Exploration & Production

GENERAL SPECIFICATION

HVAC

GS EP HVA 802

Documents to be supplied for Basic Engineering and Detailed Engineering

05	01/2012	Addition of documents to be supplied
04	01/2011	General updating
03	10/2008	Addition of documents
02	10/2006	Updating
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Rev.	Date	Notes

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1. Scope

The purpose of this document is to define the content of *HVAC* Basic Engineering and Detail Engineering studies.

The words and expressions in CAPITAL characters and *italic* are defined inside the general specification GS EP HVA 801.

When other words require a definition only to be used in the present document, then the definition is given in a dedicated paragraph of the present document and the defined word, when used, is marked in small and *italic* letters.

It is reminded that only Basic Engineering and Detailed Engineering studies provided by Companies listed within Company *HVAC VENDORS* list will be accepted. It is highlighted that main *CONTRACTOR* are not agreed to provide these studies excepted when listed within *HVAC VENDORS* list.

2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Equipment and installations shall be in accordance with (in order of precedence):

1. The country local regulations where equipment and/or installations shall be operated
2. Total General Specifications as listed in GS EP HVA 000
3. The International Standards
4. The French Regulation (when Country local regulation does not exist).

International System of Units (SI) shall be used.

Notes:

- In case of discrepancy between documents the more stringent requirements shall apply.
- The *HVAC VENDOR* or *CONTRACTOR* may propose proven improvements to the reference documents but shall obtain written approval of the *COMPANY* prior to implementation.
- An International Standard is a good "engineering practice" which shall be recognised and taken into consideration by *VENDOR*, *SUPPLIER*, *MANUFACTURER* and/or *CONTRACTOR*. If required, the translation of the standards shall be included into *HVAC* scope.
- The latest revision of Standards, codes, regulations and the published errata if any shall be used and applied by *VENDOR*, *SUPPLIER*, *MANUFACTURER* and *CONTRACTOR*.

Some documents listed hereafter are issued from the French Government and are applicable to the basic engineering, detailed engineering and construction. *ENGINEERING*, *CONTRACTOR* are in charge to translate or to entrust the translation to specialist.

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Standards

Reference	Title
NF EN ISO/CEI 17025	General requirements for the competence of testing and calibration laboratories

Professional Documents

Reference	Title
Not applicable	

Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
Not applicable	

Other documents

Reference	Title
Not applicable	

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Total General Specifications

Reference	Title
GS EP COR 350	External protection of offshore and coastal structures and equipment by painting
GS EP COR 351	External protection of structures and equipment by painting. Floating structures
GS EP EXP 101	Precommissioning and commissioning specification
GS EP EXP 103	Precommissioning and commissioning technical preparation
GS EP EXP 105	Precommissioning execution
GS EP EXP 107	Commissioning execution
GS EP HVA 000	List of HVAC specifications
GS EP HVA 100	HVAC Basis of design
GS EP HVA 461	Ductwork numbering rules
GS EP HVA 462	HVAC equipment numbering rules
GS EP HVA 801	Terminology, definitions, abbreviations
GS EP PJC 702	Requirements for Electronic Documents at Project Execution and Field Operation phases

3. Documents list

3.1 Derogations

HVAC studies, documents, equipment and construction have to be fully compliant with projects documents (including General Specifications). In case of non compliance with project documents, a derogation request has to be submitted to Company *HVAC SPECIALIST*. In case of derogation request is rejected by Company *HVAC SPECIALIST*, *HVAC* studies, documents, equipment and construction shall be compliant with the projects documents. In case of derogation about General Specification, the derogation shall be submitted by project to Company Technology Department, according to Company rules.

For each document to be provided during Basic Engineering and /or Detailed Engineering, a dedicated section regarding derogation(s) shall be added at end of document (mandatory). In case this section is not included within a submitted document, this document shall be rejected by Company.

This section shall include the following sub-sections:

- Approved derogation(s):

  The derogation(s) already approved by Company *HVAC SPECIALIST* shall be listed. The reference to each derogation and, the general description of each derogation shall be indicated for each accepted derogation.

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- Derogation(s) submitted for approval:

  In case derogation is included with the document, without being approved by Company *HVAC SPECIALIST* (Head of discipline in case of derogation to a General Specification), it shall be listed in this section. The document shall be commented after the derogation has been submitted to Company *HVAC SPECIALIST.* It means that the document will be reviewed by Company under condition that derogation(s) has (have) been submitted prior to the document to be reviewed.

3.2 List of documents to be provided

The documents to be provided during Basic Engineering and Detailed Engineering are listed in the following table. The delivery of each of following document is mandatory. However, some documents could not be required due to the *HVAC* technical design of the project because of subject about they are speaking do not concern the project. Only in that case, they do not have to be provided.

The following documents have to be provided by *HVAC CONTRACTOR* during Basic and Detailed Engineering phases. One part of these documents has only to be provided during one of these two phases (refer to section "documents description").

Notes:

- The definition of the "Acceptance Class" is defined with GS EP PJC 702.
- "Only for D.E." means that document has to be provided only during Detailed Engineering phase.

	Document title	Acceptance Class	Remark
HVA001	*HVAC* Master Document Register	1	
HVA002	*HVAC* design philosophy	1	
HVA003	Lists of heat gains from equipment	1	
HVA004	*HVAC* basis of design	1	
HVA005	U-value calculations	1	Only for D.E.
HVA006	Condensation risk analysis	1	Only for D.E.
HVA007	Heat gains and heat losses calculations	1	
HVA008	Leakage air flow rates calculations	1	
HVA009	Air flow rates calculations	1	
HVA010	*AHU*s and Fan coils units capacities calculations	1	
HVA011	Duct cooling coil capacities calculations	1	
HVA012	Refrigerating capacity calculations	1	
HVA013	Duct heaters capacities calculations	1	
HVA014	*HVAC* block diagrams	1	
HVA015	*HVAC* Ducting & Instrumentation Diagrams (*D&ID*), including symbols and typical	1	

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	Document title	Acceptance Class	Remark
HVA016	*HVAC* Piping & Instrumentation Diagrams (*P&ID*) , including symbols and typical	1	
HVA017	*HVAC* sub-systems split	2	
HVA018	Single line diagrams for *HVAC* ducting	1	
HVA019	*HVAC* duct calculation note	1	
HVA020	*HVAC* duct to scale – Synthesis view	1	Only for D.E.
HVA021	Single lines diagrams for *HVAC* piping	1	Only for D.E.
HVA022	*HVAC* piping isometric views	2	Only for D.E.
HVA023	*HVAC* piping calculation note	1	Only for D.E.
HVA024	*HVAC* equipment tagging list	2	
HVA025	*HVAC* instrument tagging list	2	
HVA026	*HVAC* equipment and instruments name plates	1	
HVA027	*HVAC* ducting construction standards	1	Only for D.E.
HVA028	*HVAC* ducting workshop drawings	1	Only for D.E.
HVA029	System effects calculation notes	1	Only for D.E.
HVA030	*OUTDOOR* air (*ODA*) ducting design	1	
HVA031	Battery room(s) *EXHAUST* air (*EHA*) flow rate(s) calculation notes	1	
HVA032	Buffer tank(s) calculations	1	
HVA033	Utilities requirements for *HVAC*	2	
HVA034	*HVAC* Automation philosophy	1	
HVA035	*HVAC* cause and effect diagrams	1	Only for D.E.
HVA036	Diffusers and grilles selection	1	Only for D.E.
HVA037	*HVAC* ducting supports - Detailed drawings	2	Only for D.E.
HVA038	*HVAC* shafts / risers sizing - (1 document per riser with detailed view for each level)	2	
HVA039	*HVAC OUTDOOR* air intakes location and layouts - (1 document per air intake with detailed view for each level)	2	
HVA040	Duct balancing calculation note (1 document per ductwork system)	1	Only for D.E.

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	Document title	Acceptance Class	Remark
HVA041	*HVAC* piping balancing calculation note - (1 document per pipework system)	1	Only for D.E.
HVA042	*HVAC* piping stress calculation notes - (1 document per pipework system)	2	Only for D.E.
HVA043	Determination of insulation thickness for ducting	1	Only for D.E.
HVA044	Determination of insulation thickness for piping	1	Only for D.E.
HVA045	Calculation of piping for pressure safety valve discharge	1	Only for D.E.
HVA046	Determination of *HVAC* instruments ranges	2	Only for D.E.
HVA047	Expansion system(s) calculation notes - (1 document per piping system)	2	Only for D.E.
HVA048	*HVAC* duct insulation - Detailed drawings (including protection against corrosion, adhesives, cladding,…)	1	Only for D.E.
HVA049	Calculation of heat gains and heat losses on ducting (insulated and non insulated) - (1 document for each ducting system)	2	Only for D.E.
HVA050	Calculation of heat gains and heat losses on piping (insulated and non insulated) - (1 document for each ducting system)	2	Only for D.E.
HVA051	*HVAC PLANT ROOM* layout (including escape ways, maintenance areas, dismantling areas, access platforms,…) - (1 document for each plant room)	1	
HVA052	*HVAC PLANT ROOM* elevations	1	
HVA053	Typical for *WALL* penetrations (*FIRE DAMPER* installation)	1	
HVA054	Typical for piping design (construction, insulation, supporting, etc.)	1	Only for D.E.
HVA055	*HVAC* interfaces and battery limits (sea water, air instrument, power supply,…) – Detailed drawings	2	
HVA056	Sound pressure level in rooms – Calculation notes (1 document per ducting system)	1	Only for D.E.
HVA057	Sound attenuators calculation notes - (1 document per ducting system)	1	Only for D.E.
HVA058	Sound attenuators detailed drawings	1	Only for D.E.
HVA059	Anti-vibration supports calculation and selection (1 document per equipment)	1	Only for D.E.

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	Document title	Acceptance Class	Remark
HVA060	Electrical architecture for *HVAC* equipment (single line diagram, including origins from electrical switchboards)	1	
HVA061	*HVAC* electrical cables calculation note	2	Only for D.E.
HVA062	*HVAC* electrical cables trays routing drawings - Layouts (1 document per level)	2	Only for D.E.
HVA063	*HVAC* electrical cables trays routing drawings - Elevations (1 document per level)	2	Only for D.E.
HVA064	Weight and center of gravity of *HVAC* equipment	2	Only weight during Basic Engineering
HVA065	Selection of *HVAC* three-ways valves	1	Only for D.E.
HVA066	Selection of *HVAC* balancing valves	1	Only for D.E.
HVA067	*HVAC* equipment technical specification (in addition to Company General Specifications, 1 document per *HVAC* item)	1	
HVA068	*HVAC* system Description Specification	1	
HVA069	HVAC Job Specification	1	
HVA070	Data sheets - *AHU* - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA071	Data sheets - Refrigerating equipment - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA072	Data sheets - Boiler - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA073	Data sheets -– *FAN UNIT* - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA074	Data sheets - Pump - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA075	Data sheets - *FIRE DAMPER*s - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA076	Data sheets - Three-ways valves - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA077	Data sheets - Balancing valves - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.

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	Document title	Acceptance Class	Remark
HVA078	Data sheets – Shut-off valves - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA079	Data sheets – Pressure control valves - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA080	Data sheets – Pressure safety valves - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA081	Data sheets - Sound attenuators - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA082	Data sheets - *SHUT-OFF DAMPER*s - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA083	Data sheets - Anti-blast dampers - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA084	Data sheets - Heat exchangers - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA085	Data sheets – Balancing damper, shut-off damper, pressure relief damper - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA086	Data sheets – *FAN UNIT* - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA087	Data sheets – Coalescer filter, sand filter - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA088	Data sheets – Air intake - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA089	Data sheets – Buffer tank - (Document to be prepared by Engineering and filled in by *MANUFACTURER*)	1	Only for D.E.
HVA090	*HVAC* block diagram for automation purpose	1	
HVA091	Wiring diagrams for *HVAC CC* (control Control cabinet Cabinet) - (1 diagram per control cabinet)	2	Only for D.E.
HVA092	Wiring diagrams for *HVAC MCC* - (1 diagram per MCC)	2	Only for D.E.
HVA093	Layout and inner view drawing for *HVAC CC* (control Control cabinet Cabinet) - (1 document for each cabinet)	2	Only for D.E.

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	Document title	Acceptance Class	Remark
HVA094	Electrical termination diagram for *HVAC CC* (control Control cabinet Cabinet) - (1 document for each cabinet)	2	Only for D.E.
HVA095	*HVAC* electrical power and control cable schedule	2	Only for D.E.
HVA096	*HVAC* control panel graphic design for operator	2	Only for D.E.
HVA097	*PLC* ladder diagram for *HVAC* automation	2	Only for D.E.
HVA098	*HVAC* Purchase Order Specification per type of main *HVAC* equipment / component - (1 document for each kind of component)	1	Only for D.E.
HVA099	*HVAC* Project Quality Plan	2	Only for D.E.
HVA100	*HVAC* Project HSE Plan	2	Only for D.E.
HVA101	*HVAC* Project Mobilisation Plan	2	Only for D.E.
HVA102	*HVAC* Project Procurement Plan	2	Only for D.E.
HVA103	Inspection and test plan for *AIR HANDLING UNIT*(s)	1	Only for D.E.
HVA104	Inspection and test plan for *FAN UNIT*(s)	1	Only for D.E.
HVA105	Inspection and test plan for *CHILLED WATER UNIT*(s)	1	Only for D.E.
HVA106	Inspection and test plan for boiler(s)	1	Only for D.E.
HVA107	Inspection and test plan for pump(s)	1	Only for D.E.
HVA108	Inspection and test plan for *FIRE DAMPER*(s)	1	Only for D.E.
HVA109	Inspection and test plan for *SHUT-OFF DAMPER*(s)	1	Only for D.E.
HVA110	Inspection and test plan for balancing damper(s)	1	Only for D.E.
HVA111	Inspection and test plan for three-ways valve(s)	1	Only for D.E.
HVA112	Inspection and test plan for buffer tank(s)	1	Only for D.E.
HVA113	Inspection and test plan for dosing tank(s)	1	Only for D.E.

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	Document title	Acceptance Class	Remark
HVA114	Inspection and test plan for expansion tank(s)	1	Only for D.E.
HVA115	Inspection and test plan for manual damper(s)	1	Only for D.E.
HVA116	Inspection and test plan for anti-blast damper(s)	1	Only for D.E.
HVA117	Inspection and test plan for sand filter(s)	1	Only for D.E.
HVA118	Inspection and test plan for sound attenuator(s)	1	Only for D.E.
HVA119	Inspection and test plan for field instrument(s)	1	Only for D.E.
HVA120	Inspection and test plan for *HVAC CC* (control Control cabinetCabinet(s))	1	Only for D.E.
HVA121	Inspection and test plan for *HVAC MCC* cabinet(s)	1	Only for D.E.
HVA122	Inspection and test plan for automatic and manual valve(s)	1	Only for D.E.
HVA123	Inspection and test plan for heat exchanger(s)	1	Only for D.E.
HVA124	Inspection and test plan for safety valve(s)	1	Only for D.E.
HVA125	*HVAC* pressure ratings of pressurised equipment	2	Only for D.E.
HVA126	*HVAC* equipment lifting and transportation procedure	2	Only for D.E.
HVA127	*HVAC* equipment preservation procedure - (1 document for each kind of equipment)	2	Only for D.E.
HVA128	Installation procedure for *HVAC* equipment - (1 document for each equipment)	1	Only for D.E.
HVA129	Factory compliance test procedure for *AIR HANDLING UNIT*(s)	1	Only for D.E.
HVA130	*FACTORY COMPLIANCE TESTS* PROCEDURE FOR *FAN UNIT*(S)	1	Only for D.E.
HVA131	*FACTORY COMPLIANCE TESTS* PROCEDURE FOR *FIRE DAMPER*(S)	1	Only for D.E.
HVA132	*FACTORY COMPLIANCE TESTS* PROCEDURE FOR *CHILLED WATER UNIT*(S)	1	Only for D.E.
HVA133	*FACTORY COMPLIANCE TESTS* PROCEDURE FOR *HVAC CC* (CONTROL CONTROL CABINETCABINET(S))	1	Only for D.E.

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	Document title	Acceptance Class	Remark
HVA134	*FACTORY COMPLIANCE TESTS* PROCEDURE FOR *MCC* CABINET(S)	1	Only for D.E.
HVA135	*HVAC* components removal procedure	1	Only for D.E.
HVA136	*FIRE DAMPER*(s) pneumatic diagram(s)	1	
HVA137	Input / Output list for *HVAC* System	2	Only for D.E.
HVA138	*MANUFACTURER* documentation for each *HVAC* component - (1 document for each component)	2	Only for D.E.
HVA139	General arrangement drawings for *AIR HANDLING UNIT*(s)	1	Only for D.E.
HVA140	General arrangement drawings for *FAN UNIT*(s)	1	Only for D.E.
HVA141	General arrangement drawings for *CHILLED WATER UNIT*(s)	1	Only for D.E.
HVA142	General arrangement drawings for boiler(s)	1	Only for D.E.
HVA143	General arrangement drawings for pump(s)	1	Only for D.E.
HVA144	General arrangement drawings for *FIRE DAMPER*(s)	1	Only for D.E.
HVA145	General arrangement drawings for *SHUT-OFF DAMPER*(s)	1	Only for D.E.
HVA146	General arrangement drawings for balancing damper(s)	1	Only for D.E.
HVA147	General arrangement drawings for anti-blast damper(s)	1	Only for D.E.
HVA148	General arrangement drawings for filter coalescer and weather louvre(s)	1	Only for D.E.
HVA149	General arrangement drawings for buffer tank(s) & dosing tank(s)	1	Only for D.E.
HVA150	General arrangement drawings for expansion tank(s)	1	Only for D.E.
HVA151	General arrangement drawings for three-ways valve(s)	1	Only for D.E.
HVA152	General arrangement drawings for heat exchanger(s)	1	Only for D.E.
HVA153	General arrangement drawings for safety valve(s)	1	Only for D.E.
HVA154	General arrangement drawings for automatic and manual valves	1	Only for D.E.

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	Document title	Acceptance Class	Remark
HVA155	General arrangement drawings for duct heater(s)	1	Only for D.E.
HVA156	General arrangement drawings for sand filter(s)	1	Only for D.E.
HVA157	General arrangement drawings for constant volume boxe(s)	1	Only for D.E.
HVA158	General arrangement drawings for sound attenuator(s)	1	Only for D.E.
HVA159	Spare parts list	2	Only for D.E.
HVA160	Lubricant Schedule	2	Only for D.E.
HVA161	Trouble shooting diagrams	2	Only for D.E.
HVA162	Operation manual	2	Only for D.E.
HVA163	Maintenance manual	2	Only for D.E.
HVA164	*HVAC* Pre-*COMMISSIONING* procedures	2	Only for D.E.
HVA165	*HVAC* Pre-*COMMISSIONING* dossier	2	Only for D.E.
HVA166	*HVAC COMMISSIONING* procedures	2	Only for D.E.
HVA167	*HVAC COMMISSIONING* dossier	2	Only for D.E.
HVA168	*HVAC* Pre-*COMMISSIONING* & *COMMISSIONING* Interfaces	2	Only for D.E.
HVA169	*HVAC* Pre-*COMMISSIONING* & *COMMISSIONING* Consumables	2	Only for D.E.
HVA170	Site acceptance *HVAC* test procedures	2	Only for D.E.
HVA171	*HVAC* final documentation dossier	2	Only for D.E.
HVA172	*HVAC VENDOR*(s) document register	2	Only for D.E.
HVA173	Choice of *HVAC SUB-CONTRACTOR* (Technical Bid Analysis)	1	Only for D.E.
HVA174	*HVAC VENDOR*(s) list	1	Only for D.E.
HVA175	*FACTORY COMPLIANCE TESTS* REPORT FOR *AIR HANDLING UNIT*(S)	1	Only for D.E.

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	Document title	Acceptance Class	Remark
HVA176	*FACTORY COMPLIANCE TESTS* REPORT FOR *FAN UNIT*(S)	1	Only for D.E.
HVA177	*FACTORY COMPLIANCE TESTS* REPORT FOR *FIRE DAMPER*(S)	1	Only for D.E.
HVA178	*FACTORY COMPLIANCE TESTS* REPORT FOR *CHILLED WATER UNIT*(S)	1	Only for D.E.
HVA179	*FACTORY COMPLIANCE TESTS* REPORT FOR *HVAC CC* (CCONTROL CCABINET(S))	1	Only for D.E.
HVA180	*FACTORY COMPLIANCE TESTS* REPORT FOR *MCC* CABINET(S)	1	Only for D.E.

3.3 Notes

1. Some documents listed hereafter have to be approved by Company before purchasing. The term "approved" means that the document is approved without comment by Company.
2. In case an approved document has to be updated (whatever the reason), *CONTRACTOR* has to produce this updated document. This updating is included within *HVAC CONTRACTOR* scope of work.
3. In case a document has to be updated, because of mistake, inconsistency, data updating, etc (and generally speaking, every time *CONTRACTOR* is cause of this updating), the document updating shall be produced without additional cost.
4. In case of a document updating has an impact on another document(s), these documents updating shall be produced by *CONTRACTOR* without additional cost.
5. Documents to be provided by *MANUFACTURER*s and / or *SUPPLIER*s are not listed in the above table.
6. The documents to be provided cannot be merged in one or several documents. The entity of each document shall be respected.
7. The information which is provided in a document (document n°1) cannot be included within another document (document n°2). In case it is necessary to refer to an information contented in the document n°1, into the document n°2, it shall be indicated "Refer to document n°1, section xxx" within the document n°2 ("section xxx" is the title of the section, without section numbering, where the information is indicated in the document n°1).The target of this requirement is to avoid that the same data is repeated in several documents; this could occur discrepancy in case of information updating.

3.4 Documents description

For some of the documents listed on previous section, a detailed description of document content is given in the following sections. The following specifications (type of document, software to be used, content, etc) are mandatory.

This document is the property of Total. It shall not be stored, reproduced or disclosed to others without written authorisation from the Company.

For the documents listed in the following sections, parts of documents have to be provided during basic engineering or detailed engineering or during both phases.

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3.4.1 *HVAC* Master Document Register

Document title:	*HVAC* Master Document Register				
***HVAC* Document number:**	HVA001				
Document to be provided for:	☒ Basic Engineering				
	☒ Detailed Engineering				
Document included within Call For Tender Documents:	☒ Yes	☐ No			
Document type:	☐ Calculation note	☒ Text, Report	☐ Drawing, sketch, layout		
	☐ Documentation	☐ Software listing			
Format of native file:	☒ Word	☐ Access	☐		
	☒ Excel	☐ Visio	☐ Autocad		
Native format to be provided for document approval:	☒ Yes	☐ No			
Document has to be Approved For Construction before purchasing::	☒ Yes	☐ No			
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*			
Document purpose:	to list the document to be provided by *HVAC CONTRACTOR* / sub-*CONTRACTOR*s for design, construction, pre-*COMMISSIONING*, *COMMISSIONING* phases				

Main items: The *HVAC* Master Document Register shall be built as a table. The table shall include at least the following columns:	**Subject to be developed during:**	
	Basic	Detailed
Document title,	☒	☒
HVAC Document number (HVAxxx), as per the present specification,	☒	☒
HVAC Document number, as per project Documents numbering rules,	☒	☒
Format of native file,	☒	☒
Document Author,	☒	☒
Scheduled delivery date for each Engineering phase,	☒	☒
Document type	☒	☒
Document class	☒	☒
Revision number	☒	☒
Status	☒	☒

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Format	☒	☒
Document weight	☒	☒
Last return code	☒	☒
Remarks.	☒	☒
The documents provided by *MANUFACTURER*s have to be included within this list. The Master Documents Register shall be updated every month by *CONTRACTOR*.		

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3.4.2 *HVAC* design philosophy

Document title:	*HVAC* design philosophy					
***HVAC* Document number:**	HVA002					
Document to be provided for:	☒ Basic Engineering					
	☒ Detailed Engineering					
Document included within Call For Tender Documents:	☒ Yes	☐ No				
Document type:	☐ Calculation note	☒ Text, Report	☐ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☐			
	☐ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☒ Yes	☐ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to present the *HVAC* system(s) proposed to maintain the ambient conditions within a building, taking into account the environment and operations parameters.					

Main items:	**Subject to be developed during:** Basic	Detailed
Reference documents shall include: o Standards o Professional documents o Regulations o Codes o Other documents o General Specifications o Projects documents. Important note: only Reference documents used for understanding of the present document have to be indicated.	☒	☒
Project operating conditions: This section is an exhaustive list of operating conditions for which the *HVAC* equipment has to be designed. For each operating case, the *HVAC* function(s) provided by *HVAC* equipment shall clearly described.	☒	☒

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HVAC possible architectures: All imaginable solutions shall be proposed and compared, in terms of construction cost, maintenance cost, operating cost, availability, occupied space, weight, environment,, schedule,...	☒	☐
HVAC proposed architecture: The analysis of *HVAC* possible architectures shall lead to the proposed architecture. A comparative summary table, showing advantages and disadvantages shall be produced with the proposed *HVAC* architecture.	☒	☐
Detailed *HVAC* architecture: o This section shall precisely detail the *HVAC* system(s), their interfaces with water system, electrical, instrument, communication systems and utilities. A dedicated section shall indicate the requirements in terms of voltage, industrial water, sea water, compressed air, ... o The main lines for *HVAC* automation and manual operations shall be described in a dedicated section.	☐	☒

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3.4.3 Lists of heat gains from equipment

Document title:	List of heat gains from equipment					
***HVAC* Document number:**	HVA003					
Document to be provided for:	☒ Basic Engineering ☒ Detailed Engineering					
Document included within Call For Tender Documents:	☒ Yes	☐ No				
Document type:	☐ Calculation note	☒ Text, Report	☐ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☐			
	☒ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☒ Yes	☐ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to list the heat dissipations from equipment managed by other disciplines than *HVAC*.					

Main items:	**Subject to be developed during:**	
	Basic	Detailed
Reference documents including: o Standards o Professional documents o Regulations o Codes o Other documents o General Specifications o Projects documents. Important note: only References used for understanding of the present document have to be indicated.	☒	☒
PROJECT LIFE CONTEXT: This section is an exhaustive list of situations meet by the construction during its life.	☒	☒

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Heat dissipation from equipment: *HVAC CONTRACTOR* shall prepare the heat dissipations lists form (Excel file) for other disciplines. For each room, the detailed list shall content the following columns: o Room tag number o Room designation o Equipment or cabinet tag number o Heat dissipation from equipment. Two columns shall be indicated (sensible and latent heat gains) for each *PROJECT LIFE CONTEXT* case (except pre-*COMMISSIONING*, *COMMISSIONING* and towing periods). The total heat dissipation, per equipment, per cabinet and grand total per room shall appear on the form. One border shall be transmitted to each discipline and shall be filled-up by the disciplines. The heat dissipation evaluation shall identify the sparing of equipment, temporary use, diversity factor, etc.	☒	☐
Heat dissipation from equipment: *HVAC CONTRACTOR* shall prepare the heat dissipations lists form for other disciplines. For each room, the detailed list shall content the following columns: o Room tag number o Room designation o Equipment or cabinet tag number o Heat dissipation from equipment. Two columns shall be indicated (sensible and latent heat gains) for each *PROJECT LIFE CONTEXT* case. The total heat dissipation, per equipment, per cabinet and grand total per room shall appear on the form. One border shall be transmitted to each discipline and shall be filled-up by the disciplines. The heat dissipation evaluation shall identify the sparing of equipment, temporary use, diversity factor, etc.	☐	☒

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3.4.4 *HVAC* basis of design

Document title:	*HVAC* basis of design					
***HVAC* Document number:**	HVA004					
Document to be provided for:	☒ Basic Engineering ☒ Detailed Engineering					
Document included within Call For Tender Documents:	☒ Yes	☐ No				
Document type:	☐ Calculation note	☒ Text, Report	☐ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☐			
	☐ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☒ Yes	☐ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to summarize the data necessary to realize the *HVAC* components calculation, design and selection. Only common data to all *HVAC* studies and general data shall be indicated.					

Main items:	**Subject to be developed during:** Basic	Detailed
Reference documents including: o Standards o Professional documents o Regulations o Codes o Other documents o General Specifications o Projects documents. Important note: only Reference documents used for understanding of this *HVAC* basis of design or used as a basis of design have to be indicated.	☒	☒
PROJECT LIFE CONTEXT: This section is an exhaustive list of situations meet by the construction during its life.	☒	☒

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Location of project (latitude, longitude, altitude)	☒	☒
Minimum outside temperature and concomitant relative humidity, on operation site	☒	☐
Minimum outside temperatures and concomitant relative humidities, during construction, pre-*COMMISSIONING*, *COMMISSIONING*, towing, on operation site	☐	☒
Maximum outside temperatures and concomitant relative humidities, on operation site	☒	☐
Maximum outside temperatures and concomitant relative humidities, during construction, pre-*COMMISSIONING*, *COMMISSIONING*, towing, on operation site	☐	☒
Atmosphere clearness factor, ground / sea reflectance factors, daily range, wind, dust on operation site	☒	☒
Air temperature and concomitant relative humidity for *OUTDOOR AIR* used at exchangers, *on AHU*s , on operation site	☒	☒
Air temperature and concomitant relative humidity for *OUTDOOR AIR* used at exchangers, on *AHU*s, during construction, pre-*COMMISSIONING*, *COMMISSIONING*, towing, on operation site	☐	☒
Available pressure, location of tie-in, temperature and quality of each fluid that *HVAC* systems can use	☒	☒
Maximum allowed pressure loss, temperature gradient between inlets and outlets tie-in, for of each fluid which can be used by *HVAC* systems)	☒	☒
HVAC systems main description (function, availability, main areas served)	☒	☒
Classification of rooms regarding *HVAC* systems. A table shall be provided indicating the *HVAC* system serving the room.	☒	☒
Table indicating ambient conditions to be maintain for each room (Minimum and maximum dry bulb and concomitant relative humidity, tolerances)	☒	☒
Table indicating *OUTDOOR AIR* volume required for each room, for each *HVAC* system,	☒	☒
Table indicating *AIR CHANGE* volume required for each room, for each *HVAC* system	☒	☒
Table indicating *EXTRACT AIR* volume required from each room, for each *HVAC* system	☒	☒
Table indicating sound pressure levels acceptable for each room, for each *HVAC* system	☒	☒
Room pressurisation (Outdoor reference), for each room, for each *HVAC* system	☒	☒
Leakage air flow rates through *WALL*s and doors, according to differential pressures (maximum real values and data to be considered for calculations),	☒	☒

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Table indicating heat dissipation from lighting for each room, per *HVAC* system	☒	☒
Table indicating occupation and activity for each room, per *HVAC* system. Heat dissipation (sensible and latent) shall be indicated for different temperatures	☒	☒
Table indicating heat gains from equipment for each room, for each *HVAC* system	☒	☒
Table indicating, for each *HVAC* system, the status of the system for each case of *PROJECT LIFE CONTEXT*	☒	☒
HVAC over-design values to be considered in *HVAC* calculation notes	☒	☒
Maximum air velocity(ies) in *OCCUPIED AREA*	☒	☒
Refrigerant gas allowed for refrigerating equipment	☒	☒
List of rooms classification, *HVAC* system by *HVAC* system (*NORMAL HVAC SYSTEM*, *ESSENTIAL HVAC SYSTEM*, …)	☒	☒
Principle of performance acceptance.	☒	☒

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3.4.5 U-value calculations

Document title:	U-value calculations					
***HVAC* Document number:**	HVA005					
Document to be provided for:	☐ Basic Engineering					
	☒ Detailed Engineering					
Document included within Call For Tender Documents:	☐ Yes	☐ No				
Document type:	☒ Calculation note	☐ Text, Report	☒ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☐			
	☒ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☒ Yes	☐ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to calculate the U-value to be used for heat gains and heat losses calculations.					

Main items:	**Subject to be developed during:** Basic	Detailed
Composition of *WALL*s A schema shall be provided for each *WALL*, indicating the position of the different layers, the rooms tag numbers separated by the *WALL* (or outside position when external *WALL*) For each *WALL*, the following characteristics shall be indicated: o Material o Thickness o Density o Thermal conductivity o Water permeability.	☐	☒
Algorithms used for external convection and external radiation factors. This algorithm shall take into account the characteristics of surface (material, colour), the ambient parameters (wind velocity), the direction of thermal flux.	☒	☒

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Algorithms used for internal convection and internal radiation factors.The algorithm shall take into account the characteristics of surface (material, colour), the direction of thermal flux,	☒	☒
Algorithm used for U-value calculations	☒	☒
U-value calculations. This calculation note shall be realized with Excel software. A synthesis table shall indicate all data used for U- value calculations. The intermediate calculations results shall be indicated for each U-value calculated: o External convection and radiation factor o Internal convection and radiation factor o *WALL* resistance o U-value.	☐	☒

General comments regarding the method to be applied:

Each *WALL* has to be tagged. The tagging method is the following:

Face 1 – Face 2

Where

Face 1 is the room number for which the *WALL* U value has to be calculated

Face 2 is the room number for which the *WALL* U value has to be calculated

The two rooms are separated by the studied *WALL*.

In case of outdoor *WALL*, Face 1 shall be indicated “Outdoor Exposure”, where “Outdoor exposure" corresponds to the *WALL* exposure.

Tagging to be used for "Outdoor exposure":

North:	N
North-East:	NE
East:	E
South-East:	SE
South:	S
South-West:	SW
West:	W
North-West	NW

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3.4.6 Condensation risk analysis

Document title:	Condensation risk analysis					
***HVAC* Document number:**	HVA006					
Document to be provided for:	☐ Basic Engineering					
	☒ Detailed Engineering					
Document included within Call For Tender Documents:	☐ Yes	☒ No				
Document type:	☒ Calculation note	☐ Text, Report	☐ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☐			
	☐ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☐ Yes	☒ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to estimate the risk of condensation on *WALL*s surface or inside the *WALL*s components.					

Main items:	**Subject to be developed during:** Basic	Detailed
Reference documents including: o Standards o Professional documents o Regulations o Codes o Other documents o General Specifications o Projects documents. Important note: only Reference documents used for understanding of this calculation note have to be indicated.	☐	☒

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The algorithms used for the following calculations shall be detailed: o Surface temperature and *WALL* internal temperatures o Dew point temperature according to air temperature and concomitant relative humidity o Partial vapour pressures inside *WALL* and on external faces of *WALL*.	☐	☒
Walls composition: The *WALL*s compositions shall refer to those used for U values calculation notes.	☐	☒
For each *WALL*, the surface temperatures shall be calculated and compared to the dew point temperature. Conclusion regarding the condensation risk shall be clearly indicated. The following data and results shall appear in calculation note: o *WALL* surface temperatures o Dew point temperatures o U value.	☐	☒

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3.4.7 Heat gains and heat losses calculations

Document title:	Heat gains and heat losses calculations					
***HVAC* Document number:**	HVA007					
Document to be provided for:	☒ Basic Engineering					
	☒ Detailed Engineering					
Document included within Call For Tender Documents:	☐ Yes	☒ No				
Document type:	☒ Calculation note	☐ Text, Report	☐ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☒ Dedicated software			
	☐ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☒ Yes	☐ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to calculate the heat gains and heat losses on each air conditioned room of project.					

Main items:	**Subject to be developed during:**	
	Basic	Detailed
References of software used for heat gains and heat losses calculations.	☒	☒
In case of software is not agreed by Company, algorithms and limits of use have to be indicated,	☒	☒
Combination of *WALL*s, in case of the software cannot accept an unlimited number of *WALL*s, and when the number of inputs is higher than the allowed number, a combination of *WALL*s has to be made to obtain an "equivalent wall". Each "equivalent wall" has to be tagged as follow: *C – Face 1 – sss* where *C* means that U value is calculated for a combination of *WALL*s, *Face 1* is the room number for which the *WALL* U-value has to be calculated, *sss* is a serial number (origin is 000, for each room) For each "equivalent wall" U-value, the list of *WALL*s for which	☒	☒

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equivalence is calculated, has to be indicated.		
Heat gains calculations for each case of operation, on operation site, room by room, indicating the input data (U-value, "equivalent" U-value, orientation, …), the intermediate results (heat gains through *WALL*s, heat gains from people, heat gains from equipment,…) and global results for each room. The sensible and latent heat gains calculations shall be calculated for each room.	☒	☐
Heat gains calculations for each case of operation, room by room, indicating the input data (U-value, "equivalent" U-value, orientation, etc), the intermediate results (heat gains through *WALL*s, heat gains from people, heat gains from equipment, …) and global results for each room. The sensible and latent heat gains calculations shall be done for each room.	☐	☒
Heat losses calculations, for each case of operation, on operation site, room by room, indicating the input data (U-value, "equivalent" U-value, orientation, etc), the intermediate results (heat gains through *WALL*s, heat gains from people, heat gains from equipment, …) and global results for each room. The sensible and latent heat gains calculations shall be done for each room.	☒	☐
Heat losses calculations, for each case of operation, room by room, indicating the input data (U-value, "equivalent" U-value, orientation, etc), the intermediate results (heat gains through *WALL*s, heat gains from people, heat gains from equipment, …) and global results for each room. The sensible and latent heat gains calculations shall be done for each room.	☐	☒
Synthesis of calculations results in a table, indicating for each room and for each situation of operation site (black start, normal operation, etc): o Total heat gains o Heat gains from equipment (cabinets, motors, lighting, etc) o Total heat losses.	☒	☐
Synthesis of calculations results in a table, indicating for each room and for each situation (*COMMISSIONING*, towing, black start, normal operation, etc): o Total heat gains o Heat gains from equipment (cabinets, motors, lighting, etc) o Total heat losses.	☐	☒

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3.4.8 Leakage air flow rates calculations

Document title:	Leakage air flow rates calculations					
***HVAC* Document number:**	HVA008					
Document to be provided for:	☒ Basic Engineering					
	☒ Detailed Engineering					
Document included within Call For Tender Documents:	☐ Yes	☒ No				
Document type:	☒ Calculation note	☐ Text, Report	☐ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☐			
	☒ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☒ Yes	☐ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to calculate the leakage air flow rates for each room, due to the pressure differences between the rooms.					

Main items:	**Subject to be developed during:**	
	Basic	Detailed
Reference documents including: o Standards o Professional documents o Regulations o Codes o Other documents o General Specifications o Projects documents. Important note: only Reference documents used for understanding of this leakage air flow rates calculations have to be indicated.	☒	☒
Algorithms used for leakages air flow rates calculations,	☒	☒
Leakage air flow rates calculation note, for each pressurized room. A synthesis table of results shall be provided at the end of the calculation note.	☒	☒

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General requirement for calculation note: It shall be provided one calculation sheet per room. The basis of design used for calculation shall be indicated on the calculation sheet. The characteristics of each element (*WALL*, door,...) for which a leakage occurs, shall be indicated on the sheet. Corresponding results, for each element, have to be mentioned. The gains and losses of flow have to be calculated. The following colours shall be used in documents, for numerical data: • Red for *HVAC* basis of design *(HVAC* basis of design, architectural data, etc. • Blue for data resulting from other calculations notes than "Leakage air flow rates calculations notes) • Black for calculations results from " Leakage air flow rates calculations notes". The air volume entering into the rooms, due to lack of tightness, shall be expressed considering the temperature / relative humidity of room where it is coming from. The air volume leaving the rooms, due to the lack of tightness, shall be expressed according to the temperature / relative humidity of the room it is leaving. Results shall be expressed in kg/h and m^3/h.		

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3.4.9 Air flow rates calculations

Document title:	Air flow rates calculations						
***HVAC* Document number:**	HVA009						
Document to be provided for:	☒ Basic Engineering ☒ Detailed Engineering						
Document included within Call For Tender Documents:	☐ Yes	☒ No					
Document type:	☒ Calculation note	☐ Text, Report	☐ Drawing, sketch, layout				
	☐ Documentation	☐ Software listing					
Format of native file:	☒ Word	☐ Access	☐				
	☒ Excel	☐ Visio	☐ Autocad				
Native format to be provided for document approval:	☒ Yes	☐ No					
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No					
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*					
Document purpose:	to calculate the air flow rates for *SUPPLY*, *RECIRCULATION*, *EXHAUST*, *TRANSFER*,... for the rooms of each *HVAC* system. These calculations result from heat gains and heat losses calculations note, leakage air flow rates calculations, hygiene calculations,....						

Main items:	**Subject to be developed during:** Basic	Detailed
<u>Important note:</u> HAP (Carrier software) calculations results, on air flow rate part, do not take into account the air specific volume variation when temperature / relative humidity change. Therefore, use of this software is not accepted by Company for air flow rates calculations.		
Reference documents including: o Standards o Professional documents o Regulations o Codes o Other documents o General Specifications o Projects documents.	☒	☒

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Important note: Only Reference documents used for understanding of the present calculation note have to be indicated.		
Algorithms used for air flow rates calculations	☒	☒
Air flow rates calculation results: The calculation results shall be realized with Excel sheets. It shall be produced one table per *HVAC SYSTEM*. The air flow rates shall be calculated room by room. The necessary data for calculations shall be indicated on the calculation tables. The following colours shall be used in documents, for numerical data: o Red for *HVAC* basis of design *(HVAC* basis of design, architectural data, etc. o Blue for data resulting from other calculations notes than "Air flow rates calculations notes) o Black for calculations results from" Air flow rates calculations notes". Air flow rates shall be expressed in kg/h and in m^3/h. The temperature and relative humidity of air flow rate has to be indicated in juxtaposed columns. For each room, all air flow entering or leaving the room shall be indicated in the table. The air flow rates shall be summarized for each level of building, per *HVAC SYSTEM*. In case of air mixing (*RECIRCULATION*, *EXHAUST*, etc), the global air flow rate per level shall take into account the temperature / relative humidity of each air flow.	☒	☒

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3.4.10 Fan coils units capacities calculations

Document title:	Fan coils units capacities calculations					
***HVAC* Document number:**	HVA010					
Document to be provided for:	☒ Basic Engineering ☒ Detailed Engineering					
Document included within Call For Tender Documents:	☒ Yes	☐ No				
Document type:	☒ Calculation note	☐ Text, Report	☐ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☐			
	☒ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☐ Yes	☒ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to define the heating capacities of duct heaters (in case of this technology is applied on project).					

Main items:	**Subject to be developed during:** Basic	Detailed
Reference documents including: o Standards o Professional documents o Regulations o Codes o Other documents o General Specifications o Projects documents. Important note: Only Reference documents used for understanding of the present calculation note have to be indicated.	☒	☒
For each *HVAC SYSTEM*, an estimated value of fan coil units installed capacities has to be provided.	☒	☐
Principle of fan coil(s) capacity(ies) calculation has to be detailed.	☒	☒
Fan coils standard capacities (according to project operating conditions) from	☐	☒

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*MANUFACTURER*s shall be listed in a table. Several *MANUFACTURER*s can be listed in the table.		
Room by room, basis of design (air flow rate, inside temperature, *SUPPLY* air temperature at room entering,…) shall be indicated within a table.	☐	☒
Room by room requested cooling capacity shall be calculated according to calculation method described above. Results shall be indicated in a table (this table and basis of design table can be combined in a common form).	☐	☒
Selection of fan coils, room by room, shall be listed (this table and basis of design table can be combined in a common form). The selection shall include the sound pressure level requirement (HVAC basis of design) and the sound pressure level performance of selected equipment. Quantity of condensate shall be calculated and reported.	☐	☒

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3.4.11 Duct cooling coil capacities calculations

Document title:	Duct cooling coil capacities calculations					
***HVAC* Document number:**	HVA011					
Document to be provided for:	☒ Basic Engineering ☒ Detailed Engineering					
Document included within Call For Tender Documents:	☒ Yes ☐ No					
Document type:	☒ Calculation note	☐ Text, Report	☐ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☐			
	☒ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☐ Yes	☒ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to define the cooling capacities of terminal cooling coils installed in ducting, in case of technology is applied on project.					

Main items:	**Subject to be developed during:** Basic	Detailed
Reference documents including: o Standards o Professional documents o Regulations o Codes o Other documents o General Specifications o Projects documents. Important note: Only Reference documents used for understanding of the present calculation note have to be indicated.	☒	☒
For each *HVAC SYSTEM*, an estimated value of terminal cooling coils installed capacities (total cooling capacity) has to be provided.	☒	☐
Principle of terminal cooling coil(s) capacity(ies) calculation has to be detailed.	☒	☒
Standard terminal cooling coils capacities (according to project operating	☐	☒

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conditions) from *MANUFACTURER*s shall be listed in a table. Several *MANUFACTURER*s can be listed in the table.		
Room by room, basis of design (air flow rate, inside temperature, *SUPPLY* air temperature at room entering,…) shall be indicated within a table.	☐	☒
Room by room requested cooling capacity shall be calculated according to calculation method described above. Results shall be indicated in a table (this table and basis of design table can be combined in a common form).	☐	☒
Selection of terminal cooling coils, room by room, shall be listed (this table and basis of design table can be combined in a common form). The selection shall include the pressure loss calculations and condensed water quantity calculation.	☐	☒

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3.4.12 Refrigerating capacity calculations

Document title:	Refrigerating capacity calculations					
HVAC Document number:	HVA012					
Document to be provided for:	☒ Basic Engineering					
	☒ Detailed Engineering					
Document included within Call For Tender Documents:	☐ Yes	☒ No				
Document type:	☒ Calculation note	☐ Text, Report	☐ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☐			
	☒ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☐ Yes	☒ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to define the refrigerating capacity to provide for each *HVAC SYSTEM*.					

Main items:	**Subject to be developed during:**	
	Basic	Detailed
Reference documents including: o Standards o Professional documents o Regulations o Codes o Other documents o General Specifications o Projects documents. Important note: Only Reference documents used for understanding of the present calculation note have to be indicated.	☐	☒

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Requested refrigerating capacity: The requested refrigerating capacity calculation for a *HVAC SYSTEM* has to be calculated considering the air flow rates calculations results. The refrigerating capacity shall take into account the heat gains / heat losses through the ducting, the heat gains from fans, the temperature / relative humidity upstream the *AIR HANDLING UNIT*s etc. The requested refrigerating capacity has to be defined for operations site (black start, emergency, normal operation, etc).	☒	☐
Requested refrigerating capacity: The requested refrigerating capacity calculation for a *HVAC SYSTEM* has to be calculated according to the air flow rates calculations results. The refrigerating capacity shall take into account the heat gains / heat losses through the ducting, the heat gains from fans, the temperature / relative humidity upstream the AIR HANDLING UNITs, etc. The requested refrigerating capacity has to be defined for the following phases: pre-*COMMISSIONING*, *COMMISSIONING*, towing, operations site (black start, emergency, normal operation, etc),	☐	☒
Installed refrigerating capacity: The minimum installed refrigerating capacity has to be calculated from Requested refrigerating capacity calculation results. It includes the over design margin, as per GS EP HVA 100.	☒	☒

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3.4.13 Duct heaters capacities calculations

Document title:	Ducts heaters capacities calculations					
***HVAC* Document number:**	HVA013				7	
Document to be provided for:	☒ Basic Engineering ☒ Detailed Engineering					
Document included within Call For Tender Documents:	☒ Yes	☐ No				
Document type:	☒ Calculation note	☐ Text, Report	☒ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☐			
	☒ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☐ Yes	☒ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to define the heating capacities of duct heaters in case of this technology is applied on project.					

Main items:	**Subject to be developed during:** Basic	Detailed
Reference documents including: o Standards o Professional documents o Regulations o Codes o Other documents o General Specifications o Projects documents. Important note: Only Reference documents used for understanding of the present calculation note have to be indicated.	☒	☒
For each *HVAC SYSTEM*, an estimated value of duct heaters installed capacities has to be provided.	☒	☐
Principle of duct heater(s) capacity(ies) calculation has to be detailed.	☒	☒
Duct heaters standard capacities from *MANUFACTURER*s shall be listed in a	☐	☒

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table. Several *MANUFACTURER*s can be listed in the table.		
Room by room, basis of design (air flow rate, inside temperature, *SUPPLY* air temperature at room entering, etc) shall be indicated within a table.	☐	☒
Room by room requested heating capacity shall be calculated according to calculation method described above. Results shall be indicated in a table (this table and basis of design table can be combined in a common form).	☐	☒
Selected heating capacities, room by room, shall be listed (this table and basis of design table can be combined in a common form).Performances (heating capacity, pressure loss, maximum surface temperature, entering and leaving temperatures, flow rates (in case of non electrical duct heater), etc of duct heaters shall be indicated.	☐	☒

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3.4.14 HVAC block diagrams

Document title:	HVAC block diagrams					
***HVAC* Document number:**	HVA014					
Document to be provided for:	☒ Basic Engineering ☒ Detailed Engineering					
Document included within Call For Tender Documents:	☒ Yes	☐ No				
Document type:	☐ Calculation note	☐ Text, Report	☒ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☐ Word	☐ Access	☐			
	☐ Excel	☐ Visio	☒ Autocad			
Native format to be provided for document approval:	☐ Yes	☒ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to present the general architecture of each *HVAC SYSTEM*.					

Main items:	**Subject to be developed during:**	
	Basic	Detailed
For each *HVAC SYSTEM*, a simplified single line diagram shall be provided, indicating (when used for the *HVAC SYSTEM*): o The main heating sources(boilers) o The refrigerating system o The condensing system o The *AIR HANDLING UNIT*s o The groups of rooms supplied from the *HVAC SYSTEM* o The rooms connected to a dedicated part of the *HVAC SYSTEM* (battery room, painting room, sick bay, etc) o The main flow lines (air, water, etc) between the main components of the *HVAC SYSTEM* o The installed percentage of nominal capacity for each *HVAC SYSTEM*, for each main component (*AHU*, *CHILLED WATER UNIT*, *HVAC MMC*, *HVAC CC*, distribution board, *EXHAUST FAN UNIT*) of *HVAC SYSTEM*	☒	☒

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o The tag number of each main component (*AHU*, chilled water unit, *HVAC MMC*, *HVAC CC*, distribution board, *EXHAUST FAN UNIT*) of *HVAC SYSTEM*.		

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3.4.15 HVAC Ducting and Instrumentation Diagrams (D&ID)

Document title:	*HVAC* Ducting & Instrumentation Diagrams (*D&ID*), including symbols and typical				
***HVAC* Document number:**	HVA015				
Document to be provided for:	☒ Basic Engineering				
	☒ Detailed Engineering				
Document included within Call For Tender Documents:	☒ Yes	☐ No			
Document type:	☐ Calculation note	☐ Text, Report	☒ Drawing, sketch, layout		
	☐ Documentation	☐ Software listing			
Format of native file:	☐ Word	☐ Access	☐		
	☐ Excel	☐ Visio	☒ Autocad		
Native format to be provided for document approval:	☒ Yes	☐ No			
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No			
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*			
Document purpose:	to present the ducting and instrument diagrams for each *HVAC SYSTEM*.				

Main items:	**Subject to be developed during:**	
	Basic	Detailed
HVAC symbols used for *D&ID*.	☒	☒

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For each of the following parts / main components of *HVAC* installation and for each *HVAC SYSTEM*, it shall be provided one *D&ID*: o *AIR HANDLING UNIT*(s), one unit and its redundancy, per sheet o *OUTDOOR* air ducting, including air intake(s), ducting from air intake(s) to *AHU*(s). *WALL*(s) penetrations shall be indicated on the *D&ID* o *SUPPLY* air, *RECIRCULATION* air, *EXTRACT* air, general *EXHAUST* air ducting from *AHU*(s) to rooms. One *D&ID* per level of building o Each *EXHAUST* air system dedicated to a room (battery room, painting room, sick bay,...), including exhaust air units. *WALL*(s) penetrations shall be indicated on *D&ID* o Typical *D&ID* (*OUTDOOR* air intakes, air lock air discharge,...) shall be produced to simplify *D&ID.*	☒	☒
Typical duct & instrument diagrams used in documents. Sheets with typical *D&ID* can be used in order to simplify the reading of the documents,	☒	☒
For each line going to or coming from another sheet, a box shall be placed at the extremity of line, indicating the document number where the line is going to, from where the line is coming,	☒	☒
Whatever the number of diffusers and grilles within a room, only one diffuser and one grille per room shall be shown on documents,	☒	☐
All diffusers and grilles to be installed for each room shall be shown on *D&ID*s.	☐	☒
All dampers, balancing dampers, *SHUT-OFF DAMPER*s to be installed, shall be shown on *D&ID*. For balancing dampers associated to diffusers and grilles, only one balancing damper shall be shown for each diffuser and each grille,	☒	☐
All dampers, balancing dampers, *SHUT-OFF DAMPER*s to be installed, shall be shown on *D&ID*.,	☐	☒
All *HVAC* instruments (sensors, transmitters, controllers, position switches, limit switches, etc) to be installed, shall be shown on *D&ID*,	☒	☒
Tag numbers of *HVAC* equipment and *HVAC* components shall be indicated on documents,	☒	☒
Tag numbers of *HVAC* instruments shall be indicated on documents,	☐	☒
All gas detectors, smoke detectors to be installed on / inside ducting, *AHU*s, air intake(s), etc, have to be shown on *D&ID*,	☒	☒
Sound attenuators, on main ducts, required to maintain the noise criteria at the acceptable values have to be shown on *D&ID*,	☒	☐
All sound attenuators required to maintain the noise criteria at the acceptable values have to be shown on *D&ID*,	☐	☒
Ducting line tag number serving *HVAC* equipment, serving rooms and / or	☐	☒

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connecting *HVAC* equipment,		
Battery limits (refer to " Utilities requirements for *HVAC*" document description),	☒	☒
Important notes: • Documents provided shall be easily readable in A3 format. It means that the number of sheets to be provided shall be defined in accordance with the number of details and information to be shown on the documents.	☒	☒
• In case a *D&ID* is detailed on two (or more) sheets, a first sheet shall be added in order to show the entire *D&ID* indicating limits of each sheet and page numbers of the detailed views.	☒	☒

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3.4.16 *HVAC* Piping and Instrumentation Diagrams (P&ID)

Document title:	*HVAC* Piping & Instrumentation Diagrams (P&ID), including symbols and typical					
***HVAC* Document number:**	HVA016					
Document to be provided for:	☒ Basic Engineering					
	☒ Detailed Engineering					
Document included within Call For Tender Documents:	☒ Yes	☐ No				
Document type:	☐ Calculation note	☐ Text, Report	☒ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☐ Word	☐ Access	☐			
	☐ Excel	☐ Visio	☒ Autocad			
Native format to be provided for document approval:	☒ Yes	☐ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to present the piping and instrument diagrams for each *HVAC SYSTEM*.					

Main items:	**Subject to be developed during:** Basic	Detailed
For each of the following parts of *HVAC* installation and for each *HVAC SYSTEM*, it shall be provided the following P&ID: o Refrigerating unit, one sheet per unit o Chilled water piping o Condensing system for refrigerating system, when water cooled o P&ID for boiler rooms o Hot water piping o Vapour and condensate piping o Heat recovery system piping o Safety valve(s) discharge piping for refrigerating system o Safety valve(s) discharge piping system for hot water o Safety valve(s) discharge piping system for vapour system o Utilities: industrial water, compressed air, etc.	☒	☒

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For each line going to or coming from another sheet, a box shall be placed at extremity of line, indicating the document number where the line is going to, from where the line is coming,	☒	☒
Typical pipe & instrument diagrams used in documents. Sheets with typical P&ID can be used in order to simplify the reading of the documents,	☒	☒
All balancing valves, isolating valves, safety valves, check valves, filters, sight glass, actuators, tanks shall be shown on P&ID,	☒	☒
All *HVAC* instruments (sensors, transmitters, controllers, pressure cut-out, metering, etc) to be installed, shall be shown on P&ID,	☒	☒
Plugs, valves for emptying, venting devices required, according to the piping layout, shall be shown on P&ID,	☒	☒
Equipment tag numbers shall be indicated for each *HVAC* component,	☒	☒
Tag numbers shall be indicated for each instruments.	☐	☒
Piping tag number shall be indicated for each piping line,	☐	☒
Battery limits (refer to "Utilities requirements for *HVAC*" document description) to be indicated.	☒	☒
Important notes: • Documents provided shall be easily readable in A3 format. It means that the number of sheets to be provided shall be defined in accordance with the number of details and information to be shown on the documents.	☒	☒
• In case a P&ID is detailed on two (or more) sheets, a first sheet shall be added in order to show the entire P&ID indicating limits of each sheet and page numbers of the detailed views.	☒	☒

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3.4.17 *HVAC* sub-systems split

Document title:	*HVAC* sub-systems split					
***HVAC* Document number:**	HVA017					
Document to be provided for:	☐ Basic Engineering					
	☒ Detailed Engineering					
Document included within Call For Tender Documents:	☐ Yes	☐ No				
Document type:	☐ Calculation note	☐ Text, Report	☒ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☐ Word	☐ Access	☐			
	☐ Excel	☐ Visio	☒ Autocad			
Native format to be provided for document approval:	☐ Yes	☒ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to present the *HVAC* systems to prepare the pre-*COMMISSIONING* and *COMMISSIONING* tasks.					

Main items:	**Subject to be developed during:**	
	Basic	Detailed
List of *HVAC* systems: The first sheet of this document shall list the *HVAC* systems in a table including the following information for each system: o *HVAC* system number o Designation of system o Sheet(s) numbers where the system is shown.	☐	☒

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Systems description: Each *HVAC* system shall describe the *HVAC* P&IDs / *D&ID*s. The system shall be described using one of the following methods (or a combination of methods): o Lines showing ducting and piping of the system have a different thickness regarding the other lines o The limit of system can easily be defined; the equipment and components included within the system shall be surrounded by a limitation line o The background of area where the equipment and components of the system are described, shall be coloured in light grey.	☐	☒
<u>Important notes</u>: • For philosophy of system definition, refer to GS EP EXP 101. This definition is different from the one applied to *HVAC SYSTEM* (defined in GS EP HVA 801), • It shall be indicated only one *HVAC* system per sheet of this document. A *HVAC* system can appear on several sheets, • The same P&ID (*D&ID*) can be used for different sheets in order to describe different *HVAC* systems.	☐ ☐ ☐	☒ ☒ ☒

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3.4.18 Single lines diagrams for *HVAC* ducting

Document title:	Single line diagrams for *HVAC* ducting				
***HVAC* Document number:**	HVA018				
Document to be provided for:	☒ Basic Engineering				
	☒ Detailed Engineering				
Document included within Call For Tender Documents:	☐ Yes	☐ No			
Document type:	☐ Calculation note	☐ Text, Report	☒ Drawing, sketch, layout		
	☐ Documentation	☐ Software listing			
Format of native file:	☐ Word	☐ Access	☐		
	☐ Excel	☐ Visio	☒ Autocad		
Native format to be provided for document approval:	☐ Yes	☒ No			
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No			
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*			
Document purpose:	to depict the ducting way on layout drawings.				

Main items:	**Subject to be developed during:** Basic	Detailed
The documents shall depict the ducting ways, including the diffusers, grilles, balancing dampers, *FIRE DAMPER*s, measurement devices and, generally speaking, all duct accessories.	☒	☒
The documents shall show the ducting tag numbers as defined within GS EP HVA 461.	☐	☒
The documents shall show the *HVAC* equipment tag numbers as defined with GS EP HVA 462.	☒	☒
Important notes: • At duct extremities coming from or going to another level, the document(s) title(s) and document(s) number(s) for continuation has (have) to be indicated within a box. • Documents provided shall be easily readable in A3 format. It means that the number of sheets to be provided shall be defined in accordance with the number of details and information to be shown on the documents.		

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• Each type of *HVAC* duct, for each *HVAC SYSTEM* shall be drawn on a dedicated layer of dwg file,		
• For each level of building, all ducting ways (whatever the *HVAC SYSTEM*) shall be drawn on the file, • It shall be provided one file per building level, • It shall be provided one or several document per level of building, depicting the ducting for all *HVAC SYSTEM*s passing or located in the concerned level, In case the number of information is important, several documents (change of document scale) shall be provided to enable the correct reading, • The duct location center line shown on drawing shall correspond to the future site center line of ducting.		

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3.4.19 *HVAC* duct calculations notes

Document title:	*HVAC* duct calculation note					
***HVAC* Document number:**	HVA019					
Document to be provided for:	☒ Basic Engineering ☒ Detailed Engineering					
Document included within Call For Tender Documents:	☐ Yes	☒ No				
Document type:	☒ Calculation note	☐ Text, Report	☐ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☐ Word	☐ Access	☒ Refer to Vendors list			
	☐ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☒ Yes	☒ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to present the *HVAC* duct calculation note and duct balancing calculation notes.					

Main items:	**Subject to be developed during:**	
	Basic	Detailed
Calculation method to be used for detailed engineering phase, for duct calculations and for balancing calculations, shall be detailed, including algorithms,	☒	☐
Calculation method, for duct calculations and for balancing calculations, shall be detailed, including algorithms,	☐	☒
Main design parameters:		
o Minimum and maximum air velocities, according to the location of duct section	☒	☒
o Maximum pressure loss per meter of duct	☒	☒
o Characteristics of duct accessories (elbows, transformations,...): detailed drawings shall be provided for each typical accessory, with design rules (numbers and locations of vanes, elbows radius,...).	☒	☒

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The calculations notes shall indicate the reference (document title, project document number, revision number, revision date) of the following documents:		
o The duct single lines diagrams	☐	☒
o The air flow rates calculation notes	☐	☒
o Data sheets	☐	☒
o System effects calculations notes.	☐	☒
Calculation of duct sizes (width and height) for main duct (branches to diffusers / grilles are excluded), including within risers, in accordance with air velocity.	☒	☐
For each OUTDOOR air intake ducting, the detailed calculation note shall be provided demonstrating that *FIRE DAMPER*s are closed before gas enter into the building.	☒	☒
The document shall be built on a table form (one table per ductwork) containing the following data:		
o In the header: *HVAC SYSTEM* designation, ducting function (*SUPPLY*, *RECIRCULATION*,... – refer to GS EP HVA 801), reference documents (refer to above)	☐	☒
o In the columns, refer to the following tables for columns content	☐	☒

Content of columns:

UpStream	Section	Lenght [m]	Direction	Outlet	Duct	Equipment	Fitting	Fix Dia [mm]

…/…

Fix Width	Fix Height	C Value	C Equip.	Pa Equip	Air m^3/h	Width	Height	Hyd Dia	Th Hyd Dia

…/…

Max Width	Max Height	Outlet [Pa]	Loss [Pa]	Singular Loss [Pa]	Loss [Pa]	Pressure

…/…

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Velocity [m/s]	Max Velocity [m/s]	K mm	Lamdba	Pa/m	RoV2 [Pa]	RoV2 junction

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3.4.20 *HVAC* duct to scale – Synthesis view

Document title:	*HVAC* duct to scale –Synthesis view					
***HVAC* Document number:**	HVA020					
Document to be provided for:	☐ Basic Engineering					
	☒ Detailed Engineering					
Document included within Call For Tender Documents:	☐ Yes	☒ No				
Document type:	☒ Calculation note	☐ Text, Report	☒ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☐ Word	☐ Access	☐ Refer to Vendors list			
	☐ Excel	☐ Visio	☒ Autocad			
Native format to be provided for document approval:	☒ Yes	☒ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to present the *HVAC* duct to scale drawings to be used for ducting installation.					

Main items:	**Subject to be developed during:**	
	Basic	Detailed
For each level of building, a scale duct layout shall be provided. All ducts of the level shall be shown on the document.	☐	☒
Duct to scale layout shall show the duct accessories like sound attenuators, *FIRE DAMPER*s, balancing dampers, *SHUT-OFF DAMPER*s, access panels into ducting, etc.	☐	☒
Duct to scale layout shall show the duct insulation (thermal insulation, fire proofing insulation, acoustic insulation).	☐	☒
Duct to scale shall show the duct supports.	☐	☒
Duct to scale shall show the maintenance area for *HVAC* equipment (to *FIRE DAMPER*s, *SHUT-OFF DAMPER*s, balancing dampers, ect).	☐	☒
Duct to scale shall show all *HVAC* instruments (air flow rate controllers, smoke detectors provided or not provided by *HVAC* discipline but installed on ducting), devices for air flow measurement, etc.	☐	☒
Important notes:		

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• Documents provided shall be easily readable in A3 format. It means that the number of sheets to be provided shall be defined in accordance with the number of details and information to be shown on the documents	☒	☒
• Each type of *HVAC* duct, for each *HVAC SYSTEM* shall be drawn on a dedicated layer of dwg file	☒	☒
• It shall be provided one file per building level	☒	☒
• It shall be provided one or several document per level of building, showing the ducting for all *HVAC SYSTEM*s passing or located in the concerned level, In case the number of information is important, several documents (change of scale) shall be provided to enable the correct reading	☒	☒
• Duct tagging (refer to GS EP HVA 462) shall be shown for each duct piece.	☒	☒

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3.4.21 Single lines diagrams for HVAC piping

Document title:	Single line diagrams for *HVAC* piping					
***HVAC* Document number:**	HVA021					
Document to be provided for:	☒ Basic Engineering ☒ Detailed Engineering					
Document included within Call For Tender Documents:	☐ Yes	☐ No				
Document type:	☐ Calculation note	☐ Text, Report	☒ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☐ Word	☐ Access	☐			
	☐ Excel	☐ Visio	☒ Autocad			
Native format to be provided for document approval:	☐ Yes	☒ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to show the *HVAC* piping routing on layout drawings.					

Main items:	**Subject to be developed during:**	
	Basic	Detailed
The documents shall show the piping routing, including the valves check valves, balancing valves, and, generally speaking, all piping accessories.	☐	☒
The documents shall show the piping tag numbers as per Company GS / projects Documents,	☐	☒
The documents shall show the *HVAC* equipment tag numbers as defined with GS EP HVA 462,	☐	☒
<u>Important notes</u>:		
• At piping extremities coming from or going to another level, the document(s) title(s) and document(s) number(s) for continuation has(have) to be indicated within a box. • Documents provided shall be easily readable in A3 format. It means that the number of sheets to be provided shall be defined in accordance with the number of details and information to be shown on the documents.		

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• Each type of *HVAC* piping, for each *HVAC SYSTEM* shall be drawn on a dedicated layer of dwg file, • For each level of building, all piping routing (whatever the *HVAC SYSTEM*) shall be drawn on the dwg file, • It shall be provided one file per building level, • It shall be provided one document per level of building, showing the piping for all *HVAC SYSTEM*s passing or located in the concerned level, In case the number of information is important, several documents shall be provided to enable the correct reading.		

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3.4.22 HVAC piping isometric views

Document title:	HVAC piping isometric views					
***HVAC* Document number:**	HVA022					
Document to be provided for:	☐ Basic Engineering ☒ Detailed Engineering					
Document included within Call For Tender Documents:	☐ Yes ☒ No					
Document type:	☐ Calculation note	☐ Text, Report	☒ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☐ Word	☐ Access	☐			
	☐ Excel	☐ Visio	☒ Autocad			
Native format to be provided for document approval:	☐ Yes	☒ No				
Document has to be Approved For Construction before purchasing:	☐ Yes	☒ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to presents the isometric views for each piping part of the *HVAC SYSTEM*s.					

Main items:	**Subject to be developed during:**	
	Basic	Detailed
The isometric views shall show the equipment, piping accessories (valves, safety valves, etc) with piping tag number and dimensions of piping lengths.	☐	☒
Piping lengths shall be indicated on each isometric view.	☐	☒
Piping classes shall be indicated on each isometric view.	☐	☒
Elevation shall be indicated every time piping is passing through a floor or a ceiling.		
Pieces of equipment and tag numbers shall be indicated.	☐	☒
<u>Important notes</u>: • The number of isometric drawings shall be provided in order to enable a correct understanding of documents,	☐	☒
• The isometric views shall be provided for the following *HVAC* piping systems: o Chilled water piping,	☐	☒

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o Hot water piping o Refrigeration piping when outside the refrigerating skid, o Safety valve piping discharge to outdoor or to drain, o Drain piping from *HVAC* equipment to main drain, o Gas piping to boilers, o Sea water piping from interface / tie-in point to *HVAC* equipment and from *HVAC* equipment to interface / tie-in point, o Industrial water piping from interface / tie-in point to *HVAC* equipment and from *HVAC* equipment to interface / tie-in point,		

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3.4.23 HVAC piping calculations notes

Document title:	*HVAC* piping calculation note
***HVAC* Document number:**	HVA023
Document to be provided for:	☐ Basic Engineering ☒ Detailed Engineering
Document included within Call For Tender Documents:	☐ Yes ☐ No
Document type:	☒ Calculation note ☐ Text, Report ☐ Drawing, sketch, layout ☐ Documentation ☐ Software listing
Format of native file:	☒ Word ☐ Access ☒ Dedicated software ☐ Excel ☐ Visio ☐ Autocad
Native format to be provided for document approval:	☒ Yes ☒ No
Document has to be Approved For Construction before purchasing:	☒ Yes ☐ No
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR* ☐ Document to be provided by *MANUFACTURER*
Document purpose:	to present the *HVAC* piping calculation note and piping balancing calculation notes. It has to be produced for chilled water piping, hot water piping. Refrigerating piping and safety valves discharge piping are excluded from this calculation note.

Main items:	**Subject to be developed during:** Basic	Detailed
Calculation method, for piping calculations and for balancing calculations, shall be detailed, including algorithms when calculation software is used for piping calculations,	☒	☒
Main design parameters: o Minimum and maximum water velocities, according to the location of piping section, taken into account the criteria to avoid corrosion o Maximum pressure loss per meter of piping o Characteristics of piping accessories (elbow, transformations,...).	☒	☒
The calculations notes shall indicate the reference (document title, project document number, revision number, revision date) of the following documents (one table for each pipework):	☐	☒
o *HVAC* piping isometric views		

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o Water flow rates calculation notes o Components pressure losses (data sheets, ...).		
The document shall be built on a table form (one table per pipework) containing the calculation data.	☐	☒

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3.4.24 *HVAC* equipment tagging list

Document title:	*HVAC* equipment tagging list					
***HVAC* Document number:**	HVA024					
Document to be provided for:	☒ Basic Engineering					
	☒ Detailed Engineering					
Document included within Call For Tender Documents:	☒ Yes	☐ No				
Document type:	☐ Calculation note	☒ Text, Report	☐ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☒ Access	☐			
	☒ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☒ Yes	☐ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to issue the exhaustive (detailed engineering) list of tag numbers of *HVAC* equipment or components.					

Main items:	**Subject to be developed during:**	
	Basic	Detailed
HVAC tagging rule or reference document applied for pieces of equipment numbering has to be detailed.	☒	☒
Tagging list for *HVAC* equipment. Accessories on ducting and piping (diffusers, grilles, *SHUT-OFF DAMPER*s, valves,…) have not to be included in the list.	☒	☐
Exhaustive tagging list for *HVAC* equipment and components. All accessories (diffusers, grilles, *SHUT-OFF DAMPER*s, constant volume boxes, valves,…) have to be included in the list.	☐	☒
Important notes: A specific native format could be required for this document. In such a case, the use of dedicated software and template for this document is mandatory. The cost of license is included within *CONTRATOR* commercial offer. Therefore additional cost to produce this document will be rejected.	☒	☒

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3.4.25 *HVAC* instrument tagging list

Document title:	*HVAC* instrument tagging list					
HVAC Document number:	HVA025					
Document to be provided for:	☒ Basic Engineering					
	☒ Detailed Engineering					
Document included within Call For Tender Documents:	☒ Yes	☐ No				
Document type:	☐ Calculation note	☒ Text, Report	☐ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☒ Dedicated software			
	☐ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☒ Yes	☐ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to issue the exhaustive list (detailed engineering) list of tag numbers for *HVAC* equipment or components.					

Main items:	**Subject to be developed during:**	
	Basic	Detailed
HVAC tagging rule or reference document applied for instrument numbering has to be detailed.	☒	☒
Exhaustive tagging list for *HVAC* instrument.	☐	☒
<u>Important notes</u>: A specific native format could be required for this document. In that case, the use of dedicated software and template for this document is mandatory. The cost of licence is included within *CONTRATOR* commercial offer. Therefore additional cost to produce this document will be rejected.	☒	☒

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3.4.26 *HVAC* equipment and instrument name plates

Document title:	*HVAC* equipment name plates					
HVAC Document number:	HVA026					
Document to be provided for:	☒ Basic Engineering					
	☒ Detailed Engineering					
Document included within Call For Tender Documents:	☒ Yes	☐ No				
Document type:	☐ Calculation note	☒ Text, Report	☒ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☐			
	☐ Excel	☐ Visio	☒ Autocad			
Native format to be provided for document approval:	☐ Yes	☒ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to detail the name plate to be provided and installed for each *HVAC* piece of equipment. The systems, machines, components for which name plates have to be provided are listed within the Company General Specifications or in project documents.					

Main items:	**Subject to be developed during:** Basic	Detailed
List of systems, machines, components having a name plate. A table shall be provided indicating, for main pieces of equipment: o Name o Tag number o Location o System and sub-system.	☒	☒
For each system, machine, component requiring ATEX certification, the detailed ATEX name plate shall be drawn.	☐	☒

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For each system, machine, component receiving a name plate, the detailed name plate shall be drawn. The following information (when applicable) shall be indicated for each drawing: o Name plate sizes, o Material (designation, grade,...) of name plate, type font and sizes o Fixing mode (bolts and nuts, rivets,…) o Material (designation, grade,...) of components for fixation o The information / data engraved on name plate ▪ Designation ▪ Equipment or component tag number ▪ Air flow rate(s) ▪ Water flow rate(s) ▪ Available pressure(s) (for *AHU*(s), *EXHAUST FAN UNIT*(s), exhaust fan(s)) ▪ Entering temperature(s) on exchanger(s) ▪ Evaporating temperature ▪ Leaving temperature on exchanger(s) ▪ Condensing temperature ▪ Heating / cooling capacity(ies) ▪ Pressure loss for each exchanger (for each medium) ▪ Power consumption(s) ▪ Supply voltage ▪ Maximum operating pressure ▪ Volume of refrigerant ▪ Equipment or component weight (kg) o The exact location of name plate on system, machine, component.	☐	☒
<u>Important note</u>: For *FIRE DAMPER*s, two name plates have to be provided per unit. The first name plate has to be installed on the *FIRE DAMPER*. The location of second name plate has also to be indicated (e.g. installation on mechanical insulation cladding).		

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3.4.27 *HVAC* ducting construction standards

Document title:	*HVAC* ducting construction standards				
***HVAC* Document number:**	HVA027				
Document to be provided for:	☐ Basic Engineering				
	☒ Detailed Engineering				
Document included within Call For Tender Documents:	☐ Yes	☒ No			
Document type:	☐ Calculation note	☐ Text, Report	☒ Drawing, sketch, layout		
	☐ Documentation	☐ Software listing			
Format of native file:	☐ Word	☐ Access	☐		
	☐ Excel	☐ Visio	☒ Autocad		
Native format to be provided for document approval:	☒ Yes	☐ No			
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No			
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*			
Document purpose:	to present the main characteristics of ducting, for duct construction. It is associated to "*HVAC* duct calculations notes".				

Main items:	**Subject to be developed during:** Basic	Detailed
The document shows the following ducting standards (when used on project): o Details of duct longitudinal seam o Details of continuously welded ducting o Details of duct reinforcement o Details of duct flanges fixation to duct (according to duct wall thickness: light gauge ducting to light gauge ducting, heavy gauge ducting to heavy gauge ducting, light gauge ducting to heavy gauge ducting) o Details of flanges drilling, in accordance with duct dimensions o Details of flanges assembly, including gaskets o Details of branches with dimensions, radius and ratio according to air flow rates	☐	☒
o Rectangular, square and circular elbows with details of vanes		

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(number and radius of vanes have to be defined in a table or in a figure – Refer to SMACNA) o Duct transformation from rectangular to rectangular duct, from rectangular to square duct, from rectangular to circular duct, from square to circular duct and from circular to square duct o A60 *FIRE DAMPER* arrangement for deck and bulkhead o H60 *FIRE DAMPER* arrangement for deck and bulkhead o H120 *FIRE DAMPER* arrangement for deck and bulkhead		
Details of duct accessories: o Inspection access doors o Details of test holes (for temperature and pressure measurements, including location of duct and distance from elbows, *SHUT-OFF DAMPER*s, …) o Details of flexible ducts o Details of bird screen o Details of drain pans and siphons o Details of duct earthing point	☐	☒
Details of duct anti-vibration supports	☐	☒
Details of duct supports, including support details for insulated ducting	☐	☒

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3.4.28 *HVAC* ducting workshop drawings

Document title:	*HVAC* ducting workshop drawings				
***HVAC* Document number:**	HVA028				
Document to be provided for:	☐ Basic Engineering				
	☒ Detailed Engineering				
Document included within Call For Tender Documents:	☐ Yes	☒ No			
Document type:	☐ Calculation note	☐ Text, Report	☒ Drawing, sketch, layout		
	☐ Documentation	☐ Software listing			
Format of native file:	☐ Word	☐ Access	☐		
	☐ Excel	☐ Visio	☒ Autocad		
Native format to be provided for document approval:	☐ Yes	☒ No			
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No			
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*			
Document purpose:	To detail the detailed workshop documents for *HVAC* duct construction.				

Main items:	**Subject to be developed during:** Basic	Detailed
The document shall include the exhaustive list (documents titles, document tag number, revision number and revision date) of the following references documents: o Single lines diagrams for *HVAC* ducting o *HVAC* duct calculations note o *HVAC* ducting construction standards and typical. The document shall be A3 format, dwg type, one sheet per type of duct piece. By "type of duct piece", it has to be understood an elbow, a duct transformation, a straight duct, a division, etc. Each of these pieces represents a "type of duct".	☐	☒

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The following information shall be indicated for each type of duct:		
o The detailed drawing enabling the duct manufacturing, with dimensions. The fixed dimensions shall be indicated on the detailed drawings. For other sizes, depending on the considered piece of duct, sizes shall be referenced by a CAPITAL letter with a serial number (A1, A2, …)	☐	☒
o A table with the following columns: ▪ Tag number of duct piece (as per GS EP HVA 461) ▪ *"HVAC* duct to scale – Synthesis view" document number and sheet, where the piece of duct appears ▪ Values, in mm, of sizes marked by letters on the detailed drawings of the considered sheet ▪ Metallurgy, material ▪ Sheet metal nominal thickness, in mm ▪ Weight of duct piece, in kg ▪ Painting system applied on piece of duct (as per GS EP COR 350, GS EP COR 351)	☐	☒
o All required dimensions of duct piece for construction, included metal thickness	☐	☒
o Weight of piece of duct	☐	☒
o Metallurgy of duct piece		
<u>Important notes</u>: One document shall be provided for each of *HVAC* ductwork,(*EXTRACT* ducting is one ductwork, *SUPPLY* air ducting is another ductwork,...),,		

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3.4.29 System effects calculation notes

Document title:	Systems effects calculations notes				
***HVAC* Document number:**	HVA029				
Document to be provided for:	☐ Basic Engineering				
	☒ Detailed Engineering				
Document included within Call For Tender Documents:	☐ Yes	☒ No			
Document type:	☒ Calculation note	☐ Text, Report	☐ Drawing, sketch, layout		
	☐ Documentation	☐ Software listing			
Format of native file:	☒ Word	☐ Access	☐		
	☐ Excel	☐ Visio	☐ Autocad		
Native format to be provided for document approval:	☐ Yes	☒ No			
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No			
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*			
Document purpose:	to present the system effect calculation notes due to *HVAC* ducting arrangement.				

Main items:	**Subject to be developed during:** Basic	Detailed
The calculation method, for each system effect, shall be detailed, including algorithms, The reference document(s) shall be listed.	☐	☒
For each *FAN* connected to a ducting, the calculation note shall include:		
o Drawing with sizes of *FAN* air inlet(s), *FAN*s air outlet, outlet area, cut-off	☐	☒
o Detailed drawing with dimensions of arrangement for ducting /*FAN UNIT* (or *FAN* or *AHU*), or reference of the drawing if independent of the present document. The dimensions shall enable the system effect calculation	☐	☒
o The detailed calculation of each system effect, in accordance with the algorithms and drawings above listed.	☐	☒
The synthesis of system effect calculations for each *FAN UNIT*, *FAN*, *AHU* (table with equipment tag number and corresponding system effect).	☐	☒

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3.4.30 *OUTDOOR* air ducting design

Document title:	*OUTDOOR* air (*ODA*) ducting design					
***HVAC* Document number:**	HVA030					
Document to be provided for:	☐ Basic Engineering					
	☒ Detailed Engineering					
Document included within Call For Tender Documents:	☐ Yes	☒ No				
Document type:	☒ Calculation note	☐ Text, Report	☐ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☐			
	☐ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☐ Yes	☒ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to design the *OUTDOOR* air ducting system , taking into the account the gas detection response time, the gas damper closure type, the duct characteristics, etc, in order to close the gas damper before the gas reaches the considered gas damper.					

Main items:	**Subject to be developed during:** Basic	Detailed
Reference documents including: o Standards o Professional documents o Regulations o Codes o Other documents o General Specifications o Projects documents. Important note: only Reference documents used for understanding of this calculation note have to be indicated.	☐	☒
The basis of design taken into account for *OUTDOOR* air ducting calculation: air flow rate (including over-design), response time of equipment (gas detectors, gas dampers closure time, F&G response time,…	☐	☒

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Calculation note defining the *OUTDOOR* ducting length, ducting section . Optimized design (length / section) has to be provided in order to minimize the ducting weight.	☐	☒
OUTDOOR air inlet grille selection (air velocity through free area, pressure loss, noise level,…).	☐	☒
Coalescor filter selection,	☐	☒
Anti-blast damper selection, according to the blast characteristics (wave profile, duration of wave,…).	☐	☒
Calculation note in order to demonstrate the blast resistance of ducting.	☐	☒

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3.4.31 Battery room(s) *EXHAUST* air flow rate(s) calculation notes

Document title:	Battery room(s) *EXHAUST* air (*EHA*) flow rate(s) calculation note					
***HVAC* Document number:**	HVA031					
Document to be provided for:	☒ Basic Engineering					
	☒ Detailed Engineering					
Document included within Call For Tender Documents:	☐ Yes	☒ No				
Document type:	☒ Calculation note	☐ Text, Report	☐ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☐			
	☐ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☐ Yes	☒ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	This document presents the calculation of air flow rate(s) to be extracted from the battery room(s), in taken into account the characteristics and number of batteries.					

Main items:	**Subject to be developed during:** Basic	Detailed
Reference documents including: o Standards o Professional documents o Regulations o Codes o Other documents o General Specifications o Projects documents Important note: only Reference documents used for understanding of this calculation note have to be indicated.	☐	☒
Battery room *EXHAUST* air flow rate calculation method.	☒	☒

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Electrical characteristics of batteries to be considered for *EXHAUST* air flow rate calculations. For each type of batteries, the number of cells shall be indicated.	☐	☒
EXHAUST air flow rate calculation.	☐	☒

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3.4.32 Buffer tank(s) calculations

Document title:	Buffer tank(s) calculations					
***HVAC* Document number:**	HVA032					
Document to be provided for:	☒ Basic Engineering ☒ Detailed Engineering					
Document included within Call For Tender Documents:	☐ Yes	☒ No				
Document type:	☒ Calculation note	☐ Text, Report	☐ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☐			
	☐ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☐ Yes	☒ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to present the buffer tanks capacity calculations for chilled water system and gas supply.					

Main items:	**Subject to be developed during:**	
	Basic	Detailed
Reference documents including: o Standards o Professional documents o Regulations o Codes o Other documents o General Specifications o Projects documents. Important note: only Reference documents used for understanding of the present calculation note have to be indicated.	☐	☒

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Buffer tank capacity calculation method. For refrigerating system, the method shall be described and shall take into account the parameters of refrigerating system, temperature stability requirement, volume of media tout be cooled. For boilers, the calculation method shall consider the capacity of boiler(s), the capacity of piping supplying boilers. In case these above calculation methods require parameters from the *MANUFACTURER*s, these parameters shall be listed.	☒	☒
Data related to each refrigerating component enabling calculation of buffer tank(s) (volume of chilled water piping connected to evaporator, etc).	☐	☒
Estimated volume and dimensions of the buffer tanks	☒	☐
Buffer tanks calculation note for each refrigerating system.	☐	☒
Data related to each boiler room allowing calculation of gas buffer tank(s) (volume of gas piping supplying each boiler room,…)..	☐	☒
Buffer tank calculation note for gas supply to each boiler room.	☐	☒

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3.4.33 Utilities requirements for *HVAC*

Document title:	Utilities requirements for *HVAC*						
***HVAC* Document number:**	HVA033						
Document to be provided for:	☒ Basic Engineering ☒ Detailed Engineering						
Document included within Call For Tender Documents:	☐ Yes	☒ No					
Document type:	☒ Calculation note	☐ Text, Report	☐ Drawing, sketch, layout	☐ Documentation	☐ Software listing		
Format of native file:	☒ Word	☐ Access	☐	☐ Excel	☐ Visio	☐ Autocad	
Native format to be provided for document approval:	☐ Yes	☒ No					
Document has to be Approved For Construction before purchasing:	☐ Yes	☒ No					
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*					
Document purpose:	to summarize the utilities requirements for *HVAC* equipment.						

Main items:	**Subject to be developed during:** Basic	Detailed
This document includes a table indicating the utilities to be provided for *HVAC* equipment operation. This list shall include the requirements for the following fluids: o Power supply(ies) (voltage and absorbed power), o Water (industrial water) (pressure and flow), o Sea water (pressure and flow), o Compressed air (pressure and flow). A similar table to the hereafter tables shall be provided of each fluid which is not listed above.	☒	☒
For each battery limit, a battery limit tag number shall be indicated. Typical tag number shall be HVAC-BL-yy-xxx where yy corresponds to the fluid designation and xxx corresponds to the serial number.	☒	☒

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The following data shall be indicated for power supply: o Battery limit tag number (HVAC-BL-PS-001 to HVAC-BL-PS-999) o Tag number of each equipment to be supplied o Equipment designation o Equipment location o Voltage o Frequency o Power rating o Absorbed power o Starting current o *DUTY RATIO* o Tag number of cabinet supplying the equipment The above list shall include the power supply for *HVAC* equipment (*HVAC CC*, *HVAC MCC*, fire /gas dampers, *HVAC* motors supplied from main switchboards, duct heaters, *HVAC* distribution boards, etc). For each data, a grand total shall be calculated for absorbed power and absorbed power with *DUTY RATIO.*	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☒ ☒ ☒ ☒ ☒ ☒ ☒ ☒ ☒ ☒ ☒
The following data shall be indicated for water supply: o Battery limit tag number (HVAC-BL-UW-001 to HVAC-BL-UW-999) o Tag number of each equipment to be supplied o Water quality o Minimum pressure at battery limit o Maximum pressure at battery limit o Minimum temperature at battery limit o Maximum temperature at battery limit o Required water flow rate at battery limit o Water consumption (m^3/day). For each data, a grand total shall be calculated for water flow rate and water consumption with *DUTY RATIO.*	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☒ ☒ ☒ ☒ ☒ ☒ ☒ ☒ ☒

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The following data shall be indicated for sea water:		
o Battery limit tag number (HVAC-BL-SW-001 to HVAC-BL-SW-999)	☐	☒
o Tag number of each equipment to be supplied	☐	☒
o Sea water quality (filtration, chlorination,...)	☐	☒
o Minimum pressure at battery limit	☐	☒
o Maximum pressure at battery limit	☐	☒
o Minimum temperature at battery limit	☐	☒
o Maximum temperature at battery limit	☐	☒
o Required sea water flow rate at battery limit	☐	☒
o Water consumption (m^3/day).	☐	☒
For each data, a grand total shall be calculated for water flow rate and water consumption with *DUTY RATIO.*		
The following data shall be indicated for compressed air (instrument air):		
o Battery limit tag number (HVAC-BL-IA-001 to HVAC-BL-IA-999)	☐	☒
o Tag number of each equipment to be supplied	☐	☒
o Air quality	☐	☒
o Minimum pressure at battery limit	☐	☒
o Maximum pressure at battery limit	☐	☒
o Minimum temperature at battery limit	☐	☒
o Maximum temperature at battery limit	☐	☒
o Dew point at battery limit	☐	☒
o Required compressed air flow rate at battery limit	☐	☒
o Compressed air consumption (Nm^3/day), for normal operation	☐	☒
o Compressed air consumption (Nm^3/day), for start-up, black start, etc.	☐	☒
For each data, a grand total shall be calculated for water flow rate and water consumption with *DUTY RATIO.*		

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Document title:	*HVAC* Automation philosophy					
***HVAC* Document number:**	HVA034					
Document to be provided for:	☒ Basic Engineering ☒ Detailed Engineering					
Document included within Call For Tender Documents:	☒ Yes	☐ No				
Document type:	☐ Calculation note	☒ Text, Report	☐ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☐			
	☐ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☐ Yes	☒ No				
Document has to be Approved For Construction before purchasing:	☒ Yes	☐ No				
☒ Document to be provided by *HVAC CONTRACTOR*	☐ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to define the architecture and the operating principles of the *HVAC* systems..					

Main items:	**Subject to be developed during:** Basic	Detailed
This document shall define the different *HVAC* systems to be provided in order to deliver the functionalities required from *HVAC* equipment. In case several systems are provided, an exhaustive list rooms to be served by each *HVAC* system shall be provided.	☒	☒
The procedure for start-up of each *HVAC* system shall be detailed for each operating mode of the plant: during towing, black start, normal operation,…	☒	☒
The interlocks with Fire & Gas System shall be described for each *HVAC* system.	☐	☒
For each operating mode of the plant (black start, normal operation, emergency situation,…) the status (ON / OFF) of each *HVAC* system shall be defined.	☒	☒
The monitoring of the *HVAC* system shall be described in order to ~~give~~ provide a list of measurement, data, events that will be monitored for helping in operation, maintenance, trouble shooting. a sufficient perception of the functionalities offered by the *HVAC* control system	☒	☒

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3.4.34 Factory compliance tests report for *AIR HANDLING UNIT*(s)

Document title:	*FACTORY COMPLIANCE TESTS* report for *AIR HANDLING UNIT*(s)					
***HVAC* Document number:**	HVA164					
Document to be provided for:	☐ Basic Engineering					
	☒ Detailed Engineering					
Document included within Call For Tender Documents:	☒ Yes	☐ No				
Document type:	☐ Calculation note	☒ Text, Report	☐ Drawing, sketch, layout			
	☐ Documentation	☐ Software listing				
Format of native file:	☒ Word	☐ Access	☐			
	☒ Excel	☐ Visio	☐ Autocad			
Native format to be provided for document approval:	☐ Yes	☒ No				
Document has to be Approved For Construction before purchasing::	☐ Yes	☒ No				
☐ Document to be provided by *HVAC CONTRACTOR*	☒ Form produced by *HVAC CONTRACTOR*, filled-up by *MANUFACTURER* and *HVAC CONTRACTOR*	☐ Document to be provided by *MANUFACTURER*				
Document purpose:	to prepare the report to be issued by for the *MANUFACTURER* of *AIR HANDLING UNIT*(s), after *FACTORY COMPLIANCE TESTS* of *AIR HANDLING UNIT*(s)					

Main items: The document shall be prepared to define the main sections to be developed by the *AHU*s *MANUFACTURER*. The minimum content of the document is the following:	**Subject to be developed during:** Basic	Detailed
Reference Documents Reference documents shall include: o Standards o Professional documents o Regulations o Codes o Other documents o General Specifications o Projects documents. Important note: only Reference documents used for Factory Compliance Tests have to be indicated.	☒	☒

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Equipment tested. This section lists the equipment tested in Factory. For each tested equipment, the following information has to be indicated: o equipment tag number, o equipment designation, o purchase Order Specification number and revision number, o date of purchasing, o *AHU MANUFACTURER* serial number.	☐	☒
List of the tests. The exhaustive list of the tests has to be provided (performance measurements, checking, compliance with specifications and with document listed in Reference Documents section, …).	☐	☒
Description of Factory equipment used for the tests. This section describes the equipment installed in Factory in order to perform the tests. The principles of the measurement and a description of the procedures for measurement, operation and/or functional tests to be performed, shall be detailed in this section. P&ID and/or *D&ID* of tests arrangement indicating all instruments for measurements. Equipment arrangement, instruments for measurement shall be indicated on these documents. Instruments tag numbers (as per calibration sheets) shall be indicated.	☐	☒
Calculation method. The calculation method to be used for performance calculation shall be detailed. Uncertainty calculation shall be detailed every time instruments and measurement tools must be used.	☐	☒
Measurement conditions. The conditions of measurement (temperature, pressure, flow,…) shall be detailed for each performance test. They shall correspond to the design data for the concerned equipment, as per project calculation notes, General Specifications, etc. It is paramount to note that the measurement conditions shall include the over-design.	☐	☒
Certification of laboratory procedures according to NF EN ISO/CEI 17025 or identity of certifying authority covering the tests. The certificates to be provided shall be listed in this section. The certificates, provided by the MANUFACTURER, shall be attached to the report, in annexes.	☐	☒
Measurements et checking results. Measurement and checking shall be reported in this section. Performance result and uncertainty shall be compared to the expected performance. In case of performance / checking are not compliant with the expected performance of the equipment, a punch list shall be produced and attached to the report.	☐	☒

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Annexes	☐	☒

4. Other references

Following Total General Specifications are applicable: GS EP EXP 101, GS EP EXP 103, GS EP EXP 105, GS EP EXP 107.

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