Electrical & Mechanical Services Department

Building Information Modelling for Asset Management (BIM-AM) Standards and Guidelines

Version 1.0

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Document Revision Tracking

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Disclaimer

The document of BIM-AM Standards and Guidelines is a reference document for EMSD managed projects and handover of as-built BIM from consultants and/or contractors. Users should carefully consider the suitability of recommendation given by this Standards and Guidelines before applying any methodology into their current project workflow.

Contents

Chapter 1

Introduction

1. Introduction

1.1. Overview and Objectives

The ***Building Information Modelling for Asset Management*** (***BIM-AM) Standards and Guidelines*** is based on the asset template developed by EMSD, which is a summary of information requirement for the most common **21** types of Electrical & Mechanical (E&M) systems that needs maintenance services in Hong Kong. This standard provides the Building Information Modelling (BIM) modelling standard, coding standard and the information requirement for E&M systems and assets from construction stage to handover for building operation.

During design and construction stage, BIM is used as a design visualization and coordination tools. Meanwhile, asset information should be gradually built up in the BIM model so that by the end of the construction stage, the BIM model becomes an Asset Information Model (AIM) for handover to asset management. This standard focuses on AIM, it provides guidelines on what information should be included and how it is managed. It aims at providing a standard for as-built BIM and asset information at handover stage conforming to EMSD BIM-AM (Asset Management) System.

This ***BIM-AM Standards and Guidelines*** aims to achieve the goals:

1. Standardize E&M systems, sub-systems and equipment coding
2. Specify the information requirement for E&M equipment to be inputted in the BIM model
3. Specify the modelling requirement, project settings, E&M settings, presentation style of E&M BIM models

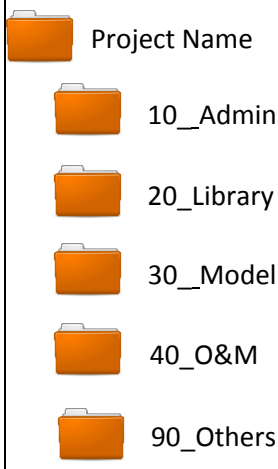
This standard is built on the guidelines defined by world-wide standards listed in Section 1.4 as reference document.

1.2. Handover Procedure of As-built BIM Model

The following personnel are involved in the handover procedure and their task is as follows:

Personnel	**Task in handover procedure**
Project discipline BIM Coordinator	Leads the modelling team to produce the individual discipline as-built BIM model, he/she responsible for quality, delivery standard and accuracy for the content in the model before submitting to Project BIM Manager.
Project BIM Manager	Sets out the project level BIM workflow and modelling standard. He/she will collect individual discipline models, check the standard and publish a federated as-built model for handover to Asset Management.
Asset Management team BIM Manager	Receives and check the as-built BIM model and link up with asset management systems / facility management system.

The handover package should contain at least the following materials which should be filed in respective folders:

	10_Admin	Stores all document for project management, including contract, project execution plans, etc.
	20_Library	Stores resources files such as Templates, Title Blocks, Line Styles, Fonts, Material Images and Specific Families
	30_BIM	Stores as-built BIM models from all discipline. Models should be in native format (e.g. .rvt) and viewer format (e.g. .nwd)
	40_O&M	Stores all documents related to operation and maintenance, e.g. testing & commissioning reports, catalogues, drawings, certificates and O&M manuals, etc.
	90_Others	Stores all other miscellaneous documents those may not be classified under the above folders.

1.3. Reference Software

All standards and guidelines set in this document are based on **Autodesk Revit 2016**, and Autodesk Navisworks is assumed to be the model viewing software. Other software fulfilling the requirements may be used for openness.

If other software platform is proposed in a project, it shall comply with:

- Most current version of Industry Foundation Classes (IFC) file format, and
- Commercially available collaborative software that provides interoperability between different software applications (e.g. Navisworks or equivalent)
- Able to carry and export all E&M asset information described in Section 4

1.4. Reference Standards and Specifications

Below listed standards or guidelines have been used as reference document for this Standards and Guidelines:

1) BS 1192:2007+A1:2015: Collaborative production of architectural, engineering and construction information. Code of practice.
2) BS 8536-1:2015: Briefing for design and construction. Code of practice for facilities management (Buildings infrastructure).
3) PAS 1192-2:2013: Specification for information management for the capital/delivery phase of construction projects using building information modelling. Pioneering the Building Information Modelling Standard.
4) PAS 1192-3:2014: Specification for information management for the operational phase of assets using Building Information Modelling.
5) PAS 1192-5:2015: Specification for security-minded Building Information Modelling, digital built environments and smart asset management.
6) Singapore BIM Guide. (May 2012)
7) Singapore BIM Essential Guide for Contractors (2013)
8) Singapore BIM Essential Guide for MEP Consultants (2013)
9) AEC (UK) BIM Protocol for Autodesk Revit: additional detail and enhancements for implementation of the AEC (UK) BIM Protocol for Autodesk Revit users. (September 2012)
10) AEC (UK) BIM Standard: A practical & pragmatic BIM Standard for the Architectural Engineering and Construction industry in the UK. (November 2009)

11) AEC (UK) BIM Technology Protocol: Practical implementation of BIM for the UK Architectural, Engineering and Construction (AEC) industry. (June 2015)
12) Computer-Aided-Drafting Standard for Works Projects (CSWP), Development Bureau, HKSARG

Chapter 2

Coding and Numbering System

2. Coding and Numbering System

2.1. District Code

All districts in Hong Kong and their corresponding district codes are listed as follows:

District		District Code
Hong Kong Island	Central and Western	CW
	Eastern	E
	Southern	S
	Wan Chai	WC
Kowloon	Kowloon City	KC
	Kwun Tong	KT
	Sham Shui Po	SSP
	Wong Tai Sin	WTS
	Yau Tsim Mong	YTM
New Territories	Islands	I
	Kwai Tsing	KWT
	North	N
	Sai Kung	SK
	Shatin	ST
	Tai Po	TP
	Tsuen Wan	TW
	Tuen Mun	TM
	Yuen Long	YL

2.2. Building Code

The list of buildings and their building code in Hong Kong is attached in Appendix A of this document.

2.3. Discipline Code

Alphabetical character represents the class of discipline.

Discipline	Code
Mechanical	M
Electrical	E
Plumbing	P
Mechanical, Electrical and Plumbing (Combined)	MEP
Architecture	A
Structure	S
Civil Engineering	C
Landscape	L
Other Disciplines	O

2.4. Names and Codes of E&M Systems and Routing

No.	System Name	System Code	Routing Name	Routing Code
1	**Lift and Escalator**	LAE	Trunking for Lift and Escalator	LAE
			Cable Tray for Lift and Escalator	
2	**LV Switchboard**	LVS	Trunking for LV Switchboards	LVS
			Cable Tray for LV Switchboards	
3	**Emergency Generator**	EMG	Trunking for Emergency Generator	EMG
			Cable Tray for Emergency Generator	
4	**HVAC**	HVAC	Primary Air Duct	PAD
			Exhaust Air Duct	EAD
			Fresh Air Duct	FAD
			Supply Air Duct	SAD
			Return Air Duct	RAD
			Transfer Air Duct	TAD
			Smoke Extraction Duct	SED
			Make Up Air Duct	MAD
			Condensate Drain Pipe	CDP
			Chilled Water Return Pipe	CHWR
			Chilled Water Supply Pipe	CHWS
			Condensing Water Supply Pipe	CDWR
			Condensing Water Return Pipe	CDWS
			Chemical Dosing Pipe	CHDP
			Make-up Water Pipe	MWP
			Heating Hot Water Supply Pipe	HHSP
			Heating Hot Water Return Pipe	HHRP
5	**Boiler System**	BLR	Boiler Pipes	BLR
6	**Filtration Plant**	FP	Filtration Plant Pipes	FP
			Return Pipes	RP
			Overflow Pipe	OP
			Supply Pipe	SP
7	**Fire Services Installation**	FS	Sprinkler Pipe	SPR
			Hose Reel / Fire Hydrant Pipe	FSP
			Automatic Fire Detection and Alarm System Pipe	AFA
			Gas Suppression System Pipe	GSS
8	**Uninterrupted Power Supply**	UPS	Trunking for UPS	UPS
			Cable Tray for UPS	
9	**Burglar Alarm**	BA	Trunking for Access Control System	ACS
			Cable Tray for Access Control System	
			Trunking for Burglar Alarm System	BAS
			Cable Tray for Burglar Alarm System	
			Trunking for CCTV and Intercom	CCTVI
			Cable Tray for CCTV and Intercom	
			Trunking for Smart Card System	SCS
			Cable Tray for Smart Card System	
			Trunking for CAS	CAS
			Cable Tray for CAS	
			Trunking for Videophone System	VPS
			Cable Tray for Videophone System	

			Trunking for Keypad Lock System	KLS
			Cable Tray for Keypad Lock System	
			Trunking for Drop-arm Barrier	DAB
			Cable Tray for Drop-arm Barrier	
10	**Radar and Navigation System**	RNS	Trunking for Radar and Navigation System	RNS
			Cable Tray for Radar and Navigation System	
11	**Microwave Link System**	MLS	Trunking for Microwave Link System	MLS
			Cable Tray for Microwave Link System	
12	**Timing & Display System**	TDS	Trunking for Timing & Display System	TDS
			Cable Tray for Timing & Display System	
13	**Audio Video System**	AV	Trunking for Audio Video System	AV
			Cable Tray for Audio Video System	
14	**Audio System**	AUS	Trunking for Audio System	AUS
			Cable Tray for Audio System	
15	**Radio System**	RS	Trunking for Radio System	RS
			Cable Tray for Radio System	
16	**Closed Circuit TV System**	CCTV	Trunking for Closed Circuit TV System	CCTV
			Cable Tray for Closed Circuit TV System	
17	**Broadcast Reception**	BR	Trunking for UHF TV System	UTV
			Cable Tray for UHF TV System	
			Trunking for Satellite TV System	STV
			Cable Tray for Satellite TV System	
18	**Lighting**	LTG	Trunking for Lighting	LTG
			Cable Tray for Lighting	
19	**Electrical Distribution**	EL	Cable Tray for Low Voltage	CT-LV
			Cable Tray for High Voltage	CT-HV
			Cable Ladder for Low Voltage	CL-LV
			Cable Ladder for High Voltage	CL-HV
			Trunking for N Power	TR-N
			Trunking for E Power	TR-E
20	**Drainage (*)**	DR	Waste Pipe	WP
			Soil and Waste Pipe	SWP
			Vent Pipe	VP
			Rain Water Pipe	RWP
			Pumped Soil & Waste Pipe	PSWP
			Pumped Waste Pipe	PWP
			Pumped Rainwater Pipe	PRWP
21	**Plumbing (*)**	PL	Cleansing Water Pipe	CLWP
			Cold Water Pipe	CWP
			Flushing Water Pipe	FLWP
			Fresh Water Pipe	FWP
			Hot Water Supply Pipe	HWSP
			Hot Water Return Pipe	HWRP
			Irrigation Water Pipe	IWP
			Grey Water Pipe	GWP

Note:

Systems marked with (*) are not in the EMSD asset templates.

Project BIM manager may further create other system types if any specific system is not listed above. The principle for system coding should be for easy identification and drawing production.

The system name and coding used in a project should be agreed by all parties and documented in the project execution plan.

2.5. E&M Equipment Code

No.	System Name	Equipment Type	Equipment Code
1	**Lift and Escalator**	Lift and Escalator (^)	LAE
		Electric Lifts	ELL
		Hydraulic Lifts	HYL
		Escalators / Passenger Conveyors	EPC
2	**LV Switchboards**	LV Switchboard (^)	LVS
		Battery	BAT
		Harmonic	HAR
		Switchgear	SWG
		Relay	REL
		Capacitor	CAP
3	**Emergency Generator**	Generator (^)	GEN
		Diesel Engine	DIE
		Alternator	ALT
		Controller	CTR
		Undervolt Relay	URE
		Fuel Tank	FUT
		Fuel Pump	FPMP
		Battery Charger	BAC
		Battery	BAT
4	**HVAC (Air Side)**	Air Side (^)	AS
		DX Unit	DXU
		VRV-IDU	VRV
		Air Handling Unit	AHU
		Primary Air Handling Unit	PAU
		Heat Wheel	HW
		Fan Coil Unit	FCU
		Fire Damper	FD
		Fresh Air Fan	FAF
		Exhaust Air Fan	EAF
		VAV Box	VAV
	HVAC (Water Side)	Water Side (^)	WS
		Chiller	CHR
		Heat Pump Type Chiller	HPC
		Cooling Tower	COT
		Heat Exchanger	HEX
		Pump	PMP
		Pressurized Water Sys	PWS
		Water Treatment Sys	WTS
		Auto-strainer	ASR
		Travelling Band Screen	TBS
	HVAC (Cold Room / Store)	Cold Room/Store (^)	CRM
	HVAC (Miscellaneous)	Miscellaneous (^)	MIS
		CCMS	CCMS
		Room Cooler	RCR
		Refrigerator	RFR

5	**Boiler System**	Boiler System (^)	BLR
		Hot water boiler	HWB
		Steam boiler	STO
		Gas boiler (*)	GAB
		Calorifier	CAL
		Heat Exchanger	HEX
		Pump	PMP
		Expansion Tank (*)	EXT
6	**Filtration Plant**	Filtration Plant (^)	FP
		Electric Boiler	ELB
		Diesel Boiler	DIB
		Electro-Chlorinator System	ECS
		Filtration Tank	FIT
		Pump	PMP
		Motor	MOT
		MCC Panel	MCCP
		Ozone Generator System	OGS
		Ultraviolet Sterilizer	ULS
		Building Management System	BMS
		Controller Analyser and Sensor	CAS
		Chemical Dosing Pump	CHP
		Air Blower	AB
		Piping System	/
		Air Release Valve	ARV
		Variable Speed Drives / Soft Starter	VSD
		Misc. Swimming Pool Equipment	MSP
		Heat Exchanger	HEX
7	**Fire Services Installation**	Wet System (^)	WTS
		Pump	PMP
		Sprinkler control valve set & accessories	SCV
		Automatic Fire Detection and Alarm System (^)	AFD
		Fire Alarm equipment	FAE
		Audio/ Visual Advisory System	AVA
		Gas Suppression System (^)	GSS
		Gas cylinder and equipment	GCE
		Portable Equipment (^)	PE
		Portable fire extinguisher	PFE
		Gas Detection System (^)	GDS
		Gas detector and equipment	GDE
		Exit sign & Directional sign (^)	EXS
8	**UPS**	UPS System (^)	UPS
		Battery System	BATS
		Static Transfer Switch	STS
9	**Burglar Alarm and Security Installation (Access Control system)**	Access Control System (^)	ACS
		Panel	PAN
		Lock/Button/Switch	LBS
		Emergency Breakglass	EMB
		Lock Control Unit	LCU
		Smart Card Reader	SMR

		Card Reader Control	CRC
		Remote Rel. But. Receiver	RER
		Intercom	INM
		Computer	COM
		Turnstiles	TUR
		Accessories	ACC
	Burglar Alarm and Security Installation (Burglar Alarm System)	Burglar Alarm System (^)	BAS
		Panel	PAN
		Lock/Button/Switch	LBS
		Intrusion Detector	IND
		Power Mgt Unit	PMU
		Amplifier	AMP
		Controller	CTR
		Camera	CAM
		Audio / Video Product	AVP
		Projectoring Product	PRP
		Screen/Monitor	SCM
		Accessories	ACC
	Burglar Alarm and Security Installation (CCTV and Intercom System)	CCTV and Intercom System (^)	CCTVI
		Intercom	INM
		Camera	CAM
		Video Switcher	VIS
		Multi Channel DVR / NVR	DVR/NVR
		Duplex Multiplexer	DUM
		Computer	COM
		Accessories	ACC
	Burglar Alarm and Security Installation (Smart Card System)	Smart Card System (^)	SCS
		Security Computer	SEC
		Printer	PRI
		Access Controller	ACR
		Card Reader	CAR
		Keypad	KEP
		Lock/Button/Switch	LBS
		Control Unit	COU
		Power Mgt Unit	PMU
		Accessories	ACC
	Burglar Alarm and Security Installation (Call Alarm System)	Call Alarm System (^)	CAS
		Control Panel	COP
		Alarm Siren/Bell	ASB
		Button	BUT
	Burglar Alarm and Security Installation (Videophone System)	Videophone System (^)	VPS
		Extension Speaker	EXS
		Station	STA
		Handset	HAN
		Videophone Control	VPC
	Burglar Alarm and Security Installation (Keypad Lock System)	Keypad Lock System (^)	KLS
		Keypad	KEP
		Backup Battery	BAB
		Door Release Button	DRB

	Burglar Alarm and Security Installation (Drop-arm Barrier)	Drop-arm Barrier(^)	DAB
		Control Panel	COP
		Barrier Gate	BAG
		Detector	DER
		Card Acc. Controller	CAC
		Proximity Card	PRC
		Intercom	INM
		Recorder	REC
		Workstation Unit	WOU
		Accessories	ACC
	Burglar Alarm and Security Installation (Electric Lock System)	Electric Lock System (^)	ELS
10	**Radar and Navigation System**	Radar and Navigation System (^)	RNS
		Antenna	BRR
		Turning unit	TUU
		Display and processing unit	DPU
		Network Equipment	NEE
		Video camera	VIC
		Accessories	ACC
11	**Microwave Link System**	Microwave Link System (^)	MLS
		Antenna	ANT
		Transceiver	TRAN
		RF Interface Unit	RIU
		Processing unit	PRU
		Network Equipment	NEE
		Accessories	ACC
12	**Timing & Display System**	Timing & Display System (^)	TDS
		Operator Control Console / Workstation, PC	OCC
		Control Unit / Server	CUS
		Sensing Unit	SEU
		Master Clock Unit	MCU
		Video Display Unit	VDU
		Video & Audio Equipment	VAE
		Network Equipment	NEE
		Queue Management Unit	QMU
		Uninterruptible Power Supply	UPS
13	**Audio Video System**	Audio Video System (^)	AV
		Player	PLA
		Recorder	REC
		Console	CONS
		Miscellaneous	MIS
		Distribution Amplifier	DIS
		Switch	SW
		Splitter	SPL
		Extender	EXT
		Matrix Switcher	MAT
		Display Unit	DIU
		Audio Amplifier	AAM

		Audio Mixer	AMI
		Audio Equalizer	AEQ
		Audio Loudspeaker	ALO
		Audio Microphone	AMC
		Audio Miscellaneous	AMS
14	**Audio System**	Audio System (^)	AUS
		Amplifier	AMP
		Chairman Unit	CHU
		Controller	CTR
		Delegate Unit	DEU
		Recorder	REC
		Mixer	MIX
		PC Workstation	PCW
		Equalizer	EQU
		Loudspeaker	LOU
		Loop Amplifier	LAM
		T-coil (Hearing Aid)	TCO
		Microphone	MIC
		Intercom Master Station	IMS
		Network Switch	NES
		Intercom Slave Station	ISS
		Annunciator	ANN
		Matrix	MAT
		Interpreter Unit	INT
		Miscellaneous	MIS
15	**Radio System**	Radio System (^)	RS
		Base Radio/Repeater	BRR
		RF Interface Unit	RIU
		Antenna	ANT
		Power Supply	POS
		Console	CONS
		Voice logger	VLO
		Network Equipment	NEE
		Radio Terminals	RAT
		Accessories	ACC
16	**Closed Circuit TV System**	CCTV System (^)	CCTV
		Camera	CAM
		Network Switch	NES
		Video Recorder	VIR
		Console	CONS
		Display Unit	DIU
		Video Matrix	VIM
		Miscellaneous	MIS
17	**Broadcast Reception Installations**	UHF TV System (^)	UTV
		Antenna/Preamplifier	ANT/PAM
		Ch Amplifier/Amplifier	AMP
		Accessories	ACC
		Satellite TV System (^)	STV
		Antenna / Amplifier	ANT/AMP

		Receiver	REC
		Converter	CON
		Accessories	ACC
18	**Lighting System**	Lighting System(^)	LTG
		Luminaire	LUM
		Lighting Control System	LCS
19	**Electrical Distribution System**	Electrical Distribution System (^)	EL
		Busbar Trunking / Main Distribution Cable	/
		Isolating switch	ISW
		Distribution Board	DTB
		ACB	ACB
		MCCB	MCCB
		Fuse switch & Switch fuse	FSW
		MCB	MCB
		RCD/RCBO	RCD/RCBO
20	**Plumbing and Drainage**	Sump Tank (*)	SUT
		Roof Tank (*)	ROT
		Booster pump (*)	BPMP
		Transfer pump (*)	TPMP
		Pressure vessel (*)	PVES
		Electric heater (*)	EHT
		Gas heater (*)	GAH
		Waste water sump pump (*)	WWSP
		Soil and waste water sump pump (*)	SWSP
		Rainwater sump pump (*)	RWSP
		Local motor control panel (*)	LMCP

Note:

Equipment marked with (*) is not in the EMSD asset templates while equipment marked with (^) is the first level equipment type.

Requirements for all plumbing and drainage equipment should be made reference to the related standards of ArchSD.

All terminal units / equipment (e.g. air terminals of HVAC system, socket outlets of electrical distribution system, etc.) should be modelled

Project BIM manager may further create other equipment coding if any equipment is not listed above. The principle for equipment coding should be for easy identification and drawing production.

The equipment and coding used in a project should be agreed by all parties and documented in the project execution plan.

2.6. E&M Equipment Numbering System

Equipment number (i.e. “Asset Code”) consists of 7 parts, it shall be in the form as shown below and separated by a hyphen “-” between fields.

There are two formats for equipment numbering, long form and short form.

Long form equipment number is the full equipment number consist of all 7 parts stated below. It is used for EMSD central maintenance management so that user knows the district, building, level and room by reading the equipment number.

Short form equipment number consists of the System Code, Equipment Code and number only. It is used by the local maintenance staffs within a building / facility. Equipment are presented in simple form for easy identification.

1	2	3	4	5	6	7
District Code (Refer to Section 2.1)	**Building Code** (Refer to Section 2.2)	**Building level**	**Room Code**	**System Code** (Refer to Section 2.4)	**Equipment Code** (Refer to Section 2.5)	**Number**
<= 3 characters	<= 5 characters	3 characters	3 to 4 characters	3 to 5 characters	3 to 4 characters	3 characters
KT-Kwun Tong	**EMSDN**-EMSD HQS (NEW)	**B02**-Basement 2 **B2M**-Basement 2 Mezzanine **B01**-Basement 1 **000**-Ground Floor **001**-1st Floor **002**-2nd Floor **003**-3rd Floor	**MR01**-Meeting Room 01 **MR02**-Meeting Room 02 **AHUR**-AHU ROOM	**BLR** - Boiler System **BA** – Burglar Alarm **FP** – Filtration Plant	**AHU**-Air Handling Unit **FCU**- Fan Coil Unit	001 002 003 004 005 006

Examples:

1. Fan Coil Unit in first floor meeting room 01 in the building “Call Centre”:

Long form equipment number:	**KT-EMSDN-001-MR01-HVAC-FCU-001**
Short form equipment number:	**HVAC-FCU-001-001**

2. F.S Pump in second floor F.S Plant Room in the building “Call Centre”:

Long form equipment number:	**KT-EMSDN-002-FSPR-FS-PMP-001**
Short form equipment number:	**FS-PMP-002-001**

Chapter 3

Modelling Standard

3. Modelling Standard

3.1. Model Management

For ease of file management and optimal model loading and display performance, it is a good practice to maintain models according to the following criteria:

1. BIM model shall be split by discipline and system
2. A model file size is controlled within 200MB
3. Remove all unused worksets, and keep worksets tidy and neatly

Due to the limitation of maximum file path in windows system being less than 256 characters, it is a good practice to keep folders name in tidy and neat manner. Too many folder levels should be avoided.

3.2. Naming Conversion

3.2.1. Model Naming

Model names consist of 6 parts, it shall be in the form as shown below and separated by a hyphen "-" between fields.

1	2	3	4	5	6
District Code	Building Code	Building Level	Discipline	System	Description
Required	Required	Required	Required	Required	Optional

Please refer to section 2 for coding definition for District code, Building code, Discipline and System code.

Example: WTS-EMSDN-001-MEP3-AC.rvt

[District Code]-[Building Code]-[Building Level]-[Discipline]-[System].rvt

A federated model shall be created for submission and coordination/

Example: WTS-EMSDN-001-Coord.rvt

[District Code]-[Building Code]-[Building Level]-Coord.rvt

3.2.2. Family Naming

Family names consist of 4 parts, it shall be in the form as shown below and separated by a hyphen "-" between fields.

Example: AHU-Plug_Fan-York-PrelimDesign.rfa

[Equipment Type]-[Sub-Type]-[Manufacturer]-[Description].rfa

[Equipment Type]
Equipment Abbreviation (3-4 characters) as listed in Section 2.5.

[Sub-Type]
Description conveying additional specialization information under a category.

Example: For AHU - Centrifugal_Fan, Plug_Fan, EC_Plug_Fan, Axial_Fan, etc

[Manufacturer]
Description indicating the manufacturer of the as-built equipment or "Generic" for otherwise.

[Description]
Optional description indicating detailed character of this object different from other type of object. Including material, size, special components, etc.

3.3. Model set up

3.3.1. Unit and Symbol

The BIM model shall be modelled in metric and in consistent units. Some common model units are provided below. For units or symbols not listed below, consultants and/or contractor are advised to propose the new units and/or symbols, with substantiation and submit the mapping table, where deemed necessary.

SI Base Units

Name	Unit	Symbol
Length	meter	mm
Mass	kilogram	kg
Time	second	s
Electric Current	Ampere	A
Thermodynamic Temperature	Kelvin	K
Amount of Substance	mole	mol
Luminous Intensity	candela	cd

SI Derived Units

Name	Unit	Symbol
Energy	joule	J
Frequency	hertz	Hz
Force	newton	KN
Illuminance	lux	lx
Pressure	pascal	Pa
Power	watt	W
Temperature	celsius	^{o}C
Potential	volt	V
Resistance	ohm	Ω

The table below lists the prefixes used to denote decimal fractions and multiples of SI units and derived SI units. Compound prefixes are **not** permitted (e.g. millimicro). The prefix attaches directly to the name of a unit, and a prefix symbol attaches directly to the symbol for a unit.

Prefixes for SI Base Units and SI Derived Units

Prefix	Symbol	Factor
yotta	Y	10^{24}
zetta	Z	10^{21}
exa	E	10^{18}
peta	P	10^{15}
tera	T	10^{12}
giga	G	10^{9}
mega	M	10^{6}
kilo	k	10^{3}
hecto	h	10^{2}
deca	da	10^{1}
deci	d	10^{-1}
centi	c	10^{-2}
milli	m	10^{-3}
micro	µ	10^{-6}
nano	n	10^{-9}
pico	p	10^{-12}
femto	f	10^{-15}
atto	a	10^{-18}
zepto	z	10^{-21}
yocto	y	10^{-24}

SI Preferred Engineering Units

Name	Unit
Area m2	m^2
Apparent power	kVA
Calorific Value	kJ/kg
Compressed air pressure	kPa
Cooling power	kW
Density	kg/m^3
Sound Power	dB
Ductwork pressure	Pa
Electric power	kW
Enthalpy Difference	kJ/kg
Heating power	kW
Mass flow rate	kg/s
Pipework pressure	kPa
Potential	V
Rotational Speed	Rev/min
Specific Heat	kJ/kg K
Specific Volume	m^3 /kg
Thermal Resistance	m^2K/W
Velocity	m/s
Volume	m^3
Volume Flow Rate	L/s
Viscosity	$N.s./m^2$

Dates for Folder and File naming

Compile with ISO 8601 - ***YYYYMMDD***

3.3.2. Location and Geo-Coordination

The origin and orientation of the project and model shall be based on project location with reference to the Hong Kong 1980 Grid and Principal Datum (mPD).

3.3.3. Worksharing and Worksets

For work sharing in Revit, using Central File is recommended for large scale projects or working between remote offices.

A central model is created in server as master model, and a local copy is created in local machine when a user access to the model. The "Synchronize" process could be sent to central model if changes are made in a local copy, so users could share their latest update among the team.

Every elements in Revit model is assigned to Workset and it is used to control the ownership of Revit model elements. One user can edit a workset at a time while other team members could view that workset.

The setting of workets are specific to different projects, for E&M, it could be one system / sub-system, one workset.

3.3.4. Cross-Disciplinary Model Coordination

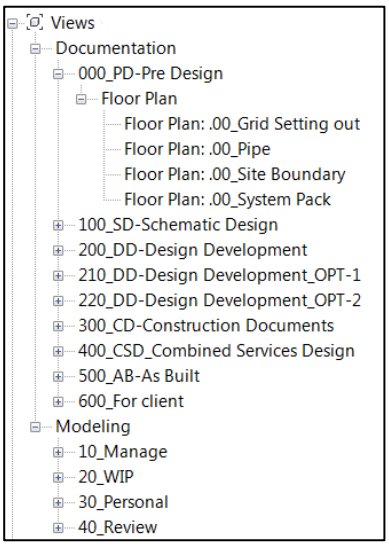
To link cross-disciplinary Revit models, e.g. Architecture, Structure and MEP models, Project Base Point should be set in every Revit models to ensure the geo-locations are aligned.

The Project Base Point should be managed by BIM Manager, the setting should be agreed and documented in the BIM Project Execution Plan.

A federated model shall be created for submission and cross-disciplinary coordination.

3.4. Browser Organization

Project Browser should be designed by the Project BIM Manager so that views can be organized according to its purpose, its viewing details and types of view.



Below is an example of one project browser organization, it is organized in 3 levels:

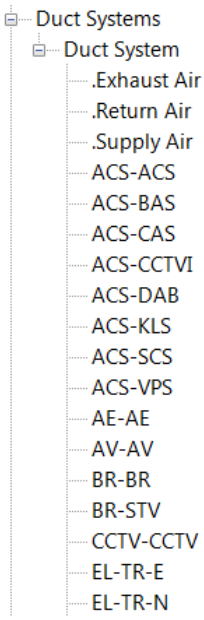
- The first level shows whether the view is used for Documentation or Modelling
- The second level shows the views belongs to what stages in a project, hence the detail level
- The third level shows the type of the view: Floor plan / 3D view / section / elevation, etc

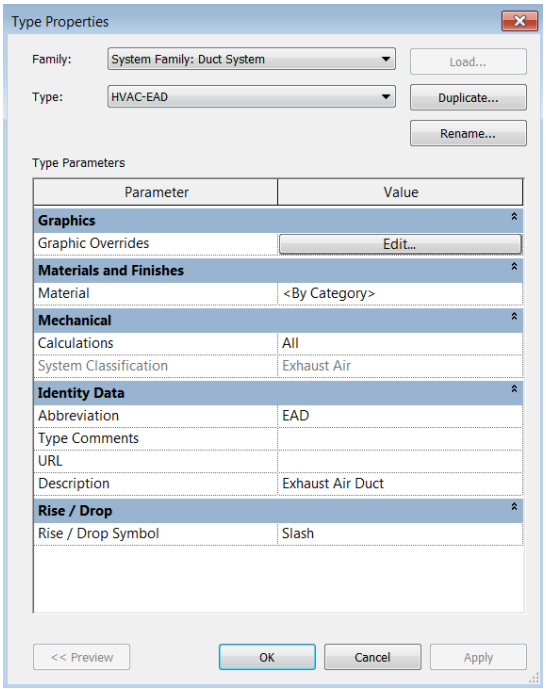
3.5. E&M System setup and modelling

3.5.1. Duct System

Duct systems listed in section 2.4 should be created in the Revit project. Each system shall be set with the following settings:

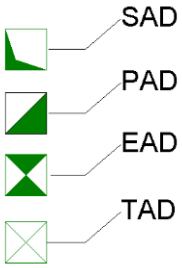
Revit field	Setting	Example
System type name	Consists of the system code and sub-system code separated by a hyphen "-"	**HVAC-EAD**
System abbreviation	Input sub-system code in section 2.4	**EAD**
Description	Input sub-system name in section 2.4	**Exhaust Air Duct**





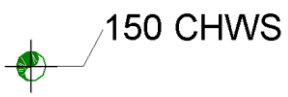
In Revit, there is no trunking family. It is recommended to use duct with specific duct system to represent trunking services.

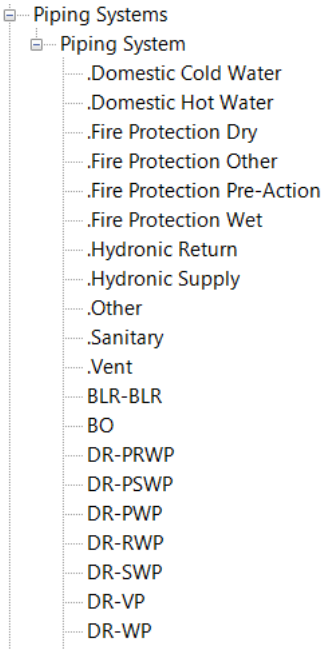
Rise/Drop symbols setting closest to CSWP standard is as below:

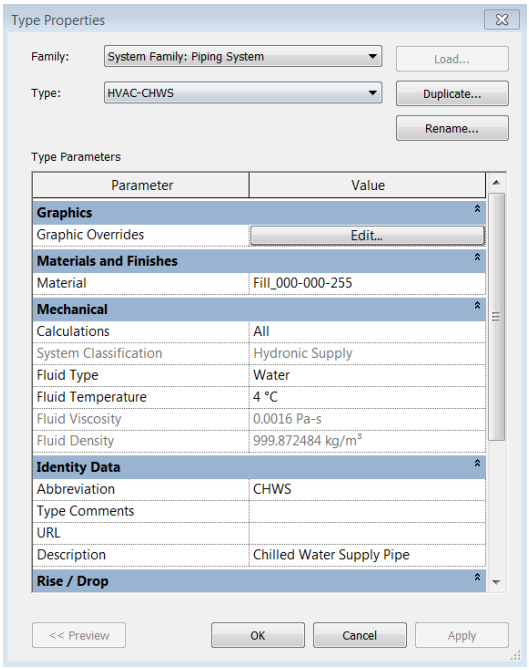
System	Rise / Drop symbol setting	Illustration
SAD	Yin Yang - Filled	
PAD	Slash - Filled	
EAD	Cross - Filled	
All other systems	Cross	

3.5.2. Pipe System

Pipe systems listed in section 2.4 should be created in the Revit project. Each system shall be set with the following settings:

Revit field	Setting	Example
System type name	Consists of the system code and sub-system code separated by a hyphen "-"	**HVAC-CHWS**
System abbreviation	Input Sub-system code in section 2.4	**CHWS**
Description	Input Sub-system name in section 2.4	**Chilled Water Supply Pipe**
Rise / Drop symbol	Yin Yang - Filled	





3.5.3. Cable Tray

When draw a cable tray. The sub-system code should be inputted in the "Service Type" field under cable tray.

3.5.4. Modelling E&M routing and equipment

E&M routing and equipment should be modeled in correct Revit categories as listed below:

Routing Type	Revit Category
Trunking	Duct
Cable Tray	Cable Tray
Duct	Duct
Pipe	Pipe

No.	System Name	Equipment Type	Revit Category
1	**Lift and Escalator**	(All)	Specialty Equipment
2	**LV Switchboard**	(All)	Electrical Equipment
3	**Emergency Generator**	(All except type below)	Electrical Equipment
		Fuel Pump	Mechanical Equipment
4	**HVAC**	(All except types below)	Mechanical Equipment
		Fire Damper	Duct Accessories
		Auto-strainer	Pipe Accessories
5	**Boiler System**	(All)	Mechanical Equipment
6	**Filtration Plant**	(All except type blow)	Mechanical Equipment
		Piping System	Pipes
7	**Fire Services Installation**	(All except type below)	Fire Alarm Devices
		Pump	Mechanical Equipment
8	**Uninterrupted Power Supply**	(All)	Electrical Equipment
9	**Burglar Alarm**	(All)	Electrical Fixtures
10	**Radar and Navigation System**	(All)	Electrical Fixtures
11	**Microwave Link System**	(All)	Electrical Fixtures
12	**Timing & Display System**	(All)	Electrical Fixtures
13	**Audio Video System**	(All)	Electrical Fixtures
14	**Audio System**	(All)	Electrical Fixtures
15	**Radio System**	(All)	Electrical Fixtures
16	**Closed Circuit TV System**	(All)	Electrical Fixtures
17	**Broadcast Reception**	(All)	Electrical Fixtures
18	**Lighting**	(All except type below)	Lighting Fixtures
		Lighting Control System	Electrical Fixtures
19	**Electrical Distribution**	(All except types below)	Electrical Equipment
		Busbar Trunking / Main Distribution Cable	Ducts / Cable Trays
		Isolating switch	Electrical Fixtures
		Fuse switch & Switch fuse	Electrical Fixtures
20	**Drainage (*)**	(All)	Mechanical Equipment
21	**Plumbing (*)**	(All)	Mechanical Equipment

Note:

Systems and Equipment marked with (*) are not in the EMSD asset templates

3.6. Presentation Style

This section addresses the BIM model elements display setting.

3.6.1. Line Styles

Category	Line Weight Projection	Line Color	Line Pattern
Lines	3	RGB 000-166-000	Solid
<Area Boundary>	12	RGB 128-000-255	Solid
<Beyond>	3	Black	Dash
<Centerline>	3	Black	AEC_Centre
<Demolished>	3	Black	Demolished
<Fabric Envelope>	1	RGB 127-127-127	Dash
<Fabric Sheets>	1	RGB 064-064-064	Solid
<Hidden>	3	Black	Hidden
<Overhead>	2	Black	Overhead
<Room Separation>	12	Cyan	AEC_Dash_3.0mm
<Sketch>	6	Magenta	Solid
<Space Separation>	12	Green	AEC_Dash_3.0mm
AEC_1-Soild	1	Black	Solid
AEC_3-Soild	3	Black	Solid
AEC_5-Soild	5	Black	Solid
AEC_6-Soild	6	Black	Solid
AEC_7-Soild	7	Black	Solid
AEC_8-RNF_Mesh	8	Black	AEC_DashDot_6.0mm
AEC_8-Soild	8	Black	Solid
AEC_9-Soild	9	Black	Solid
AEC_10-DPC	10	Magenta	Solid
AEC_10-DPM	10	RGB 000-128-000	AEC_DoubleDash
AEC_10-Soild	10	Black	Solid
AEC_11-Rebar	11	Black	Solid
Axis of Rotation	12	Blue	AEC_Centre
Centre	1	Black	AEC_Centre
Dash_1.5	1	Black	AEC_Dash_1.5mm
Dash_3.0	1	Black	AEC_Dash_3.0mm
Dash_3.0_Loose	1	Black	AEC_Dash_3.0mm_Loose
Dash_9.0	1	Black	AEC_Dash_9.0mm
DashDot_3.0	1	Black	AEC_DashDot_3.0mm
DashDot_6.0	1	Black	AEC_DashDot_6.0mm
DashDotDot_6.0	1	Black	DashDotDot_6.0
Demolished	1	Black	Demolished
Dot_1.0	1	Black	Dot_1.0
Dot_2.0	1	Black	Dot_2.0
Dot_4.0	1	Black	AEC_Dot_4.0mm
DoubleDash	1	Black	AEC_DoubleDash
ElevationSwing	1	Black	Elevation Swing
GridLine	1	Black	Grid Line
Hidden	1	Black	Hidden
Hidden Lines	3	RGB 000-161-000	AEC_Dash_3.0mm
Hidden_2.0	1	Black	AEC_Hidden_2.0mm
Insulation Batting Lines	3	Black	Solid
Lines	3	RGB 000-161-000	Solid
Medium Lines	5	Black	Solid
Overhead	1	Black	Overhead
Red Line	8	Red	Aligning Line
Thin Lines	1	Black	Solid
TripleDash	1	Black	AEC_TripleDash
Wide Lines	10	Black	Solid
WindowSwing	1	Black	Window Swing

3.6.2. Line Pattern

Name:	Line Pattern
AEC_Centre	
AEC_Dash_1.5mm	
AEC_Dash_3.0mm	
AEC_Dash_3.0mm_Loose	
AEC_Dash_9.0mm	
AEC_DashDot_3.0mm	
AEC_DashDot_6.0mm	
AEC_Dot 1.0mm	
AEC_Dot 2.0mm	
AEC_Dot_4.0mm	
AEC_DoubleDash	
AEC_Hidden_2.0mm	
AEC_TripleDash	
Aligning Line	
Center	
Dash	
Dash dot	
Dash dot dot	
DashDotDot_6.0	
Demolished	
Dot	
Dot_1.0	
Dot_2.0	
Elevation Swing	
Grid Line	
Hidden	
Long Dash	
Loose dash	
Overhead	
Rebar Cover Lines	

3.6.3. Line Weight

	1 : 10	1 : 20	1 : 50	1 : 100	1 : 200	1 : 500
1	0.1300 mm	0.1300 mm	0.1300 mm	0.0600 mm	0.0600 mm	0.0600 mm
2	0.1500 mm	0.1500 mm	0.1500 mm	0.1300 mm	0.0600 mm	0.0600 mm
3	0.1800 mm	0.1800 mm	0.1800 mm	0.1500 mm	0.1300 mm	0.0600 mm
4	0.2000 mm	0.2000 mm	0.2000 mm	0.1800 mm	0.1500 mm	0.1300 mm
5	0.2500 mm	0.2200 mm	0.2200 mm	0.2000 mm	0.1800 mm	0.1500 mm
6	0.3500 mm	0.2500 mm	0.2500 mm	0.2200 mm	0.2000 mm	0.1800 mm
7	0.4000 mm	0.3500 mm	0.3500 mm	0.2500 mm	0.2200 mm	0.2000 mm
8	0.5000 mm	0.4000 mm	0.4000 mm	0.3500 mm	0.2500 mm	0.2200 mm
9	0.6000 mm	0.5000 mm	0.5000 mm	0.4000 mm	0.3500 mm	0.2500 mm
10	0.7000 mm	0.6000 mm	0.6000 mm	0.5000 mm	0.4000 mm	0.3500 mm
11	1.0000 mm	0.7000 mm	0.7000 mm	0.6000 mm	0.5000 mm	0.4000 mm
12	1.4000 mm	1.0000 mm	1.0000 mm	0.7000 mm	0.6000 mm	0.5000 mm
13	2.0000 mm	1.4000 mm	1.4000 mm	1.0000 mm	0.7000 mm	0.6000 mm
14	3.0000 mm	2.0000 mm	2.0000 mm	1.4000 mm	1.0000 mm	0.7000 mm
15	4.0000 mm	3.0000 mm	3.0000 mm	2.0000 mm	1.4000 mm	1.0000 mm
16	5.0000 mm	4.0000 mm	4.0000 mm	3.0000 mm	2.0000 mm	1.4000 mm

3.6.4. E&M Systems Colour Coding

The colour coding shall be assigned for the system types below by configuration of corresponding “Filters” under “Visibility/Graphics Override”. For system types not listed below, consultants or contractors are advised to propose new colour coding for new system types with substantiation, where deemed necessary.

System Type	Color Palette	RGB Code
Primary Air Duct		0,255,255
Exhaust Air Duct		0, 255, 0
Fresh Air Duct		0, 0, 255
Supply Air Duct		255, 0, 0
Return Air Duct		255, 0, 255
Transfer Air Duct		0, 128, 255
Smoke Extraction Duct		128, 128, 0
Make Up Air Duct		192, 192, 192
Staircase Pressurization Duct		192, 192, 192
Condensate Drain Pipe		255, 128, 0
Chilled Water Return Pipe		0, 255, 0
Chilled Water Supply Pipe		0, 0, 255
Condening Water Supply Pipe		0, 128, 64
Condening Water Return Pipe		0, 128, 255
Chemical Dosing Pipe		192, 192, 192
Make-up Water Pipe		192, 192, 192
Heating Hot Water Supply Pipe		128, 0, 0
Heating Hot Water Return Pipe		255, 128, 64
Waste Pipe		128, 128, 0
Soil and Waste Pipe		128, 0, 0
Vent Pipe		0, 128, 255
Rain Water Pipe		0, 255, 255
Pumped Soil & Waste Pipe		64, 0, 0
Pumped Waste Pipe		64, 64, 0
Pumped Rainwater Pipe		0, 128, 128
Cleaning Water Pipe		0, 0, 255

Cold Water Pipe		0, 0, 255
Flushing Water Pipe		255, 255, 0
Fresh Water Pipe		0, 255, 0
Hot Water Supply Pipe		255, 0, 0
Hot Water Return Pipe		255, 128, 128
Irrigation Water Pipe		0, 255, 255
Grey Water Pipe		0, 128, 255
Sprinkler Pipe		255, 0, 0
Hose Reel / Fire Hydrant Pipe		255, 0, 0
Automatic Fire Detection and Alarm System Pipe		255, 0, 0
Gas Suppression System Pipe		255, 0, 0
Cable Tray for Low Voltage		0, 255, 0
Cable Tray for High Voltage		0, 255, 0
Cable Ladder for Low Voltage		0, 255, 0
Cable Ladder for High Voltage		0, 255, 0
Trunking for N Power		0, 255, 0
Trunking for E Power		0, 255, 0
Trunking for BMS		0, 255, 0
Trunking for UPS		0, 255, 0
Trunking for Lighting		0, 255, 0
Trunking for UHF TV System / Cable Tray for UHF TV System		128, 255, 255
Trunking for Satellite TV System		128, 255, 255
Trunking for Access Control System / Cable Tray for Access Control System		128, 255, 255
Trunking for Burglar Alarm System		128, 255, 255
Trunking for CCTV and Intercom		128, 255, 255
Trunking for Smart Card System		128, 255, 255
Trunking for Call Alarm System		128, 255, 255

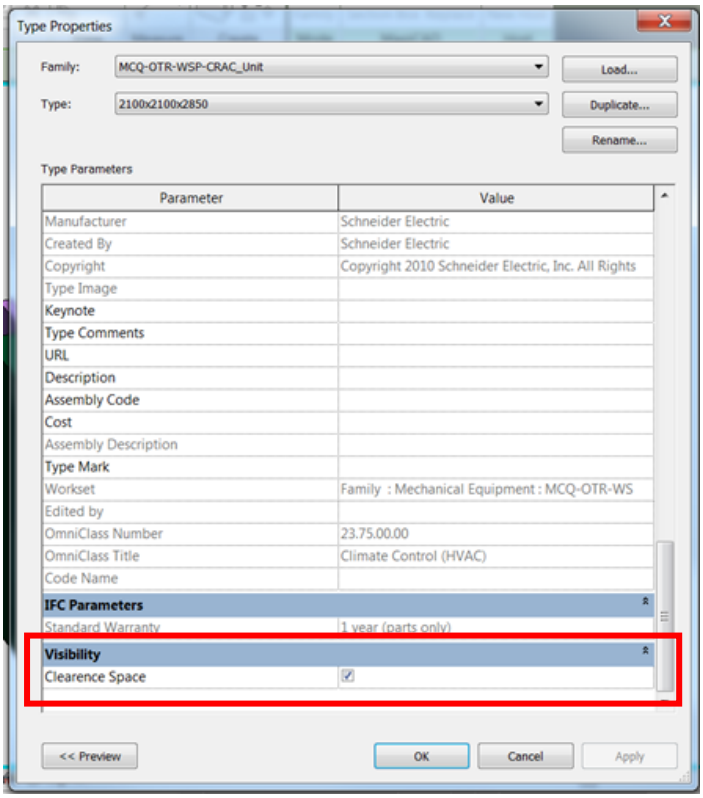
Trunking for Videophone System		128, 255, 255
Trunking for Keypad Lock System		128, 255, 255
Trunking for Drop-arm Barrier		128, 255, 255
Trunking for Electrical Distribution System / Cable Tray for Electrical Distribution System		0, 128, 128
Trunking for Distribution Board		0, 128, 128
Trunking for ACB / MCCB / MCB		0, 128, 128
Trunking for RCD / RCBO		0, 128, 128
Trunking for Audio Electronics Installation / Cable Tray for Audio Electronics Installation		0, 128, 128
Trunking for Audio Video Electronics Installation		0, 128, 128
Trunking for Closed Circuit TV System		0, 128, 128
Trunking for Microwave Link System		0, 128, 128
Trunking for Radar and Navigation System		0, 128, 128
Trunking for Radio Electronics Installation		0, 128, 128
Trunking for Timing & Display System		0, 128, 128
Trunking for Emergency Generator		128, 0, 128
Trunking for Lift and Escalator		128, 0, 128
Trunking for Lighting System		128, 0, 128
Trunking for LV Switchboards		128, 0, 128
Trunking for UPS		128, 0, 128
Boiler Pipes		255,255,0

Filtration Plant Pipes		0, 128, 0
Return Pipe		0, 128, 0
Overflow Pipe		0, 128, 0
Supply Pipe		0, 128, 0

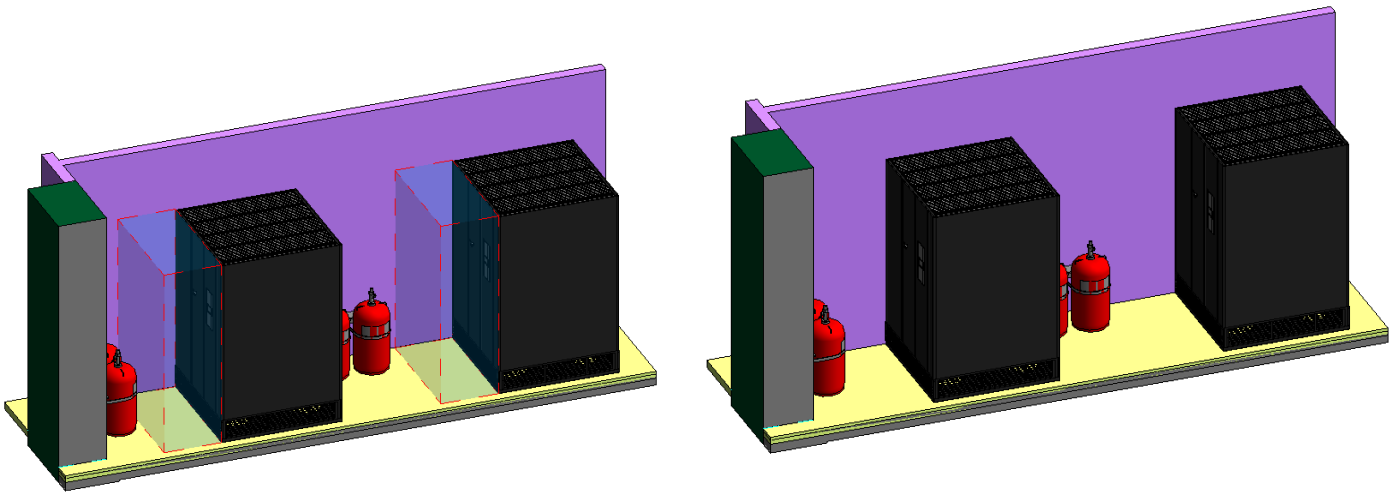
3.7. Maintainability

The equipment families are advised to provide clearance space in BIM model. Clearance space should be reflected in the BIM model for maintenance purpose.

Clearance space is modelled in BIM equipment families, so that it will be taken into consideration during the design, construction and maintenance of the equipment.



Example of mechanical equipment clearance space with visibility on and off.



Chapter 4

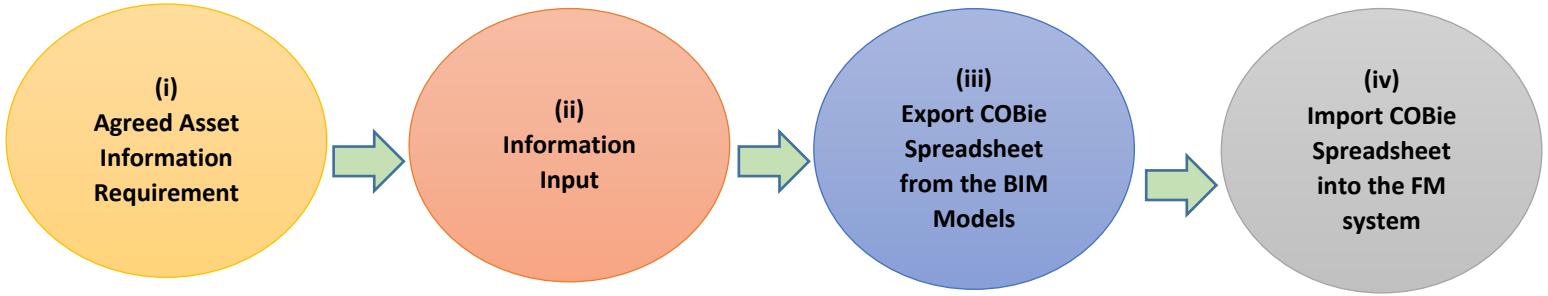
E&M Asset Information

4. E&M Asset Information

This section illustrates how the asset management concept are designed to enable the Electrical and Mechanical Services Department to maintain and manage assets. Contractors should prepare the BIM models to facilitate the BIM-AM standard workflow. In EMSD BIM Template, apart from the COBie parameters (will be described in section 4.2), it had already been created with EMSD fields for contractors to input the asset information in the BIM models. The following workflow is to ensure the project deliverables with good quality produced from the BIM models.

The workflow is applicable to asset management which are managed by EMSD.

The workflow can be described in the following figure.



Apart from the basic / technical information of the equipment, the reference link of the documents (Drawings, O&M Manual, Catalogues, T&C Records, certificates, etc...) of all the equipment should also be inputted into the models. The relative path of the documents should be inputted into the corresponding EMSD parameters," EMSD.Common.Documentation" (details refer to section 4.1).

4.1. Common Parameters for Equipment of All Systems

The Revit Shared Parameter File of the EMSD parameters described below will be provided by EMSD.

The following attributes are applicable to **all** equipment. Consultants or contractors are advised to propose additional attributes with substantiation for any equipment with substantiation where deemed necessary.

Shared Parameter with Revit Category of "Common" have to be applied to Mechanical Equipment, Electrical Equipment, Electrical Fixtures, Pipe Accessories, Duct Accessories, Specialty Equipment, Fire Alarm Devices, and Lighting Fixtures.

Among the common attributes, some attributes are defined as EMSD specific fields. Contractors should liaise with the subject officer(s) of EMSD to acquire and input the correct content of the EMSD specific fields as listed below.

Parameters	EMSD specific fields	Mandatory/ Optional/ Dependent	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.Common.Asset Code	N	M	Long form Equipment No.	Common	Instance	Common	Text	Data	KT-EMSDN-001-MR01-HVAC-FCU-001
EMSD.Common.Equipment No.	Y	M	EMSD CCS(SAP) Equipment No.	Common	Instance	Common	Text	Data	19876000
EMSD.Common.Equipment Type	N	M	Equipment Type	Common	Type	Common	Text	Data	Constant Air Volume (CAV)
EMSD.Common.Equipment Location	N	M	Equipment Location	Common	Instance	Common	Text	Data	AHU ROOM
EMSD.Common.Equipment Description	N	M	Description of the Equipment	Common	Type	Common	Text	Data	LG/F AC-2
EMSD.Common.Brand	N	M	Brand name of the Equipment	Common	Type	Common	Text	Data	
EMSD.Common.Documentation	N	M	The reference Link of the documents (T&C Records, O&M Manual, Catalogues, Certificates.....)	Common	Type	Common	URL	Data	..... "Project Name"\ 30_O&M Documentation\UPS\Battery System
EMSD.Common.Floor	N	M	Floor of the Equipment	Common	Instance	Common	Text	Data	1st Floor
EMSD.Common.Manufacturer	N	M	Manufacturer of the equipment	Common	Type	Common	Text	Data	ABC Company
EMSD.Common.RFID Tag No.	N	M	RFID Tag No. of the equipment	Common	Instance	Common	Text	Data	
EMSD.Common.Asset Relationship	N	M	Asset Relationship of the equipment	Common	Instance	Common	Text	Data	
EMSD.Common.Grouped Equipment ID	N	M	Grouped Equipment ID of the equipment	Common	Instance	Common	Text	Data	

EMSD.Common.Weight	N	O	Weight of the equipment	Common	Type	Common	Text	Data	50kg
EMSD.Common.Start-up Date	N	O	Start-up Date of the equipment	Common	Instance	Common	Text	Data	01.12.1999
EMSD.Common.Plant Section	N	O	Plant Section	Common	Instance	Common	Text	Data	
EMSD.Common.Customer Warranty Start	N	O	Customer Warranty Start Date of the equipment	Common	Instance	Common	Text	Data	01.12.1999
EMSD.Common.Customer Warranty End	N	D (Mandatory if "Customer Warranty Start" exist)	Customer Warranty End Date of the equipment	Common	Instance	Common	Text	Data	01.12.2000
EMSD.Common.Vendor Warranty Start	N	O	Vendor Warranty Start Date of the equipment	Common	Instance	Common	Text	Data	01.12.1999
EMSD.Common.Vendor Warranty End	N	D (Mandatory if "Vendor Warranty Start" exist)	Vendor Warranty End Date of the equipment	Common	Instance	Common	Text	Data	01.12.2000
EMSD.Common.Manufacturer Country	N	O	Manufacturer Country of the equipment	Common	Type	Common	Text	Data	China
EMSD.Common.Model No.	N	O	Model number of the equipment	Common	Type	Common	Text	Data	A1234
EMSD.Common.Serial No.	N	O	Serial number of the equipment	Common	Instance	Common	Text	Data	B12345678
EMSD.Common.Functional Location	Y	M	Functional Location	Common	Instance	Common	Text	Data	Meeting Room 01
EMSD.Common.Authorization Group	Y	M	Control if one can change the piece of equipment or create job and notification with reference to the equipment.	Common	Instance	Common	Text	Data	TS04
EMSD.Common.Technical ID No.	Y	M	Unique ID which is assigned by user	Common	Instance	Common	Text	Data	TEQ-150430-02
EMSD.Common.Planner Group	Y	M	Default depot or team for maintaining the Equipment.	Common	Type	Common	Text	Data	T00
EMSD.Common.Main Work Centre	Y	M	Default work centre for maintaining the Equipment.	Common	Instance	Common	Text	Data	T2EDA
EMSD.Common.Catalog Profile	Y	M	The combination of Code Groups from different Catalogs	Common	Type	Common	Text	Data	AC0000001

EMSD.Common.Division	Y	M	Division of the equipment	Common	Instance	Common	Text	Data	05 PD
EMSD.Common.Partner ID	Y	M	Short form (search form) of customer department.	Common	Instance	Common	Text	Data	CSD
EMSD.Common.Inventory No.	Y	O	Capture the equipment ID in client's system	Common	Instance	Common	Text	Data	
EMSD.Common.Construction Type	Y	O	Material Bill of Material (BOM) ID assigned to the Equipment.	Common	Type	Common	Text	Data	
EMSD.Common.Acquisition Value	Y	O	The value of the equipment	Common	Instance	Common	Text	Data	
EMSD.Common.Currency	Y	D (Mandatory if "Acquisition Value" exist)	(must follow Currency Code List)	Common	Type	Common	Text	Data	
EMSD.Common.CCS Equipment ID Superior	Y	D (Mandatory if "Technical ID No. of the Superior Equipment" not exist)	Equipment ID Superior	Common	Instance	Common	Text	Data	
EMSD.Common.Technical ID No. Superior	Y	D (Mandatory if "CCS Equipment ID" not exist and provide the reference of Lv 1 equipment Technical ID)	Technical ID No. Superior	Common	Instance	Common	Text	Data	

4.2. Equipment Specific Parameters for Different E&M Systems

4.2.1. Lift and Escalator

All Lift and Escalator equipment should have the attributes stated above and attributes specific to Lift and Escalator system.

The following attributes are specific to Lift and Escalator equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.LIFT.Location (Address)	Location (Address) on Use Permit	Specialty Equipment	Instance	Common	Text	Data	1 MAN LAM ROAD, SHA TIN
EMSD.LIFT.Location ID	Location ID on Use Permit	Specialty Equipment	Instance	Common	Text	Data	2801052-001
EMSD.LIFT.Lift No.	Lift number	Specialty Equipment	Instance	Common	Text	Data	L1
EMSD.LIFT.Year of Installation	Year of Installation	Specialty Equipment	Instance	Common	Text	Data	2001
EMSD.LIFT.Application	Application of the lift	Specialty Equipment	Type	Common	Text	Data	PASSENGER LIFT/GOODS LIFT
EMSD.LIFT.Length of Travel	Length of Travel of the lift [m]	Specialty Equipment	Instance	Common	Text	Data	14.8
EMSD.LIFT.Levels Served	level served	Specialty Equipment	Instance	Common	Text	Data	3
EMSD.LIFT.Rated Load	Rated Load [kg]	Specialty Equipment	Type	Common	Text	Data	1250
EMSD.LIFT.Rated Speed	Rated Speed [m/s]	Specialty Equipment	Type	Common	Text	Data	1
EMSD.LIFT.Type of Drive	Type of Drive	Specialty Equipment	Type	Common	Text	Data	GEARED TRACTION - VVDC
EMSD.LIFT.Control	Control type of the lift	Specialty Equipment	Type	Common	Text	Data	SIMPLEX
EMSD.LIFT.Motor Rating	Motor Rating [kW]	Specialty Equipment	Type	Electrical	Power	Electrical -Loads	10
EMSD.LIFT.No. of Suspension Rope	Number of Suspension Rope	Specialty Equipment	Type	Common	Text	Data	18
EMSD.LIFT.Construction of Suspension Rope	Construction of Suspension Rope (No. of Strand in each Rope x No. of Wire in each Strand)	Specialty Equipment	Type	Common	Text	Data	6x19
EMSD.LIFT.Nominal Diameter	Nominal Diameter of Suspension Rope [mm]	Specialty Equipment	Type	Common	Text	Data	120

EMSD.LIFT.Date of Last Replacement	Date of Last Suspension Rope Replacement	Specialty Equipment	Instance	Common	Text	Data	01.01.2015
EMSD.LIFT.Car Floor Area	Car Floor Area [sq.m]	Specialty Equipment	Type	Common	Area	Data	6.25
EMSD.LIFT.Machine Room Location	Machine Room Location	Specialty Equipment	Type	Common	Text	Data	ROOMLESS
EMSD.LIFT.Door Type	Door Type of the lift	Specialty Equipment	Type	Common	Text	Data	VERTICAL BI-PARTING
EMSD.LIFT.Fireman's Lift	Is it a Fireman's Lift	Specialty Equipment	Instance	Common	Yes/No	Data	Y
EMSD.LIFT.Rated Speed Up	Rated Speed Up of the lift[m/s]	Specialty Equipment	Type	Common	Text	Data	1
EMSD.LIFT.Diameter of Ram	Diameter of Ram [mm]	Specialty Equipment	Type	Common	Text	Data	200
EMSD.LIFT.Type of Ram	Type of Ram	Specialty Equipment	Type	Common	Text	Data	DIRECT
EMSD.LIFT.Environment	Environment of Escalators	Specialty Equipment	Type	Common	Text	Data	INDOOR/OUTDOOR
EMSD.LIFT.Angle of Inclination	Angle of Inclination [degree] of Escalators	Specialty Equipment	Type	Common	Angle	Data	30
EMSD.LIFT.Vertical Rise	Vertical Rise [m] (<99m) of Escalators	Specialty Equipment	Type	Common	Length	Data	6.7
EMSD.LIFT.Capacity	Capacity [persons/hour] of Escalators	Specialty Equipment	Type	Common	Text	Data	6750
EMSD.LIFT.Width of Step	Width of Step [mm] of Escalators	Specialty Equipment	Type	Common	Length	Data	1000
EMSD.LIFT.Type of Balustrade	Type of Balustrade	Specialty Equipment	Type	Common	Text	Data	INTERNAL - 1-SPEED AC
EMSD.LIFT.Machinery Location	Machinery Location of Escalators	Specialty Equipment	Instance	Common	Text	Data	INSIDE TRUSS

4.2.2. LV Switchboard

All LV Switchboard equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to LV Switchboard equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.LV.Switchgear No.	Switchgear No.	Electrical Equipment	Instance	Common	Text	Data	SLPCSB01
EMSD.LV.Type of Circuit	Type of Circuit	Electrical Equipment	Type	Common	Text	Data	Incomer/Bus-section/Sub-main(Normal)
EMSD.LV.Rating	Rating (A) of the switchboard	Electrical Equipment	Type	Electrical	Current	Electrical Engineering	2500
EMSD.LV.Make	Made by which company	Electrical Equipment	Type	Common	Text	Data	Schneider Electric
EMSD.LV.Nos. of Pole(s)	1-pole/ 2-pole/ 3-pole/ 4-pole	Electrical Equipment	Type	Electrical	Number of Poles	Electrical Engineering	4-pole
EMSD.LV.Outgoing Circuit	Outgoing Circuit	Electrical Equipment	Type	Common	Text	Data	Cable
EMSD.LV.Size	Size of the Switchboard	Electrical Equipment	Type	Common	Text	Data	400mm
EMSD.LV.Type	Type of the Cables	Electrical Equipment	Type	Common	Text	Data	Amoured XLPE
EMSD.LV.Rating of switchgear	Rating(A) of the switchgear	Electrical Equipment	Type	Electrical	Current	Electrical Engineering	728
EMSD.LV.Length	For bus-bars only(per piece) (mm)	Electrical Equipment	Type	Common	Length	Data	500
EMSD.LV.Capacitor Bank No.	Bank No. of the Capacitor	Electrical Equipment	Type	Common	Text	Data	C1
EMSD.LV.Date of Last PITC	Date of Last PITC	Electrical Equipment	Instance	Common	Text	Data	11.01.2014
EMSD.LV.Largest Rating	Largest Rating (A) of Switchboards	Electrical Equipment	Type	Electrical	Current	Electrical Engineering	2500
EMSD.LV.Cubicle Make	Cubicle Make	Electrical Equipment	Type	Common	Text	Data	Fair-rack
EMSD.LV. Make(optional)	Make(optional)	Electrical Equipment	Type	Common	Text	Data	BICC / PIRELLI

4.2.3. Emergency Generator

All Emergency Generator equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to Emergency Generator equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.Emergency.Make	Made by which company	Electrical Equipment,Mechanical Equipment	Type	Common	Text	Data	Johndeere
EMSD.Emergency.Rating	Rating (kVA)	Electrical Equipment	Type	Electrical	Apparent Power	Electrical -Loads	50
EMSD.Emergency.Capacity	Capacity (Litre)	Electrical Equipment,Mechanical Equipment	Type	Common	Text	Data	489
EMSD.Emergency.Type of Battery	Type of Battery	Electrical Equipment	Type	Common	Text	Data	Pb-acid type
EMSD.Emergency.Open/Sealed Type	Open Type / Sealed Type	Electrical Equipment	Type	Common	Text	Data	Open Type
EMSD.Emergency.Voltage	Voltage of Battery System	Electrical Equipment	Type	Electrical	Electrical Potential	Electrical Engineering	6

4.2.4. HVAC Systems

All HVAC Systems equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to HVAC Systems equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.HVAC.Cooling Capacity	Cooling Capacity (kW)	Mechanical Equipment	Type	HVAC	Cooling Load	Energy Analysis	214.6
EMSD.HVAC.Air Flow	Air Flow	Mechanical Equipment	Type	HVAC	Air Flow	Mechanical -Flow	6100
EMSD.HVAC.Rated Power Input	Rated Power Input (kW)	Mechanical Equipment,Pipe Accessories	Type	HVAC	Power	Mechanical -Flow	30
EMSD.HVAC.1st Filter	First filter	Mechanical Equipment	Type	Common	Text	Data	Washable Panel Filter
EMSD.HVAC.2nd Filter	Second filter	Mechanical Equipment	Type	Common	Text	Data	NONE

EMSD.HVAC.UV Sterilizing Light	Contain UV Sterilizing Lightor not	Mechanical Equipment	Type	Common	Text	Data	Y
EMSD.HVAC.VSD	Contain VSD or not	Mechanical Equipment	Type	Common	Text	Data	Y
EMSD.HVAC.Fuel Type	Fuel Type	Mechanical Equipment	Type	Common	Text	Data	Air Flow / Electric / Gas
EMSD.HVAC.Motor	Motor	Mechanical Equipment	Type	Common	Text	Data	AC motor / DC motor
EMSD.HVAC.Motor Power	Motor Power	Mechanical Equipment	Type	HVAC	Power	Mechanical	11
EMSD.HVAC.Head	Head (m)	Mechanical Equipment	Type	Common	Text	Data	25
EMSD.HVAC.Quantity	Total Quantity	Mechanical Equipment,Duct Accessories	Type	Common	Text	Data	5
EMSD.HVAC.Refrigerant	Type of Refrigerant	Mechanical Equipment	Type	Common	Text	Data	R-410A
EMSD.HVAC.Compressor	Compressor	Mechanical Equipment	Type	Common	Text	Data	Centrifugal / Oil-free centrifugal
EMSD.HVAC.Storage Function	Storage Function	Mechanical Equipment	Type	Common	Text	Data	Body / Blood / Food /
EMSD.HVAC.Temperature Range	Temperature Range	Mechanical Equipment	Type	Common	Text	Data	20-40
EMSD.HVAC.Heating Capacity	Heating Capacity (kW)	Mechanical Equipment	Type	HVAC	Heating Load	Energy Analysis	40
EMSD.HVAC.Fan Motor	Fan Motor (kW)	Mechanical Equipment	Type	HVAC	Power	Mechanical	50
EMSD.HVAC.Water Flow	Water Flow (L/s)	Mechanical Equipment, Pipe Accessories	Type	Piping	Flow	Mechanical -Flow	30
EMSD.HVAC.Configuration	Configuration	Mechanical Equipment	Type	Common	Text	Data	Counterflow / Crossflow
EMSD.HVAC.Capacity	Capacity (kW)	Mechanical Equipment	Type	HVAC	Cooling Load	Energy Analysis	30

4.2.5. Boiler System

All Boiler System equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to Boiler System equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.Boiler.Location (Address)	Location (Address) on Use Permit	Mechanical Equipment	Instance	Common	Text	Data	32 Ngan Shing Street Shatin
EMSD.Boiler.Location ID	Location ID on Use Permit	Mechanical Equipment	Instance	Common	Text	Data	0113619-01
EMSD.Boiler.Boiler No.	Boiler No.	Mechanical Equipment	Instance	Common	Text	Data	BL01
EMSD.Boiler.Year of Installation	Year of Installation	Mechanical Equipment	Instance	Common	Text	Data	2001
EMSD.Boiler.Fuel	Type of fuel used	Mechanical Equipment	Type	Common	Text	Data	Town gas
EMSD.Boiler.Output Capacity	Output Capacity (kW) of the boiler	Mechanical Equipment	Type	Electrical	Power	Electrical -Loads	3000
EMSD.Boiler.Output Capacity	Output Capacity (kg/hr.) of the boiler	Mechanical Equipment	Type	Electrical	Power	Electrical -Loads	900
EMSD.Boiler.Output Steam Pressure	Output Steam Pressure (kPa) of boiler	Mechanical Equipment	Type	HVAC	Pressure	Mechanical -Flow	200
EMSD.Boiler.Calorifier No.	Calorifier No.	Mechanical Equipment	Instance	Common	Text	Data	C1
EMSD.Boiler.Primary Heat Source	Primary Heat Source of Calorifier	Mechanical Equipment	Type	Common	Text	Data	Steam
EMSD.Boiler.Secondary Heat Source	Secondary Heat Source of Calorifier	Mechanical Equipment	Type	Common	Text	Data	Hot Water
EMSD.Boiler.Territory Heat Source	Territory Heat Source of Calorifier	Mechanical Equipment	Type	Common	Text	Data	Nil
EMSD.Boiler.Type	Type of Pump	Mechanical Equipment	Type	Common	Text	Data	Centrifugal / Screw
EMSD.Boiler.Pump No.	Pump no.	Mechanical Equipment	Instance	Common	Text	Data	
EMSD.Boiler.Heat Exchanger No.	Heat Exchanger No. of pump	Mechanical Equipment	Instance	Common	Text	Data	
EMSD.Boiler.Usage	Usage of pump	Mechanical Equipment	Type	Common	Text	Data	Circulation
EMSD.Boiler.Pressure	Pressure (kPa)	Mechanical Equipment	Type	HVAC	Pressure	Mechanical -Flow	350

EMSD.Boiler.Flow	Flow (l/s) of the pump	Mechanical Equipment	Type	Piping	Flow	Mechanical -Flow	200
EMSD.Boiler.Speed	Speed (rpm) of the pump	Mechanical Equipment	Type	Common	Text	Data	1350
EMSD.Boiler.Motor Brand	Brand of Motor	Mechanical Equipment	Type	Common	Text	Data	ABB / Simens
EMSD.Boiler.Motor Model	Model of Motor	Mechanical Equipment	Type	Common	Text	Data	
EMSD.Boiler.Motor Power	Motor Power (kW) of pump	Mechanical Equipment	Type	Electrical	Power	Electrical -Loads	55

4.2.6. Filtration Plant

All Filtration Plant equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to Filtration Plant equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.Filtration.Boiler No.	Boiler No.	Mechanical Equipment	Instance	Common	Text	Data	A123
EMSD.Filtration.Capacity	Capacity(kg/hr)	Mechanical Equipment	Type	Common	Text	Data	5
EMSD.Filtration.Working Pressure	Working Pressure(kPa)	Mechanical Equipment	Type	HVAC	Pressure	Mechanical -Flow	20
EMSD.Filtration.Rated Power	Rated Power(kW)	Mechanical Equipment	Type	Electrical	Power	Electrical -Loads	40
EMSD.Filtration.Phase	Phase	Mechanical Equipment	Type	Common	Text	Data	3
EMSD.Filtration.Input Voltage	Input Voltage	Mechanical Equipment	Type	Common	Text	Data	220/380/400(V)
EMSD.Filtration.Input Current	Input Current(Amp)	Mechanical Equipment	Type	Electrical	Current	Electrical Engineering	50
EMSD.Filtration.Pool	Pool	Mechanical Equipment	Type	Common	Text	Data	Main
EMSD.Filtration.DC Output Voltage	DC Output Voltage	Mechanical Equipment	Type	Common	Text	Data	below 50 / 50 or above(V)
EMSD.Filtration.DC Output Current	DC Output Current(Amp)	Mechanical Equipment	Type	Electrical	Current	Electrical Engineering	45

EMSD.Filtration.Tank	Tank	Mechanical Equipment	Type	Common	Text	Data	Sand / Carbon / Reaction
EMSD.Filtration.Tank Type	Tank Type	Mechanical Equipment	Type	Common	Text	Data	Horizontal / Vertical
EMSD.Filtration.Flow Rate	Flow Rate(m3/hr)	Mechanical Equipment	Type	Piping	Flow	Mechanical -Flow	30
EMSD.Filtration.Pump Head(m)	Pump Head(m)	Mechanical Equipment	Type	Common	Text	Data	10
EMSD.Filtration.Application	Application	Mechanical Equipment	Type	Common	Text	Data	Circulation
EMSD.Filtration.Speed (rpm)	Speed (rpm)	Mechanical Equipment	Type	Common	Text	Data	1400 to 1500
EMSD.Filtration.NEMA Insulation Class	NEMA Insulation Class of motor	Mechanical Equipment	Type	Common	Text	Data	B
EMSD.Filtration.Input Rating	Input Rating (Amp)	Mechanical Equipment	Type	Electrical	Current	Electrical Engineering	20
EMSD.Filtration.Ozone Production	Ozone Production (g/hr)	Mechanical Equipment	Type	Common	Text	Data	300
EMSD.Filtration.Gas Flow	Gas Flow (m3/hr)	Mechanical Equipment	Type	Common	Text	Data	10
EMSD.Filtration.Range	Range of the Controller Analyser and Sensor	Mechanical Equipment	Type	Common	Text	Data	11
EMSD.Filtration.Range Unit	Range Unit	Mechanical Equipment	Type	Common	Text	Data	PPM / mV / PH
EMSD.Filtration.Class	Class of the Misc. Swimming Pool Equipment	Mechanical Equipment	Type	Common	Text	Data	F
EMSD.Filtration.Frame	Frame of the Misc. Swimming Pool Equipment	Mechanical Equipment	Type	Common	Text	Data	F123456
EMSD.Filtration.Material - casing	Material - casing of Heat Exchanger	Mechanical Equipment	Type	Common	Text	Data	stainless steel
EMSD.Filtration.Material - plate	Material - plate of Heat Exchanger	Mechanical Equipment	Type	Common	Text	Data	titanium
EMSD.Filtration.Material - tube	Material - tube of Heat Exchanger	Mechanical Equipment	Type	Common	Text	Data	titanium
EMSD.Filtration.Design / Working Max Temp.	Design / Working Max Temp. (Deg C)	Mechanical Equipment	Type	HVAC	Temperature	Mechanical	50
EMSD.Filtration.Design / Working Pressure	Design / Working Pressure (kPa)	Mechanical Equipment	Type	HVAC	Pressure	Mechanical -Flow	20
EMSD.Filtration.Cell Model No.	Cell Model Number	Mechanical Equipment	Instance	Common	Text	Data	
EMSD.Filtration.Cell Manufacturer	Cell Manufacturer	Mechanical Equipment	Type	Common	Text	Data	De Nora / DINEC

EMSD.Filtration.Transformer Model No.	Transformer Model Number	Mechanical Equipment	Type	Common	Text	Data	
EMSD.Filtration. Transformer Manufacturer	Transformer Manufacturer	Mechanical Equipment	Type	Common	Text	Data	SanRex / Sanilec
EMSD.Filtration.Analyser Model No.	Analyzer Model Number	Mechanical Equipment	Instance	Common	Text	Data	
EMSD.Filtration.Analyser Manufacturer	Analyzer Manufacturer	Mechanical Equipment	Type	Common	Text	Data	LOGOTRODE / ALTEC
EMSD.Filtration.Sensor Model No.	Sensor Model Number	Mechanical Equipment	Instance	Common	Text	Data	
EMSD.Filtration.Sensor Manufacturer	Sensor Manufacturer	Mechanical Equipment	Type	Common	Text	Data	LOGOTRODE / Triogen
EMSD.Filtration.Pump Model No.	Analyzer Model Number	Mechanical Equipment	Instance	Common	Text	Data	
EMSD.Filtration.Pump Manufacturer	Analyzer Manufacturer	Mechanical Equipment	Type	Common	Text	Data	Pulsatron / Pulsafeeder
EMSD.Filtration.Motor Model No.	Transformer Model Number	Mechanical Equipment	Instance	Common	Text	Data	
EMSD.Filtration.Motor Manufacturer	Transformer Manufacturer	Mechanical Equipment	Type	Common	Text	Data	Pulsatron / Pulsafeeder
EMSD.Filtration.Pipe Size	Pipe Size	Pipes	Instance	Common	Text	Data	Below 100, 100-200,..
EMSD.Filtration.Pipe Material	Pipe Material	Pipes	Instance	Common	Text	Data	Iron, pvc,….
EMSD.Filtration.Pipe Pool	Pool of the Pipe	Pipes	Instance	Common	Text	Data	Mian, Secondary,….

4.2.7. FS Installation

All FS equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to FS equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.FS.Motor Power	Motor Power of pump	Mechanical Equipment	Type	Electrical	Power	Electrical -Loads	400
EMSD.FS.Head	Head (m)	Mechanical Equipment	Type	Common	Text	Data	20
EMSD.FS.Water Flow	Water Flow (L/s)	Mechanical Equipment	Type	Piping	Flow	Mechanical -Flow	30
EMSD.FS.Quantity	Total Quantity of the equipment	Fire Alarm Devices,Mechanical Equipment	Type	Common	Text	Data	5
EMSD.FS.Total capacity	Total capacity (kg)	Fire Alarm Devices	Type	Common	Text	Data	100

4.2.8. Uninterrupted Power Supply

All Uninterrupted Power Supply equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to Uninterrupted Power Supply equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.UPS.Redundancy	(Y/N)	Electrical Equipment	Type	Common	Yes/No	Data	Y
EMSD.UPS.Client	Client	Electrical Equipment	Type	Common	Text	Data	EMSD
EMSD.UPS.Backup Time	Backup Time under Full Load (min)	Electrical Equipment	Type	Common	Text	Data	30
EMSD.UPS.Rating (kVA)	Rating (kVA)	Electrical Equipment	Type	Electrical	Apparent Power	Electrical -Loads	400
EMSD.UPS.Phase	(Three-Phase/ Single-Phase)	Electrical Equipment	Type	Common	Text	Data	Three-Phase

EMSD.UPS.Gen-set Backup	(Y/N)	Electrical Equipment	Type	Common	Yes/No	Data	Y
EMSD.UPS.Voltage of a Battery Block	Voltage of a Battery Block (V)	Electrical Equipment	Type	Electrical	Electrical Potential	Electrical Engineering	2
EMSD.UPS.Capacity of Battery Blk	Capacity of Battery Blk (Ah)	Electrical Equipment	Type	Common	Text	Data	400
EMSD.UPS.Battery Type	Battery Type	Electrical Equipment	Type	Common	Text	Data	VRLA
EMSD.UPS.No. of battery bank(s)	No. of battery bank(s)	Electrical Equipment	Type	Common	Text	Data	2
EMSD.UPS.No. of battery blk in a bank	No. of battery blk in a bank	Electrical Equipment	Type	Common	Text	Data	204
EMSD.UPS.Battery Monitoring System	(Y/N)	Electrical Equipment	Type	Common	Yes/No	Data	N
EMSD.UPS.No. of UPS input	No. of UPS input	Electrical Equipment	Type	Common	Text	Data	2
EMSD.UPS.No. of output	No. of output	Electrical Equipment	Type	Common	Text	Data	1
EMSD.UPS.Remote Monitoring Panel	(Y/N)	Electrical Equipment	Type	Common	Yes/No	Data	N

4.2.9. Burglar Alarm

All Burglar Alarm equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to Burglar Alarm equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.Burglar.Make	Made by which company	Electrical Fixtures,Fire Alarm Devices	Type	Common	Text	Data	
EMSD.Burglar.Vender	Vender of the equipment	Electrical Fixtures,Fire Alarm Devices	Type	Common	Text	Data	
EMSD.Burglar.Quantity	Total Quantity of the equipment	Electrical Fixtures,Fire Alarm Devices	Type	Common	Text	Data	5

4.2.10. Radar and Navigation System

All Radar and Navigation System equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to Radar and Navigation System equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.Radar.Make	Made by which company	Electrical Fixtures	Type	Common	Text	Data	Raymarine/ Raythoen
EMSD.Radar.Quantity	Total Quantity of the equipment	Electrical Fixtures	Type	Common	Text	Data	5
EMSD.Radar.Frequency Band	Frequency Band	Electrical Fixtures	Type	Common	Text	Data	X-band / S-band
EMSD.Radar.Rotation Speed	Rotation Speed	Electrical Fixtures	Type	Common	Text	Data	24 RPM
EMSD.Radar.Peak Radiated Power	Peak Radiated Power	Electrical Fixtures	Type	Electrical	Power	Electrical -Loads	25 KW
EMSD.Radar.Oscillator	Oscillator	Electrical Fixtures	Type	Common	Text	Data	Magnetron / Solid state
EMSD.Radar.Screen Size	Screen Size of the unit	Electrical Fixtures	Type	Common	Text	Data	19 inch
EMSD.Radar.Minimum Detection Range	Minimum Detection Range	Electrical Fixtures	Type	Common	Text	Data	35 m
EMSD.Radar.Image Sensor	Image Sensor	Electrical Fixtures	Type	Common	Text	Data	Uncooled / Cooled
EMSD.Radar.Optical Zoom	Optical Zoom	Electrical Fixtures	Type	Common	Text	Data	20X

4.2.11. Microwave Link System

All Microwave Link System equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to Microwave Link System equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.Microwave.Make	Made by which company	Electrical Fixtures	Type	Common	Text	Data	
EMSD.Microwave. Quantity	Total Quantity of the equipment	Electrical Fixtures	Type	Common	Text	Data	5
EMSD.Microwave.Frequency Band	Frequency Band	Electrical Fixtures	Type	Common	Text	Data	8 GHz

4.2.12. Timing & Display System

All Timing & Display System equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to Timing & Display System equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.Timing.Make	Made by which company	Electrical Fixtures	Type	Common	Text	Data	
EMSD.Timing.Quantity	Total Quantity of the equipment	Electrical Fixtures	Type	Common	Text	Data	5
EMSD.Timing.Operating System	Operating System	Electrical Fixtures	Instance	Common	Text	Data	Windows/Unix / Linux
EMSD.Timing.Special Purpose Software	Special Purpose Software	Electrical Fixtures	Instance	Common	Text	Data	
EMSD.Timing.Remark	Any Remark	Electrical Fixtures	Type	Common	Text	Data	
EMSD.Timing.Synchronization Method	Synchronization Method	Electrical Fixtures	Type	Common	Text	Data	Network Time Protocol (NTP)
EMSD.Timing.Type	Type of the display unit	Electrical Fixtures	Type	Common	Text	Data	LCD / Plasma
EMSD.Timing.Size	Size of the display unit	Electrical Fixtures	Type	Common	Text	Data	50”
EMSD.Timing.Rating	Rating (kVA)	Electrical Fixtures	Type	Electrical	Apparent Power	Electrical -Loads	60

EMSD.Timing.Phase	Phase	Electrical Fixtures	Type	Common	Text	Data	Single / Three
EMSD.Timing.Backup Time in Minutes	Backup Time in Minutes	Electrical Fixtures	Type	Common	Text	Data	30
EMSD.Timing.No. of battery banks	No. of battery banks	Electrical Fixtures	Type	Common	Text	Data	2
EMSD.Timing.No. of battery cells in each bank	No. of battery cells in each bank	Electrical Fixtures	Type	Common	Text	Data	32
EMSD.Timing.Rating (V) of each battery	Rating (V) of each battery	Electrical Fixtures	Type	Electrical	Electrical Potential	Electrical Engineering	12

4.2.13. Audio Video System

All Audio Video Electronics Installation equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to Audio Video Electronics Installation equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.AV.Make	Made by which company	Electrical Fixtures	Type	Common	Text	Data	Gefen / JVC
EMSD.AV.Quantity	Total Quantity of the equipment	Electrical Fixtures	Type	Common	Text	Data	5
EMSD.AV.Type	Type of the Equipment	Electrical Fixtures	Type	Common	Text	Data	DVD / S-VHS
EMSD.AV.Storage Size	Storage Size	Electrical Fixtures	Type	Common	Text	Data	500 GB
EMSD.AV.PC & Monitor Model	PC & Monitor Model	Electrical Fixtures	Type	Common	Text	Data	PC: ProDesk Monitor: UD590
EMSD.AV.No. of Monitor	No. of Monitor	Electrical Fixtures	Instance	Common	Text	Data	2
EMSD.AV.Operating System	Operating System	Electrical Fixtures	Instance	Common	Text	Data	Window 10 Professional 64-bit
EMSD.AV.No. of Input	No. of Input	Electrical Fixtures	Instance	Common	Text	Data	1
EMSD.AV.No. of Output	No. of Output	Electrical Fixtures	Instance	Common	Text	Data	6
EMSD.AV.Transmission Range(m)	Transmission Range(m)	Electrical Fixtures	Type	Common	Text	Data	60
EMSD.AV.Configuration(mxn)	Configuration(mxn) of the display unit	Electrical Fixtures	Type	Common	Text	Data	2x2
EMSD.AV.Diagonal Size in inch	Diagonal Size in inch	Electrical Fixtures	Type	Common	Text	Data	46
EMSD.AV.Technology	Technology of the display unit	Electrical Fixtures	Type	Common	Text	Data	IPS / LCD
EMSD.AV.Resolution	Resolution of the display unit	Electrical Fixtures	Type	Common	Text	Data	Full HD (1920 x 1080)

EMSD.AV.Input Channel	Input Channel	Electrical Fixtures	Type	Common	Text	Data	2
EMSD.AV.Output Channel	Output Channel	Electrical Fixtures	Type	Common	Text	Data	2
EMSD.AV.Max Power	Max Power	Electrical Fixtures	Type	Electrical	Power	Electrical -Loads	240W
EMSD.AV.Line Voltage	Line Voltage	Electrical Fixtures	Type	Common	Text	Data	High / Low
EMSD.AV.No. of Band	No. of Band	Electrical Fixtures	Type	Common	Text	Data	31
EMSD.AV.Mounting Method	Mounting Method	Electrical Fixtures	Instance	Common	Text	Data	Ceiling / Free
EMSD.AV.Load Impedance	Load Impedance	Electrical Fixtures	Type	Common	Text	Data	8

4.2.14. Audio Electronics Installation

All Audio Electronics Installation equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to Audio Electronics Installation equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.Audio.Make	Made by which company	Electrical Fixtures	Type	Common	Text	Data	TOA / Crown
EMSD.Audio.Quantity	Total Quantity of the equipment	Electrical Fixtures	Type	Common	Text	Data	5
EMSD.Audio.Input Channel	Input Channel	Electrical Fixtures	Type	Common	Text	Data	2
EMSD.Audio.Output Channel	Output Channel	Electrical Fixtures	Type	Common	Text	Data	2
EMSD.Audio.Max Power	Max Power	Electrical Fixtures	Type	Electrical	Power	Electrical -Loads	240W
EMSD.Audio.Line Voltage	Line Voltage	Electrical Fixtures	Type	Common	Text	Data	High
EMSD.Audio.Power Supply	Power Supply(V)	Electrical Fixtures	Type	Electrical	Electrical Potential	Electrical Engineering	6V
EMSD.Audio.Supplier Voltage	Supplier Voltage	Electrical Fixtures	Type	Electrical	Electrical Potential	Electrical Engineering	6V
EMSD.Audio.No of Channel	No of Channel	Electrical Fixtures	Type	Common	Text	Data	16
EMSD.Audio.Recording type	Recording type	Electrical Fixtures	Type	Common	Text	Data	Digital/ Analog
EMSD.Audio.No. of Band	No. of Band	Electrical Fixtures	Type	Common	Text	Data	31
EMSD.Audio.Mounting Method	Mounting Method	Electrical Fixtures	Instance	Common	Text	Data	Ceiling / Free / Wall
EMSD.Audio.Load Impedance	Load Impedance	Electrical Fixtures	Type	Common	Text	Data	
EMSD.Audio.POE	POE	Electrical Fixtures	Type	Common	Text	Data	No / POE / POE+

EMSD.Audio.No. of Ports	No. of Ports	Electrical Fixtures	Type	Common	Text	Data	48
EMSD.Audio.Firmware	Firmware	Electrical Fixtures	Instance	Common	Text	Data	24 Port Data IP Services
EMSD.Audio.Tech Unit	Tech Unit	Electrical Fixtures	Type	Common	Text	Data	Yes / No
EMSD.Audio.Type	Type	Electrical Fixtures	Type	Common	Text	Data	Monitor / Analyser

4.2.15. Radio Electronics Installation

Radio Electronics Installation equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to Radio Electronics Installation equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.Radio.Make	Made by which company	Electrical Fixtures	Type	Common	Text	Data	Philips / Airbus
EMSD.Radio.Quantity	Total Quantity of the equipment	Electrical Fixtures	Type	Common	Text	Data	5
EMSD.Radio.Mounting	Mounting	Electrical Fixtures	Instance	Common	Text	Data	Wall mount / Rack mount
EMSD.Radio.Nominal Output Power	Nominal Output Power	Electrical Fixtures	Type	Electrical	Power	Electrical -Loads	25 W
EMSD.Radio.Frequency Band	Frequency Band	Electrical Fixtures	Type	Common	Text	Data	VHF / UHF
EMSD.Radio.System Nature	System Nature	Electrical Fixtures	Type	Common	Text	Data	Two-way radio / TETRA
EMSD.Radio.Gain	Gain	Electrical Fixtures	Type	Common	Text	Data	10 dBi
EMSD.Radio.Battery Back-up Time	Battery Back-up Time	Electrical Fixtures	Type	Common	Text	Data	4 hours
EMSD.Radio.PC & Monitor Make	PC & Monitor Make	Electrical Fixtures	Instance	Common	Text	Data	PC: HP Monitor: Samsung
EMSD.Radio.PC & Monitor Model	PC & Monitor Model	Electrical Fixtures	Instance	Common	Text	Data	PC: ProDesk Monitor: UD590
EMSD.Radio.Operating System	Operating System	Electrical Fixtures	Instance	Common	Text	Data	Windows XP
EMSD.Radio.Console Software	Console Software	Electrical Fixtures	Instance	Common	Text	Data	
EMSD.Radio.Recording Media	Recording Media	Electrical Fixtures	Instance	Common	Text	Data	Tape / Flash memory card
EMSD.Radio.Transmitter power	Transmitter power	Electrical Fixtures	Type	Electrical	Power	Electrical -Loads	1 W

4.2.16. Closed Circuit TV System

Closed Circuit TV equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to Closed Circuit TV equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.CCTV.Make	Made by which company	Electrical Fixtures	Type	Common	Text	Data	Panasonic / Samsung
EMSD.CCTV.Quantity	Total Quantity of the equipment	Electrical Fixtures	Type	Common	Text	Data	5
EMSD.CCTV.Camera Position	Camera Position	Electrical Fixtures	Instance	Common	Text	Data	Below 2m / 3m - 7 m
EMSD.CCTV.Camera Housing	Camera Housing	Electrical Fixtures	Instance	Common	Text	Data	Indoor / Outdoor
EMSD.CCTV.Type	Type	Electrical Fixtures	Type	Common	Text	Data	IP Based (Fixed) / Analogue (Fixed)
EMSD.CCTV.Resolution	Resolution	Electrical Fixtures	Type	Common	Text	Data	4K HD
EMSD.CCTV.Optional Features	Optional Features	Electrical Fixtures	Type	Common	Text	Data	IR Illumination / Motion Detection
EMSD.CCTV.Data Speed	Data Speed	Electrical Fixtures	Type	Common	Text	Data	100 Mbps
EMSD.CCTV.No. of Port	No. of Port	Electrical Fixtures	Type	Common	Text	Data	20
EMSD.CCTV. UPS Rating & Battery Retention Time	UPS Rating & Battery Retention Time	Electrical Fixtures	Type	Common	Text	Data	2KVA / 4 Hours
EMSD.CCTV.Storage Size in TB	Storage Size in TB	Electrical Fixtures	Type	Common	Text	Data	2
EMSD.CCTV.Storage Type	Storage Type	Electrical Fixtures	Type	Common	Text	Data	Hard Disk
EMSD.CCTV.PC & Monitor Make	CCTV.PC & Monitor Make	Electrical Fixtures	Instance	Common	Text	Data	PC: HP Monitor: Samsung
EMSD.CCTV.PC & Monitor Model	PC & Monitor Model	Electrical Fixtures	Instance	Common	Text	Data	PC: ProDesk Monitor: UD590
EMSD.CCTV.No. of Monitor	No. of Monitor	Electrical Fixtures	Instance	Common	Text	Data	5
EMSD.CCTV.Operating System	Operating System	Electrical Fixtures	Instance	Common	Text	Data	Window 10 Professional 64-bit
EMSD.CCTV. Configuration(mxn)	Configuration(mxn)	Electrical Fixtures	Instance	Common	Text	Data	2 x 2
EMSD.CCTV.Size of Display Unit	Size of Display Unit	Electrical Fixtures	Type	Common	Text	Data	46
EMSD.CCTV.Technology	Technology	Electrical Fixtures	Type	Common	Text	Data	IPS / OLED
EMSD.CCTV.Number of Input Port	Number of Input Port	Electrical Fixtures	Type	Common	Text	Data	8
EMSD.CCTV.Number of output Port	Number of output Port	Electrical Fixtures	Type	Common	Text	Data	8
EMSD.CCTV.Number of Channel	Number of Channel	Electrical Fixtures	Type	Common	Text	Data	4

4.2.17. Broadcast Reception

Broadcast Reception equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to Broadcast Reception equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.Broadcast.Quantity	Total Quantity of the equipment	Electrical Fixtures	Type	Common	Text	Data	5

4.2.18. Lighting

Lighting equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to Lighting equipment

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.Lighting.Indoor/ Outdoor	Indoor/ Outdoor of the lighting	Lighting Fixtures	Instance	Common	Text	Data	Indoor
EMSD.Lighting.Lamp Type	Lamp Type	Lighting Fixtures	Type	Common	Text	Data	FL T8
EMSD.Lighting.Lamp Description	Lamp Description	Lighting Fixtures	Type	Common	Text	Data	1X 2ft Tube
EMSD.Lighting.Make	Made by which company	Lighting Fixtures	Type	Common	Text	Data	PHILIPS
EMSD.Lighting.Light Fitting	Light Fitting	Lighting Fixtures	Type	Common	Text	Data	Recessed mounted
EMSD.Lighting.Luminaire Power	Luminaire Power	Lighting Fixtures	Type	Electrical	Power	Electrical -Loads	18.7W
EMSD.Lighting.Quantity	Total Quantity of the equipment	Lighting Fixtures	Type	Common	Text	Data	10
EMSD.Lighting.Installation Date	Installation Date of the lighting	Lighting Fixtures	Instance	Common	Text	Data	Nov-17
EMSD.Lighting.Distribution Board Identification	Distribution Board Identification	Lighting Fixtures	Type	Common	Text	Data	DB "A"
EMSD.Lighting.Circuit	Circuit	Lighting Fixtures	Instance	Common	Text	Data	10-Y

4.2.19. Electrical Distribution

Electrical Distribution equipment should have the attributes stated above and attributes specific to its system.

The following attributes are specific to Electrical Distribution equipment.

Parameters	Description	Revit Category	Type/Instance	Discipline	Type of parameter	Group	Examples
EMSD.Electrical.Make	Made by which company	Electrical Equipment, Electrical Fixtures, Ducts, Cable Trays	Type	Common	Text	Data	Merlin Gerin / General Cable
EMSD.Electrical.Upstream Equipment CCS' No.	Upstream Equipment CCS' No. of the equipment	Electrical Equipment, Electrical Fixtures, Ducts, Cable Trays	Instance	Common	Text	Data	new
EMSD.Electrical.Upstream Equipment No.	Upstream Equipment No. of the equipment	Electrical Equipment, Electrical Fixtures, Ducts, Cable Trays	Instance	Common	Text	Data	LVSB4-4C
EMSD.Electrical.Switchgear No.	Switchgear No.	Electrical Equipment, Electrical Fixtures	Instance	Common	Text	Data	DB-U-PGA-3-1
EMSD.Electrical.Rating (A)	Rating (A) of the equipment	Electrical Equipment, Electrical Fixtures, Ducts, Cable Trays	Type	Electrical	Current	Electrical Engineering	20
EMSD.Electrical.Nos. of Pole(s)	Nos. of Pole(s)	Electrical Equipment, Electrical Fixtures, Ducts, Cable Trays	Type	Electrical	Number of Poles	Electrical Engineering	1
EMSD.Electrical.Nos. of Phase	Nos. of Phase	Electrical Equipment, Ducts, Cable Trays	Type	Common	Text	Data	3-Phase+N
EMSD.Electrical.Material	Material	Ducts, Cable Trays	Instance	Common	Text	Data	Copper
EMSD.Electrical.Insulation Type	Insulation Type	Ducts, Cable Trays	Instance	Common	Text	Data	XLPE/SWA/LOSH Cu. Cable
EMSD.Electrical.Dimensions	Busbar --- [(width, mm) X (heigth, mm)] Cable --- Cross Sectional Area (mm2)	Ducts, Cable Trays	Instance	Common	Text	Data	95mm2
EMSD.Electrical.Outgoing Circuit	Outgoing Circuit	Electrical Equipment, Electrical Fixtures, Ducts, Cable Trays	Type	Common	Text	Data	Switchgear
EMSD.Electrical.Rating of Outgoing Circuit	Rating of Outgoing Circuit	Electrical Equipment, Electrical Fixtures, Ducts, Cable Trays	Type	Electrical	Current	Electrical Engineering	200

4.3. Asset Information Requirement

For each equipment listed in section 2.5, the required parameters consists of 2 parts:

1. Parameters applicable to all systems as listed in section 4.1
2. Parameters listed in **"Appendix B Asset Information Requirement"**.

The following lists some of the equipment as examples.

Example 1: HVAC equipment – Primary Air Handling Unit

Asset	Attributes Type	Attributes	Parameters Naming in Revit	Examples
PAU	Parameters applicable to all systems	Asset Code	EMSD.Common.Asset Code	KT-EMSDN-001-PAUR-HVAC-PAU-001
		Equipment No.	EMSD.Common.Equipment No.	19876000
		Equipment Type	EMSD.Common.Equipment Type	Primary Air Unit
		Functional Location	EMSD.Common.Functional Location	MKCFC-CWX-004
		Equipment Location	EMSD.Common.Equipment Location	G/F
		CCS Equipment ID	EMSD.Common.CCS Equipment ID	
		Technical ID No. Superior	EMSD.Common.Technical ID No. Superior	
		Equipment Description	EMSD.Common.Equipment Description	PAU-1
		Brand	EMSD.Common.Brand	
		Authorization Group	EMSD.Common.Authorization Group	TS04
		Documentation	EMSD.Common.Documentation	..... "Project Name"\ 30_O&M Documentation\HVAC System \PAU
		Weight	EMSD.Common.Weight	
		Inventory No.	EMSD.Common. Inventory No.	
		Start-up Date	EMSD.Common.Start-up Date	
		Technical ID No.	EMSD.Common.Technical ID No.	TEQ-150430-02
		Construction Type	EMSD.Common.Construction Type	
		Plant Section	EMSD.Common.Plant Section	
		Room/Floor	EMSD.Common.Room/Floor	
		Planner Group	EMSD.Common.Planner Group	T00
		Main Work Centre	EMSD.Common.Main Work Centre	T2EDA
		Catalog Profile	EMSD.Common.Catalog Profile	AC0000001
		Division	EMSD.Common.Division	4
		Partner ID	EMSD.Common.Partner ID	CSD
		Customer Warranty Start	EMSD.Common.Customer Warranty Start	01.01.2016
		Customer Warranty End	EMSD.Common.Customer Warranty End	
		Vendor Warranty Start	EMSD.Common.Vendor Warranty Start	
		Vendor Warranty End	EMSD.Common.Vendor Warranty End	01.01.2016
		Manufacturer	EMSD.Common.Manufacturer	ABC Company
		Manufacturer Country	EMSD.Common.Manufacturer Country	Hong Kong
		Model No.	EMSD.Common.Model No.	CW036-4
		Serial No.	EMSD.Common.Serial No.	1234567
		Acquisition Value	EMSD.Common.Acquisition Value	
		RFID Tag No.	EMSD.Common.RFID Tag No.	
		Asset Relationship	EMSD.Common.Asset Relationship	
		Grouped Equipment ID	EMSD.Common.Grouped Equipment ID	
		Currency	EMSD.Common.Currency	

	Parameters applicable to PAU only	Make	EMSD.HVAC.Make	Cold Magic
		Cooling Capacity (kW)	EMSD.HVAC.Cooling Capacity	59.06
		Air Flow (L/s)	EMSD.HVAC.Air Flow	6100
		Rated Power Input (kW)	EMSD.HVAC.Rated Power Input	3
		1st Filter	EMSD.HVAC.1st Filter	Washable Panel Filter
		2nd Filter	EMSD.HVAC.2nd Filter	NONE
		UV Sterilizing Light	EMSD.HVAC.UV Sterilizing Light	N
		VSD	EMSD.HVAC.VSD	Y

Example 2: FS equipment – FS Pump

Asset	Attributes Type	Attributes	Parameters Naming in Revit	Examples
FS Pump	Parameters applicable to all systems	Asset Code	EMSD.Common.Asset Code	KT-EMSDN-002-FSPR-FS-PMP-001
		Equipment No.	EMSD.Common.Equipment No.	19876001
		Equipment Type	EMSD.Common.Equipment Type	FS Pump
		Functional Location	EMSD.Common.Functional Location	TWGO-FS
		Equipment Location	EMSD.Common.Equipment Location	G/F
		CCS Equipment ID	EMSD.Common.CCS Equipment ID	19999999
		Technical ID No. Superior	EMSD.Common.Technical ID No. Superior	TECHID-999999
		Equipment Description	EMSD.Common.Equipment Description	Pump
		Brand	EMSD.Common.Brand	
		Authorization Group	EMSD.Common.Authorization Group	MN00
		Documentation	EMSD.Common.Documentation	..... "Project Name"\ 30_O&M Documentation\FS Installation\Pump
		Weight	EMSD.Common.Weight	
		Inventory No.	EMSD.Common. Inventory No.	
		Start-up Date	EMSD.Common.Start-up Date	01.01.1999
		Technical ID No.	EMSD.Common.Technical ID No.	TECHID-999998
		Construction Type	EMSD.Common.Construction Type	
		Plant Section	EMSD.Common.Plant Section	
		Room/Floor	EMSD.Common.Room/Floor	
		Planner Group	EMSD.Common.Planner Group	M00
		Main Work Centre	EMSD.Common.Main Work Centre	MN24FL0
		Catalog Profile	EMSD.Common.Catalog Profile	FS0000001
		Division	EMSD.Common.Division	4
		Partner ID	EMSD.Common.Partner ID	LCSD
		Customer Warranty Start	EMSD.Common.Customer Warranty Start	
		Customer Warranty End	EMSD.Common.Customer Warranty End	
		Vendor Warranty Start	EMSD.Common.Vendor Warranty Start	
		Vendor Warranty End	EMSD.Common.Vendor Warranty End	
		Manufacturer	EMSD.Common.Manufacturer	
		Manufacturer Country	EMSD.Common.Manufacturer Country	
		Model No.	EMSD.Common.Model No.	
		Serial No.	EMSD.Common.Serial No.	
		Acquisition Value	EMSD.Common.Acquisition Value	
		RFID Tag No.	EMSD.Common.RFID Tag No.	
		Asset Relationship	EMSD.Common.Asset Relationship	

		Grouped Equipment ID	EMSD.Common.Grouped Equipment ID	
		Currency	EMSD.Common.Currency	
	Parameters applicable to FS Pump only	Make	EMSD.FS.Make	KSB
		Motor Power (kW)	EMSD.FS.Motor Power	999.99
		Head (m)	EMSD.FS.Head	9.9
		Water Flow (L/s)	EMSD.FS.Water Flow	999.99
		Quantity	EMSD.FS.Quantity	9

4.4. COBie

This section describes the concept and the application of COBie.

4.4.1. Introduction of COBie

COBie is an acronym for "Construction Operations Building Information exchange".

COBie is an information exchange specification for the life-cycle capture and delivery of information needed by facility managers. It defines the way this information is structured and formats that can be used. COBie is a format of building data for the publication of a subset of building model information and is commonly in the format of excel spreadsheet for delivering construction handover between lifecycles.

4.4.2. EMSD COBie

COBie exchange format Excel spreadsheets are used to integrate Autodesk Revit project file and EMSD's Facility Management System. The COBie Excel file will contain COBie parameters and EMSD parameters specified above. The COBie parameters requirement is specified below.

The consultants or contractors should follow this document and submit the required COBie attribute spreadsheet.

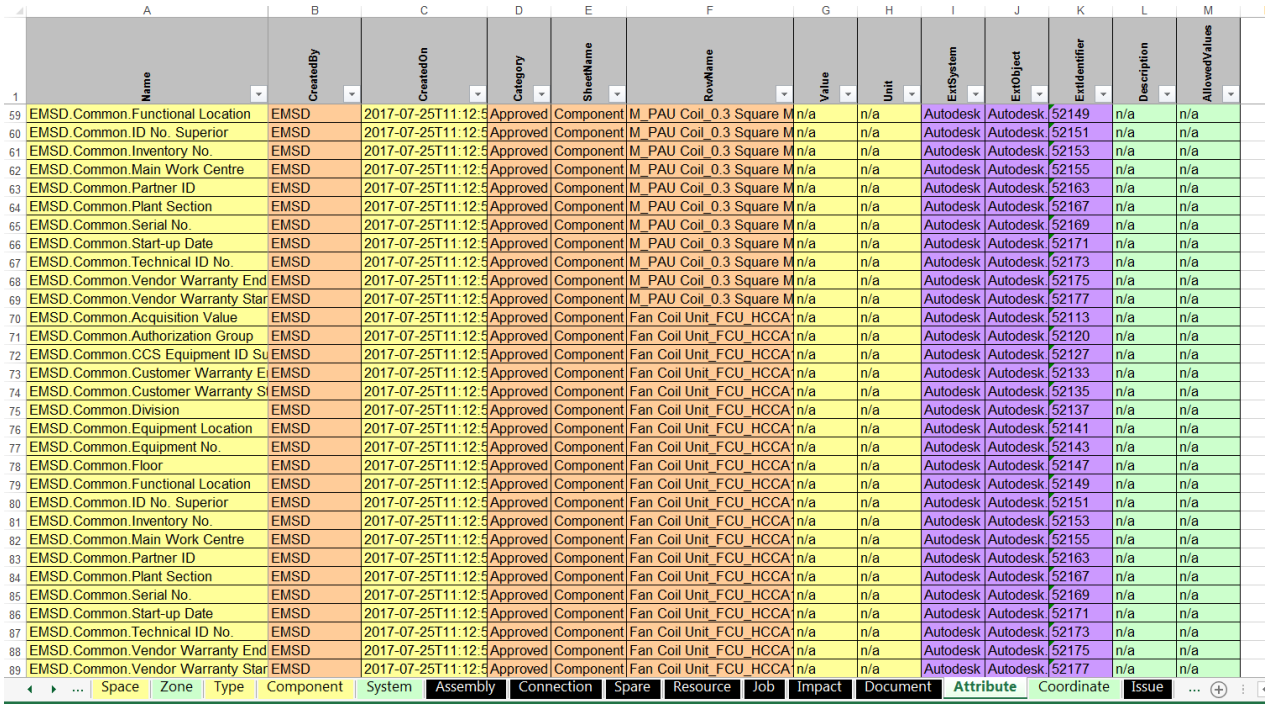
COBie Parameters	Sheet	EMSD	Description	Remarks
COBie.Facility.Name	Facility	Yes		
COBie.Facility.Category	Facility	No		
COBie.Facility.ProjectName	Facility	Yes		
COBie.Facility.SiteName	Facility	Yes		
COBie.Facility.LinearUnits	Facility	Yes	Automatic by Revit	Project Units
COBie.Facility.AreaUnits	Facility	Yes	Automatic by Revit	Project Units
COBie.Facility.VolumeUnits	Facility	Yes	Automatic by Revit	
COBie.Facility.CurrencyUnit	Facility	Yes		
COBie.Facility.AreaMeasurement	Facility	No		
COBie.Facility.Description	Facility	No		
COBie.Facility.ProjectDescription	Facility	Yes		
COBie.Facility.SiteDescription	Facility	No		
COBie.Facility.Phase	Facility	No		
COBie.Floor.Name	Floor	Yes	Automatic by Revit	
COBie.Floor.Category	Floor	No		
COBie.Floor.Description	Floor	No		
COBie.Floor.Elevation	Floor	Yes	Automatic by Revit	

COBie.Floor.Height	Floor	Yes		
COBie.Space.Name	Space	Yes		
COBie.Space.Category	Space	No		
COBie.Space.FloorName	Space	No		
COBie.Space.Description	Space	No		
COBie.Space.RoomTag	Space	No		
COBie.Space.UsableHeight	Space	No		
COBie.Space.GrossArea	Space	Yes		
COBie.Space.NetArea	Space	Yes		
COBie.Type.Name	Type	Yes	Automatic by Revit	
COBie.Type.Category	Type	Yes	Automatic by Revit (OmniClass Number): OmniClass Title	2010 version
COBie.Type.Description	Type	Yes		
COBie.Type.AssetType	Type	No		
COBie.Type.Manufacturer	Type	Yes	The value should be same as "EMSD.Common.Manufacturer"	
COBie.Type.ModelNumber	Type	Yes	The value should be same as "EMSD.Common.Model No."	
COBie.Type.WarrantyGuarantorParts	Type	No		
COBie.Type.WarrantyDurationParts	Type	No		
COBie.Type.WarrantyGuarantorLabor	Type	No		
COBie.Type.WarrantyDurationLabor	Type	No		
COBie.Type.WarrantyDurationUnit	Type	No		
COBie.Type.ReplacementCost	Type	No		
COBie.Type.ExpectedLife	Type	No		
COBie.Type.DurationUnit	Type	No		
COBie.Type.WarrantyDescription	Type	No		
COBie.Type.NominalLength	Type	Yes		
COBie.Type.NominalWidth	Type	Yes		
COBie.Type.NominalHeigh	Type	Yes		
COBie.Type.ModelReference	Type	No		
COBie.Type.Shape	Type	No		
COBie.Type.Size	Type	No		
COBie.Type.Color	Type	No		
COBie.Type.Finish	Type	No		
COBie.Type.Grade	Type	No		
COBie.Type.Material	Type	No		
COBie.Type.Constituents	Type	No		
COBie.Type.Features	Type	No		
COBie.Type.AccessibilityPerformance	Type	No		
COBie.Type.CodePerformance	Type	No		
COBie.Type.SustainabilityPerformanc	Type	No		
COBie.Type.Area	Type	No		
COBie.Type.Length	Type	No		
COBie.Component.Name	Component	Yes	Automatic by Revit	
COBie.Component.TypeName	Component	Yes		
COBie.Component.Space	Component	Yes		
COBie.Component.Description	Component	Yes	Description in words	
COBie.Component.SerialNumber	Component	Yes	The value should be same as "EMSD.Common.Serial No.	
COBie.Component.InstallationDate	Component	Yes		
COBie.Component.WarrantyStartDate	Component	Yes		

COBie.Component.TagNumber	Component	No		
COBie.Component.BarCode	Component	No		
COBie.Component.AssetIdentifier	Component	Yes	The value should be same as "EMSD.Common.Asset Code"	
COBie.Component.Area	Component	No		
COBie.Component.Length	Component	Yes		
COBie.System.Name	System	No		
COBie.System.Category	System	No		
COBie.System.ComponentNames	System	No		
COBie.System.Description	System	No		

4.4.3. COBie for EMSD MEP attributes

Apart from the above COBie information. All EMSD attributes stated in section 4.1 should be incorporated into the COBie attribute spreadsheet. The COBie Spreadsheet exported from Revit should involve all those EMSD attributes. Detailed procedures refer to Appendix B.



	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Name	CreatedBy	CreatedOn	Category	SheetName	RowName	Value	Unit	ExtSystem	ExtObject	ExtIdentifier	Description	AllowedValues
59	EMSD.Common.Functional Location	EMSD	2017-07-25T11:12:5	Approved	Component	M_PAU Coil_0.3 Square M	n/a	n/a	Autodesk	Autodesk	52149	n/a	n/a
60	EMSD.Common.ID No. Superior	EMSD	2017-07-25T11:12:5	Approved	Component	M_PAU Coil_0.3 Square M	n/a	n/a	Autodesk	Autodesk	52151	n/a	n/a
61	EMSD.Common.Inventory No.	EMSD	2017-07-25T11:12:5	Approved	Component	M_PAU Coil_0.3 Square M	n/a	n/a	Autodesk	Autodesk	52153	n/a	n/a
62	EMSD.Common.Main Work Centre	EMSD	2017-07-25T11:12:5	Approved	Component	M_PAU Coil_0.3 Square M	n/a	n/a	Autodesk	Autodesk	52155	n/a	n/a
63	EMSD.Common.Partner ID	EMSD	2017-07-25T11:12:5	Approved	Component	M_PAU Coil_0.3 Square M	n/a	n/a	Autodesk	Autodesk	52163	n/a	n/a
64	EMSD.Common.Plant Section	EMSD	2017-07-25T11:12:5	Approved	Component	M_PAU Coil_0.3 Square M	n/a	n/a	Autodesk	Autodesk	52167	n/a	n/a
65	EMSD.Common.Serial No.	EMSD	2017-07-25T11:12:5	Approved	Component	M_PAU Coil_0.3 Square M	n/a	n/a	Autodesk	Autodesk	52169	n/a	n/a
66	EMSD.Common.Start-up Date	EMSD	2017-07-25T11:12:5	Approved	Component	M_PAU Coil_0.3 Square M	n/a	n/a	Autodesk	Autodesk	52171	n/a	n/a
67	EMSD.Common.Technical ID No.	EMSD	2017-07-25T11:12:5	Approved	Component	M_PAU Coil_0.3 Square M	n/a	n/a	Autodesk	Autodesk	52173	n/a	n/a
68	EMSD.Common.Vendor Warranty End	EMSD	2017-07-25T11:12:5	Approved	Component	M_PAU Coil_0.3 Square M	n/a	n/a	Autodesk	Autodesk	52175	n/a	n/a
69	EMSD.Common.Vendor Warranty Star	EMSD	2017-07-25T11:12:5	Approved	Component	M_PAU Coil_0.3 Square M	n/a	n/a	Autodesk	Autodesk	52177	n/a	n/a
70	EMSD.Common.Acquisition Value	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52113	n/a	n/a
71	EMSD.Common.Authorization Group	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52120	n/a	n/a
72	EMSD.Common.CCS Equipment ID Su	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52127	n/a	n/a
73	EMSD.Common.Customer Warranty E	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52133	n/a	n/a
74	EMSD.Common.Customer Warranty St	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52135	n/a	n/a
75	EMSD.Common.Division	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52137	n/a	n/a
76	EMSD.Common.Equipment Location	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52141	n/a	n/a
77	EMSD.Common.Equipment No.	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52143	n/a	n/a
78	EMSD.Common.Floor	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52147	n/a	n/a
79	EMSD.Common.Functional Location	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52149	n/a	n/a
80	EMSD.Common.ID No. Superior	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52151	n/a	n/a
81	EMSD.Common.Inventory No.	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52153	n/a	n/a
82	EMSD.Common.Main Work Centre	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52155	n/a	n/a
83	EMSD.Common.Partner ID	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52163	n/a	n/a
84	EMSD.Common.Plant Section	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52167	n/a	n/a
85	EMSD.Common.Serial No.	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52169	n/a	n/a
86	EMSD.Common.Start-up Date	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52171	n/a	n/a
87	EMSD.Common.Technical ID No.	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52173	n/a	n/a
88	EMSD.Common.Vendor Warranty End	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52175	n/a	n/a
89	EMSD.Common.Vendor Warranty Star	EMSD	2017-07-25T11:12:5	Approved	Component	Fan Coil Unit_FCU_HCCA	n/a	n/a	Autodesk	Autodesk	52177	n/a	n/a

... Space Zone Type Component System Assembly Connection Spare Resource Job Impact Document Attribute Coordinate Issue ...

4.4.4. COBie Revit Add-in

For the details of the COBie Revit add-in, please refer to the Appendix C.

Chapter 5

Interfacing/Intergrating BIM-AM System with other systems

5. Interfacing/Integrating BIM-AM System with other systems

5.1. Interfacing with Building Management System (BMS) / Central Control and Monitoring System (CCMS) / Real Time Location System (RTLS) / Internet-of-Things (IoT) devices / Long Range Radio (LoRA) network

Where real time system is required to be monitored / controlled directly from BIM-AM System, web services (via RESTful or SOAP) API for data exchanged in XML/JSON format should be developed at both sides of the real time systems and the BIM-AM System.

Where simple monitoring /control of real time system without storing historical data in the BIM-AM System is preferred, interfacing via a web link of the real time system is recommended, provided that the web application of the real time system is developed and the web link is accessible via iOS and/ Android browsers.

5.2 Integrating Mobile BIM-AM System with RFID Reader

5.2.1 RFID Readers

Only selected models of handheld UHF RFID readers with iOS and/ Android APIs available would be supported by the mobile BIM-AM System. Contractors should liaise with EMSD to enquire the exact models of RFID readers supported and propose the suitable RFID readers of different read ranges.

5.2.2 Passive RFID Tags

The RFID readers as specified in Section 5.2.1 can read the passive UHF RFID tags compatible with EPC Class 1 Gen2. The Contractor shall be responsible for securely affixing the RFID tags onto major equipment to be identified by the EMSD.

Generally, each equipment as stipulated under Section 2.3.3 should be mounted with a RFID tag. For assets of same equipment type and large number of quantity (e.g. sprinkler heads, lighting panels, cameras, loudspeakers, antennae), the mounting of RFID tags should be based on their spatial proximity (e.g. zone, area, floor, level, etc.) such that there is at least one asset of that particular type mounted with a RFID tag. Generally, the distance between adjacent assets of same equipment type with RFID tags adhered should not exceed 4 meters, and the distance between RFID readers and tags should be within 4 meters during operation.

The contractor should note that the scanning performance of RFID tags depends on a number of factors, e.g. metal blockage/absorption/reflection, orientation of tag, mounting surface (e.g. metal/non-metal surface), distance between RFID reader and tags, types of RFID tag (metal tag or paper tag), size of RFID tag antenna, other environmental factors, etc.

The naming convention of RFID tag numbers and the mounting methodology should be proposed by the contractor for approval by the EMSD. Contractor could make reference with the following naming convention below for RFID tag numbers assignment.

Building Code	Number
<= 5 characters	10 characters

e.g. EMSDN	0000000001 0000000002 0000000003 … … 9999999999

5.3 Interfacing with CCTV system/camera

The interface between BIM-AM System and CCTV system / camera should be achieved by a web link of the video recorder for CCTV system / individual URL of camera, provided that the web link is accessible via iOS and/ Android browsers.

Appendices

Appendix A - Building Code

List of buildings in Hong Kong and their corresponding building code.

Appendix B – Asset Information Requirement

The Asset Information Requirement (list of all equipment information required for EMSD maintenance services) of the 18 E&M systems.

Appendix C – COBie Extension for Revit

A user guide for the Revit-Plug-in “COBie Extension for Revit”