

ENGINEERING FOR SOCIETY

โครงการแบบจำลองเพื่อ ทดสอบการใช้ข้อมูล ประกอบการทำงาน

โดย ผศ. ดร. เด่นชัย วรเดชจำเริญ
กรรมการร่างมาตรฐาน

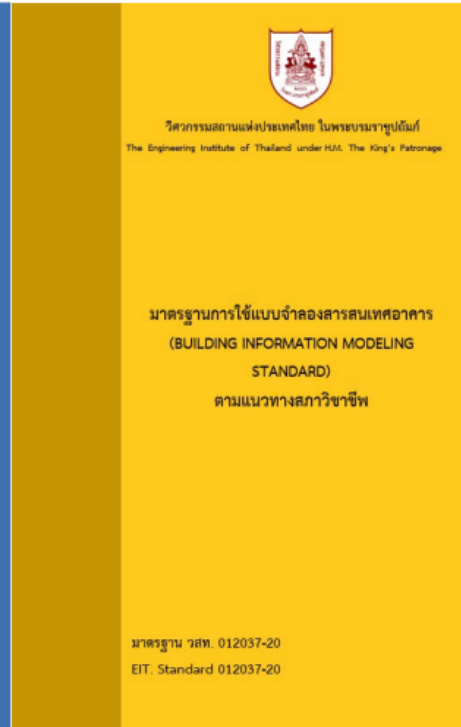
BIM LAB
by EIT

**SMART
ENGINEERING
AND INNOVATION**
FOR SOCIETY

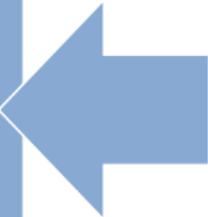
EIT BIM Standard

Information Standard

- Responsibility and Roles
- Common Data Environment
- Standard Method
 - File Naming
 - Origin and orientation
 - Drawing sheet templates
 - Annotation



EIT BIM for MEP



- การทำงานร่วมระหว่าง stage (software หลากหลาย)
- การแลกเปลี่ยนข้อมูล (หาข้อมูลกลางหรือรูปแบบอย่างไร)
- เป้าหมายการใช้ข้อมูลโดยใคร (Construction or FM)
- Architect information for MEP
- คู่กันด้วย model จริง



CIC Building Information Modelling Standards

Mechanical, Electrical and Plumbing

4.2 LOD-Information Requirements

This section describes the LOD-information required for a BIM model, it is well noted that project clients / organisations may have their own requirement for LOD-Information. This section sets out a software-neutral approach for determining LOD-I, using samples instead of attempting to giving an exhaustive list of requirement. The BIM standards developed by HKSAR Works Departments should be referred to for further details. These and other relevant publications are given in the CIC BIM Portal <https://www.bim.cic.hk/en/resources/publications> for relevant publications.

The following table lists the attributes commonly attached to individual model elements / objects.

Type	Information / Attributes	Data Type	Unit	Example	Descriptions	LOD-Information				
						100	200	300	400	500
General Properties	Equipment Type	Text	N/A	Pump	Equipment type (e.g. pump, valves)	R	R	R	R	R
	Equipment Name	Text	N/A	AHU-1F-01	Equipment name* (Follow the rule by the project clients / employers)		R	R	R	R
	Locations	Text	N/A	AHU Room	Locations* (Follow the rule by the project clients / employers)		R	R	R	R
Design Properties	Design properties of the equipment, using a Chiller as an example						R	R	R	R
	Cooling Capacity	Number	kW	214	Cooling capacity of chiller		R	R	R	R
	Rated Power Input	Number	kVA	30	Rated power input		R	R	R	R
Classification Properties	Classification Title	Text	N/A	Chillers	Classification title agreed by project clients / employers if necessary			R	R	R
	Classification Code	Number	N/A	23-33 21 00	Classification coding agreed by project clients / employers if necessary			R	R	R

- สอบทวน international guide – Data or information
- HK – LOD information (Manufacturer based guide)

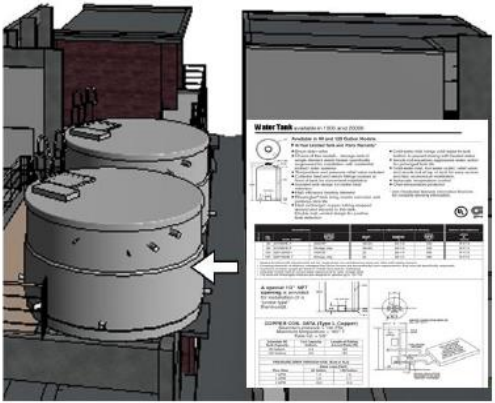
3 BIM DELIVERABLES

- Site model
- Massing model
- Architectural, structural, MEP models
 - For regulatory submissions
 - For coordination and / or clash detection analysis
 - For visualization
 - For cost estimation
- Schedule (material, time etc) and phasing program (in BIM or spreadsheet)
- Construction and fabrication models
- Shopdrawings
- As-built model (in native proprietary or open formats)
- **Data** for facility management
- Other additional value-added BIM services

- สอบทวน international guide – Data or information
- SG – Information transfer guide (Data to FM)

Table 5: Example of a BIM Project Collaboration Map

	Employer	Architect	Consulting Engineers	Contractor / Quantity Surveyor
Conceptual Design	Provide requirements related to form, function, cost and schedule	Begin design intent model with massing concepts with site considerations	Provide feedback on initial building performance goals and requirements	Provide feedback on initial building cost, schedule, and constructability *
Schematic Design	Provide design review and to further refine design requirements	Refine Design Model with new input from Employer, Consulting Engineers, and Construction Manager	Provide schematic modelling, analysis and system iterations as Design Model continues to develop	Provide design review and continued feedback on cost, schedule and constructability*
Detailed Design	Design reviews. Final approval of project design and metrics	Continue to refine Design Model. Introduce consultants models and perform model coordination	Create Discipline-specific Design Models and Analyses	Create Construction Model for simulation, coordination, estimates, and schedule *
Construction	Monitor construction and give input to construction changes and issue	Respond to construction RFI's Perform contract administration, update Design Model with changes	Respond to construction RFI's and update Discipline specific Design Models, field conditions, and commissioning	Manage construction with subcontractors and suppliers, inform changes to Design Model
As-Built		Verify As-built model	Verify As-built model	Prepare As-built model
Facility Management	Engage Architect and Facilities Group for handing over	Coordinate information exchange through model to Facilities Group	Prepare handover documentation	

<p>Facility Management</p> <ul style="list-style-type: none"> O & M 	<p>1:50</p>	<p>BIM element is modelled as an actual constructed building component or system and is an as-built representation of the actual completed building.</p>  <p>Water storage tank element with attached specification PDF (Source: HDB)</p>
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(IV) ACMV BIM ELEMENTS

	Element	Elements or Parameters needed by each non-ACMV discipline
ACMV Equipment	Air Handling unit	
	Chiller unit	
	Variable refrigerant unit	
	Cooling Tower	
	Split-type indoor & outdoor air conditioning units	
	Exhaust or extract air fans	
	Fresh air fans	
	Other fans such as jet fans	
	Heat Exchanges for projects with District Cooling	
ACMV Distribution	Exhaust air ducts (excluding hangars)	
	Fresh air ducts (excluding hangars)	
	Supply air ducts (excluding hangars)	
	Return air ducts (excluding hangars)	
	Transfer air ducts (excluding hangars)	
	Diffusers, air-boots, air grilles, air filters, registers	
	Fire dampers, motorized dampers, volume control dampers, CO ₂ sensors, CO sensors	

- SG – Data to FM (O&M)
- Survey and synthesis FM information (pdf based and ACMV guide)

- Find out ACMV and SN guide for FM users
- Non-standardized elements in Thailand

(V) MEP BIM MODELLING GUIDELINES

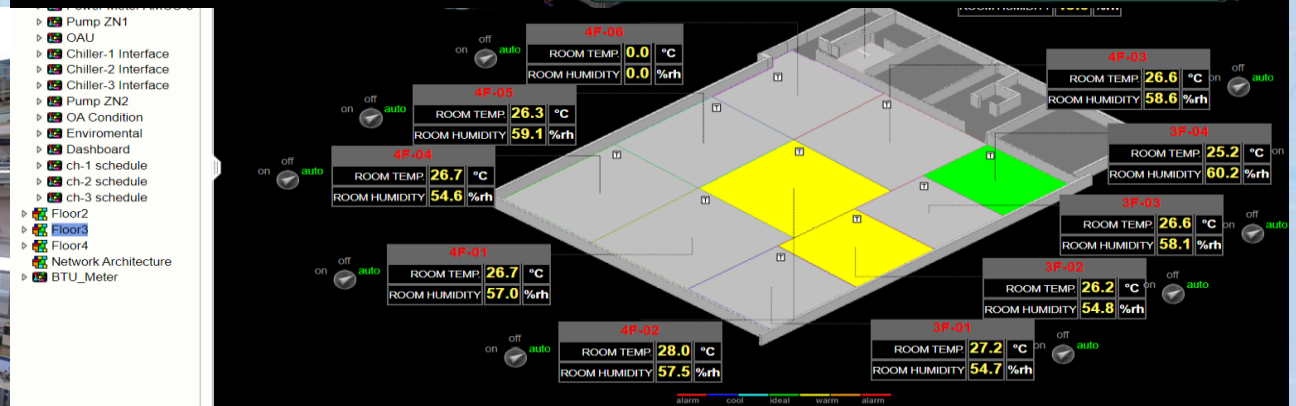
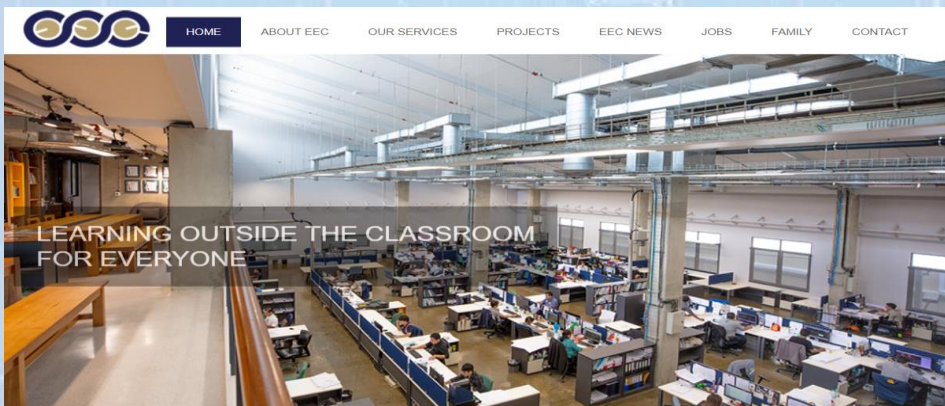
a. ACMV

Stages	Elements	Modelling Guidelines	Remarks
Conceptual	System distribution lines	Use line diagrams to show the entire system distribution Include equipment symbols in the line diagrams.	Output: Schematic diagrams
	Space objects	Use box objects to represent spaces required for MEP systems Add names and colours to the space objects.	
Preliminary Design	Zone Objects, Air Handling Unit, Chiller Unit Variable refrigerant flow unit,	Zone the spaces that have common design requirements with colour legends on plans. Model each element using the correct BIM generic object	Output: Preliminary Model Shows main distribution

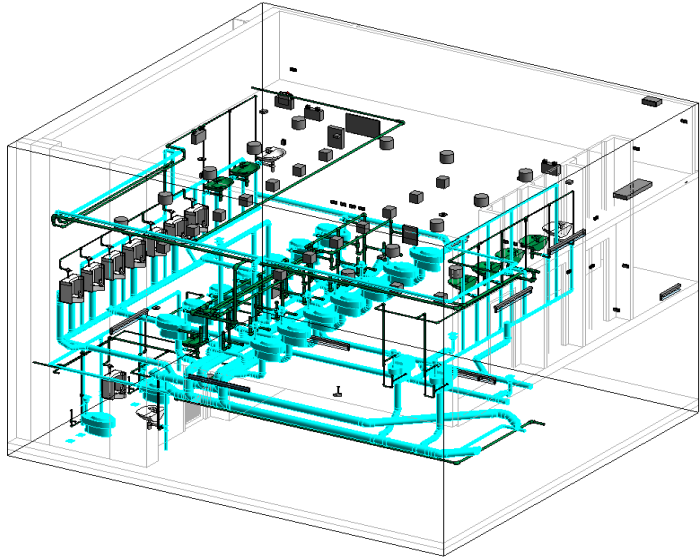
Design–bid–build (DBB) also known as Design–tender - traditional method with separate entities for the design and construction of a project.

- **Material approve to FM as static data (data transfer in a DBB process)**

Stages	Elements	Modelling Guidelines	Remarks
Detailed Design	Main elements of Preliminary Design	Use CP83 symbols and colour standards	Output: Detailed model for e-Submission and Tender
	Fire dampers, Motorized dampers, Volume control dampers Split-type indoor & outdoor air conditioning units Exhaust or extract air fans Fresh air fans Other fans such as jet fans Diffusers, air-boots, air grilles, air filters, registers Fan Coil unit Switch boards, Control, BMS & DDC panels BMS control & monitoring modules	Model each element using object correspond to actual component with actual size, material, type code and performance criteria. Include insulation to reflect actual size for coordination purpose. System routing should be connected with fittings. Unavailable BIM objects that are modelled using different objects should be identified accordingly, e.g. use proper names and colours. Downward slopes of the pipes should be modelled realistically. Required fittings allowances, cross-over spaces and maintenance spaces should be considered. Fasteners and hangers are not necessary. Commercial product libraries can be used to the extent allowed by the modelling software. Fire rating should be included in the fire damper objects. Pipe Accessories should follow the CP83 symbols in plan views. For design coordination, documents such as coordinated services plans, sections, elevations, etc. should be derived from the	For BIM e-Submission, please also refer to submission guidelines Services should be coordinated with architecture model Proposed position of mechanical components base on calculation or analysis e.g. air terminals, FCU should be approved by the architect.



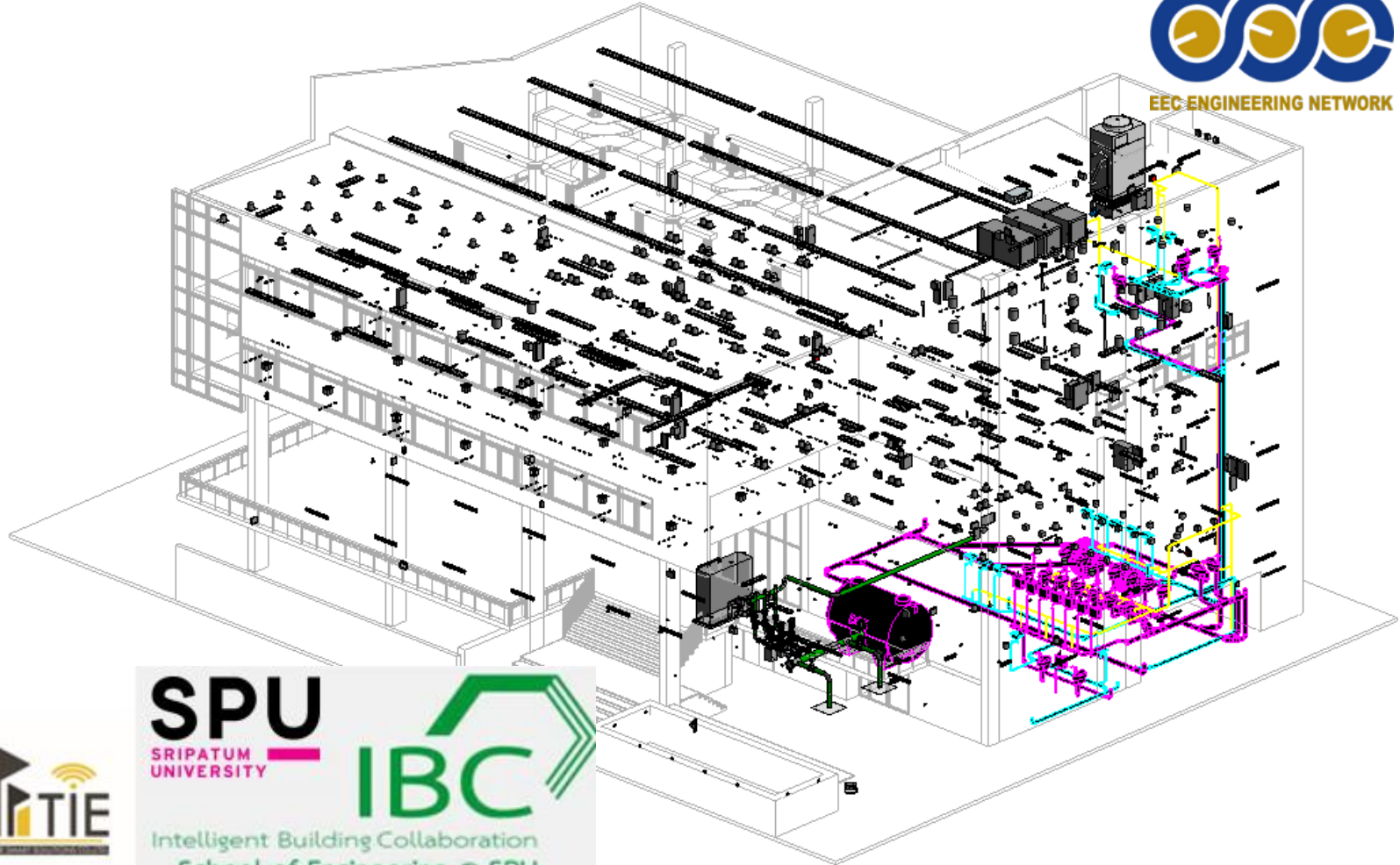
แบบจำลอง data information ต้นแบบ

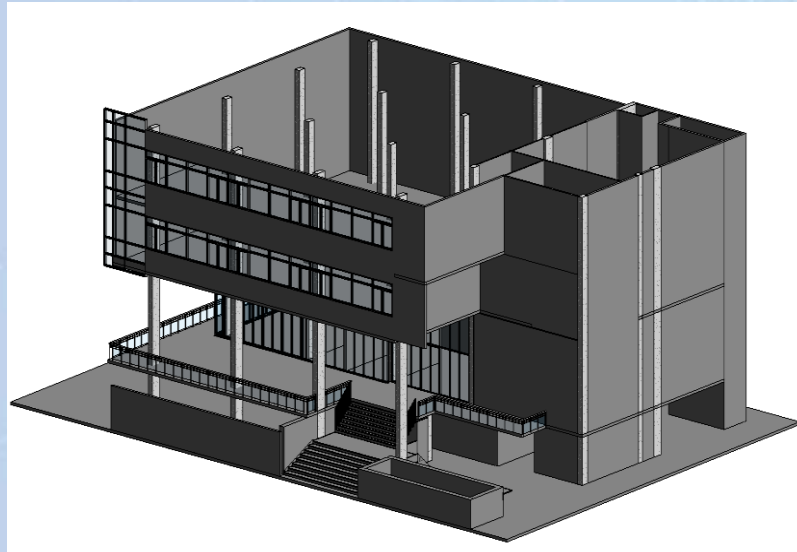
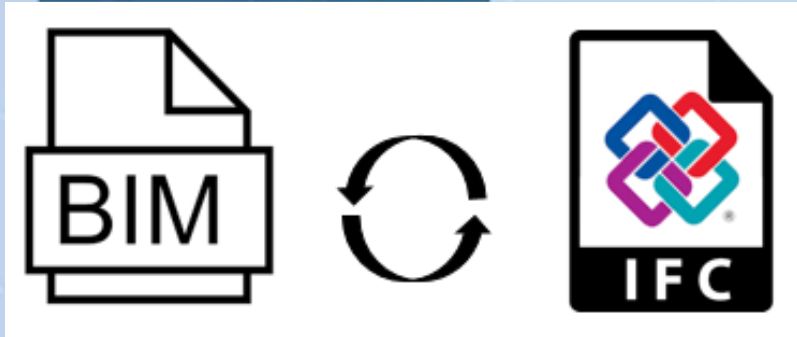


Asst. Prof. Dr. Denchai Woradechjumroen



Mr. Takorn Vasupokin





IfcColumn

IfcDoor

IfcWindow

IfcSlab

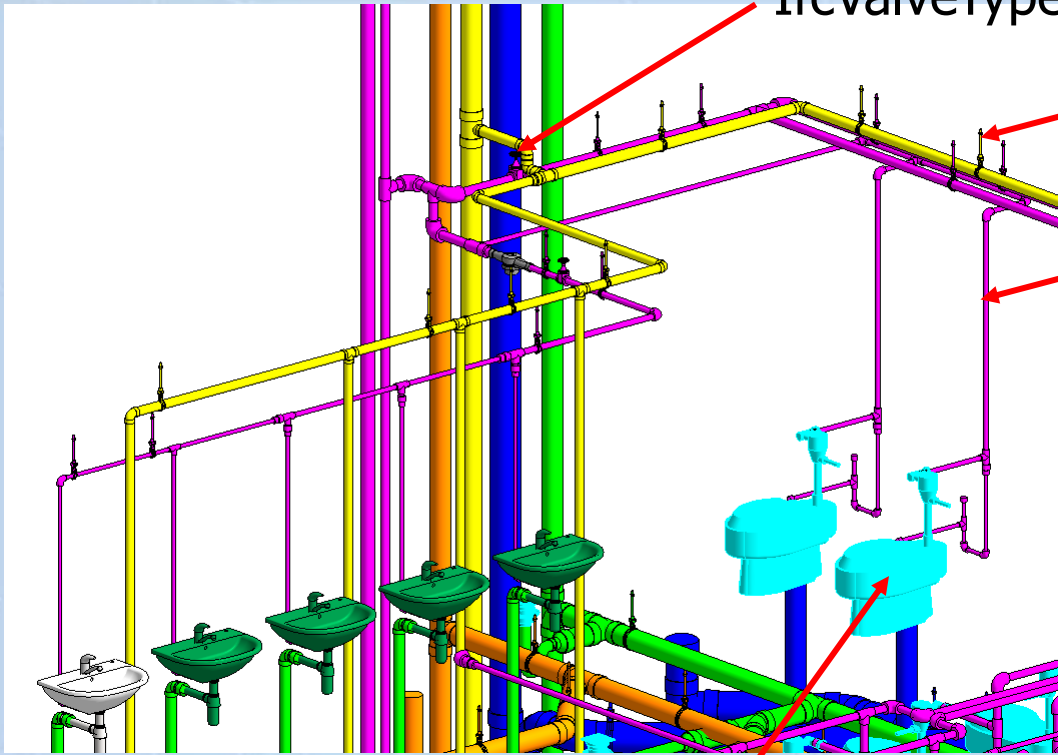
IfcWall

IfcStair

IfcRailing



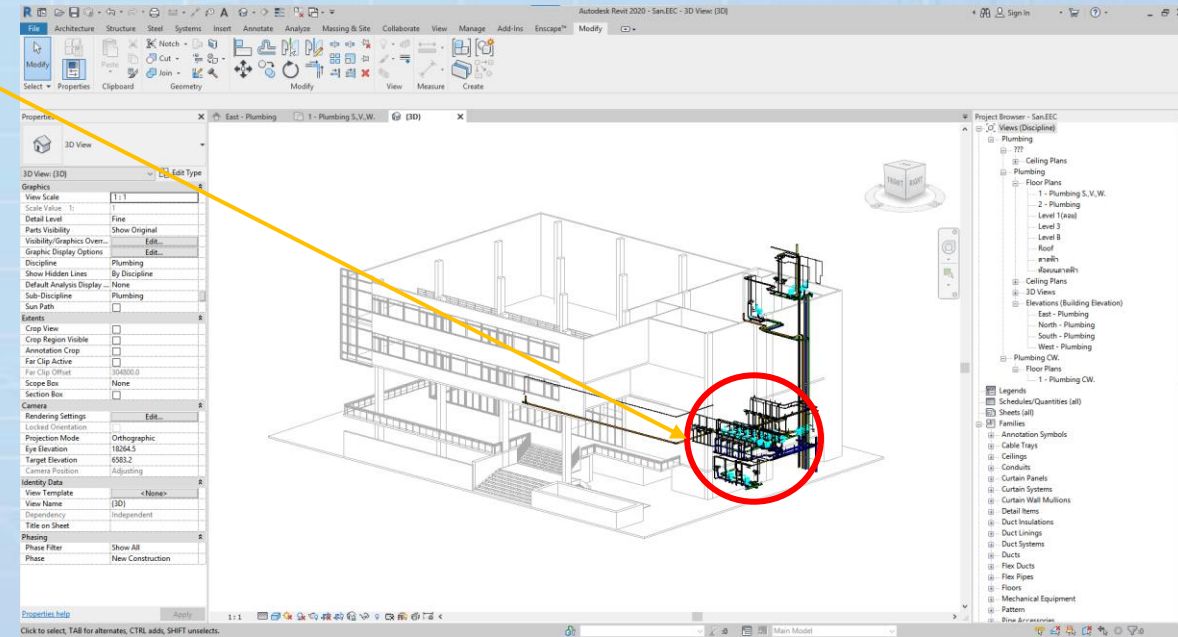
BIM information exchanger



IfcBuildingElementProxy

IfcFastener

IfcFlowFitting





ACMV BIM ELEMENTS		
	Element	Ifc Element
ACMV Equipment	Air Handling unit	IfcEvaporativeCoolerType
	Chiller unit	IfcChillerType
	Variable refrigerant unit	IfcAirTerminalType
	Cooling Tower	IfcCoolingTowerType
	Split-type indoor & outdoor air conditioning units	IfcAirTerminalBoxType
	Exhaust or extract air fans	IfcFanType
	Fresh air fans	
	Other fans such as jet fans	
	Heat Exchanges for projects with District Cooling	IfcHeatExchangerType
ACMV Distribution	Exhaust air ducts (excluding hangars)	IfcDuctFittingType IfcDuctSegmentType IfcDuctSilencerType
	Fresh air ducts (excluding hangars)	
	Supply air ducts (excluding hangars)	
	Return air ducts (excluding hangars)	
	Transfer air ducts (excluding hangars)	
	Diffusers, air-boots, air grilles, air filters, registers	IfcFilterType
	Fire dampers, motorized dampers, volume control dampers, CO2 sensors, CO sensors	IfcDamperType

1. Data exchange format – กำหนดอย่างไร
2. Designer information
3. Material approval
4. FM data (material approval)
5. Static data (commissioning record and design)
6. Dynamic data (BAS and CPM data)

Properties

Basic Wall
Generic - 200mm

Walls (1) Edit Type

Constraints

Location Line	Finish Face: Interior
Base Constraint	Level 4
Base Offset	0.0000
Base is Attached	<input type="checkbox"/>
Base Extension Distance	0.0000
Top Constraint	Up to level: Level 6
Unconnected Height	7.8500
Top Offset	0.0000
Top is Attached	<input type="checkbox"/>
Top Extension Distance	0.0000
Room Bounding	<input checked="" type="checkbox"/>
Related to Mass	<input type="checkbox"/>

Structural

Structural

Enable Analytical Model

Structural Usage Non-bearing

Dimensions

Length	25.7680
Area	198.562 m ²
Volume	39.712 m ³

Identity Data

Image

Comments

Mark

Phasing

Phase Created	New Construction
Phase Demolished	None

Type Properties

Family: System Family: Basic Wall Load...

Type: Generic - 200mm Duplicate...

Rename...

Type Parameters

Parameter	Value
Construction	
Structure	Edit...
Wrapping at Inserts	Do not wrap
Wrapping at Ends	None
Width	0.2000
Function	
Function	Exterior
Graphics	
Coarse Scale Fill Pattern	
Coarse Scale Fill Color	Black
Materials and Finishes	
Structural Material	<By Category>
Analytical Properties	
Heat Transfer Coefficient (U)	
Thermal Resistance (R)	
Thermal mass	
Absorptance	0.100000
Roughness	1
Identity Data	
Type Image	
Keynote	
Model	
Manufacturer	

[What do these properties do?](#)

<< Preview OK Cancel Apply

Edit Assembly

Family: Basic Wall

Type: Generic - 200mm

Total thickness: 0.2000 Sample Height: 6.0000

Resistance (R): 0.0000 (m²·K)/W

Thermal Mass: 0.00 kJ/K

Layers

EXTERIOR SIDE					
Function	Material	Thickness	Wraps	Structural Material	
1	Core Boundary	Layers Above	0.0000		
2	Structure [1]	<By Category	0.2000	<input checked="" type="checkbox"/>	
3	Core Boundary	Layers Below	0.0000		

INTERIOR SIDE

Insert Delete Up Down

Default Wrapping

At Inserts: Do not wrap At Ends: None

Modify Vertical Structure (Section Preview only)

Modify Merge Regions Sweeps

Assign Layers Split Region Reveals

<< Preview OK Cancel Help

Properties

- Characteristics
 - ContainedInStructure
 - ContainedInStructure IfcBuildingStorey 'Level 5' (0bF_8TBRzE_fwB7ME422b3)
 - General Data
 - Class IfcWallStandardCase
 - GlobalId 26205f8FGPFQdxh23lvn00
 - Name Basic Wall:Generic - 200mm:361930
 - Geometrical Representation
 - Axis
 - Body Clipping [SweptSolid] 4.2500 [Meters]
 - Bounding Box (Altezza) 0.2000 [Meters]
 - Bounding Box (Lunghezza) 25.7360 [Meters]
 - Bounding Box (Spessore) BoundingBox [128, 128, 128, 255]
 - SurfaceColor 21.8756 [Metri Cubi]
 - Volume 15.6500 [Meters]
 - Z Max 11.4000 [Meters]
 - Z Min
- IfcObjectPlacement
 - Axis [0.0000; 0.0000; 1.0000]
 - Location [-19.1270581819; 11.1385301147; 0.0000] [Metri Cubi]
 - PlacementRelTo IfcBuildingStorey 'Level 5'
 - RefDirection [0.0000; -1.0000; 0.0000]
- IfcOwnerHistory
- Material
 - IfcMaterialLayerSetUsage
 - IfcMaterialLayerSet
 - IfcMaterialLayer
 - IsVentilated Unknown
 - LayerThickness 0.2 [metri]
 - Name Default Wall
 - SurfaceColor [128, 128, 128, 255]
 - LayerSetName Basic Wall:Generic - 200mm
 - DirectionSense Negative
 - LayerSetDirection Axis Y
 - OffsetFromReferenceLine 0.1
- Layer
 - IfcPresentationLayerAssignment
 - Name A-WALL-____OTLN
- Properties
 - BaseQuantities
 - Area 198.5616 [metri quadrati]
 - Length 25.7680 [metri]
 - Volume 39.71232 [metri cubi]

Type Properties

Family: System Family: Basic Wall [Load...]

Type: CW 102-85-100p [Duplicate...]

Rename...

Type Parameters

Parameter	Value
Construction	
Structure	Edit...
Wrapping at Inserts	Do not wrap
Wrapping at Ends	None
Width	0.2990
Function	Exterior
Graphics	
Coarse Scale Fill Pattern	Diagonal cross-hatch
Coarse Scale Fill Color	Black
Materials and Finishes	
Structural Material	Concrete Masonry Units
Analytical Properties	
Heat Transfer Coefficient (U)	0.3463 W/(m²·K)
Thermal Resistance (R)	2.8877 (m²·K)/W
Thermal mass	28.38 kJ/K
Absorptance	0.100000
Roughness	1
Identity Data	
Type Image	
Keynote	
Model	
Manufacturer	

What do these properties do?

<< Preview OK Cancel Apply

Edit Assembly

Family: Basic Wall

Type: CW 102-85-100p

Total thickness: 0.2990 Sample Height: 6.0000

Resistance (R): 2.8877 (m²·K)/W

Thermal Mass: 28.38 kJ/K

Layers

EXTERIOR SIDE					
	Function	Material	Thickness	Wraps	Structural Material
1	Finish 1 [4]	Brick, Comm	0.1020	<input checked="" type="checkbox"/>	
2	Thermal/Air La	Air	0.0500	<input checked="" type="checkbox"/>	
3	Thermal/Air La	Cavity Fill	0.0350	<input checked="" type="checkbox"/>	
4	Membrane Lay	Vapour Retar	0.0000	<input checked="" type="checkbox"/>	
5	Core Boundary	Layers Above	0.0000		
6	Structure [1]	Concrete Ma	0.1000		<input checked="" type="checkbox"/>
7	Core Boundary	Layers Below	0.0000		
8	Finish 2 [5]	Gypsum Wal	0.0120	<input checked="" type="checkbox"/>	

Interior Side: Insert Delete Up Down

Default Wrapping

At Inserts: Do not wrap At Ends: None

Modify Vertical Structure (Section Preview only)

Modify Merge Regions Sweeps Assign Layers Split Region Reveals

OK Cancel Help

Properties

- Characteristics
 - ContainedInStructure: IfcBuildingStorey 'Level 4 (0bF_STBRzE_fw7ME42z28)
 - General Data
 - Class: IfcWallStandardCase
 - GlobalId: 26205f0cPFQdxhZFlvNEW
 - Name: Basic Wall: CW 102-50-100p:362098
 - Geometrical Representation
 - Axis: Curve2D
 - Body: Clipping [SweptSolid]
 - Bounding Box (Altezza): 3.4500 [Meters]
 - Bounding Box (Lunghezza): 25.7800 [Meters]
 - Bounding Box (Spessore): 0.2640 [Meters]
 - Box: BoundingBox
 - SurfaceColor: [170, 100, 105, 255]
 - Volume: 12.6459 [Metri Cubi]
 - Z Max: 11.4000 [Meters]
 - Z Min: 7.9500 [Meters]
 - IfcObjectPlacement
 - Axis: [0.0000; 0.0000; 1.0000]
 - Location: [-19.0270581819; -14.7294698853; 0.1500] [Metri Cubi]
 - PlacementRelTo: IfcBuildingStorey 'Level 4'
 - RefDirection: [1.0000; 0.0000; 0.0000]
- OwnerHistory
 - Material
 - IfcMaterialLayerSet
 - IfcMaterialLayer
 - IsVentilated: Unknown
 - LayerThickness: 0.102 [metri]
 - Name: Brick, Common
 - SurfaceColor: [170, 100, 105, 255]
 - IfcMaterialLayer (2)
 - IsVentilated: Unknown
 - LayerThickness: 0.05 [metri]
 - Name: Cavity Fill
 - SurfaceColor: [127, 127, 127, 255]
 - IfcMaterialLayer (3)
 - IsVentilated: Unknown
 - LayerThickness: 0.1 [metri]
 - Name: Concrete Masonry Units
 - SurfaceColor: [181, 181, 181, 255]
 - IfcMaterialLayer (4)
 - IsVentilated: Unknown
 - LayerThickness: 0.012 [metri]
 - Name: Gypsum Wall Board
 - SurfaceColor: [249, 249, 249, 255]

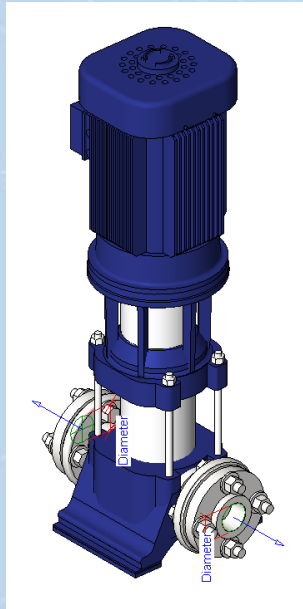
Properties

- IsVentilated: Unknown
- LayerThickness: 0.05 [metri]
- Name: Cavity Fill
- SurfaceColor: [127, 127, 127, 255]
- IfcMaterialLayer (3)
 - IsVentilated: Unknown
 - LayerThickness: 0.1 [metri]
 - Name: Concrete Masonry Units
 - SurfaceColor: [181, 181, 181, 255]
- IfcMaterialLayer (4)
 - IsVentilated: Unknown
 - LayerThickness: 0.012 [metri]
 - Name: Gypsum Wall Board
 - SurfaceColor: [249, 249, 249, 255]
- TypeObject Property
 - Analytical Properties
 - Absorptance: 0.1000
 - Heat Transfer Coefficient (U): 0.87234
 - Roughness: 1
 - Thermal Resistance (R): 1.146342
 - Thermal mass: 309792.0000
 - Construction
 - Function: Exterior
 - Width: 0.2640 [metri]
 - Wrapping at Inserts: None
 - Wrapping at Ends: Do not wrap
 - Graphics
 - Coarse Scale Fill Color: 0
 - Coarse Scale Fill Pattern: Diagonal cross-hatch
 - Identity Data
 - Assembly Code: CW 102-50-100p
 - Assembly Description: Concrete Masonry Units
 - Type Name: Basic Wall
 - Materials and Finishes
 - Structural Material: Concrete Masonry Units
 - Other
 - Category: Walls
 - Family Name: Basic Wall
 - ConnectedFrom
 - IfcRelConnectsPathElements
 - RelatedConnectionType: .ATSTART.
 - RelatingConnectionType: .ATEND.
 - RelatingElement: IfcWallStandardCase 'Basic Wall: CW 102-50-100p:362098'
 - HasOpenings
 - IfcRelVoidsElement
 - RelatedOpeningElement: IfcOpeningElement 'W24:W24:37'

BIM

IFC

IFC data format – w/o property



Family Types

Type name:

Search parameters

Parameter	Value	Formula	Lock
Constraints			
Default Elevation	0.0	=	<input type="checkbox"/>
Dimensions			
Rad con (default)	32.5	=	<input type="checkbox"/>
Dia con (default)	65.0	= Rad con * 2	<input type="checkbox"/>
Other			
w	220.0	=	<input checked="" type="checkbox"/>
Identity Data			

Manage Lookup Tables

[How do I manage family types?](#)

OK Cancel Apply

BIM



Properties


- Characteristics
 - ContainedInStructure: IfcBuildingStorey 'Level 6' (0bF_8TBRzE_fwB7ME422bG)
- General Data
 - Class: IfcBuildingElementProxy
 - GlobalId: 0yh68Esb9Da9w7nnQTvwx6
 - Name: MTL-M_Vertical Pump_50:MTL-M_Vertical Pump_50:5499
- Geometrical Representation
 - Body: MappedRepresentation [Brep]
 - Bounding Box (Altezza): 1.0662 [Meters]
 - Bounding Box (Lunghezza): 0.3000 [Meters]
 - Bounding Box (Spessore): 0.2750 [Meters]
 - Box: BoundingBox
 - SurfaceColor: [0, 128, 192, 255]
 - Volume: 0.0408 [Metri Cubi]
 - Z Max: 16.8662 [Meters]
 - Z Min: 15.8000 [Meters]
- IfcObjectPlacement
 - Axis: [0.0000; 0.0000; 1.0000]
 - Location: [9.672941818; 7.0865876539; 0.1500] [Metri Cubi]
 - PlacementRelTo: IfcBuildingStorey 'Level 6'
 - RefDirection: [1.0000; 0.0000; 0.0000]
- IfcOwnerHistory
- Material
- Layer
- Properties
- TypeObject Characteristics
- TypeObject Geometry
- TypeObject Material
- TypeObject Property
 - Constraints: Default Elevation: 0.0000 [metri]
- Identity Data
 - Assembly Code
 - Assembly Description
 - Code Name
 - OmniClass Number: 23.75.00.00
 - OmniClass Title: Climate Control (HVAC)
 - Type Name: MTL-M_Vertical Pump_50
- Mechanical
 - Classification: None

IFC



IFC data format – with property

Position	Qty.	Description	Single Price
1		TP 50-190/4 A-F-B-BAQE	



Product No.: 96087291


Single-stage, close-coupled, volute pump with in-line suction and discharge ports of identical diameter. The pump is of the top-pull-out design, i.e. the power head (motor, pump head and impeller) can be removed for maintenance or service while the pump housing remains in the pipework.

The pump is fitted with an unbalanced rubber bellows seal. The shaft seal is according to EN 12758. Pipework connection is via PN 16 DIN flanges (EN 1092-2 and ISO 7005-2).

The pump is fitted with a fan-cooled asynchronous motor.

Further product details

The product carries the Grundfos Blueflux® label. It represents the best from Grundfos within energy-efficient motors and frequency converters. Grundfos Blueflux® solutions either meet or exceed legislative requirements such as the EuP IE3 or IE4 grade.



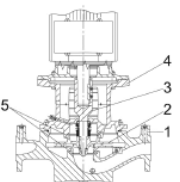
The product's minimum efficiency index (MEI) is greater or equal to 0.70. This is by the Commission Regulation (EU) considered as an indicative benchmark for best-performing water pump available on the market as from 1 January 2013.

Pump

Pump housing and pump head are electrocoated to improve the corrosion resistance.

Electrocoating includes:

- 1) Alkaline-based cleaning.
- 2) Pretreatment with zinc phosphate coating.
- 3) Cathodic electrocoating (epoxy).
- 4) Curing of paint film at 200-250 °C.



- 1: Pump housing
- 2: Impeller
- 3: Stub shaft
- 4: Pump head/motor stool
- 5: Wear rings

Catalog

Family Types

Type name: CM 50-1420 T

Search parameters

Parameter	Value	Formula	Lock
Constraints			
IFC Parameters			
lfcExportAs	lfcPumpType	=	
Data			
ENCLOSURE CLASS (IEC)	55 (Protect. water jets/duct)	=	
MOTOR EFFICIENCY AT	87.6-85.6%	=	
MOTOR EFFICIENCY AT	87.7-87.2%	=	
MOTOR EFFICIENCY AT	86.7%	=	
PUMPED liquid	Water	=	
LIQUID TEMPERATURE	120.00 °C	=	
LIQUID TEMPERATURE	20.00 °C	=	
DENSITY	998.2 kg/m2	=	
KINEMATIC VISCOSITY	1 mm2/s	=	
SPEED FOR PUMP DATA	1450 rpm	=	
ACTUAL CALCULATED	13.2m3/h	=	
RESULTING HEAD OF T	18.7 m	=	
ACTUAL IMPELLER DIA	240 mm	=	
SHAFT SEAL	BAQE	=	
CURVE TOLERANCE	ISO 9906:1999 ANNEX A	=	
PIPE CONNECTION	DN 50	=	
PRESSURE STAGE	PN 16	=	
RATED POWER - P2	2.2 kW	=	
POWER (P2) REQUIRED	2.2 kW	=	
RATED CURRENT	4.9 A	=	
RATED SPEED	1450 rpm	=	
Identity Data			

BIM

Properties

- Characteristics
 - ContainedInStructure: IfcBuildingStorey 'Level 6' (0bF_STBRzE_fw7ME422bG)
- General Data
 - Class: IfcFlowMovingDevice
 - GlobalId: 0TmD2ywgP4891yFPB1H5fK
 - Name: Plumbing_Pumps_Dab-Pumps_CM-50:CM 50-510 T:621569
- Geometrical Representation
 - IfcObjectPlacement
 - Axis: [0.0000; 0.0000; 1.0000]
 - Location: [7.352941818; 6.9065876539; 0.0000000013] [Metri Cubi]
 - PlacementRelTo: IfcBuildingStorey 'Level 6'
 - RefDirection: [1.0000; 0.0000; 0.0000]
- IfcOwnerHistory
- Material
- Layer
- Properties
- TypeObject Characteristics
- TypeObject Geometry
- TypeObject Material
- TypeObject Property

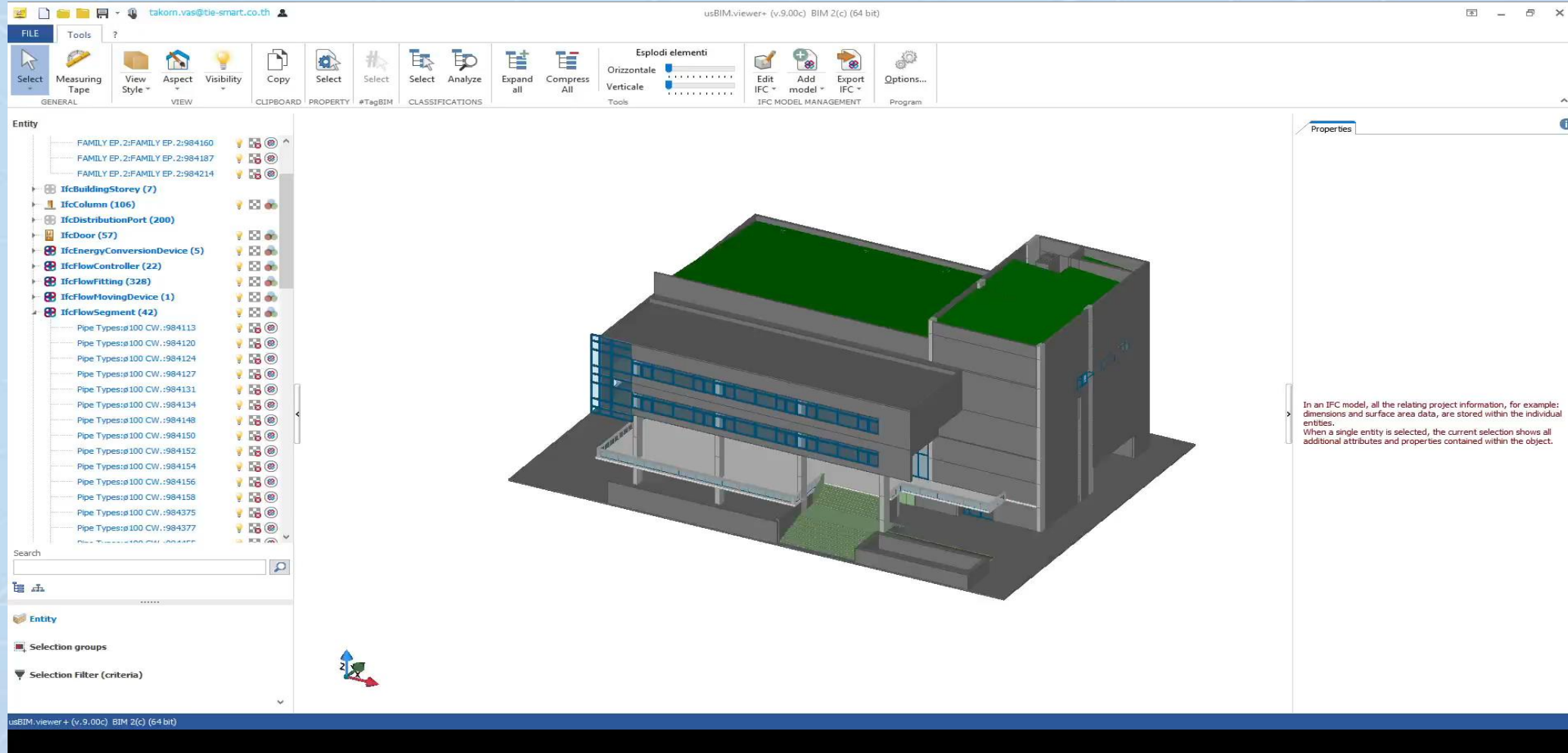
Property	Value
Default Elevation	0.0000 [metri]
Data	
ACTUAL CALCULATED FLOW	13.2m3/h
ACTUAL IMPELLER DIAMETER	240 mm
CURVE TOLERANCE	ISO 9906:1999 ANNEX A
DENSITY	998.2 kg/m2
ENCLOSURE CLASS (IEC34-5)	55 (Protect. water jets/duct)
KINEMATIC VISCOSITY	1 mm2/s
LIQUID TEMPERATURE	20.0000 [Chilo THERMALTRANSMITTANCEUNIT Gram \ Kelvin Second³]
LIQUID TEMPERATURE RANGE	120.0000 [Chilo THERMALTRANSMITTANCEUNIT Gram \ Kelvin Second³]
MOTOR EFFICIENCY AT 1/2 LOAD	87.6-85.6%
MOTOR EFFICIENCY AT 3/4 LOAD	87.7-87.2%
MOTOR EFFICIENCY AT FULL LOAD	86.7%
PIPE CONNECTION	DN 50
POWER (P2) REQUIRED BY PUMP	2.2 kW
PRESSURE STAGE	PN 16
PUMPED liquid	Water
RATED CURRENT	4.9 A
RATED SPEED	1450 rpm
RESULTING HEAD OF THE PUMP	18.7 m
SHAFT SEAL	BAQE
SPEED FOR PUMP DATA	1450 rpm

IFC

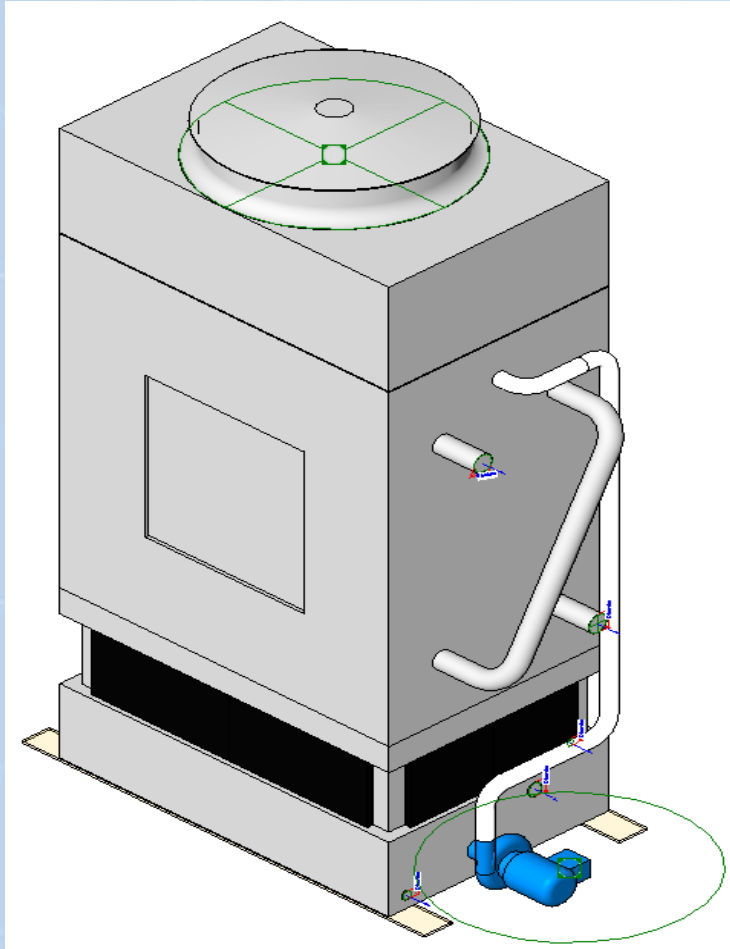
IFC data format – with property



**BIM viewer by
FM operators**



IFC data format – w/o property



Family Types

Type name:

Search parameters

Parameter	Value	Formula	Lock
Constraints			
Default Elevation	0.0	=	<input type="checkbox"/>
Identity Data			
Type Image		=	
Keynote		=	
Model		=	
Manufacturer		=	
Type Comments		=	
URL		=	
Description		=	
Assembly Code		=	
Cost		=	

BIM

Manage Lookup Tables

How do I manage family types?

OK Cancel Apply

Properties

- Characteristics**
 - ContainedInStructure: IfcBuildingStorey 'Level 6' (0bf_8TBRzE_fw7ME422bG)
- General Data**
 - Class: IfcBuildingElementProxy
 - GlobalId: 0yh68Esb9Da9w7nnQTvwx6
 - Name: MTL-M_Vertical Pump_50:MTL-M_Vertical Pump_50:5499
- Geometrical Representation**
 - Body: MappedRepresentation [Brep]
 - Bounding Box (Altezza): 1.0662 [Meters]
 - Bounding Box (Lunghezza): 0.3000 [Meters]
 - Bounding Box (Spessore): 0.2750 [Meters]
 - Box: BoundingBox
 - SurfaceColor: [0, 128, 192, 255]
 - Volume: 0.0408 [Metri Cubi]
 - Z Max: 16.8662 [Meters]
 - Z Min: 15.8000 [Meters]
- IfcObjectPlacement**
 - Axis: [0.0000; 0.0000; 1.0000]
 - Location: [9.672941818; 7.0865876539; 0.1500] [Metri Cubi]
 - PlacementRelTo: IfcBuildingStorey 'Level 6'
 - RefDirection: [1.0000; 0.0000; 0.0000]
- IfcOwnerHistory**
- Material**
- Layer**
- Properties**
- TypeObject Characteristics**
- TypeObject Geometry**
- TypeObject Material**
- TypeObject Property**
- Constraints**
 - Default Elevation: 0.0000 [metri]
- Identity Data**
 - Assembly Code
 - Assembly Description
 - Code Name
 - OmniClass Number: 23.75.00.00
 - OmniClass Title: Climate Control (HVAC)
 - Type Name: MTL-M_Vertical Pump_50
- Mechanical**
 - Classification: None

IFC

IFC data format – with property

LIANG CHI INDUSTRY (THAILAND) CO., LTD.

FANLESS COUNTER FLOW INDUCED DRAFT
LFC TYPE COOLING TOWER SPECIFICATION

DATE : 01/01/15
TOWER MODEL NO. : LFC - N - 80
NO. OF SETS : 1

DESIGN & OPERATING CONDITIONS		(MAXIMUM FLOW RATE)
WATER FLOW RATE.	815	LPM/SET
HOT WATER TEMP.	37.8	°C
COLD WATER TEMP.	32.2	°C
AMB. WET BULB TEMP.	28.3	°C
EJECTION PIPE PUMP HEAD	15	M
DRIFT LOSS OF WATER FLOW RATE	0.001-0.009	%
EVAPORATION LOSS OF WATER FLOW RATE	0.93	%
DESIGN WIND LOAD	200	Kg / M ²

STRUCTURAL DETAILS		
OVERALL DIMENSION L * W	2080*2680	MM
DRY WEIGHT	850	Kg
OPERATING WEIGHT PER TOWER	1770	Kg

CONSTRUCTION

TOWER SUPPORTER FRAME ASSY	: H.D.G.S.
CASING	: F.R.P.
COLD WATER BASIN	: F.R.P.
FILLING	: P.V.C.
FILLING SUPPORTOR	: H.D.G.S.
DRIFT ELIMINATOR	: P.P.
WATER BASIN	: H.D.G.S.
BOLTS,NUTS & WASHERS	: ST.S.

LIANG CHI IND.(THAILAND) CO.LTD.
TECHNIC DEPT.
 FOR REFERENCE
 FOR APPROVAL
 OTHER
DATE : 08 JAN 2015
TECHNIC BY :

Catalog

LIANG CHI COOLING TOWER LFC SPEC/PAGE 1 OF 4

Type Properties

Family: Cooling_TowerEEC [Load...]

Type: Refer to Catalog [Duplicate...]

[Rename...]

Type Parameters

Parameter	Value	=
Constraints		
Default Elevation	0.0000	
Dimensions		
DIMENSION L	2080 mm	
DIMENSION W	2680 mm	
DRY WEIGHT	850 Kg	
OPERATING WEIGHT PER TOWER	1770 Kg	
Mechanical		
Identity Data		
IFC Parameters		
IfcExportAs	IfcCoolingTower	
Data		
WATER FLOW RATE.	815 LPM./SET	
HOT WATER TEMP.	37.80 °C	
COLD WATER TEMP.	32.20 °C	
AMB. WET BULB TEMP.	28.30 °C	
EJECTION PIPE PUMP HEAD.	15 M	
DRIFT LOSS OF WATER FLOW RATE.	0.001-0.009 %	
EVAPORATION LOSS OF WATER FLO	0.93 %	
DESIGN WIND LOAD	200 Kg/M2	

What do these properties do?

BIM

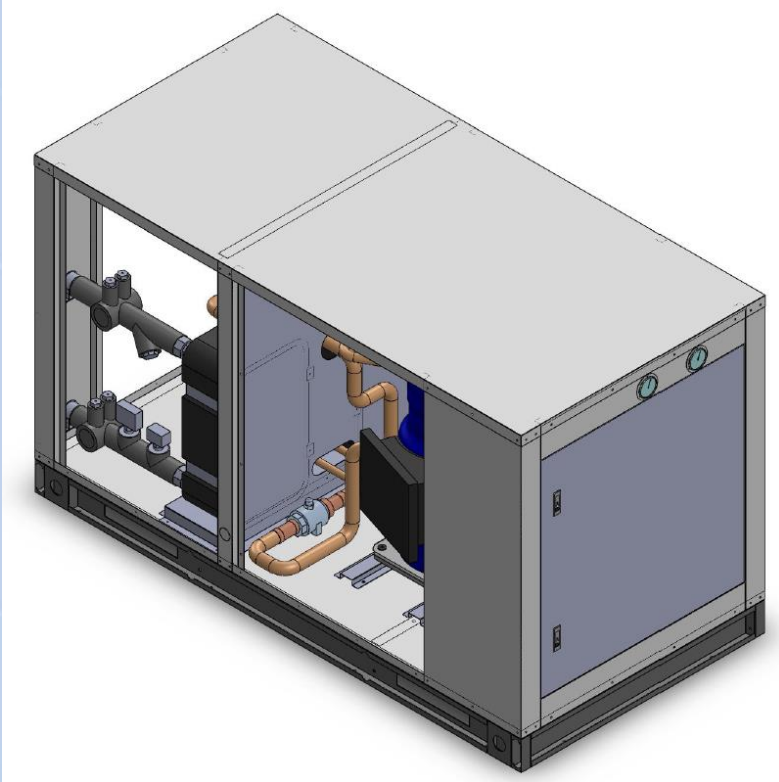
<< Preview OK Cancel Apply

Properties

- Characteristics
 - ContainedInStructure: IfcBuildingStorey 'Level 6' (Obf_8TBRzE_fwB7ME422bG)
 - General Data
 - Class: IfcEnergyConversionDevice
 - GlobalId: 0JfJEQsq13COrPYyHfzYt
 - Name: Cooling_TowerEEC [Refer to Catalog:518947]
 - Geometrical Representation
 - IfcObjectPlacement
 - Axis: [0.0000; 0.0000; 1.0000]
 - Location: [7.9521465458; 10.6435801147; 0.1500] [Metri Cubi]
 - PlacementRelTo: IfcBuildingStorey 'Level 6'
 - RefDirection: [0.0000; -1.0000; 0.0000]
 - IfcOwnerHistory
 - Material
 - Layer
 - Properties
 - TypeObject Characteristics
 - TypeObject Geometry
 - TypeObject Material
 - TypeObject Property
 - Constraints
 - Default Elevation: 0.0000 [m]
 - Data
 - AMB. WET BULB TEMP.: 28.3000 [Chilo THERMALTRANSMITTANCEUNIT Gram \ Kelvin Second?]
 - COLD WATER TEMP.: 32.2000 [Chilo THERMALTRANSMITTANCEUNIT Gram \ Kelvin Second?]
 - DESIGN WIND LOAD: 200 Kg/M2
 - DRIFT LOSS OF WATER FLOW RATE.: 0.001-0.009 %
 - EJECTION PIPE PUMP HEAD.: 15 M
 - EVAPORATION LOSS OF WATER FLOW RATE.: 0.93 %
 - HOT WATER TEMP.: 37.8000 [Chilo THERMALTRANSMITTANCEUNIT Gram \ Kelvin Second?]
 - WATER FLOW RATE.: 815 LPM./SET
 - Dimensions
 - DIMENSION L: 2080 mm
 - DIMENSION W: 2680 mm
 - DRY WEIGHT: 850 Kg
 - OPERATING WEIGHT PER TOWER: 1770 Kg
 - Identity Data
 - Mechanical
 - Other

IFC

IFC data format – w/o property



Family Types

Type name:

Search parameters

Parameter	Value	Formula	Lock
Constraints			
Default Elevation	0.0	=	<input type="checkbox"/>
Identity Data			
Type Image		=	
Keynote		=	
Model		=	
Manufacturer		=	
Type Comments		=	
URL		=	
Description		=	
Assembly Code		=	
Cost		=	

BIM

Manage Lookup Tables

How do I manage family types?

Properties

- Characteristics
 - ContainedInStructure: IfcBuildingStorey 'Level 6' (0bF_8TBRzE_fwB7ME422bG)
- General Data
 - Class: IfcBuildingElementProxy
 - GlobalId: 0yh68Esb9Da9w7nnQTvwx6
 - Name: MTL-M_Veritical Pump_50;MTL-M_Veritical Pump_50;5499
- Geometrical Representation
 - Body: MappedRepresentation [Brep]
 - Bounding Box (Altezza): 1.0662 [Meters]
 - Bounding Box (Lunghezza): 0.3000 [Meters]
 - Bounding Box (Spessore): 0.2750 [Meters]
 - Box: BoundingBox
 - SurfaceColor: [0, 128, 192, 255]
 - Volume: 0.0408 [Metri Cubi]
 - Z Max: 16.8662 [Meters]
 - Z Min: 15.8000 [Meters]
- IfcObjectPlacement
 - Axis: [0.0000; 0.0000; 1.0000]
 - Location: [9.672941818; 7.0865876539; 0.1500] [Metri Cubi]
 - PlacementRelTo: IfcBuildingStorey 'Level 6'
 - RefDirection: [1.0000; 0.0000; 0.0000]
- IfcOwnerHistory
- Material
- Layer
- Properties
- TypeObject Characteristics
- TypeObject Geometry
- TypeObject Material
- TypeObject Property
 - Constraints
 - Default Elevation: 0.0000 [metri]
 - Identity Data
 - Assembly Code
 - Assembly Description
 - Code Name
 - OmniClass Number: 23.75.00.00
 - OmniClass Title: Climate Control (HVAC)
 - Type Name: MTL-M_Veritical Pump_50
 - Mechanical
 - Classification: None

IFC

IFC data format – with property

UNI-Aire®

Physical and Electrical Data

Model	WCU - PHE	024
Power Supply	V/Ph/Hz	380 / 3 / 50
Nominal Cooling Capacity	MBH	288
Power Consumption	KW	19.005
Efficiency @ Full load *	EER	15.02
	COP	4.40
Compressor	EER	22.68
	COP	6.64
Compressor	Type	Hermetic (Scroll DC Inverter)
	Hp.	33.2
	Qty./Unit	1
	Rate Load Amps. (A)	61
Inverter	Type	Driver DC Inverter
	Qty./Unit	1
	Type	R-410A
Refrigerant	Charge	Holding
	HPS/Setting (Auto) psig	440
	LPS/Setting (Auto) psig	130
Water Cooled Condenser	Type	Plat heat exchanger
	Qty./Unit	1
	Water Flow Rate (GPM) **	72.00
	Entering Water Temp. (F) **	90
	Leaving Water Temp. (F) **	100
	Water Pressure Drop (Ft.WG) **	16.05
	No. of Water Passer	-
Water Chiller	Type	Plat heat exchanger
	Qty./Unit	1
	Water Flow Rate (GPM) **	57.60
	Entering Water Temp. (F) **	55
	Leaving Water Temp. (F) **	45
	Water Pressure Drop (Ft.WG) **	7.68
	No. of Water Passer	-
Dimension	Water Connection In/Out (inch)	2 / 2
	L	2300
	W	1000
	H	1200

Note
 MBH = 1000 BTUH
 FOR SI. UNIT, COOLING CAPACITY (KW) = (MBH x 1000) / 3412
 * RATED IN ACCORDANCE WITH AHRI STANDARD 550/590 AT STANDARD RATING CONDITIONS
 ** NOMINAL VALUES

Catalog

Family Types

Type name:

Search parameters

Parameter	Value	Formula	Lock
Constraints			
Dimensions			
L	2300.00	=	<input type="checkbox"/>
W	1000.00	=	<input type="checkbox"/>
H	1200.00	=	<input type="checkbox"/>
IFC Parameters			
lfcExportAs	lfcChiller	=	
Data			
COOLING CAPACITY	293 KW	=	
POWER SUPPLY	380 V / 3 Ph / 50 Hz	=	
NOMINAL COOLING CA	288 MBH	=	
POWER CONSUMPTIO	19.005 KW	=	
EFFICIENCY @ FULL LO	4.40 COP	=	
EFFICIENCY @ FULL LO	15.02 EER	=	
EFFICIENCY @ LOAD PR	6.64 COP	=	
EFFICIENCY @ LOAD PR	22.68 EER	=	
INVERTER TYPE	DRIVER DC Inverter	=	
COMPRESSOR TYPE	HERMETIC (SCROLL DC	=	
COMPRESSOR Hp.	33.2 Hp.	=	
COMPRESSOR Rate Loa	61 A	=	
REFRIGERANT TYPE	R-410A	=	
REFRIGERANT HPS	440 HPS/Setting (Auto)	=	
REFRIGERANT LPS	130 LPS/Setting (Auto) p	=	
WATER COOLED COND	PLAT HEAT EXCHANGE	=	
WATER COOLED COND	72 GPM	=	
WATER COOLED COND	90 F	=	
WATER COOLED COND	100 F	=	
WATER COOLED COND	16.05 Ft.WG	=	
WATER CHILLER TYPE	PLAT HEAT EXCHANGE	=	
WATER CHILLER WATE	57.60 GPM	=	
WATER CHILLER ENTER	55 F	=	
WATER CHILLER LEAVI	45 F	=	
WATER CHILLER WATER	7.68 Ft.WG	=	

BIM

How do I manage family types?

Manage Lookup Tables

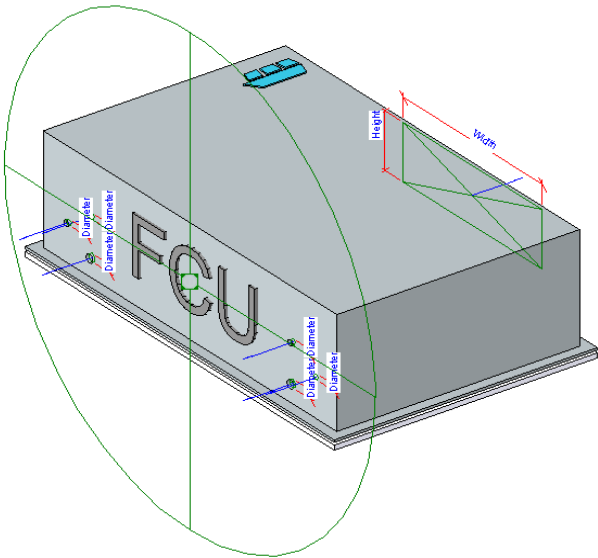
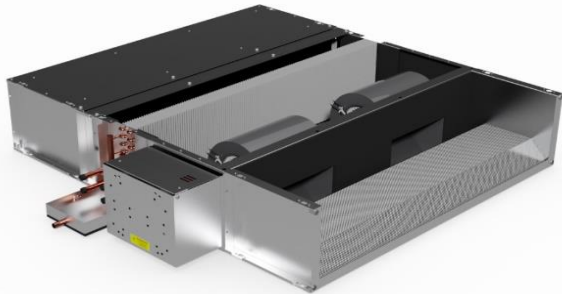
OK Cancel Apply

Properties

- Characteristics
 - ContainedInStructure
 - ContainedInStructure
 - General Data
 - Class: IfcFlowMovingDevice
 - GlobalId: OTmD2ywgP4891yFPB1H5fK
 - Name: Plumbing_Pumps_Dab-Pumps_CM-50:CM 50-510 T:621569
 - Geometrical Representation
 - IfcObjectPlacement
 - Axis: [0.0000; 0.0000; 1.0000]
 - Location: [7.352941818; 6.9065876539; 0.0000000013] [Metri Cubi]
 - IfcBuildingStorey 'Level 6'
 - RefDirection: [1.0000; 0.0000; 0.0000]
 - IfcOwnerHistory
 - Material
 - Layer
 - Properties
 - TypeObject Characteristics
 - TypeObject Geometry
 - TypeObject Material
 - TypeObject Property
- Constraints
 - Default Elevation: 0.0000 [metri]
- Data
 - ACTUAL CALCULATED FLOW: 13.2m3/h
 - ACTUAL IMPELLER DIAMETER: 240 mm
 - CURVE TOLERANCE: ISO 9906:1999 ANNEX A
 - DENSITY: 998.2 kg/m2
 - ENCLOSURE CLASS (IEC34-5): 55 (Protect. water jets/duct)
 - KINEMATIC VISCOSITY: 1 mm2/s
 - LIQUID TEMPERATURE: 20.0000 [Chilo THERMALTRANSMITTANCEUNIT Gram \ Kelvin Second³]
 - LIQUID TEMPERATURE RANGE: 120.0000 [Chilo THERMALTRANSMITTANCEUNIT Gram \ Kelvin Second³]
 - MOTOR EFFICIENCY AT 1/2 LOAD: 87.6-85.6%
 - MOTOR EFFICIENCY AT 3/4 LOAD: 87.7-87.2%
 - MOTOR EFFICIENCY AT FULL LOAD: 86.7%
 - PIPE CONNECTION: DN 50
 - POWER (P2) REQUIRED BY PUMP: 2.2 kW
 - PRESSURE STAGE: PN 16
 - PUMPED liquid: Water
 - RATED CURRENT: 4.9 A
 - RATED POWER - P2: 2.2 kW
 - RESULTING HEAD OF THE PUMP: 18.7 m
 - SHAFT SEAL: BAQE
 - SPEED FOR PUMP DATA: 1450 rpm

IFC

IFC data format – w/o property



Family Types

Type name:

Search parameters

Parameter	Value	Formula	Lock
Constraints			
Default Elevation	0.0	=	<input type="checkbox"/>
Identity Data			
Type Image		=	
Keynote		=	
Model		=	
Manufacturer		=	
Type Comments		=	
URL		=	
Description		=	
Assembly Code		=	
Cost		=	

BIM

Manage Lookup Tables

How do I manage family types?

OK Cancel Apply

Properties

- Characteristics
 - ContainedInStructure: IfcBuildingStorey 'Level 6' (0bF_8TBRzE_fw7ME422bG)
 - General Data
 - Class: IfcBuildingElementProxy
 - GlobalId: 0yh68Esb9Da9w7nnQTvwx6
 - Name: MTL-M_Vertical Pump_50:MTL-M_Vertical Pump_50:5499
 - Geometrical Representation
 - Body: MappedRepresentation [Brep]
 - Bounding Box (Altezza): 1.0662 [Meters]
 - Bounding Box (Lunghezza): 0.3000 [Meters]
 - Bounding Box (Spessore): 0.2750 [Meters]
 - Box: BoundingBox
 - SurfaceColor: [0, 128, 192, 255]
 - Volume: 0.0408 [Metri Cubi]
 - Z Max: 16.8662 [Meters]
 - Z Min: 15.8000 [Meters]
 - IfcObjectPlacement
 - Axis: [0.0000; 0.0000; 1.0000]
 - Location: [9.672941818; 7.0865876539; 0.1500] [Metri Cubi]
 - PlacementRelTo: IfcBuildingStorey 'Level 6'
 - RefDirection: [1.0000; 0.0000; 0.0000]
- IfcOwnerHistory
- Material
- Layer
- Properties
- TypeObject Characteristics
- TypeObject Geometry
- TypeObject Material
- TypeObject Property
 - Constraints
 - Default Elevation: 0.0000 [metri]
 - Identity Data
 - Assembly Code
 - Assembly Description
 - Code Name
 - OmniClass Number: 23.75.00.00
 - OmniClass Title: Climate Control (HVAC)
 - Type Name: MTL-M_Vertical Pump_50
 - Mechanical
 - Classification: None

IFC data format – with property

MODEL		HFCA04	HFCA06	HFCA08	HFCA10	HFCA12
RATED - Volts/Ph/Hz		220-240/1/50	220-240/1/50	220-240/1/50	220-240/1/50	220-240/1/50
SYSTEM DATA						
Nominal Airflow	cfm	400	600	800	1000	1200
Cooling Capacity	Btu/h	12000	18000	24000	30000	36000
Water Inlet Connection Size	in	5/8	5/8	5/8	5/8	5/8
Water Outlet Connection Size	in	5/8	5/8	5/8	5/8	5/8
Water Connection Size		Brazed	Brazed	Brazed	Brazed	Brazed
INDOOR COIL						
Fin Type		Slit	Slit	Slit	Louver	Louver
Fin per inch*						
3 - Row coil		12	12	15	18	18
4 - Row coil		14	15	16	15	15
Drain Connection Size	in	1/2	1/2	1/2	1/2	1/2
FAN						
Fan Type		Centrifugal	Centrifugal	Centrifugal	Centrifugal	Centrifugal
No. used		2	2	2	2	2
Drive Type		Direct	Direct	Direct	Direct	Direct
STANDARD FAN MOTOR						
Qty of Motor		1	1	1	1	1
Motor Power	W	13	47	59	162	186
No. of Speed		3	3	3	4	4
V _{ph} /Hz		220/1/50	220/1/50	220/1/50	220/1/50	220/1/50
RLA/LRA		0.20/0.35	0.49/0.71	0.56/0.69	1.36/2.31	1.35/2.41

Family Types

Type name: CBY(2-Pipe EHeat)

Search parameters

Parameter	Value	Formula
Constraints		
Default Elevation	0' 0"	=
IFC Parameters		
IfcExportAs	IfcUnitaryEquipment	=
Data		
RATED - VOLTS/Ph/Hz	220-240 V / 1 Ph / 50 Hz	=
NOMINAL AIRFLOW	400.00 CFM	=
COOLING CAPACITY	12000.00 Btu/h	=
FAN TYPE	CENTRIFUGAL	=
FAN (No used)	2	=
FAN (Drive Type)	Direct	=
FIN TYPE	Slit	=
3 - Row coil	12	=
4 - Row coil	14	=
MOTOR POWER	13 W	=
MOTOR-VOLTS/ Ph / Hz	220 V / 1 Ph / 50 Hz	=
MOTOR-RLA/ LRA	02 / 0.35	=
Identity Data		

BIM

Manage Lookup Tables

How do I manage family types?

OK Cancel Apply

Properties

- Characteristics
 - ContainedInStructure
 - ContainedInStructure IfcBuildingStorey 'Level 6' (0bF_8TBRzE_fwB7ME422B
 - General Data
 - Class IfcEnergyConversionDevice
 - GlobalId 1isMSL4vDmBIZitAdblVW
 - Name Horizontal_Telescoping_Fan_Coil_Unit_-_CBY_-_JEC
 - Geometrical Representation
 - IfcObjectPlacement
 - IfcOwnerHistory
 - Material
 - Layer
 - System
 - Properties
 - TypeObject Characteristics
 - TypeObject Geometry
 - TypeObject Material
 - TypeObject Property
 - Constraints
 - Default Elevation 0.0000 [metr]
 - Data
 - 3 - Row coil 12
 - 4 - Row coil 14
 - COOLING CAPACITY 37855.088941
 - FAN (Drive Type) Direct
 - FAN (No used) 2
 - FAN TYPE CENTRIFUGAL
 - FIN TYPE Slit
 - MOTOR POWER 13 W
 - MOTOR-RLA/ LRA 02 / 0.35
 - MOTOR-VOLTS/ Ph / Hz 220 V / 1 Ph / 50 Hz
 - NOMINAL AIRFLOW 6.666667
 - RATED - VOLTS/Ph/Hz 220-240 V / 1 Ph / 50 Hz
 - Identity Data
- API Number
- Assembly Code
- Assembly Description
- Code Name
- Description
- Manufacturer
- Model
- OmniClass Number 23.75.70.17.27
- OmniClass Title Fan Coil Units

Catalog

ปัญหาในการดำเนินการ



IFC Export Classes: C:\ProgramData\Autodesk\Revit 2020\exportlayers-ifc-lal.bt

Revit Category	IFC Class Name	IFC Type
Hidden Lines	IfcCurtainWall	
Curtain Wall Mullions	IfcCurtainWall	
Hidden Lines	IfcCurtainWall	
Data Devices	IfcElectricApplianceType	
Demolished	Not Exported	
Detail Items	IfcAnnotation	
Heavy Lines	IfcAnnotation	
Hidden Lines	IfcAnnotation	
Light Lines	IfcAnnotation	
Medium Lines	IfcAnnotation	
Dimensions	Not Exported	
Automatic Sketch Dimensions	(Not Exported)	
Door Tags	Not Exported	
Doors	IfcDoor	
Architrave	IfcDoor	
Elevation Swing	IfcDoor	
Frame/Mullion	IfcDoor	
Glass	IfcDoor	
Hidden Lines	IfcDoor	
Ironmongery	IfcDoor	
Moulding/Architrave	IfcDoor	
Opening	IfcDoor	



ARCHICAD Tool				
ARCHICAD	IFCObjectType	IFCObject PredefinedType	IFCTypeObjectType	IFCTypeObject PredefinedType
Beam	IFCBeam		IFCBeamType	
Column	IFCColumn		IFCColumnType	
Wall	IFCWall		IFCWallType	
Shell	IFCSlab	ROOF	IFCSlabType	ROOF
Roof	IFCSlab	ROOF	IFCSlabType	ROOF
Slab	IFCSlab	FLOOR	IFCSlabType	FLOOR
Mesh	IFCSite			
Morph	IFCBuildingElementProxy		IFCBuildingElementProxyType	
Railing	IFCRailing		IFCRailingType	
Baluster	IFCMember		IFCMemberType	
Handrail	IFCMember		IFCMemberType	
Inner Post	IFCMember		IFCMemberType	
Railing Panel	IFCMember		IFCMemberType	
Railing Post	IFCMember		IFCMemberType	
Rail	IFCMember		IFCMemberType	
Toprail	IFCMember		IFCMemberType	
Handrail Connection	IFCMember		IFCMemberType	



Type: <undefined>

Filter:

- IFC 2x3: <undefined>
 - ex
 - Ifc2DCompositeC...
 - IfcAbsorbedDose...
 - IfcAccelerationM...
 - IfcActionRequest
 - IfcActionSourceT...
 - IfcActionTypeEnum
 - IfcActor
 - IfcActorRole
 - IfcActuatorType
 - IfcActuatorTypeE...
 - IfcAddressTypeEn...
 - IfcAheadOrBehind
 - IfcAirTerminalBox...
 - IfcAirTerminalBox...
 - IfcAirTerminalType

โดยแต่ละโปรแกรมจะมีโครงสร้าง การดึงข้อมูลในรูปแบบ IFC ไว้อยู่แล้วสามารถนำมาใช้งานได้อย่างง่ายดาย โดยโครงสร้างจะถูกกำหนดโดยมาตรฐานของโปรแกรมนั้นอย่างถูกต้องและสมบูรณ์

แต่ก็ยังมีบางโปรแกรมที่ต้องกำหนดนามสกุล IFC ลงไปด้วยตัวเองอย่างเช่น Sketchup ซึ่งแต่ละโปรแกรมเราสามารถใส่ Information ลงไปเพิ่มเติมในส่วนของรายละเอียดของวัตถุชนิดนั้นได้อีกด้วย

*หมายเหตุ โปรแกรมที่ยกมาข้างต้นเป็นโปรแกรมที่ได้รับความนิยมในไทย



IFC ≠ Cobie

IFC vs. Omniclass



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IFC Files

You can export SOLIDWORKS files as Industry Foundation Classes (.ifc files) for use in software applications commonly used in the building supply chain. You can import .ifc files into the SOLIDWORKS software to include information from models originally created with structural software applications.

The following attributes can be mapped from a SOLIDWORKS file to an IFC 4.0 file:

- Geometrical data
- Material and mass properties
- Tessellated geometry
- Face and body colors

The following properties can be written to IFC 2x3 files:

- Material
- Mass measure
- Area measure
- Volume measure

1. Click **File > Save As**.
2. From the Save As dialog box, for **Files of type**, select **IFC 2x3** or **IFC 4**.
3. Click **Options**.
4. Select the OmniClass™, Uniclass2015, Custom Properties, Material and Mass Properties, and Units, and click **OK**.

Before you select an OmniClass or UniClass, it is important that you understand the classes listed in the dialog box.
See <http://www.omniclass.org> and [<http://www.cpic.org.uk/uniclass2/>].

IFC Export Options

You can export SOLIDWORKS top-level assemblies or components as Industry Foundation Classes (.ifc files). You can assign the model OmniClass™, Uniclass2015, Custom Properties, Material and Mass Properties, and Units when exporting.

To open the .ifc Export Options dialog box:

With a model open, click **File > Save As**, select **IFC 2x3** or **IFC 4.0**, and click **Options**.

Output as

OmniClass Specifies the OmniClass Construction Classification System class. This classification organizes components for the building supply chain or construction industry.

UniClass2015 Specifies the UniClass2015 development

Class data for FM

Need more specify in IFC format

IFC4 supports:

1. **multiple model view definition (MDV)**
2. **Information on XML (website)**
3. **API (application programming interface) on BIM-app**

Manufacturer

สรุป

1. การดำเนินการ **BIM modeling** ตามแนวทางของ ผู้ออกแบบและ **international guide (SG without analysis)** โดยเปรียบเทียบกับข้อจำกัดของ **BIM model** ตัวอย่าง
2. การระบุข้อมูลของ **IFC 2x3** เน้นที่ข้อมูลจาก **material approval**
3. การระบุชนิด **IFC 2x3** อยู่ใน **appendix as guide**
4. การพัฒนาสำหรับงาน **FM** ดำเนินต่อไปในมาตรฐานถัดไป เนื่องจากต้องยกระดับข้อมูลเป็น **IFC4.0**
5. ต้องแยกข้อมูลระหว่าง **static data (design and commissioning)**
6. ข้อมูล **Dynamic data (BAS and chiller plant manager)**