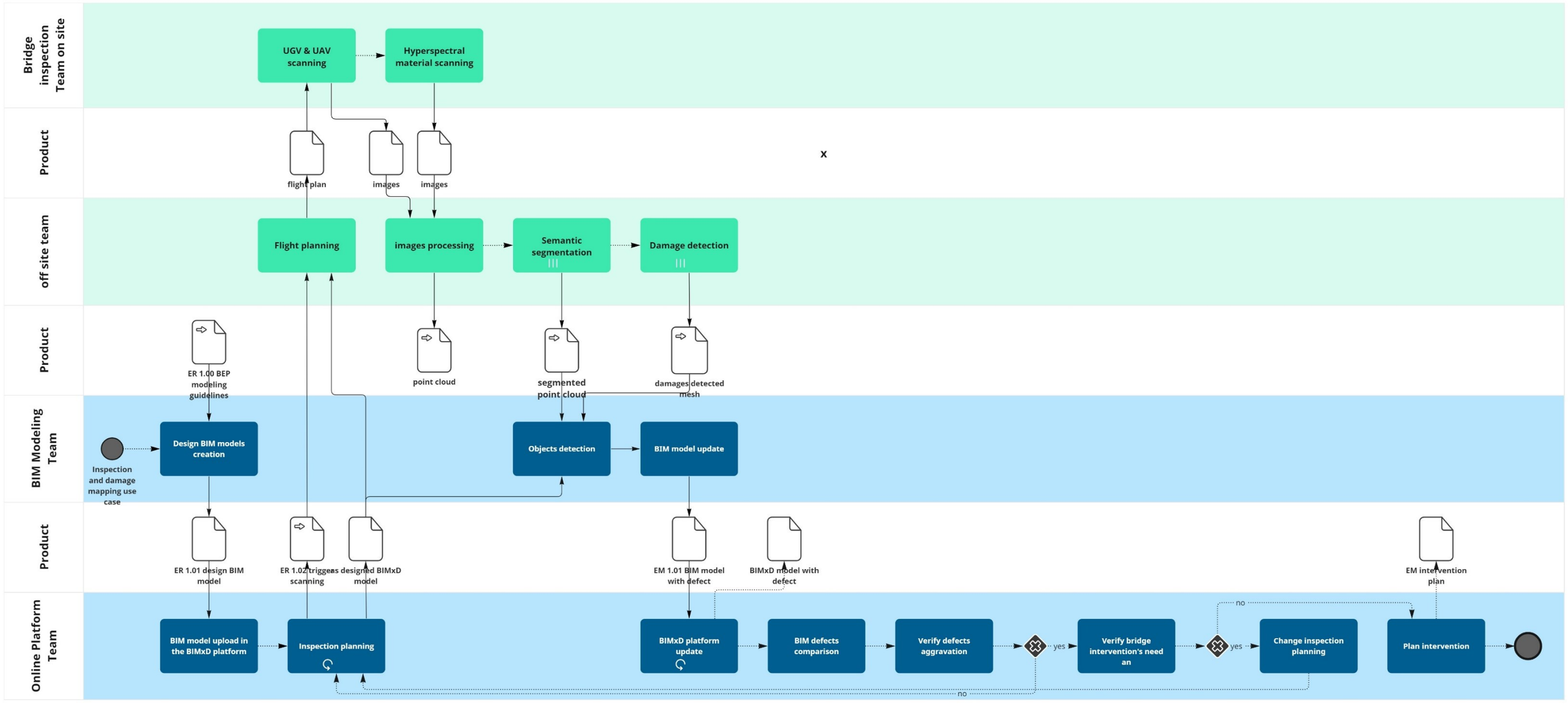
Code	Title	Description	Actor	Actor receiver
EM 3.04	Demolition task completed	As the robot performs the demolition activities, it communicates the progress and completion status of the assigned task back to the BIM online platform. This exchange ensures updates on the robot's activities and allows project stakeholders to track the progress of the demolition project.	Demolition Team	Online Platform Team
EM 3.05	Updated BIMxD model	After the demolition task is completed, the BIM online platform generates an updated BIMxD model. This updated model reflects the changes made during the demolition process, providing an accurate representation of the structure post-demolition. It helps stakeholders visualize and assess the impact of the demolition activities on the remaining structure and plan for subsequent stages of the project.	Online Platform Team	Demolition Team
EM 3.06	Updated demolition Task	Based on the updated BIMxD model, the BIM online platform generates an updated demolition task, if required. This may involve assigning new tasks, adjusting the scope of the project, or providing additional instructions to the robot operator based on the changes observed in the updated model.	Online Platform Team	Demolition Team

Table 2 Pilot III - Remote controlled demolition Process Map Exchange Model

6. IDM Pilot IV. Bridge inspection and monitoring

Bridges as a core part of infrastructure networks are ageing all over Europe. With the ongoing ageing and the deterioration of their condition, the demand for bridge inspection and defect detection increases constantly. UAVs and other mobile scanning devices can be used to autonomously capture a structure's geometry with high accuracy and with high-resolution textures. However, information necessary to assess the state of the structure needs to be derived from the data. Such information involves BIMxD models of the structure, damages and defects etc. This pilot will demonstrate the use of scanning and computer vision technology to support efficient bridge inspection routines.

6.1. Process Map of the Pilot IV



Pilot IV- Bridge inspection and monitoring Process Map

6.2. Activities of the Pilot IV

Code	Activity Title	Activity Description	Activity Actor
AC 4.01	Design BIM models creation	It involves creating different disciplines' Building Information Modeling (BIM) models for the design phase and federating them. During the design phase of a construction project, various disciplines such as architecture, structural engineering, mechanical engineering, electrical engineering, and others create their respective BIM models.	BIM Modeling Team
AC 4.02	BIM model upload in the BIMxD platform	It refers to the process of uploading the BIM models to the BIMxD platform, which is a cloud-based platform that allows stakeholders to access and interact with the BIM models.	Online Platform Team
AC 4.03	Inspection planning	It involves strategizing and organizing the process of inspecting a bridge to assess its condition, identify potential issues, and ensure its structural integrity. It includes determining the inspection scope, methods, frequency, and resources required for a comprehensive evaluation. The planning phase considers factors such as bridge type, age, usage, and regulatory requirements to develop an effective inspection plan.	Online Platform Team
AC 4.04	Flight planning	The process of preparing and organizing unmanned aerial vehicle (UAV) operations for data collection and analysis. It involves determining the flight area, altitude, routes, and imaging parameters to capture high-resolution images or data of the target area, such as a bridge.	Team off site
AC 4.05	UGV & UAV scanning	Following the trigger scanning schedules, UGVs and UAVs are used to scan and collect data from the bridge site, capturing detailed information about the damages and defects and of the physical environment.	Bridge inspection Team on site
AC 4.06	Hyperspectral material scanning	It uses hyperspectral imaging techniques to analyze the characteristics of materials or surfaces in the construction site and to identify specific properties or components.	Bridge inspection Team on site
AC 4.07	Images processing	This activity aims to post-process the outputs of the digital survey in order to register a point cloud and to have results of the material of the constructed assets.	Bridge inspection Team off site

Code	Activity Title	Activity Description	Activity Actor
AC 4.08	Semantic segmentation	It is a process that involves analyzing and categorizing individual points within a point cloud dataset based on their semantic meaning or class labels.	Semantic Point Cloud Team
AC 4.09	Damage detection	It is the identification and assessment of any deterioration, defects, or structural issues present in a bridge. It includes visual inspections and automatically analysis of the outputs and the analysis of data collected from various sources, such as UAV images, sensors, or monitoring systems.	Bridge inspection Team off site
AC 4.10	Object Detection	A phase in which images and the segmented point clouds are used to identify and localize objects and defects of the bridge using machine learning algorithms and computer vision techniques.	BIM Modeling Team
AC 4.11	BIM Model update	BIM model update is the process of incorporating new or revised information into the existing BIM model, in terms of reconstruction of defects and . This can include updating the model with design changes, as-built data, or additional details obtained during construction or maintenance activities. BIM model updates help maintain an accurate and up-to-date representation of the building or infrastructure project throughout its lifecycle.	BIM Modeling Team
AC 4.12	BIMxD platform update	Update information of the construction site within the BIMxD platform.	Online Platform Team
AC 4.13	BIM defects comparison	It involves comparing the as-built conditions against the original design BIM model to identify defects. BIM defects comparison helps detect deviations from the design intent, facilitates quality control, and guides corrective actions.	Online Platform Team
AC 4.14	Verify bridge intervention's need	It evaluates the results of bridge inspections, assessments, and data analysis to determine whether maintenance, repairs, or other interventions are necessary. This process considers the severity of detected damage, structural safety, operational requirements, and budgetary constraints to make informed decisions on the appropriate actions required to address the identified issues.	Online Platform Team

Code	Activity Title	Activity Description	Activity Actor
AC 4.15	Change inspection planning	Change inspection planning refers to modifying the initial bridge inspection plan based on new information, findings, or project requirements. This may involve adjusting the inspection scope, methods, or timeline to account for unexpected issues, changes in conditions, or updated priorities.	Online Platform Team
AC 4.16	Plan intervention	It develops a comprehensive strategy and action plan for addressing the identified issues or defects in a bridge. It includes defining the scope of work, determining the necessary resources, establishing timelines, and coordinating with relevant stakeholders.	Online Platform Team

Table 5 Pilot IV- Bridge inspection and monitoring Process Map Activities

6.3. Exchange Model of the Pilot IV

Code	Title	Description	Actor	Actor receiver
EM 4.01	BEP modeling guidelines	BEP stands for BIM Execution Plan, which is a comprehensive document that outlines the processes, standards, and protocols for creating and managing a BIM model for bridge inspection and monitoring. They provide instructions and requirements for the creation and utilization of the BIM model during the management phase	-	BIM Modeling Team
EM 4.02	Design BIM model	A Design BIM model is a digital representation of a building or infrastructure project during the design phase. It includes information about the project's geometry, spatial relationships, components, materials, and other relevant data.	BIM Modeling Team	Online Platform Team
EM 4.03	Trigger scanning	Trigger scanning refers to the process of initiating a 3D scanning operation at a specific point or event during a construction project. Trigger scanning is performed when significant changes occur, such as completing a construction phase or before	Online Platform Team	off site Team

Code	Title	Description	Actor	Actor receiver
		the installation of new elements.		
EM 4.04	As-designed Design BIMxD model Material equipment tracking	The As-Designed Design BIMxD model is an enhanced version of the design BIM model managed in the BIMxD platform. It incorporates additional documentation, annotations, and specifications related to the design intent, construction sequencing, and material specifications. The BIMxD model aims to provide a comprehensive source of information for inspections teams to follow during the project execution.	Online Platform Team	BIM Modeling Team Off site Team
EM 4.05	Flight plan	It is a predetermined set of instructions that outline the flight path, data acquisition strategy, and specific parameters for the drone's operation. It includes details such as the area of interest, flight parameters, flight path, sensor and imaging details, and image capture strategy.	Off site Team	Bridge inspection Team on site
EM 4.06	UAV images	UAV images refer to aerial photographs or data captured by drones or unmanned aircraft.	Bridge inspection Team on site	Off site Team
EM 4.07	Hyperspectral images	Hyperspectral images are images captured using sensors that measure a wide range of electromagnetic wavelengths. They are used for tasks such as vegetation mapping, material identification, and environmental monitoring.	Bridge inspection Team on site	Off site Team
EM 4.08	Point Cloud	A point cloud is a large collection of 3D data points that represent the surface geometry of the bridge.	Off site Team	Off site Team
EM 4.09	Segmented Point Cloud	A segmented point cloud is a subset of a larger point cloud where specific construction objects of the bridge and the defects have been separated	Off site Team	BIM Modeling Team

Code	Title	Description	Actor	Actor receiver
		and labelled into distinct groups or segments.		
EM 4.10	Damages detected mesh	This is a 3D model or point cloud representation of the bridge that highlights identified damages or areas of concern, identified as single objects.	Off site Team	BIM Modeling Team
EM 4.11	BIM model with defect	It is a digital representation of the bridge structure that incorporates the identified flaws or issues. It overlays the defects onto the original BIM model, enabling a detailed visualization of the specific areas requiring attention.	BIM Modeling Team	Online Platform Team
EM 4.12	BIMxD model with defect	It integrates within the BIMxD platform the identified defects into this enriched model, allowing for a more detailed analysis of the impact of the defects on the bridge's structural behaviour or long-term performance.	Online Platform Team	Online Platform Team
EM 4.13	Intervention plan		Online Platform Team	Online Platform Team

Table 6 Exchange Model of the Pilot IV. Bridge inspection and monitoring

7. Exchange Requirements of the Exchange Models

Design BIM model

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Wall	1-01	Object	IfcWall	IfcWall	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Wall (load bearing)	**03-01**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Wall (load bearing)		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry Wall (non bearing)	**03-01**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Wall (non bearing)		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Height	02-05.01	Property	BaseQuantities.Height	BaseQuantities.Height	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetVolume	02-05.09	Property	BaseQuantities.NetVolume	BaseQuantities.NetVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossWeight	02-05.10	Property	BaseQuantities.GrossWeight	BaseQuantities.GrossWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Layer	**03-20.01**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Layer Class	03-20.01.0	Property	IfcMaterialDefinition.IfcMaterialLayer	IfcMaterialDefinition.IfcMaterialLayer	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayerSet	03-20.01.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayer	03-20.01.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Floor	1-02	Object	IfcCovering.PredefinedType.FLOORING	IfcCovering.PredefinedType.FLOORING	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
System-generated quantities	03-01	Group	BaseQuantities	BaseQuantities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Width	02-05.03	Property	BaseQuantities.Width	BaseQuantities.Width	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Perimeter	02-05.04	Property	BaseQuantities.Perimeter	BaseQuantities.Perimeter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetVolume	02-05.09	Property	BaseQuantities.NetVolume	BaseQuantities.NetVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossArea	02-05.12	Property	BaseQuantities.GrossArea	BaseQuantities.GrossArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetArea	02-05.13	Property	BaseQuantities.NetArea	BaseQuantities.NetArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry Slab	03-05	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Slab		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Layer	03-20.01	Group			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Layer Class	03-20.01.0	Property	IfcMaterialDefinition.IfcMaterialLayer	IfcMaterialDefinition.IfcMaterialLayer	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayerSet	03-20.01.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayer	03-20.01.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	06-02.00	Group			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Door	1-03	Object	IfcDoor	IfcDoor	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Height	02-05.01	Property	BaseQuantities.Height	BaseQuantities.Height	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Width	02-05.03	Property	BaseQuantities.Width	BaseQuantities.Width	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Perimeter	02-05.04	Property	BaseQuantities.Perimeter	BaseQuantities.Perimeter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry Door	**03-06**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Door		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Window	1-04	Object	IfcWindow	IfcWindow	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Window	**03-07**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Window		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Roof	**1-05**	**Object**	**IfcRoof**	**IfcRoof**	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Roof	**03-07**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Roof		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Layer	**03-20.01**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Layer Class	03-20.01.0	Property	IfcMaterialDefinition.IfcMaterialLayer	IfcMaterialDefinition.IfcMaterialLayer	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayerSet	03-20.01.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayer	03-20.01.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Curtain Wall	1-06	Object	IfcCurtainWall	IfcCurtainWall	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	03-20.03	Group			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	06-02.00	Group			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Stair	1-07	Object	IfcStair	IfcStair	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Stair/Ramp properties	02-06	Group	Pset_StairCommon	Pset_StairCommon	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
RiserHeight		Property	Pset_StairCommon.RiserHeight	Pset_StairCommon.RiserHeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Riser Number		Property	Pset_StairCommon.NumberOfRiser	Pset_StairCommon.NumberOfRiser	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
TreadLength		Property	Pset_StairCommon.TreadLength	Pset_StairCommon.TreadLength	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Treads Number		Property	Pset_StairCommon.NumberOfTreads	Pset_StairCommon.NumberOfTreads	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Ceiling	**1-08**	**Object**	**IfcCovering.PredefinedType.CEILING**	**IfcCovering.PredefinedType.CEILING**	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Width	02-05.03	Property	BaseQuantities.Width	BaseQuantities.Width	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Perimeter	02-05.04	Property	BaseQuantities.Perimeter	BaseQuantities.Perimeter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetVolume	02-05.09	Property	BaseQuantities.NetVolume	BaseQuantities.NetVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossArea	02-05.12	Property	BaseQuantities.GrossArea	BaseQuantities.GrossArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
NetArea	02-05.13	Property	BaseQuantities.NetArea	BaseQuantities.NetArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Layer	**03-20.01**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Layer Class	03-20.01.0	Property	IfcMaterialDefinition.IfcMaterialLayer	IfcMaterialDefinition.IfcMaterialLayer	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayerSet	03-20.01.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayer	03-20.01.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material profile	**03-20.02**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Profile Class	03-20.02.0	Property	IfcMaterialDefinition.IfcMaterialProfile	IfcMaterialDefinition.IfcMaterialProfile	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfileSet	03-20.02.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfile	03-20.02.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Railing	1-09	Object	IfcRailing.PredefinedType.BALUSTRADE	IfcRailing.PredefinedType.BALUSTRADE	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
System-generated quantities	03-01	Group	BaseQuantities	BaseQuantities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Height	02-05.01	Property	BaseQuantities.Height	BaseQuantities.Height	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Ramp	1-10	Object	IfcRamp	IfcRamp	(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Beam	2-01	Object	IfcBeam	IfcBeam	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
CrossSectionArea	02-05.05	Property	BaseQuantities.CrossSectionArea	BaseQuantities.CrossSectionArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossSurfaceArea	02-05.07	Property	BaseQuantities.GrossSurfaceArea	BaseQuantities.GrossSurfaceArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossVolume	02-05.08	Property	BaseQuantities.GrossVolume	BaseQuantities.GrossVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetVolume	02-05.09	Property	BaseQuantities.NetVolume	BaseQuantities.NetVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossWeight	02-05.10	Property	BaseQuantities.GrossWeight	BaseQuantities.GrossWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry Beam	**03-03**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 400 - Beam		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material profile	**03-20.02**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Profile Class	03-20.02.0	Property	IfcMaterialDefinition.IfcMaterialProfile	IfcMaterialDefinition.IfcMaterialProfile	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfileSet	03-20.02.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfile	03-20.02.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Footing	2-02	Object	IfcFooting	IfcFooting	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Footing	**03-08**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Footing		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Material profile	**03-20.02**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Profile Class	03-20.02.0	Property	IfcMaterialDefinition.IfcMaterialProfile	IfcMaterialDefinition.IfcMaterialProfile	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfileSet	03-20.02.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfile	03-20.02.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Pile	2-03	Object	IfcPile	IfcPile	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
System-generated quantities	03-01	Group	BaseQuantities	BaseQuantities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
CrossSectionArea	02-05.05	Property	BaseQuantities.CrossSectionArea	BaseQuantities.CrossSectionArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
OuterSurfaceArea	02-05.06	Property	BaseQuantities.OuterSurfaceArea	BaseQuantities.OuterSurfaceArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossSurfaceArea	02-05.07	Property	BaseQuantities.GrossSurfaceArea	BaseQuantities.GrossSurfaceArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossVolume	02-05.08	Property	BaseQuantities.GrossVolume	BaseQuantities.GrossVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetVolume	02-05.09	Property	BaseQuantities.NetVolume	BaseQuantities.NetVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossWeight	02-05.10	Property	BaseQuantities.GrossWeight	BaseQuantities.GrossWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry Pile	**03-09**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
LOG 300 - Pile		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material profile	**03-20.02**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Profile Class	03-20.02.0	Property	IfcMaterialDefinition.IfcMaterialProfile	IfcMaterialDefinition.IfcMaterialProfile	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfileSet	03-20.02.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfile	03-20.02.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Member	2-04	Object	IfcMember	IfcMember	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
CrossSectionArea	02-05.05	Property	BaseQuantities.CrossSectionArea	BaseQuantities.CrossSectionArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossSurfaceArea	02-05.07	Property	BaseQuantities.GrossSurfaceArea	BaseQuantities.GrossSurfaceArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossVolume	02-05.08	Property	BaseQuantities.GrossVolume	BaseQuantities.GrossVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetVolume	02-05.09	Property	BaseQuantities.NetVolume	BaseQuantities.NetVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossWeight	02-05.10	Property	BaseQuantities.GrossWeight	BaseQuantities.GrossWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Material profile	**03-20.02**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Profile Class	03-20.02.0	Property	IfcMaterialDefinition.IfcMaterialProfile	IfcMaterialDefinition.IfcMaterialProfile	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfileSet	03-20.02.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfile	03-20.02.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Column	2-05	Object	IfcColumn	IfcColumn	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
CrossSectionArea	02-05.05	Property	BaseQuantities.CrossSectionArea	BaseQuantities.CrossSectionArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossSurfaceArea	02-05.07	Property	BaseQuantities.GrossSurfaceArea	BaseQuantities.GrossSurfaceArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossVolume	02-05.08	Property	BaseQuantities.GrossVolume	BaseQuantities.GrossVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossWeight	02-05.10	Property	BaseQuantities.GrossWeight	BaseQuantities.GrossWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry Column	**03-04**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Column		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material profile	**03-20.02**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Material Profile Class	03-20.02.0	Property	IfcMaterialDefinition.IfcMaterialProfile	IfcMaterialDefinition.IfcMaterialProfile	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfileSet	03-20.02.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfile	03-20.02.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Plate	2-06	Object	IfcPlate	IfcPlate	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Width	02-05.03	Property	BaseQuantities.Width	BaseQuantities.Width	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Perimeter	02-05.04	Property	BaseQuantities.Perimeter	BaseQuantities.Perimeter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossVolume	02-05.08	Property	BaseQuantities.GrossVolume	BaseQuantities.GrossVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetVolume	02-05.09	Property	BaseQuantities.NetVolume	BaseQuantities.NetVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossWeight	02-05.10	Property	BaseQuantities.GrossWeight	BaseQuantities.GrossWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossArea	02-05.12	Property	BaseQuantities.GrossArea	BaseQuantities.GrossArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetArea	02-05.13	Property	BaseQuantities.NetArea	BaseQuantities.NetArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Layer	**03-20.01**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Layer Class	03-20.01.0	Property	IfcMaterialDefinition.IfcMaterialLayer	IfcMaterialDefinition.IfcMaterialLayer	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
IfcMaterialLayerSet	03-20.01.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayer	03-20.01.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Reinforcing Bar	2-07	Object	IfcReinforcingBar	IfcReinforcingBar	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material profile	**03-20.02**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Profile Class	03-20.02.0	Property	IfcMaterialDefinition.IfcMaterialProfile	IfcMaterialDefinition.IfcMaterialProfile	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfileSet	03-20.02.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfile	03-20.02.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Stair	2-08	Object	IfcStair	IfcStair	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
System-generated quantities	03-01	Group	BaseQuantities	BaseQuantities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetVolume	02-05.09	Property	BaseQuantities.NetVolume	BaseQuantities.NetVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	03-20.03	Group			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	06-02.00	Group			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Ramp structural	2-09	Object	IfcRamp	IfcRamp	(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material constituent	03-20.03	Group			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Slab	2-10	Object	IfcSlab.PredefinedType.FLOOR	IfcSlab.PredefinedType.FLOOR	(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Layer	**03-20.01**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Layer Class	03-20.01.0	Property	IfcMaterialDefinition.IfcMaterialLayer	IfcMaterialDefinition.IfcMaterialLayer	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayerSet	03-20.01.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayer	03-20.01.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
AirTerminal	3-01	Object	IfcAirTerminal	IfcAirTerminal	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Perimeter	02-05.04	Property	BaseQuantities.Perimeter	BaseQuantities.Perimeter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
GrossWeight	02-05.10	Property	BaseQuantities.GrossWeight	BaseQuantities.GrossWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Quantity MEP Common	**03-02**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
TotalSurfaceArea	03-02.3	Property	#.TotalSurfaceArea	#.TotalSurfaceArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Boiler	3-02	Object	IfcBoiler	IfcBoiler	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry MEP Terminal	**03-10**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Flow Terminal		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Chiller	3-03	Object	IfcChiller	IfcChiller	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Compressor	3-04	Object	IfcCompressor	IfcCompressor	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Condencer	3-05	Object	IfcCondenser	IfcCondenser	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Damper	3-06	Object	IfcDamper	IfcDamper	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	03-20.03	Group			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	06-02.00	Group			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Duct	3-07	Object	IfcDuctSegment	IfcDuctSegment	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material profile	03-20.02	Group			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Profile Class	03-20.02.0	Property	IfcMaterialDefinition.IfcMaterialProfile	IfcMaterialDefinition.IfcMaterialProfile	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfileSet	03-20.02.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
IfcMaterialProfile	03-20.02.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Duct Fitting	3-08	Object	IfcDuctFitting	IfcDuctFitting	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossVolume	02-05.08	Property	BaseQuantities.GrossVolume	BaseQuantities.GrossVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossWeight	02-05.10	Property	BaseQuantities.GrossWeight	BaseQuantities.GrossWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Heat Exchanger	3-09	Object	IfcHeatExchanger	IfcHeatExchanger	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Lamp	3-10	Object	IfcLamp	IfcLamp	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Unitary Equipment	3-11	Object	IfcUnitaryEquipment	IfcUnitaryEquipment	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Pipe	**3-12**	**Object**	**IfcPipeSegment**	**IfcPipeSegment**	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossVolume	02-05.08	Property	BaseQuantities.GrossVolume	BaseQuantities.GrossVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossWeight	02-05.10	Property	BaseQuantities.GrossWeight	BaseQuantities.GrossWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material profile	**03-20.02**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Profile Class	03-20.02.0	Property	IfcMaterialDefinition.IfcMaterialProfile	IfcMaterialDefinition.IfcMaterialProfile	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfileSet	03-20.02.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfile	03-20.02.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Pipe fitting	**3-13**	**Object**	**IfcPipeFitting**	**IfcPipeFitting**	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossVolume	02-05.08	Property	BaseQuantities.GrossVolume	BaseQuantities.GrossVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossWeight	02-05.10	Property	BaseQuantities.GrossWeight	BaseQuantities.GrossWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Pump	3-14	Object	IfcPump	IfcPump	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Pump Type Properties	**02-13**	**Group**	**Pset_PumpTypeCommon**	**Pset_PumpTypeCommon**	(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Casing Material		Property			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Impeller Material		Property			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Impeller Seal Material		Property			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Tank	3-15	Object	IfcTank	IfcTank	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Tank Type Properties	**02-11**	**Group**	**Pset_TankTypeCommon**	**Pset_TankTypeCommon**	(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material		Property			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Thickness		Property			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Valve	**3-16**	**Object**	**IfcValve**	**IfcValve**	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Valve Type Properties	**02-12**	**Group**	**Pset_ValveTypeCommon**	**Pset_ValveTypeCommon**	(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Body Material		Property			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Operating Mechanism Material		Property			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Light Fixture	**3-21**	**Object**	**IfcBuiltElement**	**IfcBuildingElementProxy**	(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Trigger Scanning

Name	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
BCF	Object			-	-	-	(✓)	-	(✓)	-	-	-	(✓)	-	-	-	-
BCF ProjectFile	**Group**			-	-	-	✓	-	✓	-	-	-	✓	-	-	-	-
ProjectId	Property			-	-	-	✓	-	✓	-	-	-	✓	-	-	-	-
Name	Property			-	-	-	✓	-	✓	-	-	-	✓	-	-	-	-
BCF Header	**Group**			-	-	-	✓	-	✓	-	-	-	✓	-	-	-	-
IfcProject	Property			-	-	-	✓	-	✓	-	-	-	✓	-	-	-	-
IfcSpatialStructureElement	Property			-	-	-	✓	-	✓	-	-	-	✓	-	-	-	-
IsExternal	Property			-	-	-	✓	-	✓	-	-	-	✓	-	-	-	-
Filename	Property			-	-	-	✓	-	✓	-	-	-	✓	-	-	-	-
Date	Property			-	-	-	✓	-	✓	-	-	-	✓	-	-	-	-
Reference	Property			-	-	-	✓	-	✓	-	-	-	✓	-	-	-	-
Construction	Object	IfcTask.PredefinedType.CONSTRUCTION	IfcTask.PredefinedType.CONSTRUCTION	-	-	-	(✓)	-	-	-	-	-	-	-	-	-	-
Task properties	**Group**			-	-	-	✓	-	-	-	-	-	-	-	-	-	-
Name	Property		IfcElement Attributes.Name	-	-	-	✓	-	-	-	-	-	-	-	-	-	-
Status	Property	IfcTask Attributes.Status	IfcTask Atributes.Status	-	-	-	✓	-	-	-	-	-	-	-	-	-	-
WorkMethod	Property	IfcTask attributes.WorkMethod	IfcTask Attributes.WorkMethod	-	-	-	✓	-	-	-	-	-	-	-	-	-	-
IsMilestone	Property		IfcTask Attributes.IsMilestone	-	-	-	✓	-	-	-	-	-	-	-	-	-	-
Priority	Property		IfcTask Attributes.Priority	-	-	-	✓	-	-	-	-	-	-	-	-	-	-
TaskTime	Property		IfcTask Attributes.TaskTime	-	-	-	✓	-	-	-	-	-	-	-	-	-	-

As-designed Design BIMxD model

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Wall	1-01	Object	IfcWall	IfcWall	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Wall (load bearing)	03-01	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Wall (load bearing)		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry Wall (non bearing)	03-01	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Wall (non bearing)		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
System-generated quantities	03-01	Group	BaseQuantities	BaseQuantities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Height	02-05.01	Property	BaseQuantities.Height	BaseQuantities.Height	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetVolume	02-05.09	Property	BaseQuantities.NetVolume	BaseQuantities.NetVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossWeight	02-05.10	Property	BaseQuantities.GrossWeight	BaseQuantities.GrossWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Layer	03-20.01	Group			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Layer Class	03-20.01.0	Property	IfcMaterialDefinition.IfcMaterialLayer	IfcMaterialDefinition.IfcMaterialLayer	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayerSet	03-20.01.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayer	03-20.01.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	06-02.00	Group			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Floor	1-02	Object	IfcCovering.PredefinedType.FLOORING	IfcCovering.PredefinedType.FLOORING	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
System-generated quantities	03-01	Group	BaseQuantities	BaseQuantities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Width	02-05.03	Property	BaseQuantities.Width	BaseQuantities.Width	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Perimeter	02-05.04	Property	BaseQuantities.Perimeter	BaseQuantities.Perimeter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetVolume	02-05.09	Property	BaseQuantities.NetVolume	BaseQuantities.NetVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossArea	02-05.12	Property	BaseQuantities.GrossArea	BaseQuantities.GrossArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetArea	02-05.13	Property	BaseQuantities.NetArea	BaseQuantities.NetArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry Slab	03-05	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Slab		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Layer	03-20.01	Group			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Layer Class	03-20.01.0	Property	IfcMaterialDefinition.IfcMaterialLayer	IfcMaterialDefinition.IfcMaterialLayer	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayerSet	03-20.01.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayer	03-20.01.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	06-02.00	Group			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Door	1-03	Object	IfcDoor	IfcDoor	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Height	02-05.01	Property	BaseQuantities.Height	BaseQuantities.Height	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Width	02-05.03	Property	BaseQuantities.Width	BaseQuantities.Width	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Perimeter	02-05.04	Property	BaseQuantities.Perimeter	BaseQuantities.Perimeter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry Door	**03-06**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Door		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Window	1-04	Object	IfcWindow	IfcWindow	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Window	**03-07**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Window		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Roof	1-05	Object	IfcRoof	IfcRoof	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Roof	**03-07**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Roof		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Layer	**03-20.01**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Layer Class	03-20.01.0	Property	IfcMaterialDefinition.IfcMaterialLayer	IfcMaterialDefinition.IfcMaterialLayer	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayerSet	03-20.01.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayer	03-20.01.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Curtain Wall	1-06	Object	IfcCurtainWall	IfcCurtainWall	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
System-generated quantities	03-01	Group	BaseQuantities	BaseQuantities	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Height	02-05.01	Property	BaseQuantities.Height	BaseQuantities.Height	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	03-20.03	Group			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	06-02.00	Group			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Common Material properties	06-02.01	Group	[MAPPING ERROR]	[MAPPING ERROR]	(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
MolecularWeight	06-02.01.1	Property	Pset_MaterialCommon.MolecularWeight	Pset_MaterialCommon.MolecularWeight	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Stair	1-07	Object	IfcStair	IfcStair	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Common Properties	02-00	Group			(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Fire Rating		Property	Pset_StairCommon.FireRating	Pset_StairCommon.FireRating	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Stair/Ramp properties	02-06	Group	Pset_StairCommon	Pset_StairCommon	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
TreadLength		Property	Pset_StairCommon.TreadLength	Pset_StairCommon.TreadLength	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Treads Number		Property	Pset_StairCommon.NumberOfTreads	Pset_StairCommon.NumberOfTreads	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetVolume	02-05.09	Property	BaseQuantities.NetVolume	BaseQuantities.NetVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Common Material properties	**06-02.01**	**Group**	**[MAPPING ERROR]**	**[MAPPING ERROR]**	(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
MolecularWeight	06-02.01.1	Property	Pset_MaterialCommon.MolecularWeight	Pset_MaterialCommon.MolecularWeight	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Ceiling	**1-08**	**Object**	**IfcCovering.PredefinedType.CEILING**	**IfcCovering.PredefinedType.CEILING**	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Common Properties	**02-00**	**Group**			(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Fire Rating		Property	Pset_CoveringCommon.FireRating	Pset_CoveringCommon.FireRating	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Width	02-05.03	Property	BaseQuantities.Width	BaseQuantities.Width	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Perimeter	02-05.04	Property	BaseQuantities.Perimeter	BaseQuantities.Perimeter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetVolume	02-05.09	Property	BaseQuantities.NetVolume	BaseQuantities.NetVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossArea	02-05.12	Property	BaseQuantities.GrossArea	BaseQuantities.GrossArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetArea	02-05.13	Property	BaseQuantities.NetArea	BaseQuantities.NetArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material profile	**03-20.02**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Profile Class	03-20.02.0	Property	IfcMaterialDefinition.IfcMaterialProfile	IfcMaterialDefinition.IfcMaterialProfile	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfileSet	03-20.02.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfile	03-20.02.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Railing	1-09	Object	IfcRailing.PredefinedType.BALUSTRADE	IfcRailing.PredefinedType.BALUSTRADE	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Common Properties	**02-00**	**Group**			(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Is External		Property	Pset_RailingCommon.IsExternal	Pset_RailingCommon.IsExternal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Reference		Property	Pset_RailingCommon.Reference	Pset_RailingCommon.Reference	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Common Material properties	**06-02.01**	**Group**	[MAPPING ERROR]	[MAPPING ERROR]	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
MolecularWeight	06-02.01.1	Property	Pset_MaterialCommon.MolecularWeight	Pset_MaterialCommon.MolecularWeight	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Porosity	06-02.01.2	Property	Pset_MaterialCommon.Porosity	Pset_MaterialCommon.Porosity	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
MassDensity	06-02.01.3	Property	Pset_MaterialCommon.MassDensity	Pset_MaterialCommon.MassDensity	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Ramp	1-10	Object	IfcRamp	IfcRamp	(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Beam	2-01	Object	IfcBeam	IfcBeam	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
System-generated quantities	03-01	Group	BaseQuantities	BaseQuantities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
CrossSectionArea	02-05.05	Property	BaseQuantities.CrossSectionArea	BaseQuantities.CrossSectionArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossSurfaceArea	02-05.07	Property	BaseQuantities.GrossSurfaceArea	BaseQuantities.GrossSurfaceArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossVolume	02-05.08	Property	BaseQuantities.GrossVolume	BaseQuantities.GrossVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetVolume	02-05.09	Property	BaseQuantities.NetVolume	BaseQuantities.NetVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossWeight	02-05.10	Property	BaseQuantities.GrossWeight	BaseQuantities.GrossWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry Beam	03-03	Group			(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
LOG 300 - Beam		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material profile	**03-20.02**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Profile Class	03-20.02.0	Property	IfcMaterialDefinition.IfcMaterialProfile	IfcMaterialDefinition.IfcMaterialProfile	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
IfcMaterialProfileSet	03-20.02.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfile	03-20.02.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Footing	2-02	Object	IfcFooting	IfcFooting	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Footing	**03-08**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Footing		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material profile	**03-20.02**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Profile Class	03-20.02.0	Property	IfcMaterialDefinition.IfcMaterialProfile	IfcMaterialDefinition.IfcMaterialProfile	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfileSet	03-20.02.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfile	03-20.02.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Pile	2-03	Object	IfcPile	IfcPile	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
CrossSectionArea	02-05.05	Property	BaseQuantities.CrossSectionArea	BaseQuantities.CrossSectionArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
OuterSurfaceArea	02-05.06	Property	BaseQuantities.OuterSurfaceArea	BaseQuantities.OuterSurfaceArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossSurfaceArea	02-05.07	Property	BaseQuantities.GrossSurfaceArea	BaseQuantities.GrossSurfaceArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossVolume	02-05.08	Property	BaseQuantities.GrossVolume	BaseQuantities.GrossVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetVolume	02-05.09	Property	BaseQuantities.NetVolume	BaseQuantities.NetVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossWeight	02-05.10	Property	BaseQuantities.GrossWeight	BaseQuantities.GrossWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry Pile	**03-09**	**Group**			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Pile		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material profile	**03-20.02**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Profile Class	03-20.02.0	Property	IfcMaterialDefinition.IfcMaterialProfile	IfcMaterialDefinition.IfcMaterialProfile	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfileSet	03-20.02.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfile	03-20.02.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Member	2-04	Object	IfcMember	IfcMember	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
System-generated quantities	03-01	Group	BaseQuantities	BaseQuantities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
CrossSectionArea	02-05.05	Property	BaseQuantities.CrossSectionArea	BaseQuantities.CrossSectionArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossSurfaceArea	02-05.07	Property	BaseQuantities.GrossSurfaceArea	BaseQuantities.GrossSurfaceArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossVolume	02-05.08	Property	BaseQuantities.GrossVolume	BaseQuantities.GrossVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetVolume	02-05.09	Property	BaseQuantities.NetVolume	BaseQuantities.NetVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossWeight	02-05.10	Property	BaseQuantities.GrossWeight	BaseQuantities.GrossWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material profile	03-20.02	Group			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Profile Class	03-20.02.0	Property	IfcMaterialDefinition.IfcMaterialProfile	IfcMaterialDefinition.IfcMaterialProfile	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfileSet	03-20.02.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfile	03-20.02.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	06-02.00	Group			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Column	2-05	Object	IfcColumn	IfcColumn	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
System-generated quantities	03-01	Group	BaseQuantities	BaseQuantities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
CrossSectionArea	02-05.05	Property	BaseQuantities.CrossSectionArea	BaseQuantities.CrossSectionArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossSurfaceArea	02-05.07	Property	BaseQuantities.GrossSurfaceArea	BaseQuantities.GrossSurfaceArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossVolume	02-05.08	Property	BaseQuantities.GrossVolume	BaseQuantities.GrossVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossWeight	02-05.10	Property	BaseQuantities.GrossWeight	BaseQuantities.GrossWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry Column	03-04	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Column		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material profile	03-20.02	Group			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Profile Class	03-20.02.0	Property	IfcMaterialDefinition.IfcMaterialProfile	IfcMaterialDefinition.IfcMaterialProfile	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfileSet	03-20.02.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfile	03-20.02.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	06-02.00	Group			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Plate	2-06	Object	IfcPlate	IfcPlate	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
System-generated quantities	03-01	Group	BaseQuantities	BaseQuantities	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Width	02-05.03	Property	BaseQuantities.Width	BaseQuantities.Width	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Perimeter	02-05.04	Property	BaseQuantities.Perimeter	BaseQuantities.Perimeter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetVolume	02-05.09	Property	BaseQuantities.NetVolume	BaseQuantities.NetVolume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossWeight	02-05.10	Property	BaseQuantities.GrossWeight	BaseQuantities.GrossWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossArea	02-05.12	Property	BaseQuantities.GrossArea	BaseQuantities.GrossArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
NetArea	02-05.13	Property	BaseQuantities.NetArea	BaseQuantities.NetArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Layer	03-20.01	Group			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Layer Class	03-20.01.0	Property	IfcMaterialDefinition.IfcMaterialLayer	IfcMaterialDefinition.IfcMaterialLayer	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayerSet	03-20.01.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayer	03-20.01.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	06-02.00	Group			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Reinforcing Bar	2-07	Object	IfcReinforcingBar	IfcReinforcingBar	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material profile	03-20.02	Group			(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Material Profile Class	03-20.02.0	Property	IfcMaterialDefinition.IfcMaterialProfile	IfcMaterialDefinition.IfcMaterialProfile	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialProfile	03-20.02.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Description	06-2.00	Property	IfcMaterial* Attributes.Description	IfcMaterial* Attributes.Description	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Common Material properties	**06-02.01**	**Group**	**[MAPPING ERROR]**	**[MAPPING ERROR]**	(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
MolecularWeight	06-02.01.1	Property	Pset_MaterialCommon.MolecularWeight	Pset_MaterialCommon.MolecularWeight	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Stair	**2-08**	**Object**	**IfcStair**	**IfcStair**	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Length	02-05.02	Property	BaseQuantities.Length	BaseQuantities.Length	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
NetVolume	02-05.09	Property	BaseQuantities.NetVolume	BaseQuantities.NetVolume	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
NetWeight	02-05.11	Property	BaseQuantities.NetWeight	BaseQuantities.NetWeight	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Mechanical material properties	**06-02.03**	**Group**	**[MAPPING ERROR]**	**[MAPPING ERROR]**	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
YoungModulus	06-02.03.2	Property	Pset_MaterialMechanical.YoungModulus	Pset_MaterialMechanical.YoungModulus	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Ramp structural	2-09	Object	IfcRamp	IfcRamp	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	03-20.03	Group			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	06-02.00	Group			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Shape Category	06-02.00.4	Property	IfcMaterial* Attributes.Category	IfcMaterial* Attributes.Category	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Mechanical material properties	06-02.03	Group	[MAPPING ERROR]	[MAPPING ERROR]	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
PoissonRatio	06-02.03.4	Property	Pset_MaterialMechanical.PoissonRatio	Pset_MaterialMechanical.PoissonRatio	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Slab	2-10	Object	IfcSlab.PredefinedType.FLOOR	IfcSlab.PredefinedType.FLOOR	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Slab	03-05	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Slab		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Common Properties	02-00	Group			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Thermal Transmittance		Property	Pset_SlabCommon.ThermalTransmittance	Pset_SlabCommon.ThermalTransmittance	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Layer	03-20.01	Group			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Layer Class	03-20.01.0	Property	IfcMaterialDefinition.IfcMaterialLayer	IfcMaterialDefinition.IfcMaterialLayer	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialLayer	03-20.01.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
Shape Material Properties	**06-02.00**	**Group**			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
LayerThickness	06-02.00.5	Property	IfcMaterial* Attributes.LayerThickness	IfcMaterial* Attributes.LayerThickness	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Mechanical material properties	**06-02.03**	**Group**	**[MAPPING ERROR]**	**[MAPPING ERROR]**	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
ThermalExpansionCoefficient	06-02.03.5	Property	Pset_MaterialMechanical.ThermalExpansionCoefficient	Pset_MaterialMechanical.ThermalExpansionCoefficient	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
AirTerminal	3-01	Object	IfcAirTerminal	IfcAirTerminal	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Air Terminal Properties	**02-08**	**Group**	**Pset_AirTerminalTypeCommon**	**Pset_AirTerminalTypeCommon**	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
EffectiveArea	02-08.22	Property	Pset_AirTerminalTypeCommon.EffectiveArea	Pset_AirTerminalTypeCommon.EffectiveArea	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
AirFlowrateVersusFlowControlElement	02-08.23	Property	Pset_AirTerminalTypeCommon.AirFlowrateVersusFlowControlElement	Pset_AirTerminalTypeCommon.AirFlowrateVersusFlowControlElement	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
System-generated quantities	**03-01**	**Group**	**BaseQuantities**	**BaseQuantities**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Perimeter	02-05.04	Property	BaseQuantities.Perimeter	BaseQuantities.Perimeter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
GrossWeight	02-05.10	Property	BaseQuantities.GrossWeight	BaseQuantities.GrossWeight	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Quantity MEP Common	**03-02**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
TotalSurfaceArea	03-02.3	Property	#.TotalSurfaceArea	#.TotalSurfaceArea	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry MEP Terminal	**03-10**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Flow Terminal		Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
IfcMaterialConstituentSet	03-20.03.1	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Mechanical material properties	**06-02.03**	**Group**	[MAPPING ERROR]	[MAPPING ERROR]	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
YoungModulus	06-02.03.2	Property	Pset_MaterialMechanical.YoungModulus	Pset_MaterialMechanical.YoungModulus	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
ShearModulus	06-02.03.3	Property	Pset_MaterialMechanical.ShearModulus	Pset_MaterialMechanical.ShearModulus	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
PoissonRatio	06-02.03.4	Property	Pset_MaterialMechanical.PoissonRatio	Pset_MaterialMechanical.PoissonRatio	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
ThermalExpansionCoefficient	06-02.03.5	Property	Pset_MaterialMechanical.ThermalExpansionCoefficient	Pset_MaterialMechanical.ThermalExpansionCoefficient	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Boiler	3-02	Object	IfcBoiler	IfcBoiler	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	**03-00**	**Group**			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	**03-20.03**	**Group**			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	**06-02.00**	**Group**			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Mechanical material properties	**06-02.03**	**Group**	[MAPPING ERROR]	[MAPPING ERROR]	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
PoissonRatio	06-02.03.4	Property	Pset_MaterialMechanical.PoissonRatio	Pset_MaterialMechanical.PoissonRatio	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC14	P04-UC22	P04-UC23	P06-UC00	P06-UC14	P06-UC22	P06-UC32	P06-UC33	P06-UC45	P06-UC47	P08-UC00	P08-UC23	P08-UC45	P08-UC47
ThermalExpansionCoefficient	06-02.03.5	Property	Pset_MaterialMechanical.ThermalExpansionCoefficient	Pset_MaterialMechanical.ThermalExpansionCoefficient	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Chiller	3-03	Object	IfcChiller	IfcChiller	(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material constituent	03-20.03	Group			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Constituent Class	03-20.03.0	Property	IfcMaterialDefinition.IfcMaterial Constituent	IfcMaterialDefinition.IfcMaterial Constituent	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
IfcMaterialConstituent	03-20.03.2	Geometry (LoG)			✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Shape Material Properties	06-02.00	Group			(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Material Shape Name	06-02.00.2	Property	IfcMaterial*Attributes.Name	IfcMaterial*Attributes.Name	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-
Material of the Shape	06-02.00.3	Property	IfcMaterial* Attributes.Material	IfcMaterial* Attributes.Material	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	-	-	-

Objects' transformation documentation

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Wall	1-01	Object	IfcWall	IfcWall	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Wall (load bearing)	03-01	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Wall (load bearing)		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry Wall (non bearing)	03-01	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Wall (non bearing)		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Floor	1-02	Object	IfcCovering.PredefinedType.FLOORING	IfcCovering.PredefinedType.FLOORING	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Slab	03-05	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Slab		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Door	1-03	Object	IfcDoor	IfcDoor	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Door	03-06	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Door		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Window	1-04	Object	IfcWindow	IfcWindow	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Window	03-07	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Window		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Roof	1-05	Object	IfcRoof	IfcRoof	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Roof	03-07	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Roof		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Curtain Wall	1-06	Object	IfcCurtainWall	IfcCurtainWall	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Stair	1-07	Object	IfcStair	IfcStair	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Ceiling	1-08	Object	IfcCovering.PredefinedType.CEILING	IfcCovering.PredefinedType.CEILING	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Railing	1-09	Object	IfcRailing.PredefinedType.BALUSTRADE	IfcRailing.PredefinedType.BALUSTRADE	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Common Properties	02-00	Group			(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Is External		Property	Pset_RailingCommon.IsExternal	Pset_RailingCommon.IsExternal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Reference		Property	Pset_RailingCommon.Reference	Pset_RailingCommon.Reference	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-

Ramp	1-10	Object	IfcRamp	IfcRamp	(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Beam	2-01	Object	IfcBeam	IfcBeam	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Beam	03-03	Group			(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
LOG 300 - Beam		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Footing	2-02	Object	IfcFooting	IfcFooting	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Footing	03-08	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Footing		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Member	2-04	Object	IfcMember	IfcMember	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Column	2-05	Object	IfcColumn	IfcColumn	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Column	03-04	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Column		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Ramp structural	2-09	Object	IfcRamp	IfcRamp	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Slab	2-10	Object	IfcSlab.PredefinedType.FLOOR	IfcSlab.PredefinedType.FLOOR	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Slab	03-05	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Slab		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-

New objects' documentation

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Wall	1-01	Object	IfcWall	IfcWall	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Wall (load bearing)	03-01	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Wall (load bearing)		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Geometry Wall (non bearing)	03-01	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Wall (non bearing)		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Floor	1-02	Object	IfcCovering.PredefinedType.FLOORING	IfcCovering.PredefinedType.FLOORING	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Slab	03-05	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Slab		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Door	1-03	Object	IfcDoor	IfcDoor	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Door	03-06	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Door		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Window	1-04	Object	IfcWindow	IfcWindow	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Window	03-07	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Window		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Roof	1-05	Object	IfcRoof	IfcRoof	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Roof	03-07	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Roof		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Curtain Wall	1-06	Object	IfcCurtainWall	IfcCurtainWall	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Stair	1-07	Object	IfcStair	IfcStair	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Ceiling	1-08	Object	IfcCovering.PredefinedType.CEILING	IfcCovering.PredefinedType.CEILING	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Railing	1-09	Object	IfcRailing.PredefinedType.BALUSTRADE	IfcRailing.PredefinedType.BALUSTRADE	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Common Properties	02-00	Group			(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Is External		Property	Pset_RailingCommon.IsExternal	Pset_RailingCommon.IsExternal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Reference		Property	Pset_RailingCommon.Reference	Pset_RailingCommon.Reference	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Ramp	1-10	Object	IfcRamp	IfcRamp	(✓)	(✓)	(✓)	-	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-

Name	Code	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Beam	2-01	Object	IfcBeam	IfcBeam	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Beam	03-03	Group			(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
LOG 300 - Beam		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Footing	2-02	Object	IfcFooting	IfcFooting	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Footing	03-08	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Footing		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Member	2-04	Object	IfcMember	IfcMember	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Column	2-05	Object	IfcColumn	IfcColumn	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Column	03-04	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Column		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Ramp structural	2-09	Object	IfcRamp	IfcRamp	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry General	03-00	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Slab	2-10	Object	IfcSlab.PredefinedType.FLOOR	IfcSlab.PredefinedType.FLOOR	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	(✓)	-	-	-	-
Geometry Slab	03-05	Group			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
LOG 300 - Slab		Geometry (LoG)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-

Update Trigger scanning

Name	Type	IFC 4.3	IFC 4 Add2	P04-UC 14	P04-UC 22	P04-UC 23	P06-UC 00	P06-UC 14	P06-UC 22	P06-UC 32	P06-UC 33	P06-UC 45	P06-UC 47	P08-UC 00	P08-UC 23	P08-UC 45	P08-UC 47
BCF	Object			-	-	-	-	-	(✓)	-	-	(✓)	(✓)	-	-	-	-
BCF ProjectFile	Group			-	-	-	-	-	✓	-	-	✓	✓	-	-	-	-
ProjectId	Property			-	-	-	-	-	✓	-	-	✓	✓	-	-	-	-
Name	Property			-	-	-	-	-	✓	-	-	✓	✓	-	-	-	-
BCF Header	Group			-	-	-	-	-	✓	-	-	✓	✓	-	-	-	-
IfcProject	Property			-	-	-	-	-	✓	-	-	✓	✓	-	-	-	-
IfcSpatialStructureElement	Property			-	-	-	-	-	✓	-	-	✓	✓	-	-	-	-
IsExternal	Property			-	-	-	-	-	✓	-	-	✓	✓	-	-	-	-
Filename	Property			-	-	-	-	-	✓	-	-	✓	✓	-	-	-	-
Date	Property			-	-	-	-	-	✓	-	-	✓	✓	-	-	-	-
Reference	Property			-	-	-	-	-	✓	-	-	✓	✓	-	-	-	-
Construction	Object	IfcTask.PredefinedType.CONSTRUCTION	IfcTask.PredefinedType.CONSTRUCTION	-	-	-	-	-	-	-	-	(✓)	-	-	-	-	-
Task properties	Group			-	-	-	-	-	-	-	-	✓	-	-	-	-	-
Name	Property		IfcElement Attributes.Name	-	-	-	-	-	-	-	-	✓	-	-	-	-	-
Status	Property	IfcTask Attributes.Status	IfcTask Atributes.Status	-	-	-	-	-	-	-	-	✓	-	-	-	-	-
WorkMethod	Property	IfcTask attributes.WorkMethod	IfcTask Attributes.WorkMethod	-	-	-	-	-	-	-	-	✓	-	-	-	-	-
IsMilestone	Property		IfcTask Attributes.IsMilestone	-	-	-	-	-	-	-	-	✓	-	-	-	-	-
Priority	Property		IfcTask Attributes.Priority	-	-	-	-	-	-	-	-	✓	-	-	-	-	-
TaskTime	Property		IfcTask Attributes.TaskTime	-	-	-	-	-	-	-	-	✓	-	-	-	-	-

8. Conclusion and Next Steps

The division of the general Information Delivery Manual (IDM) into specific IDM pilots within the context of the Human Tech project enables a focused approach tailored to the unique objectives and challenges of automation in BIM modeling, robot-assisted demolition, and bridge inspection. By applying the IDM framework to each pilot, stakeholders benefit from clearer and more specific requirements, ensuring effective implementation of the automation processes. The utilization of openBIM standards plays a crucial role in this context, providing a standardized framework from the outset to define the necessary requirements for each activity. As a research project, the multiple IDM pilots will continuously evolve and be updated based on the research findings. This iterative approach ensures that the IDM pilots are optimized and refined, incorporating the valuable insights gained throughout the project. By embracing openBIM standards and leveraging the research outcomes, the HT project is poised to drive innovation and advancements in automation, ultimately enhancing the efficiency, safety, and effectiveness of BIM modeling for construction, demolition and monitoring activities.

In addition to the aforementioned points, the utilization of the BIMxD platform plays a pivotal role in the HT project. This online platform, enriched with BIM capabilities, serves as a central hub for storing, accessing, and exchanging project information. The BIMxD platform enables seamless collaboration among project stakeholders and facilitates the integration of various data sources, such as point cloud data and segmented point cloud analysis, for enhanced construction monitoring.

To ensure the project's success, it is crucial to define and capture the necessary information within the BIMxD platform. This includes detailed information about the construction progress, asset tracking on the construction site, identification of uncovered openings and falling hazards, and mapping of emergency exits. By capturing and analyzing this information, stakeholders can make informed decisions, proactively address safety concerns, and streamline project workflows.

Furthermore, as the HT project is a research endeavour, there is an opportunity to propose addition to the existing IFC data schema, through the bSDD standard and sharing an IDS with the required information requirement. These custom requirements, which may be missing in the current schema, can be identified through the project's specific needs and objectives. The Human Tech project can accommodate the unique requirements and data structures necessary for automation in BIM modeling, robot-

assisted demolition, and bridge inspection. This ensures that the information exchange within the BIMxD platform aligns closely with the project's goals and enables seamless interoperability among various tools and software used throughout the project lifecycle.