Reconstruction of the Québec Grande Allée Armoury

Commissioning plan

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Introduction

The Quebec Grande Allée Armoury dates from 1887. It is a Canadian historic site and a national heritage building, especially because of its castle-like architecture. Unfortunately, in 2008, it was heavily damaged by fire. Since then, the Canadian government has undertaken restoration work and tried to adapt it by harmonising its mission to the environment.

In that sense, Public Works and Government Services Canada (PWGSC) required the production of a technical program, published in 2011. The project guidelines being set, its implementation was entrusted to a consortium of architects and a set of engineering consulting firms including: BPR (civil engineering, structure), Pageau Morel (HVAC, regulation) and Dessau (Plumbing, fire protection and electrical systems).

The different steps of the project are grouped in terms called required services (RS). At the time of drafting the initial version of the commissioning plan, the RS0 : Concept development, the RS1 : Project requirements analysis and the RS2 : Conceptual design were completed. From a sustainable development viewpoint (RS9), an analysis of the project is made according to the Green Globes certification. The commissioning is part of the recommendations of this program.

The commissioning plan is made at the same time as the development of design (RS3). Its function is mainly to describe everyone’s role as well as to define the procedures and deliverables to include in the construction documents that are produced in step RS4. This sets up the stage called « Commissioning of the facility » (RS7) which is undertaken from an advanced stage of construction (RS6).

1 Commissioning Objective

The commissioning objective is to verify and ensure that the entire building is designed, constructed and calibrated to operate as intended. In addition, the commissioning plan is used to ensure that the entire building, all its systems and the commissioning process itself, have been fully documented.

Commissioning is a joint effort of all the stakeholders involved in the project from the main intention of a client to start a project until it's final completion by the construction team. Plus, it exceeds the expectations of a traditional site supervision by verifying facilities and systems performance on an individual basis and in between all different system interactions.

Most importantly, commissioning includes the electromechanical and architectural elements that have an impact on the energy performance of the building and the comfort of its occupants. Other elements may be included in the commissioning process depending on the clients' requests or if they are believed to have an impact on the global performance of the building.

2 Commissioning Scope

Commissioning was first introduced to Public Works and Government Services Canada (PWGSC) over a decade ago. Given their importance, it is required in all projects managed by PWGSC, as stipulated in the 2011 Commissioning Policy.

A commissioning plan is produced in parallel with the project's design. Targeted systems are usually grouped into three categories. A few examples are listed here as reference only.

2.1 Architectural and Structural Systems

- accessibility (vertical transportation systems);
- exterior envelope;
- special access doors for laboratories.

2.2 Mechanical Systems

- ventilation and exhaust systems;
- hydronic networks;
- plumbing and accessories;
- HVAC controls;
- special fire protection systems.

2.3 Electrical Systems

- distribution networks (transformers and switches);
- electric power and accessories;
- emergency power systems;
- lighting systems and equipment.

The systems covered by a given project depends on its size, importance and specific objectives. In the case of the Armoury, the section 5 of this commissioning plan details the list of the targeted systems and will be updated as the design progress.

3 Roles and Responsibilities

3.1 Main Stakeholders

This commissioning plan is mainly intended to its team members which is composed of several stakeholders whose roles are described in this section.

Departmental Representative (DR)

This person has the overall responsibility to manage the project and is the only contact for the client, the PWGSC commissioning manager, the consultants, the commissioning agent, and all other project team members.

PWGSC Commissioning Manager (CM)

The manager makes sure that the deliverables are quality reviewed and examines the commissioning materials on every stages of the project. He attends every tests, adjustments, and balancing procedures (TAB). If the tests are postponed for some reasons such as seasonal issues, the CA has to reschedule them in order to be able to meet the required conditions.

The Consultant (C) (PAGEAU MOREL, DESSAU, BPR, ARCOP, DFS, STGM)

The Consultant designs the installation according to the client's functional and operational requirements while respecting the initial budget. Plus, he prepares the working documents and includes the commissioning documentations to the construction scope of work. He develops the performance audits criteria and works on the development of solutions for the problems encountered in the commissioning. The production of the "as built" plans are also part of his responsabilities.

The Consultant's Commissioning Agent (CA) (Pageau MOREL, DESSAU)

The CA prepares the commissioning and training plans, produce the installation and startup lists as well as the performance verification forms (PV). He collaborates in the conception of the building management manuel (BMM) and verifies the accuracy of submited reports of every tests and start-up activities. Also, he is responsible for the planning of the commissioning activites in collaboration with the CCR and witnesses each system performance evaluation.

The Construction Team (CT)

The team consist of the contractor, the subcontractors, the suppliers, and various trade suppliers. They are responsible for the construction/installation in accordance with the contractual documents. Also, they solve the issues related to commissioning and performs the needed adjustments. Plus, while under the supervision of the contractor's commissioning

representative (CCR), the team is responsible of every tests and training as well as the delivery of all required commissioning documents.

The Contractor's Commissioning Representative (CCR)

This person is designated by contractor and must demonstrate its expertise in the field of commissioning. He works in collaboration with the CA on the planification and coordination of the commissioning activites.

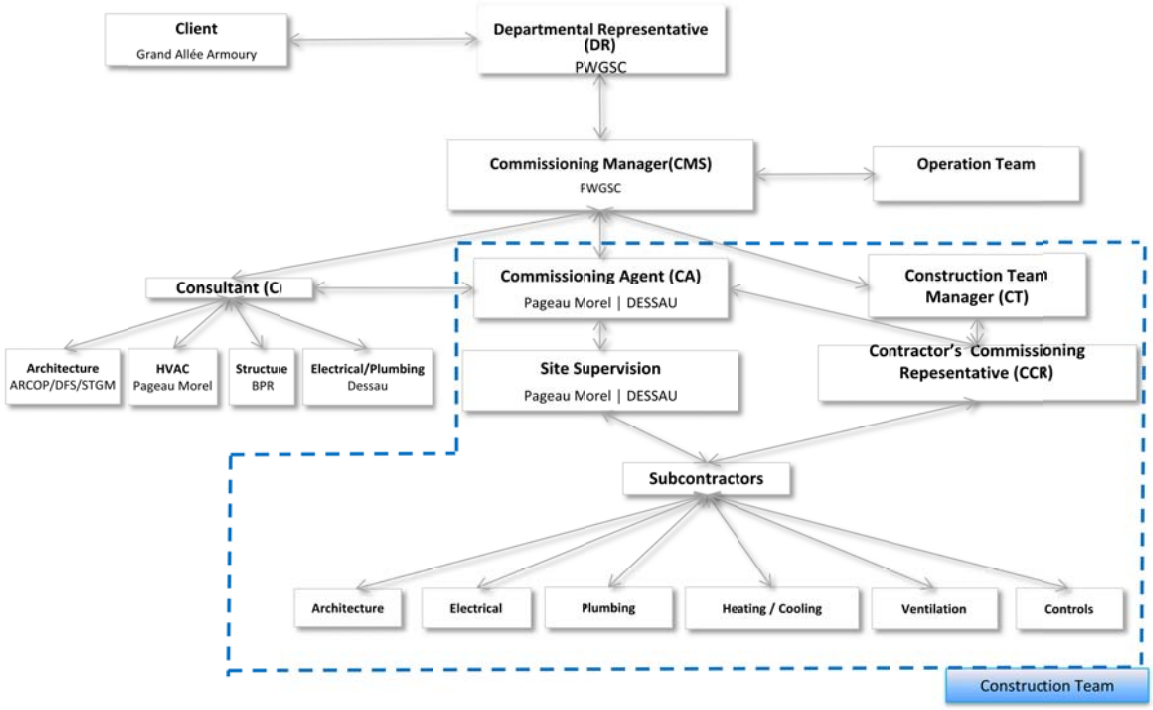
The CCR's responsibility is different from the one of the contractor's site supervisor. He reviews the commissioning plan, forms, and lists, and ensures their understanding by the subcontractors. The CCR produce the commissioning schedule and executes all the commissioning activities required in the technical specifications. His role includes the completion of the installation lists, the PV and the PI forms of every installed systems. He receives and analyses the testing, adjusting and electromechanical balancing reports submitted by the subcontractors. The CCR prepares the building's operation manual which will be included in the BMM. Also, he implements the training plan and is available to provide emergency services during the first year of occupation to make the needed adjustments and modifications that are not part of the responsibilities of the operation and maintenance staff.

Other Specialists

It is possible for some manufacturer representatives or other specialists to be invited to participate in certain stages of commissioning.

3.2 Stakeholder Organizational Flowchart

The chart below is a graphic representation of the various commissioning team members presented in section 3.1.



3.3 Communication Protocol

During the project, the main forms of communication will be minutes of meeting, site visit reports, field directives, changes, and emails. The implementation and availability of a FTP site makes the information and documents available to everyone.

To maintain an efficient structure, as well as traceable events and decisions, the following table presents the communication protocol to be followed.

Request for information or formal request of documentation:	The Commissioning Agent (CA) communicates directly with the Construction Team, subcontractors or consultants.
Request for information or minor clarification:	The CA speaks directly to the concerned party.
Deficiency statement for subcontractors:	The CA documents deficiencies for the commissioning team. The CA can also directly discuss it with subcontractors before notifying the team.
Planning tests or training:	The coordination between each activities is done by the CCR and CA. Although, the planification and production of the schedule is the CCR's reponsability.
Planning commissioning meetings:	Meeting dates are proposed by the CA and the CCR notifies commissioning team members.
Request for major change:	The CA does not have the authority to issue change requests.
Minor change to sequence:	The CA cannot modify operation sequences without Consultant (C) approval.
Disagreement between subcontractors and commissioning agent:	Attempt to resolve with the CA. If necessary, the CCR can mediate between parties.
Communications between Commissioning Manager, Consultants and Construction Team:	Communication via the Departmental Representative (DR).
Communication between Departmental Representative (DM) and Consultant (C):	The communication is done via the CM in the case of operational questions. No circumstance may justify jeopardizing the building's operation without the DR's approval, obtained by the applicable mode of communication.

4 Commissioning Phases

Ideally, the commissioning is part of all stages of a project. The subdivisions presented here summarize the key activities and deliverables of some phases.

4.1 Predesign and Design

It is essential that all consultants include the commissioning procedures and criteria in their construction documents. The specifications will include the description of the required documents. The CA's participation might be required for the three following categories:

1. The acceptance of equipments requires the submission of the product information records (PIR); these records include construction type, nameplates, data, as well as all other informations related to their purchase. This information is required for the submited documents such as shop drawings, records, and equipment requirements.
2. Static tests, or preliminary startup tests, are determined for the concerned material; they are recorded in a sheet called installation and startup list (IL). Their completion certifies that separate pieces of equipment or systems are compliant and that startup can begin. Examples of IL forms are enclosed with the specifications. The contractor is responsible for completing or producing IL forms as needed. Preparing these documents requires the participation of the Consultants' design team.
3. As the design gradually becomes detailed enough, the commissioning plan is revised to include testing provisions of all parameters and to follow the full range of operating conditions. Testing results are recorded in performance verification reports, which are detailed in the technical specifications.

During the tender process, it is the Contractor's responsibility to consult the commissioning documents and procedures and to be sure to understand the scope of work.

The CA drafts the commissioning plan during the design phase. This tool defines the approach, the roles of the stakeholders and the list of deliverables. It will be regularly revised according to the project's progress.

4.2 Construction

A commissioning startup meeting is recommended at the start of construction. It allows the commissioning team members to validate their interpretation of the different tasks and to discuss about the commissioning schedule. The final version of this schedule will be proposed

by the contractor via its Commissioning Representative (CCR). The following meetings can be combined with site meetings.

Changes and problems encountered during construction should be recorded and documented with a solution in a register. This differs from a list of deficiencies, it is a document that will be part of the building management manual. A register entry template is provided in Appendix 1.

4.2.1 Supply, Installation and Startup of Components

The objective at this stage is to ensure that each system is complete, safe to use and ready for priming. As the construction goes on, the CCR will collaborate with the subcontractors to provide the product information data sheets and help them to complete the installation and startup lists as well as every other required documents. As stated in the specifications, this set of documents includes, but is not limited to:

- Identification, location and access of elements and components.
- Pressure testing of networks (fluids and air).
- Cleaning equipment and networks.
- Supports and suspension (vibration, acoustics, seismic).
- Connections and interlocks (electrical, controls, alarms, etc.).
- Other (plans, specifications, manufacturer special requirements, etc.).

When construction is sufficiently advanced and the installation and startup lists (IL) have been completed, equipments and subsystems performances tests can be performed. The results will be included in the appropriate PV forms.

4.3 Commissioning

Performance testing of integrated systems start when the startup of their components have been completed and documented. The performance of certain elements must also have been demonstrated and reported in the provided forms. This has also been verified by the CA and approved by the CM.

Testing of integrated systems will first validate the performance and compare with the criteria set by designers according to user identified needs. Complementary to initial startup, they also aim to adequately perform operation adjustments, balancing equipments and systems, as well as calibrating, in order to achieve optimal operation of the electromechanical elements, not only individually, but as an integrated package. These tests are documented in the commissioning records.

This stage includes all stakeholders and is not the sole responsibility of the controls section. The CM coordinates activities with those responsible for supplying and installing components, equipment, and systems, as well as other stakeholders who have a link, one way or another, with the installation and operation. PV forms are prepared by the Contractor, verified by the CA, and finally approved by the CM. These tests must be performed in the presence of the CA or the CM.

The analysis and acceptance of commissioning reports of large integrated systems in a timely manner will facilitate optimal conditions. It is possible that certain tests may have to be postponed, e.g. for seasonal conditions. However, their completion will follow the same procedures as testing at the end of construction.

4.4 Manuals

The operation and maintenance manual (OMM) is assembled from data produced by the contractor and must be written and completed at 90% before the static completion of construction. It is handed to the commissioning agent for review and acceptance. This manual must at least contain the following:

- Verified shop drawings (signed and dated).
- Compliance certificates, various acceptance letters and warranties.
- Specifications on operation and maintenance of equipment, including:
    - maintenance schedule;
    - lists of spare parts;
    - troubleshooting guides, etc.
- Training program (content, attendance sheets, etc.).
- All forms, tables, reports, installation tests and performance verification.

The building management manual is also assembled and includes the OMM. The manual is also revised during the recommissioning of the building's systems when occupants' needs will have significantly changed.

The manual must be part of the training program and should be adjusted following the comments from the people receiving the training.

4.5 Training

The construction team must schedule training sessions for the owner's operation and maintenance staff. The schedule and content of these sessions must be sent to the CM who will record this information and the list of participants in the management manual.

Each training session must at least cover the following:

- demonstration on how the equipments and systems work;
- description of the equipments and systems;
- operating procedures;
- maintenance by the operator of the building;
- maintenance provided by the manufacturer;
- regular and special tools for routine maintenance of the equipment;
- available spare parts from the manufacturer and delivery schedule of the other parts;
- acceptable tolerances for the adjustments of the equipments;
- the extent of the equipment warranty;
- a review of operations and maintenance data;
- procedures for startup and shutdown;
- emergency procedures.

This summary does not replace the special indications in the training specifications.

4.6 Significant Completion and Occupation

When approaching the end of construction works, "as built" drawings are produced by consultants and end of warranty examinations are made. If adjustments are necessary, they are performed by the contractor in conjunction with the consultants. The CA participates in the revision of these steps.

In collaboration with the contractor and its CCR, the CA prepares a commissioning report that collects the tests results, the changes that have been made and a list of the problems encountered and their solutions. The unresolved cases are included and documented. In the case of enhanced commissioning, the report also describes the training activities and design reviews (see section 4.1). After all, it is sent to the CM for review and approval.

4.7 Closure of the Commissioning

Once all the required commissioning activities are completed by the CT, the CM must have all final documents delivered to the CA. The CA will then review the documents and assemble the manuals and reports before sending them to the client.

4.8 Responsibility Matrix

The following table describes the roles and responsibilities of the various stakeholders presented in section 3.1 in relation to the steps described earlier in chapter 4.

Legend

R	Responsible for the activity	**CM**	PWGSC Commissioning Manager
A	Acceptance	**CT**	Construction Team
I	To inform	**C**	Consultant
V	Verification/ comments	**CA**	Commissioning Agent
C	Consult, assist and supply information	**CCR**	Contractor's Commissioning Representative

CONCEPT	CM	CA	C	CCR	CT
Development of the commissioning plan	**A**	**R**			
Functional program approved by the owner	**A**		**R**		
Preparation of the basis of design (BOD) parameters	**R**				
Review owner's requirements versus basis of design	**R/A**	**C**	**C**		
Preliminary drafting of commissioning clauses to be included in the specifications	**V**	**C/A**	**R**		
Design review versus the 50% commissioning plan, and production of a report from this review	**R**		**C**		
PLANS AND SPECIFICATIONS	**CM**	**CA**	**C**	**CCR**	**CT**
Drafting of the final commissioning clauses to be included in the tendering documents	**A**	**V/C**	**R**		
Preparation of the commissioning records to include them in the documents for the calls for tenders	**A**	**R**	**C**		
Preparation of the performance verification sheets to be included in the tender documents	**A**	**R**	**C**		
Review of the tendering documents versus the commissioning plan	**R**		**C**		
Review of tender documents that are nearly completed (between 75% and 90%) and producing a report of this review	**R**		**C**		
Final review of tender drawings and producing a report of this review	**R**	**A**	**C**		
Updating the commissioning plan (if necessary)	**A**	**R**			

CONSTRUCTION	CM	CA	C	CCR	CT
Review of construction documents	R	C	C	C	C
Identification of the stakeholders involved in the project (contractor, subcontractors, professionals, maintenance staff)	C	R			
Review of the commissioning requirements with the stakeholders	C	R	C	C	C
Analyzing tender documents containing elements included in the commissioning plan	A	V			
Updating the commissioning plan (if necessary)	A	R			
Establishing the commissioning schedule	A	V		R	C
Shop drawings (analysis)		V		R	
Factory testing		V	V	C	R
Product information record (completion)		V		V	R
Producing detailed testing procedures	I	V	I	R	C
Pre-startup inspection		V	C	R	
Pre-startup testing		V	C	R	
Operating and maintenance manual (preparation)	A	V		R	C
Drafting the training plan for operators and occupants	A	V		R	C
Tracking changes during construction and their impacts on the needs identified by the Owner, the concept developed by the Consultants, the functionality, operability and reliability of the equipment, etc.	C	V	R	C	C
Equipment startup		V	I	C	R
Updating the commissioning plan following changes	A	R			
COMMISSIONING	**CM**	**CA**	**C**	**CCR**	**CT**
Providing as-built documents	A	V final review	V 1st review		R
Operating and maintenance manual (final version)	A	V		R	C
Warranty	A	V 2nd review	V 1st review	C	R
Certificate of calibration of the measuring equipment used for the tests	A	V		R	
Commissioning record (completion)	A	V		R	C
Verification of performances and operating parameters versus the design parameters	A	V	I	R	
Random verification of conformance of installation, operation and commissioning of the equipment and the documents	A	R		C	C
Final commissioning report and documentation	A	R	C	C	
MANUALS AND TRAINING	**CM**	**CA**	**C**	**CCR**	**CT**
Training	C	V		R	C
Preparing a descriptive/operations manual, including recommissioning ideas	A	R	C	C	C

COMPLETION SIGNIFICATIVE ET OCCUPATION	CM	CA	C	CCR	CT
Warranty followup		**R**			
Review of the performances and deficiencies identified and establishment of a plan in the first year following completion of the work	**A**	**V**			**R**
Compilation of complaints and corrective actions	**R**	**C**	**I**		
Production of a final commissioning report including followup	**A**	**R**	**C**	**C**	**C**
Additional documentation (if necessary)		**R**	**C**	**I**	

5 Planned Commissioning

Construction works will include, but not be limited to, the commissioning for the following items. The equipments and tests are indicated for the current status of design, which may change during the project.

Mechanical

- Ventilation systems series 10x to 70x (over then 28 systems)
  - ✓ Variable speed drives and ventilators;
  - ✓ Motorized dampers;
  - ✓ Humidifier;
  - ✓ Heating, chilling, and recovery coils;
  - ✓ Terminal units.
- Geothermal network
  - ✓ Headers and wells
  - ✓ Variable speed drives and pumps
  - ✓ Expansion tanks;
  - ✓ Plates heat exchangers;
  - ✓ Feed pumps (make-up).
- Central plant (heat pump network)
  - ✓ Heat pumps;
  - ✓ Chillers and cooling towers;
  - ✓ Stockage tanks (hot / cold)
  - ✓ Condensation boilers;
  - ✓ Variable speed drives and pumps;
  - ✓ Plates heat exchangers;
  - ✓ Feed pumps (make-up);
  - ✓ Filtration;
  - ✓ Expansion tanks.
- Heating and perimeter
  - ✓ Variable speed drives and pumps;
  - ✓ Plates heat exchangers;
  - ✓ Radiators;
  - ✓ Fan coils.
- Domestic water
  - ✓ Piping (REC, DHW, DCW);
  - ✓ Pumps
  - ✓ Backflow preventers;
  - ✓ Hot water heaters.
- Drainage
  - ✓ Sum pumps;
  - ✓ Piping

- Special Piping
  - ✓ Storage tanks;
  - ✓ Natural gas;
  - ✓ Oil.

Electrical

- Generator set
  - ✓ Generator;
  - ✓ Transfer switch;
  - ✓ Cables and distribution.
- Lighting
  - ✓ Fixtures and accessories;
  - ✓ Controls and network;
  - ✓ Security.
- Distribution
  - ✓ Panels;
  - ✓ MCC;
  - ✓ Starters;
  - ✓ Transformers;
  - ✓ Testing.
- Fire alarm
  - ✓ Panels and network;
  - ✓ Detection loop;
  - ✓ Signal loop.

Fire Protection

- Water base sprinkler system;
- Dry based sprinkler system;
- Fire pump and accessories.

Power Management System

- Architecture
  - ✓ Configuration/network;
  - ✓ Communication and protocol.
- Adjusted sequences for all equipments
  - ✓ Completion tests after installation (static tests: physical verifications and calibration) and final tests before startup (point-by-point verification);
  - ✓ Sequence testing (dynamic tests);
  - ✓ Final functional tests (study of trends recorded over 30 days).

As the construction documents are prepared, a detailed system followup list of commissioned systems will be issued. It is annexed to this plan (Appendix 2). The followup list will indicate

which components require an installation/startup list and a performance verification (PV) form. In addition, the definition of commissioned integrated systems and the procedure will be outlined.

APPENDIX 1
TEMPLATE OF A CHANGE REGISTRY ENTRY

CHANGE/PROBLEM REGISTRY ENTRY

Project : Reconstruction of the Grande Allée Armoury in Québec	**Number : 2631-000-SR7**
Update :	**Page 1 of 1**

Number	Date	Description	Intented to	Correction accepted

APPENDIX 2
FOLLOWUP LIST OF COMMISSIONED EQUIPMENTS AND SYSTEMS

Reconstruction of the Grande Allée Armoury in Québec

2631-000-SR7 / Commissioning

Revision 0

Commissioning - Follow-up list

Systems	Equipments	Identification	Location (room)	Shop Drawing documented	Installation					Startup		Balancing			Performance		Training		Comments
		Plans/Specs			Plumbing	Ventilation	Controls	Electrical	Accepted	Completed	Accepted	Air	Liquid	Accepted	Completed	Accepted	Needed	Completed	
Ventilation																			
VENTILATION																			
Comments:																			
Piping																			
Heating / Cooling																			
Comments:																			
Plumbing																			
Plumbing																			
Comments:																			
Electrical																			
Electrical																			
Comments:																			

APPENDIX 3
FLOW DIAGRAMS AND VARIOUS SYSTEMS

PAR PLOMBERIE
BY PLUMBING

VERS DRAIN
TO DRAIN

ERS

EC1-ERS-B00

PO1-XXX-B00

EC2-ERS-B00

UNITÉS DE REFROIDISSEMENT DES CHAMBRES FROIDES
COLD ROOM CHILLER UNIT

SG1-100-B00

SG1-200-C01

PO3-GLY-B00

PG1-GLY-B00

PRESSURISATION DE GLYCOL - PROPYLÈNE 45%
GLYCOL PRESSURISATION - PROPYLENE 45%

RD1-GLY-B00

PO1-GLY-B00

PO2-GLY-B00

EC1-GLY-B00

EC2-GLY-B00

GLF

CBT

N.F.

N.O.

SYSTÈME D'ALIMENTATION DE PRODUITS CHIMIQUES
CHEMICAL PRODUCTS SYSTEM SUPPLY

TC1-TR1-B00

TC1-TR2-B00

PO1-TR1-B00

PO1-TR2-B00

PO1-FS1-B00

FS1-TR1-B00

FILTRE À SABLE
SAND FILTER

VERS DRAIN
TO DRAIN

PO1-FS2-B00

FS2-TR2-B00

FUTUR

REFROIDISSEUR
CHILLER

RF1-GLF-B00

RF2-GLF-B00

PO1-RF1-B00

PO2-RF1-B00

EVAP

COND.

TP1-ERP-B00

TP2-ERP-B00

TP3-ERP-B00

TP4-ERP-B00

TP5-ERP-B00

PO1-TP1-B00

PO2-TP1-B00

PO1-TP2-B00

PO2-TP2-B00

PO1-TP3-B00

PO2-TP3-B00

PO1-TP4-B00

PO2-TP4-B00

PO1-TP5-B00

PO2-TP5-B00

ET

EC1-CBT-B00

RS1-CBT-B00

RESERVOIR D'EAU CHAUDE
HOT RESERVOIR

RD1-CBT-B00

PO2-CBT-B00

PO1-CBT-B00

RS1-GLF-B00

RESERVOIR D'EAU GLACÉE
ICE RESERVOIR

PO3-GLF-B00

PG1-GLF-B00

RD1-GLF-B00

PRESSURISATION DE GLYCOL - PROPYLÈNE 33%
GLYCOL PRESSURISATION - PROPYLENE 33%

PO2-GLF-B00

PO1-GLF-B00

SECTEUR OUEST
SECTOR WEST

TOUR D'EAU INTÉRIEURE
INTERNAL WATER TOWER

TR1-ETR-C03

TR2-ETR-C03

AIR EXTÉRIEURE
OUTDOOR AIR

ENP

SECTEUR EST
SECTOR EAST

CH1-CBT-A00

CHAUDIÈRE CONDENSATION
BOILER

PO1-CH1-A00

CH2-CBT-A00

PO1-CH2-A00

GEOA

GEOR

PO1-GEO-B00

PO2-GEO-B00

PUITS DE GÉOTHERMIE
GEOTHERMAL WELL

P03-GEO-B00

RD1-GEO-B00

PG1-GEO-B00

PRESSURISATION DE GLYCOL - PROPYLÈNE 33%
GLYCOL PRESSURISATION - PROPYLENE 33%

FILTRE

STATION DE COUPON DE CORROSION
CORROSION COUPON RACKS

DRAIN

CONTRE-PASSE D'ALIMENTATION DE PRODUITS CHIMIQUES
CHEMICAL PRODUCT DISTRIBUTION BYPASS

EC1-GEO-B00

(TYP.)

3 DÉTAIL
DETAIL
ÉCHELLE / *SCALE* AUCUNE / *NONE*

MÉCANIQUE

PLAN-CLÉ
KEY PLAN

AILE EST | BÂTIMENT CENTRAL | AILE OUEST

FOYER
SALLE MULTI
BLOC OUEST
RDN
ZM
CG
TM
TM

CE PLAN NE DOIT PAS ÊTRE UTILISÉ À DES FINS DE CONSTRUCTION.

THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.

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SCEAUX / *STAMPS*

No	Description / Révisions / Revisions	Date
C	Émis pour SR4 - 80% / Issued for SR4 - 80%	14-10-31
B	Émis pour SR4 - 50% / Issued for SR4 - 50%	14-08-15
A	Émis pour SR3 - Préliminaires / Issued for SR3 - Preliminary	14-03-31

Projet / *Project*

TPSGC / *PWGSC*

805 AVENUE WILFRID LAURIER,
QUÉBEC G1R 5B8

RECONSTRUCTION DU MANÈGE MILITAIRE DE LA GRANDE ALLÉE DE QUÉBEC

RECONSTRUCTION OF THE GRANDE ALLÉE ARMOURY

Dessin / *Drawing*

TUYAUTERIE DIAGRAMME

HEATING AND COOLING DIAGRAM

Conçu par / *Designed By*	J.F.DE.
Date / *(aaaa/mm/jj)*	
Dessiné par / *Drawn By*	S.M.
Date / *(aaaa/mm/jj)*	
Approuvé par / *Approved By*	S.LE.
Date / *(aaaa/mm/jj)*	
Soumission / *Tender*	EMISSION SR4 - 80%
Administrateur de projets / *Project Manager*	
No du projet / *Project no.*	R.0035921.300
No du projet / *Project no.*	X:2631-000-00
TPSGC / *PWGSC*	Client / *Client*
Nom du fichier / *File name*	M-350-MT-M-DG01
Échelle / *Scale*	AUCUNE / NONE
No de plan ou dessin / *Drawing or plan no*	MT-M-DG01
No de la feuille / *Sheet no.*	M-350

MODIFIÉ / *MODIFIED*

2011/07/29

TPSGC-PWGSC A0 (1189x841)

0 10 20mm 40 60 80 100 120 140 160 180 200mm

SECTEUR EST
EAST SECTOR

SECTEUR CENTAL
CENTRAL SECTOR

SECTEUR OUEST
WEST SECTOR

ÉTAGE 4

ÉTAGE 3

ÉTAGE 2

RDC

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
404-01

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
404-02
ESC-4

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
303-01
303-02

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
300-02
303-03

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
203-05
203-06

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
203-01

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
200-02
202-01
202-02
203-13
203-15
203-17

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
203-21

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
203-01
203-03
203-04

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
103-06a
103-06b
103-06c
103-07

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
103-09
103-10a
103-10b
103-11
103-12
103-14
103-15

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
103-02
103-03
103-04

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
ESC-3
103-16
103-17
103-18
103-19

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
100-04
100-06
100-07

SC1-110-A01

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
S102-03
S102-04

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
S102-02

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
S102-05
S102-06

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
S100-01
S100-03

VC1-112-A09

VC1-108-A04

VC1-108-A02

VC1-109-A02

VC1-601-A02

SF1-107-A00

VC1-007-A00

AE1-CBT-A00

CHAUFFAGE PÉRIMÉTRIQUE DE LA SALLE MULTIFONCTIONNELLE
PERIMETER HEATING OF MULTIPURPOSE ROOM

CHAUFFAGE PÉRIMÉTRIQUE DE LA SALLE MULTIFONCTIONNELLE
PERIMETER HEATING OF MULTIPURPOSE ROOM

CHAUFFAGE / CLIMATISATION PÉRIMÉTRIQUE DU FOYER
PERIMETER HEATING / COOLING OF LOBBY

CHAUFFAGE PÉRIMÉTRIQUE DE LA SALLE MULTIFONCTIONNELLE
PERIMETER HEATING OF MULTIPURPOSE ROOM

CHAUFFAGE PÉRIMÉTRIQUE DE LA SALLE MULTIFONCTIONNELLE
PERIMETER HEATING OF MULTIPURPOSE ROOM

CHAUFFAGE / CLIMATISATION PÉRIMÉTRIQUE DU FOYER
PERIMETER HEATING / COOLING OF LOBBY

VC1-502-B00

VC1-501-B00

SF1-110-B00

SF1-102-B00

SF1-101-B00

SF1-105-B00

1
M-351

2
M-350

SF1-103-B00

SF1-104-B00

SF1-106-B00

VC1-606-C00

VC1-602-C02

VC1-605-C02

VC1-604-C01

VC1-603-C01

SF1-202-C01

SF1-201-C01

SC1-203-C01

SF1-203-C01

SC1-205-C01

AE1-CBT-C02

AE2-CBT-C02

100-57
100-62
100-63
100-66
ESC-13

CHAUFFAGE / CLIMATISATION PÉRIMÉTRIQUE SECTEUR OUEST
PERIMETER HEATING / COOLING WEST SECTOR

RADIATEURS PÉRIMÉTRIQUE
PERIMETER RADIATORS
(TYP.)
100-04
100-05

CBT
ERS

MODIFIÉ /*MODIFIED*

CE PLAN NE DOIT PAS ÊTRE UTILISÉ À DES FINS DE CONSTRUCTION.

THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.

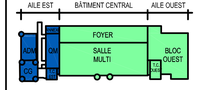
Canada

Travaux publics et Services gouvernementaux Canada
Public works and Government Services Canada

Direction générale des biens immobiliers
Real Property Branch

Région du Québec
Quebec Region

PLAN-CLÉ
KEY PLAN



MÉCANIQUE

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Québec (QC) G1E 3J3
Tél. (418) 626.8224

STRUCTURE ET CIVIL
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Québec (QC), G1P 2J7
Tél. (418) 871-8151

MÉCANIQUE
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Montréal, Québec
Canada, H2P 1C6
Tél: (514) 382.5150

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1060 University, Suite 600
Montreal, Quebec, Canada
H3B 4V3

PLOMBERIE
DESSAU INC. EXPERTS-CONSEIL
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PROTECTION INCENDIE
DESSAU INC. EXPERTS-CONSEIL
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AMÉNAGEMENT EXTÉRIEUR
OPTION aménagement
225, De Saint-Vallier Est,
Québec (Québec) G1K 3P2
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SERVICES ALIMENTAIRES
WSP Canada Inc.
5355, boul. des Gradins
Québec (Québec) G2J 1C8
Tél. : (418) 623-7066

SCEAUX / *STAMPS*

No	Description / Révisions / Revisions	Date
C	Émis pour SR4 - 80% / Issued for SR4 - 80%	14-10-31
B	Émis pour SR4 - 50% / Issued for SR4 - 50%	14-08-15
A	Émis pour SR3 - Préliminaires / Issued for SR3 - Preliminary	14-03-31

Projet / *Project*

TPSGC / *PWGSC*

805 AVENUE WILFRID LAURIER,
QUÉBEC G1R 5B8

RECONSTRUCTION DU MANÈGE MILITAIRE DE LA GRANDE ALLÉE DE QUÉBEC

RECONSTRUCTION OF THE GRANDE ALLÉE ARMOURY

Dessin / *Drawing*

TUYAUTERIE DIAGRAMME

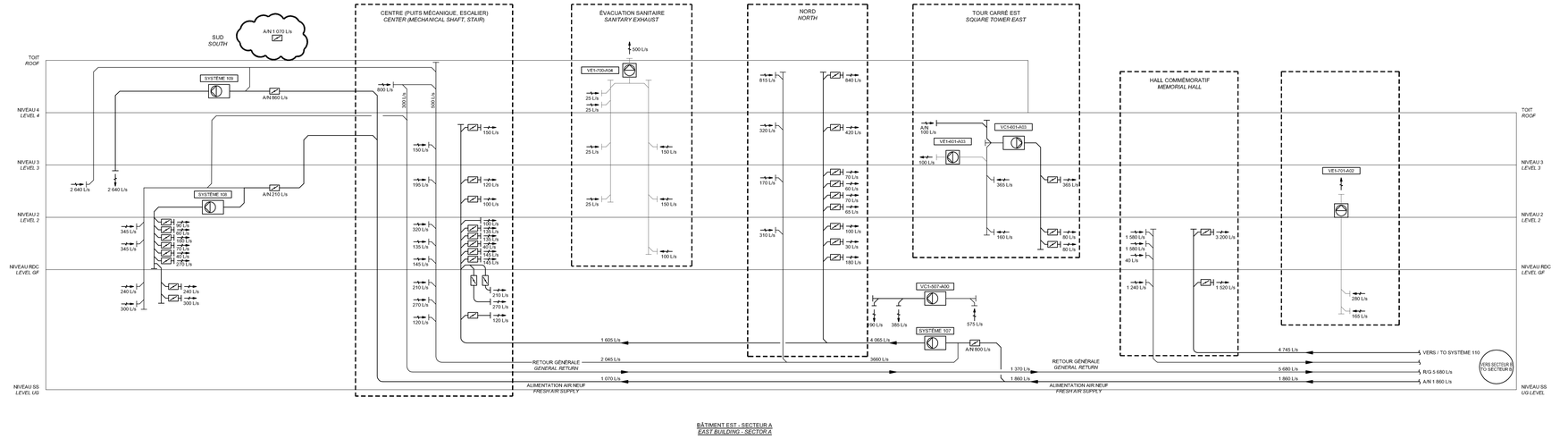
HEATING AND COOLING DIAGRAM

Conçu par / *Designed By*	J.F.DE.
Date / (aaaa/mm/jj)	
Dessiné par / *Drawn By*	S.M.
Date / (aaaa/mm/jj)	
Approuvé par / *Approved By*	S.LE.
Date / (aaaa/mm/jj)	
Soumission / *Tender*	EMISSION SR4 - 80%
Administrateur de projets / *Project Manager*	
No du projet / *Project no.* (TPSGC)	R.0035921.300
No du projet / *Project no.* (*PWGSC* Client)	X:2631-000-00
Nom du fichier / *File name*	M-351-MT-M-DG02
Échelle / *Scale*	AUCUNE / NONE
No de plan ou dessin / *Drawing or plan no.*	MT-M-DG02
No de la feuille / *Sheet no.*	M-351

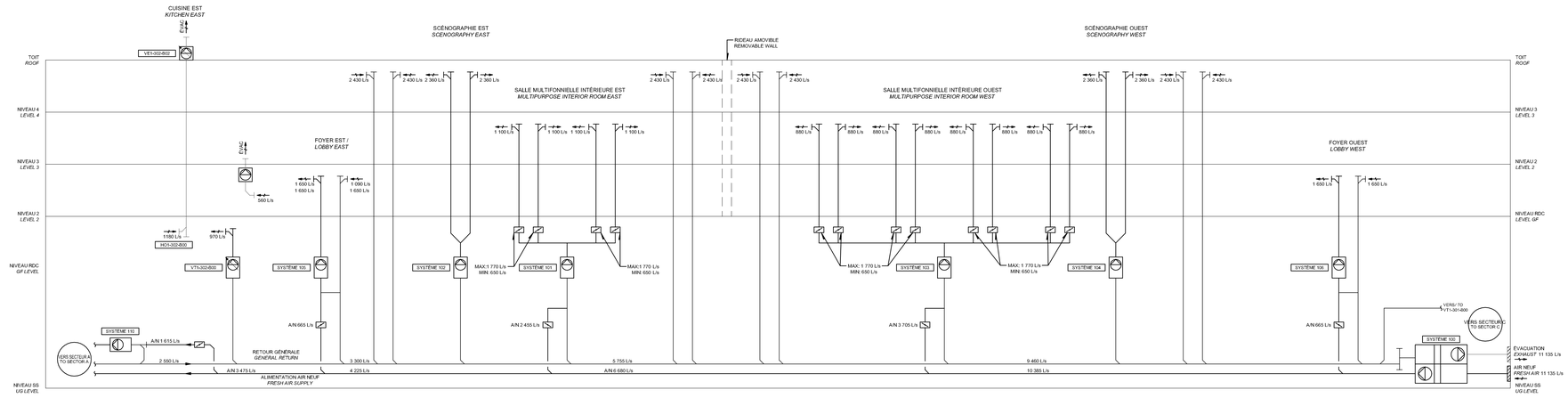
20111/07/29

TPSGC-PWGSC A0 (1189x841)

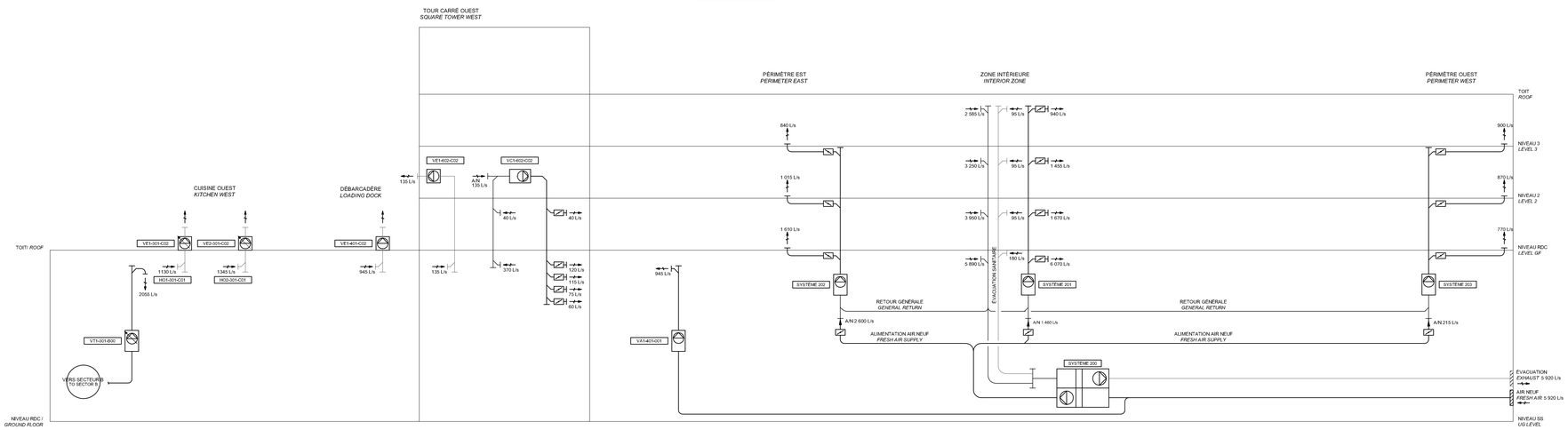
0 10 20mm 40 60 80 100 120 140 160 180 200mm



BÂTIMENT EST - SECTEUR A
EAST BUILDING - SECTOR A



BÂTIMENT CENTRAL - SECTEUR B
CENTRAL BUILDING - SECTOR B



BÂTIMENT OUEST - SECTEUR C
WEST BUILDING - SECTOR C

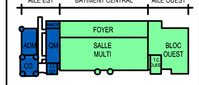
Canada

Travaux publics et Services gouvernementaux Canada
Public works and Government Services Canada

Direction générale des biens immobiliers
Real Property Branch

Région du Québec
Quebec Region

PLAN-CLÉ
KEY PLAN



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SCEAUX / *STAMPS*

CE PLAN NE DOIT PAS ÊTRE UTILISÉ À DES FINS DE CONSTRUCTION.

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No	Description	Date
C	Émis pour SR4 - 80% Issued for SR4 - 80%	14-10-31
B	Émis pour SR4 - 50% Issued for SR4 - 50%	14-08-15
A	Émis pour SR3 - Préliminaires Issued for SR3 - Preliminary	14-03-31

Révisions / Revisions

Projet / *Project*

TPSGC / *PWGSC*

805 AVENUE WILFRID LAURIER,
QUÉBEC G1R 5B8

RECONSTRUCTION DU MANÈGE MILITAIRE DE LA GRANDE ALLÉE DE QUÉBEC

RECONSTRUCTION OF THE GRANDE ALLÉE ARMOURY

Dessin / *Drawing*

DIAGRAMME
COOLING
CLIMATISATION

VENTILATION
COOLING
DIAGRAMS

Conçu par / *Designed By*	J.F.DE.
Date / *(aaaa/mm/jj)*	
Dessiné par / *Drawn By*	I.GO.
Date / *(aaaa/mm/jj)*	
Approuvé par / *Approved By*	S.LE.
Date / *(aaaa/mm/jj)*	
Soumission / *Tender*	EMISSION SR4 - 80%
Administrateur de projets / *Project Manager*	
No du projet / *Project no.*	R.0035921.300
No du projet / *Project no.*	X:2631-000-00
TPSGC / *PWGSC*	Client / *Client*
Nom du fichier / *File name*	M-450-MV-M-DG01
Échelle / *Scale*	AUCUNE NONE
No de plan ou dessin / *Drawing or plan no*	MV-M-DG01
No de la feuille / *Sheet no.*	M-450

MODIFIÉ /*MODIFIED*

2011/07/29

TPSGC-PWGSC A0 (1189x841)

C

0 10 20mm 40 60 80 100 120 140 160 180 200mm

CALCUL DES CHARGES (SELON L'ARTICLE 8-210)
LOAD CALCULATION (TO CODE ARTICLE 8-210)

	m²	Watts/m²	F.U.	Sous-total/ *Sub-total*	Total
A) CHARGE DE BASE / *BASIC LOAD*					
AILE EST (BUREAUX) / *EAST WING (OFFICES)*	3803				**142 405** W
Premiers/First 930 m²	930	50	90%	41 850	
Excédent/*Excess*	2873	50	70%	100 555	
BLOC CENTRAL / *CENTRAL BLOCK*	5780	20	80%	92 480	**92 480** W
AILE OUEST (BUREAUX) / *WEST WING (OFFICES)*	3500				**131 800** W
Premiers/First 930 m²	930	50	90%	41 850	
Excédent/*Excess*	2570	50	70%	89 950	
TOTAL M.C.	13083				**366 685 W**
B) CHARGE MÉCANIQUE / *MECHANICAL LOAD*					
1 lot	1	895 144	100%		895 144 W
					895 144 W
C) CHARGE CUISINE / *KITCHEN LOAD*					
1 lot	1	165 000	100%		165 000 W
					165 000 W
D) ASCENSEURS / *ELEVATORS*					
6 * 40 hp @ 100%	6	42 000	100%		**252 000 W**
E) ESCALIERS MÉCANIQUES / *ESCALATORS*					
0 * 10 hp @ 100%	0	10 000	100%		**0 W**
F) SCÉNOGRAPHIE / *SCENOGRAPHY*					
600 kW @ 67%	1	600 000	67%		**402 000 W**
G) AMÉNAGEMENT EXTÉRIEUR / *SITE WORKS*					
50 kW @ 100%	1	50 000	100%		**50 000 W**
		SOUS-TOTAL =			2 130 829 W
CAPACITÉ DE RÉSERVE / SPARE CAPACITY		25%			532 707 W
		TOTAL=			2 663 537 W

$$\frac{2\,663\,537}{600 \times 1.732} \text{ W} = \textbf{2563 A} \text{ (BRANCHEMENT / } \textit{SERVICE}\text{)}$$

VERS RÉSEAU HQ / *TO HQ NETWORK*

T.S.S.

BOITIER EXTÉRIEUR 400A 347/600V, AU MUR EXTÉRIEUR, POUR GÉNÉRATRICE MOBILE
400A 347/600V EXTERIOR BOX, ON EXTERIOR WALL, FOR MOBILE GENSET

SALLE DE GÉNÉRATRICE / *GENERATOR ROOM*

W-R-J3G1 250KW-347/600V-3PH-4F/4W.

300A 3P.

400A 3P.

W-R-J3G1 (MANUEL / MANUAL)

W-R-P3G1 400A-347/600V-3PH-4F/4W

250A 3P. | 250A 3P. | 100A 3P.

W-R-Y3H1

W-R-Y3U1
SÉCURITÉ DES PERSONNES / *LIFE SAFETY*

SALLE ÉLECTRIQUE PRINCIPALE (SOUS-SOL OUEST) / *MAIN ELECTRICAL ROOM (BASEMENT WEST)*

K 400A 3P/SF

900x900x300MM

250A 3P. 65kA

K

LSIG

3000A 3P. 65kA

MESURAGE HQ

4#4 - ISOLANT MINÉRAL (MI)

BARRE DE MALT DE LA SALLE ELECTRIQUE / *ELECTRICAL ROOM GROUNDING BUS*

W-S-B3N1 3000A- 347/600V - 3PH-4F/4W- 65KA

800A 3P. | 800A 3P. | 1000A 3P. | 200A 3P. | 20% ESPACES / *20% SPACES* | 800A 3P. | 100A 3P. | 250A 3P.

W-S-Q3N1 150 KVAR

BOITE DE JONCTION/TIRAGE DANS LA SALLE MÉCANIQUE (VOIR PLAN E-210) / *JUNCTION - PULL BOX IN THE MECHANICAL ROOM (SEE SHEET E-210)*

4#4 - ISOLANT MINÉRAL (MI)

SALLE ÉLECTRIQUE BATIMENT CENTRALE / SOUS-SOL / *ELECTRICAL ROOM CENTRAL BUILDING / BASEMENT*

C-S-B3N1 1000A - 347/600V- 3PH-4F/4W - 35KA

50A 3P. | 200A 3P. | 200A 3P.

45KVA 600-120/208V C-S-T2N6

200A 3P-SF C-S-I2N1

C-S-G2N1

BARRE DE MALT DE LA SALLE ELECTRIQUE / *ELECTRICAL ROOM GROUNDING BUS*

C-S-B3N2 800A - 347/600V- 3PH-4F/4W - 35KA

20% ESPACE / SPACE

250A 3P. | 250A 3P. | 175A 3P. | 15A 3P.

K13 225KVA 600-120/208V C-S-T2N1

K13 225KVA 600-120/208V C-S-T2N2

K13 150KVA 600-120/208V C-S-T2N3

TVSS3 120KA

C-S-G2N1 800A | C-S-G2N2 800A | C-S-G2N3 600A

20% ESPACE / SPACE

600A 3P. | 125A 3P. | 50A 3P. | 15A 3P.

112 1/2KVA 600-120/208V C-S-T2N4

45 KVA 600-120/208V C-S-T2N6

TVSS1 120KA

C-S-L2N1 400A | C-S-L2N2 CUISINE / KITCHEN

C-S-H1U1 30A 3P/SF

15KVA 600-120/208V C-S-T2U1

C-S-L2U1

W-R-H1H1 400A 3P.

W-R-B3H1 400A - 347/600V- 3PH-4F/4W - 35KA

100A 3P. | 100A 3P. | 150A 3P. | 200A 3P. | 90A 3P.

W-R-B3U1 100A-347/600V-3PH-4F/4W

20A 3P. | 15A 3P. | 15A 3P.

VOIR SUITE PLAN E-504 / SEE SUITE DWG E-504

SALLE ÉLECTRIQUE EST / SOUS-SOL / *ELECTRICAL ROOM EAST WING / BASEMENT*

E-S-B3N1 800A-347/600V-3PH-4F/4W 18KA

250A 3P. | 400A 3P. | 15A 3P.

225KVA 600-120/208V E-S-T2N1

TVSS2 120KA

SALLE MÉCANIQUE EST / SOUS-SOL / *MECHANICAL ROOM EAST WING / BASEMENT*

4#4 - RW90-C-1/0MM

FM E-S-Y3H1

PC FIM

POMPE INCENDIE / *FIRE PUMP*

SALLE AUDIOVISUEL(ELEC) BATIMENT CENTRAL / SOUS-SOL / *AUDIOVISUAL ROOM (ELEC)CENTRAL BUILDING / BASEMENT*

C-S-B3H1 250A-347/600V-3PH-4F/4W

100A 3P. | 100A 3P. | 100A 3P.

C-S-T2H1 30KVA 600-120/208V

C-S-L2H1

90A 3P. | 30A 3P. | 30A 3P.

C-S-T2H1 75KVA 600-120/208V

200A 3P.

VOIR SUITE PLAN E-504 / SEE SUITE DWG E-504

ASSC #1 / 40KVA VOIR DEVIS SECTION 26 33 53 / *UPS #1 / 40KVA SEE SPECIFICATION SECTION 26 33 53*

100A 3P-SF C-S-H2H1

E-S-D2N1 800A-120/208V-3PH-4F/4W

100A 3P. | 100A 3P. | 100A 3P. | 100A 3P. | 100A 3P. | 100A 3P. | 100A 3P. | 100A 3P. | 100A 3P.

E-S-B3H1 250A-347/600V-3PH-4F/4W

50A 3P. | 100A 3P. | 100A 3P.

45KVA 600-120/208V E-S-T2H1

E-S-H5J1 30A 3P/SF

15KVA 600-120/208V E-S-T2U1

E-S-L2N1 | E-S-L2N2 | E-S-L2N3 | E-S-L2H1 | E-S-L2U1

C-R-R2N1 "CAM-LOK" 100A | C-R-R2N2 "CAM-LOK" 200A | C-S-R2N1 "CAM-LOK" 100A | W-R-R2N2 "CAM-LOK" 400A

C-R-L2N1 | C-R-L2N2 | C-R-L2N3

C-2-R2N2 "CAM-LOK" 200A | C-2-L2N1

C-2-R2N1 "CAM-LOK" 400A | C-2-R2N3 "CAM-LOK" 200A | C-2-L2N2

C-2-L2U1

C-S-D2N3

W-R-R2N1 "CAM-LOK" 200A

C-2-R2N5 "CAM-LOK" 100A

C-2-R2N4 "CAM-LOK" 200A | C-2-R2N6 "CAM-LOK" 100A

VOIR SUITE PLAN E-504 / SEE SUITE DWG E-504

VOIR SUITE PLAN E-504 / SEE SUITE DWG E-504

VOIR SUITE PLAN E-504 / SEE SUITE DWG E-504

C-S-L2H2

E-R-L2H1

W-3-L2H1

NIVEAU SOUS-SOL - OUEST / *BASEMENT - WEST*

E-S-L2N1 | E-S-L2N2 | E-S-L2N3 | E-R-L2N1 | E-2-L2N1 | E-3-L2N1 | E-4-L2N1

SOUS-SOL / *BASEMENT*

REZ-DE-CHAUSSÉE / *GROUND FLOOR*

NIVEAU 2 / *LEVEL 2*

NIVEAU 3 / *LEVEL 3*

NIVEAU 4 / *LEVEL 4*

2011/07/29

TPSGC-PWGSC A0 (1189x841)

0 10 20mm 40 60 80 100 120 140 160 180 200mm

C

ÉLECTRICITÉ

ARCHITECTURE
A49-DFS-STGM ARCHITECTES
2980, boul. Sainte-Anne,
Québec (QC) G1E 3J3
Tél. (418) 626.8224

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Montreal, Quebec, Canada
H3B 4V3

PLOMBERIE
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PROTECTION INCENDIE
DESSAU INC.
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AMÉNAGEMENT EXTÉRIEUR
OPTION aménagement
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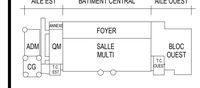
SERVICES ALIMENTAIRES
WSP Canada Inc.
5355, boul. des Gradins
Québec (Québec) G2J 1C8
Tél. : (418) 623-7066

SCEAUX / *STAMPS*

PLAN-CLÉ / *KEY PLAN*



No	Description / Révisions / Revisions	Date
0	ÉMIS POUR SOUMISSION / ISSUED FOR TENDER	2014-12-18
E	ÉMIS POUR SR4 - 80% / ISSUED FOR SR4 - 80%	2014-10-31
D	ÉMIS POUR SR4 - 50% / ISSUED FOR SR4 - 50%	2014-08-15
C	SR4 50% POUR ESTIMATION / SR4 50% FOR ESTIMATION	2014-07-18
B	émis pour SR3 - PRÉLIMINAIRE / issued for SR3 - PRELIMINARIES	2014-03-31
A	SR3 POUR ESTIMATION / SR3 FOR ESTIMATION	2014-03-03

Projet / *Project*

TPSGC / *PWGSC*

805 AVENUE WILFRID LAURIER,
QUÉBEC G1R 5B8

RECONSTRUCTION DU MANÈGE MILITAIRE DE LA GRANDE ALLÉE DE QUÉBEC

RECONSTRUCTION OF THE GRANDE ALLÉE ARMOURY IN QUÉBEC

Dessin / *Drawing*

DIAGRAMME UNILIGNE DE LA DISTRIBUTION ÉLECTRIQUE -1-

ELECTRICAL DISTRIBUTION ONE LINE DIAGRAM -1-

Conçu par / *Designed By*	N. Martin T.P.
Dessiné par / *Drawn By*	N. Martin T.P.
Approuvé par / *Approved By*	K. Haddad
Soumission / *Tender*	ÉMIS POUR SOUMISSION / ISSUED FOR TENDER
Administrateur de projets / *Project Manager*	
No du projet / *Project no.*	R.035921.300
TPSGC / *PWGSC*	
No du projet / *Project no.*	
Client / *Client*	
Nom du fichier / *File name*	
Échelle / *Scale*	1 : 1
No de plan ou dessin / *Drawing or plan no*	E-503
No de la feuille / *Sheet no.*	

VOIR SUITE PLAN E-503
SEE SUITE DWG E-503

VOIR SUITE PLAN E-503
SEE SUITE DWG E-503

VOIR SUITE PLAN E-503
SEE SUITE DWG E-503

C-S-L6N1 600A-600V-3PH-3F/3W

30A 3P. — P02-TR2-B00
20A 3P. — P01-TR2-B00
20A 3P. — VA1-104-B00
50A 3P. — VA1-103-B00
60A 3P. — VE1-100-B00
70A 3P. — VA1-100-B00
200A 3P. — RF1-ERP-B00/A — 133A-600V
200A 3P. — RF2-ERP-B00/A — 133A-600V
200A 3P. — RF3-ERP-B00/A — 133A-600V
200A 3P. — 169A-600V — TP 1-4

C-S-M6N1 200A-600V-3PH-3F/3W

30A 3P. — PO10
30A 3P. — PO11
30A 3P. — PO12
30A 3P. — PO13
30A 3P. — PO14
90A 3P. — VA1
80A 3P. — VE1
40A 3P. — VA3
40A 3P. — VA4
40A 3P. — VA7
40A 3P. — VA8
30A 3P. — VA9

100A 3P.

C-S-M6H2 100A-600V-3PH-3F/3W

15A 3P.
15A 3P.
15A 3P.

100A 3P.

C-S-M6H1 100A-600V-3PH-3F/3W

15A 3P.
15A 3P.
15A 3P.

C-S-L6N2 250A-600V-3PH-3F/3W

20A 3P. — VA1-110-B00
20A 3P. — VA1-102-B00
20A 3P. — VA1-105-B00
20A 3P. — P01-GEO-B00
20A 3P. — P02-GEO-BOO
20A 3P. — PO1-GLY-B00
20A 3P. — PO2-GLY-B00
20A 3P. — P01-ERS-B00
20A 3P. — P01-ERS-B00

SALLE MÉCANIQUE BÂTIMENT CENTRAL / SOUS-SOL
MECHANICAL ROOM CENTRAL BUILDING / BASEMENT

W-R-L6N1 250A-600V-3PH-3F/3W

20A 3P. — VA1-110-B00
20A 3P. — VA1-102-B00
20A 3P. — VA1-105-B00
20A 3P. — P01-GEO-B00
20A 3P. — P02-GEO-BOO
20A 3P. — PO1-GLY-B00
20A 3P. — PO2-GLY-B00
20A 3P. — P01-ERS-B00
20A 3P. — P01-ERS-B00

SALLE MÉCANIQUE OUEST / RDC
MECHANICAL ROOM WEST WING / GF

VOIR SUITE PLAN E-503
SEE SUITE DWG E-503

VOIR SUITE PLAN E-503
SEE SUITE DWG E-503

W-R-L2H1

SALLE ÉLECTRIQUE OUEST / RDC
ELECTRICAL ROOM WEST WING / GF

W-R-B3N1 800A-347/600V-3PH-4F/4W

100A 3P.
40A 3P.
125A 3P. — **W-R-T2N2** 112½KVA 600-120/208V
100A 3P.
15A 3P. — 3 CT's — TVSS — 120KA

W-R-S1N1 60A 3P/SF
W-R-T2N3 30KVA 600-120/208V
W-R-L1N5 — PLACARD RDD / *RDD CUPBOARD*

225KVA 600-120/208V — **W-R-T2N1**

W-R-B2N1 800A-120/208V-3PH-4F/4W

100A 3P. — **W-R-L1N1**
100A 3P.
150A 3P. — **W-R-L2N2**
200A 3P. — **W-R-L2N4** — CUISINE / KITCHEN
200A 3P. — **W-R-L2N3** — CUISINE / KITCHEN
200A 3P.
100A 3P.
200A 3P.
100A 3P.
200A 3P.
100A 3P. — **W-4-L2N1**
100A 3P.

W-2-I2N1 400A 3P/SF — **W-2-G2N1** — GRADATEURS / DIMMERS

W-2-L2N1

W-3-L2N1

SALLE ÉLECTRIQUE OUEST / SOUS-SOL
ELECTRICAL ROOM WEST WING / BASEMENT

W-S-H1H1 100A 3P/SF
75KVA 600-120/208V — **W-S-T2H1**

W-S-B2H1 250A-120/208V-3PH-4F/4W

100A 3P.
100A 3P.
100A 3P.
100A 3P.
100A 3P.

W-S-L2H1

NIVEAU SOUS-SOL - OUEST
BASEMENT - WEST

W-R-I4U1 30A 3P/SF
W-R-T2U1 15KVA 600-120/208V
W-R-L2U1

W-2-L2H1

REZ-DE-CHAUSSÉE - OUEST
GROUND FLOOR - WEST

NIVEAU 2 - OUEST
LEVEL 2 - WEST

NIVEAU 3 - OUEST
LEVEL 3 - WEST

NIVEAU 4 - OUEST
LEVEL 4 - WEST

2011/07/29

TPSGC-PWGSC A0 (1189x841)

C

0 10 20mm 40 60 80 100 120 140 160 180 200mm

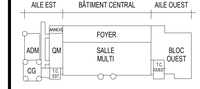
Canada

Travaux publics et Services gouvernementaux Canada
Public works and Government Services Canada

Direction générale des biens immobiliers
Real Property Branch

Région du Québec
Quebec Region

PLAN-CLÉ
KEY PLAN



ÉLECTRICITÉ

ARCHITECTURE
A49-DFS-STGM ARCHITECTES
2980, boul. Sainte-Anne,
Québec (QC) G1E 3J3
Tél. (418) 626.8224

STRUCTURE ET CIVIL
BPR BÂTIMENT INC
4655, boul. Wilfrid-Hamel
Québec (QC), G1P 2J7
Tél. (418) 871-8151

MÉCANIQUE
PAGEAUMOREL EXPERTS-CONSEIL
210, boul. Crémazie Ouest, bur. 110
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SERVICES ALIMENTAIRES
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5355, boul. des Gradins
Québec (Québec) G2J 1C8
Tél. : (418) 623-7066

SCEAUX / *STAMPS*

No	Description / Révisions / Revisions	Date
0	ÉMIS POUR SOUMISSION / ISSUED FOR TENDER	2014-12-18
C	ÉMIS POUR SR4 - 80% / ISSUED FOR SR4 - 80%	2014-10-31
B	ÉMIS POUR SR4 - 50% / ISSUED FOR SR4 - 50%	2014-08-15
A	SR4 50% POUR ESTIMATION / SR4 50% FOR ESTIMATION	2014-07-18

Projet / *Project*

TPSGC / *PWGSC*

805 AVENUE WILFRID LAURIER,
QUÉBEC G1R 5B8

RECONSTRUCTION DU MANÈGE MILITAIRE DE LA GRANDE ALLÉE DE QUÉBEC

RECONSTRUCTION OF THE GRANDE ALLÉE ARMOURY IN QUÉBEC

Dessin / *Drawing*

DIAGRAMME UNILIGNE DE LA DISTRIBUTION ÉLECTRIQUE -2-

ELECTRICAL DISTRIBUTION ONE LINE DIAGRAM -2-

Conçu par / *Designed By*: N. Martin T.P.
Date (aaaa/mm/jj)

Dessiné par / *Drawn By*: N. Martin T.P.
Date (aaaa/mm/jj)

Approuvé par / *Approved By*: K. Haddad
Date (aaaa/mm/jj)

Soumission / *Tender*: ÉMIS POUR SOUMISSION / ISSUED FOR TENDER
Administrateur de projets / *Project Manager*

No du projet / *Project no.*	No du projet / *Project no.*
R.035921.300	
TPSGC / *PWGSC*	Client / *Client*

Nom du fichier / *File name*

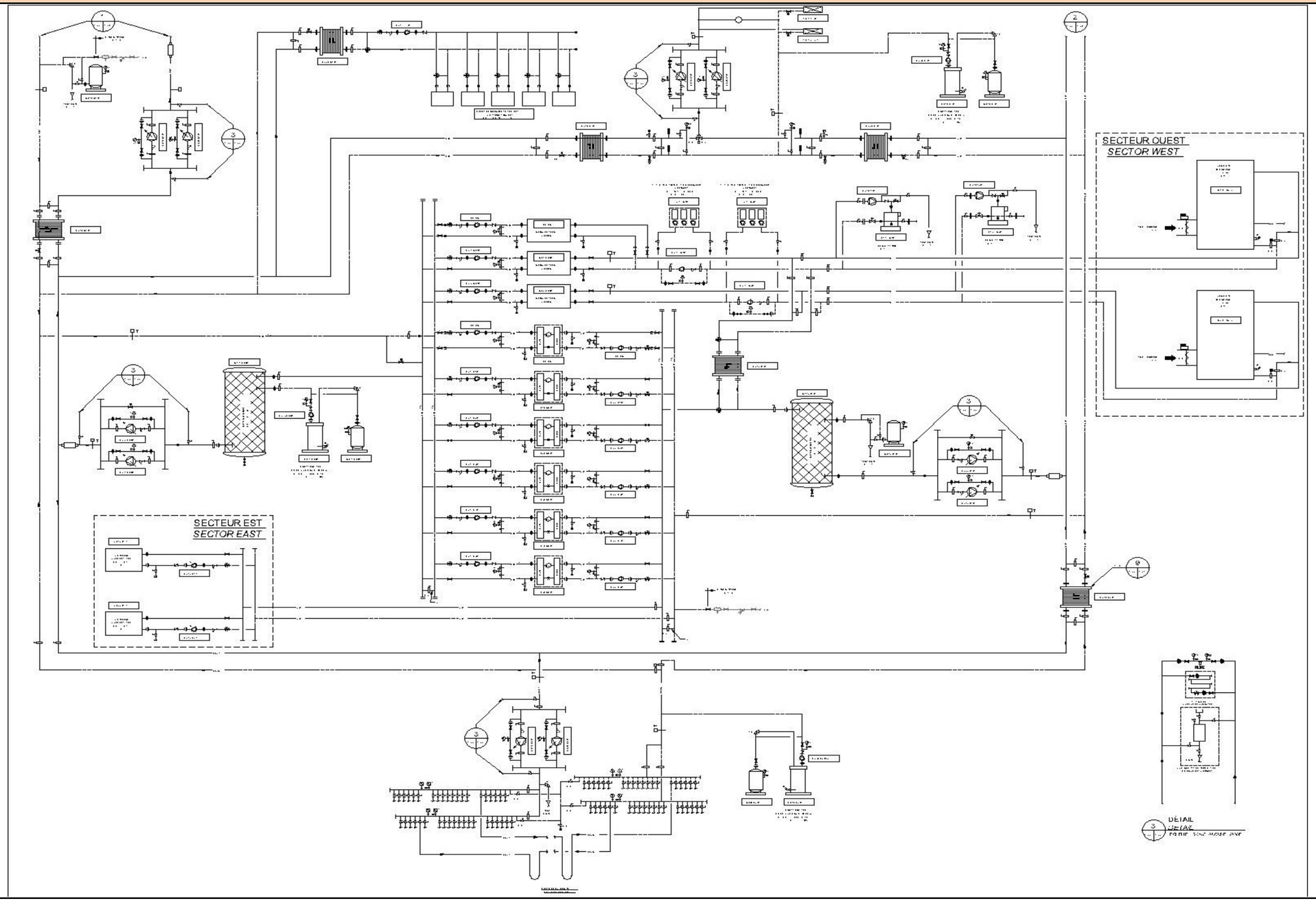
Échelle / *Scale*: 1 : 1

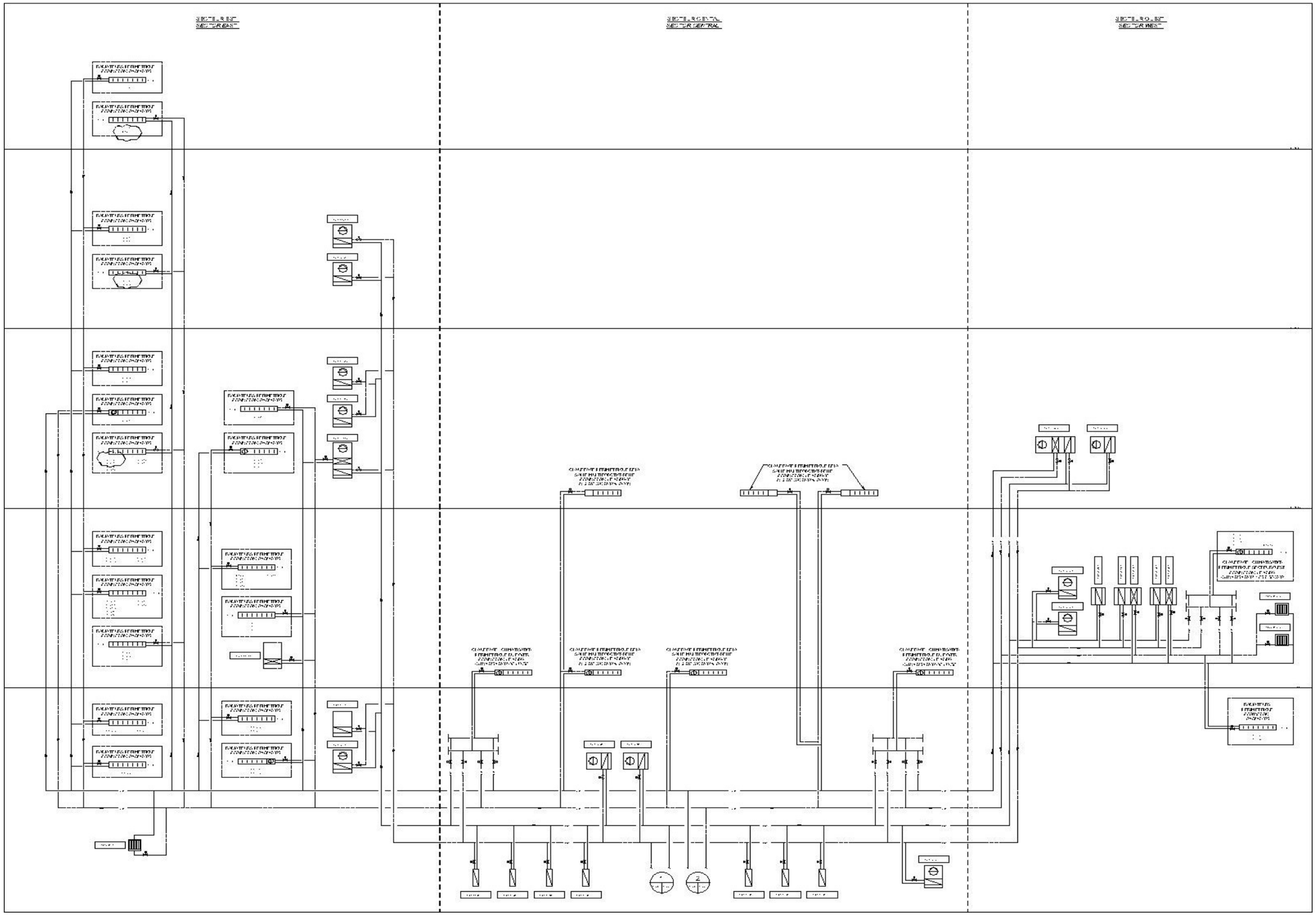
No de plan ou dessin / *Drawing or plan no*: E-504

No de la feuille / *Sheet no.*

APPENDIX 4
VERIFICATION POINTS AND CONTROL SEQUENCES

Sequence verification for: Heat pump Network (hot/cold production)



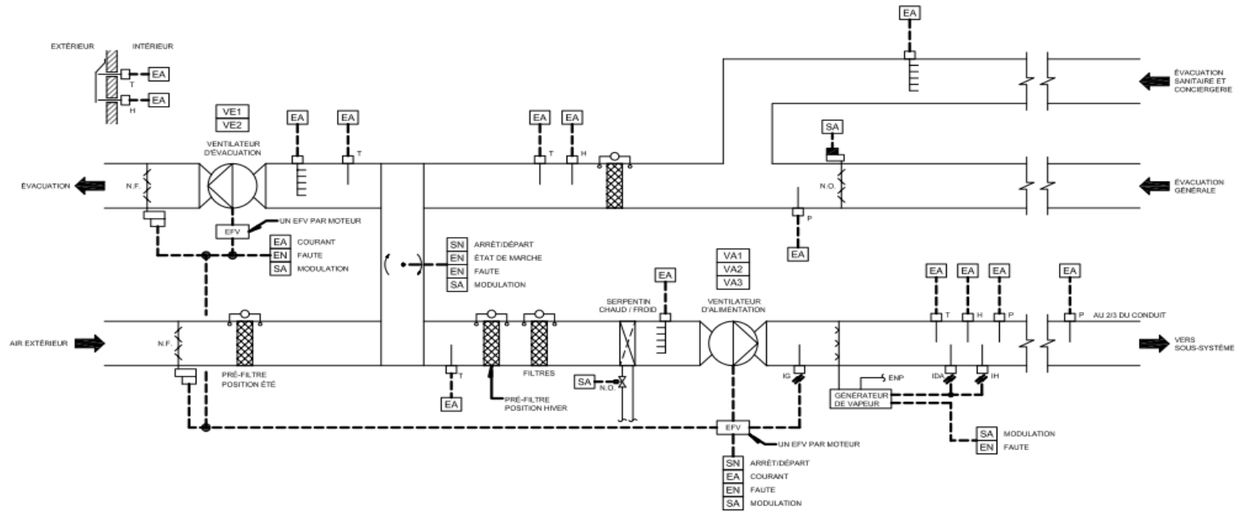

SECTEUR EST
SECTEUR CENTRAL
SECTEUR OUEST

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
Method of Operation	The building operates in two (2) different modes: heating and cooling.					
	When switchover occurs from one mode to the other, the entire heat pump network is stopped, the pumps are stopped and the heat exchanger valves are closed.					
	When in heating mode, the supply temperature setpoint on the condenser side of the heat pumps is adjusted to 48.9 °C (120 °F), the geothermal field's isolation valve opens and flow to the geothermal wells is permitted by the 3-way valve on the glycol loop.					
	When in cooling mode, the supply temperature setpoint on the evaporator side of the heat pumps is adjusted to 3.9 °C (39 °F), the geothermal field's isolation valve is closed and the 3-way valve on the glycol loop is positioned to permit flow from heat exchanger EC1-GEO-B00 to the geothermal wells.					
	Heat pump start priority is changed every week such that runtime is relatively equivalent for each heat pump. Priority is defined as follows: • Week one TP1-GEO-B00 is lead and TP2-GEO-B00, TP3-GEO-B00 and TP4-GEO-B00 start in sequence according to demand; • Week two TP2-GEO-B00 is lead TP3-GEO-B00, TP4-GEO-B00 and TP5-GEO-B00 start in sequence according to demand; • Week three TP3-GEO-B00 is lead TP4-GEO-B00, TP5-GEO-B00 and TP1-GEO-B00 start in sequence according to demand; • And so on.					
	Supply pumps start by electrical interlock with the start of a new heat pump.					
System Shutdown	The heat pumps (TP1-ERP-B00 to TP5-ERP-B00) are stopped.					
	The heat pump supply pumps (PO1-TP1-B00 to PO2-TP5-B00) are stopped.					
	The chillers (RF1-GLF-B00 and RF2-GLF-B00) are stopped.					
	The chiller supply pumps (PO1-RF1-B00 and PO1-RF2-B00) are stopped.					
	The cooling towers (TR1-ETR-C03 and TR2-ETR-C03) are stopped.					
	The cooling tower supply pumps (PO1-TR1-B00 and PO1-TR2-B00) are stopped.					
	The isolation valves on chiller RF1-GLF-B00 are closed to heat exchanger EC1-CBT-B00 and open to its cooling tower.					
	The isolation valves on chiller RF2-GLF-B00 are closed to heat exchanger EC1-CBT-B00 and open to its cooling tower.					
	The valve on the hot water return is open and bypasses heat exchanger EC1-CBT-B00.					
	The condensing boilers (CH1-CBT-A00 and CH2-CBT-A00) are stopped.					
	The supply pumps (PO1-CH1-A00 and PO1-CH2-A00) for the condensing boilers are stopped.					
	The geothermal field's isolation valve is closed.					
	The geothermal field's pumps (PO1-GEO-B00 and PO2-GEO-B00) are stopped.					
	The geothermal exchanger's (EC1-GEO-B00) valve is closed.					
	The pumps on the heating network (PO1-CBT-B00 and PO2-CBT-B00) are stopped.					
	The bypass valve on the heating network pumps is open.					
	The primary cooling network pumps (PO1-GLF-B00 and PO2-GLF-B00) are stopped.					
	The bypass valve on the primary cooling network pumps is open.					
	The valve between the cold glycol supply header and the return is closed.					
	The secondary cooling network pumps (PO1-ERS-B00 and PO2-ERS-B00) are stopped.					
	The cooling exchanger's (EC1-ERS-B00) valve is closed.					
	The sand filters are stopped.					
n Start-Up	The heat pump network runs continuously.					
	The lead heat pump is authorized to start and the corresponding pumps (evaporator and condenser) start by electrical interlock.					
	One of the heating network pumps (PO1-CBT-B00 or PO2-CBT-B00) starts at low speed.					

Syster	One of the primary cooling network pumps (PO1-GLF-B00 or PO2-GLF-B00) starts at low speed					
	One of the secondary cooling network pumps (PO1-ERS-B00 or PO2-ERS-B00) starts at low speed.					
Normal Operation of Heating Mode	The geothermal field's isolation valve opens and cold glycol flow to the geothermal wells is permitted by the 3-way valve on the glycol loop.					
	The activation of the stages and the sequential start of the four (4) heat pumps and the start of the two (2) condensing boilers are command by the CNP to maintain hot water network supply temperature at a setpoint of 48.9 °C (120 °F).					
	The bypass valve on the heating network pumps is modulated by the CNP in sequence with the speed of the heating network pump to maintain the heating distribution network's differential pressure at setpoint (determined during balancing).					
	The valve on heat exchanger EC1-GEO-B00 (used as the heating network's bypass valve) is modulated by the CNP in sequence with the start of the first condensing boiler (the one with the least running time) and the modulation of the speed of its pump to maintain the differential pressure between the supply and the return headers at a slightly positive setpoint (determined during balancing). A negative differential pressure implies that the production of hot water by the heat pumps is insufficient to supply demand and that the condensing boilers must be started in sequence.					
	When pump speed is over 60% for 15 minutes (the boiler is running at over 60% of its capacity), the second boiler is started and the speed of its pump is modulated by the CNP. The speed of both pumps is simultaneously modulated. When the speed of the pumps is below 25% for 15 minutes, the boiler with the most running time is stopped by the CNP. After an adjustable delay following a boiler shutdown, its supply pump is stopped.					
	The bypass valve on the primary cooling network pumps is modulated by the CNP in sequence with the primary cooling network pump speed to maintain the differential pressure between the network's supply header and the return at a slightly positive setpoint (determined during balancing).					
	The geothermal pump is started (the one with the least running time) and its speed is modulated by the CNP to maintain the primary cooling network's differential pressure at setpoint (determined during balancing).					
	The secondary cooling network's supply temperature setpoint is readjusted by the CNP in sequence with the modulation of the network's pump to maintain the network's differential pressure at setpoint (determined during balancing). The secondary cooling network's supply temperature setpoint is readjusted from 5.6 °C to 8.9 °C (42 °F to 48 °F).					
	Heat exchanger's (EC1-ERS-B00) valve is modulated by the CNP to maintain the secondary cooling network's supply temperature at calculated setpoint.					
	When the geothermal pump is stopped for more than 30 minutes and that no condensing boiler is running (cooling demand is too significant for heating mode), the heat pump network switches to cooling mode.					
; Call for Cooling	When the geothermal pump is stopped for more than 30 minutes and that a condensing boiler is running (cooling demand is too significant for heating mode), a chiller is required to satisfy the cooling demand (the one for the winter season).					
	The geothermal field's isolation valve is closed and the 3-way valve is positioned to allow flow from heat exchanger EC1-GEO-B00 to the geothermal wells.					
	The chiller's isolation valves open to heat exchanger EC1-CBT-B00 and close to its cooling tower.					
	The valve on the hot water return closes thus forcing the return water through heat exchanger EC1-CBT-B00 and transferring the heat produced by the chiller to the low temperature hot water network.					
	When the cold glycol return temperature reaches 12 °C (53.6 °F) the chiller is started and its cold glycol and cooling tower pumps are started by the CNP.					
	The bypass valve on the primary cooling network pumps is modulated by the CNP in sequence with the cooling network pump speed to maintain the network's differential pressure at setpoint (determined during balancing).					
	The valve between the cold glycol supply header and the return is modulated by the CNP to maintain the differential pressure between the primary cooling network's supply and return headers at a slightly positive setpoint (determined during balancing).					
	The two (2) condensing boilers are modulated by the CNP in sequence with heat exchanger EC1-GEO-B00's valve to maintain the heating network's supply temperature at a setpoint of 48.9 °C (120 °F).					

Normal Operation Mode With Strong	On a supply temperature rise, the sequence is as follows: • The pump speeds of both condensing boilers are simultaneously and gradually diminished. • When speed of both pumps is less than 25% for 15 minutes, the boiler with the most running time is stopped by the CNP. Following the boiler shutdown and an adjustable delay, its supply pump is stopped. • The remaining pump's speed is gradually diminished. When its speed is less than 25% for 15 minutes, the CNP stops the boiler. Following the boiler shutdown and an adjustable delay, its supply pump is stopped. • Gradual opening of heat exchanger EC1-GEO-B00's valve. • When heat exchanger EC1-GEO-B00's valve is more than 10% open, the geothermal pump (the one with the least running time) starts and its speed is gradually increased in parallel with the opening of the valve.					
	When heat exchanger EC1-GEO-B00's valve is completely open (the geothermal pump is at full speed) and that the low temperature heating network's supply temperature is still too high, the speed of the heat recovery wheels from systems 100 and 200 is gradually reduced to favor the use of the low temperature heating network over energy recovery.					
	When the thermal wheels from systems 100 and 200 are completely stopped and that the low temperature heating network's supply temperature is still too high, the cooling tower associated with the chiller is used to evacuate the energy surplus.					
	On a supply temperature rise, the sequence is as follows: • The outdoor air damper is opened and the cooling tower's fan is started at low speed; • Complete opening of the 3-way bypass valve to the tower's sprinklers (no modulation); • When the 3-way valve is 100% open to the sprinklers, the fan's speed is gradually increased in parallel with the modulation of heat exchanger EC1-CBT-B00's 3-way valve toward the cooling tower.					
	The cooling tower's fan speed is limited by the CNP to always maintain the temperature at the condenser's inlet above 43.3 °C (110 °F).					
	At the end of a show when cooling demand is reduced the inverse sequence is followed and the heating mode is activated.					
Normal Operation of Cooling Mode	The geothermal field's isolation valve is close and the 3-way valve is positioned to allow flow from heat exchanger EC1-GEO-B00 to the geothermal wells.					
	The activation of the stages and the sequential start of the four (4) heat pumps are command by the CNP to maintain the primary cooling network's supply temperature at a setpoint of 3.9 °C (39 °F).					
	Upon the start of all four (4) heat pumps and if the temperature setpoint is not maintained, a first chiller is started (the one with the least running time) and its cold glycol pumps and cooling tower are started by the CNP. When the chiller is running at 90% of its capacity for over 15 minutes, the second chiller is started and its cold glycol pumps and cooling tower are started by the CNP. When both chillers are running bellow 40% of their capacity for over 15 minutes, the chiller with the most running time is stopped by the CNP. Following the chiller shutdown, its pumps are stopped.					
	Upon a confirmation that the cooling tower's pump is running, the CNP authorises the sand filter to function.					
	The chemical treatment system is authorised to operate by electrical interlock with the cooling tower pump.					
	At chiller and pump start-up the cooling tower's outdoor air damper opens, the fan starts at low speed and the 3-way valve is modulated by the CNP in sequence with the fan speed to maintain the condenser's water inlet temperature at a calculated setpoint. This setpoint is readjusted from 29.4 °C (85 °F) to 18.3 °C (65 °F) when the outdoor dew point temperature varies from 23.9 °C (75 °F) to 7.2 °C (45 °F).					
	On a temperature rise at the condenser's water inlet, the sequence is as follows: • The outdoor air damper is opened and the cooling tower's fan is started at low speed; • Gradual opening of the 3-way bypass valve to the tower's sprinklers; • When the 3-way valve is 100% open to the sprinklers the fan speed is gradually increased.					
	The make-up water valve (supplied and installed by plumbing contractor) opens by electrical interlock upon low water detection inside the cooling tower (low level switch supplied with tower).					
	The bypass valve on the primary cooling network pumps is modulated by the CNP in sequence with the cooling network pump speed to maintain the network's differential pressure at setpoint (determined during balancing).					
	The valve between the cold glycol supply header and the return is modulated by the CNP to maintain the differential pressure between the supply and the return headers on the primary cooling network at a slightly positive setpoint (determined during balancing).					

	The secondary cooling network's supply temperature setpoint is readjusted by the CNP in sequence with the secondary network's pump speed to maintain the network's differential pressure at setpoint (determined during balancing). The secondary cooling network's supply temperature setpoint is readjusted from 5.6 °C to 8.9 °C (42 °F to 48 °F).					
	Heat exchanger EC1-ERS-B00's valve is modulated by the CNP to maintain the secondary cooling network's temperature at calculated setpoint.					
	The heating network pumps' bypass valve is modulated by the CNP in sequence with the speed of the pumps to maintain the differential pressure between the supply and the return headers on the heating network at a slightly positive setpoint (determined during balancing).					
	Heat exchanger EC1-GEO-B00's valve is modulated by the CNP to maintain the differential pressure of the heating network at setpoint (determined during balancing).					
	When heat exchanger EC1-GEO-B00's valve is 10% open, the geothermal pump (the one with the least running time) is started and its speed is modulated by the CNP to maintain the heating network's return temperature at a setpoint of 31.1 °C (88 °F).					
	When heat exchanger EC1-GEO-B00's valve is closed for more than 30 minutes and that no chiller is running (heating demand is too significant for cooling mode) the heat pump network switches to heating mode.					
Local Protecti	The chiller stops on a low flow indication from the differential pressure switches.					
	The cooling tower stops if excessive vibration is detected by the vibration switch (provided with the tower but electrical interlock by the current Section).					
Alarm	Pump current intensity is sent to the CNP.					
	Variable frequency drives fault is sent to the CNP.					
	Glycol tank low level indication is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: • Network differential pressure: SP ± 10 kPa; • Network supply temperature: SP ± 2 °C.					
Notes						



System 100: Fresh Air / Exhaust (General and East)

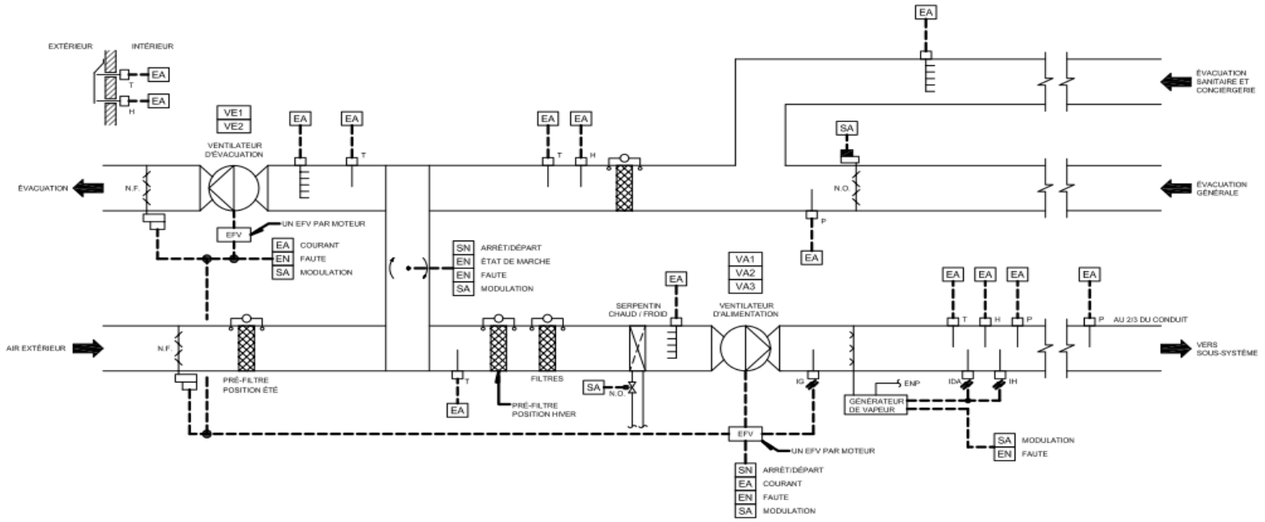
System 200: Fresh Air / Exhaust (West)

(2 Similars)

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	Supply (VA1, VA2, and VA3) and exhaust (VE1 and VE2) fans are stopped.					
	Outside air and exhaust dampers are closed.					
	When the outdoor temperature is above 5 ℃ (41 ℉), the dual-mode coil's control valve is closed. Below 5 ℃ outside, the dual-mode coil's control valve is modulated by the CNP to maintain the setpoint at 13 ℃ (55 ℉) between the heat recovery wheel and the filters inside the ventilation unit.					
	The heat recovery wheel is stopped.					
	The humidifier is stopped.					
System Start-Up	A command from the CNP opens the outside air damper according to an occupancy schedule.					
	Upon full-open confirmation of the outside air damper, the supply fans start at low speed.					
	The exhaust damper opens by electrical interlock with the supply fans.					
	Upon full-open confirmation of the exhaust damper, the exhaust fans starts at low speed.					

Normal Operation	The speed of supply fans is simultaneously modulated by the CNP to maintain supply duct static pressure at setpoint.					
	The speed of supply fans is limited by the CNP to prevent excessive pressure at the supply end of ventilation unit. If the measured pressure exceeds the critical setpoint, the system is shutdown.					
	The speed of exhaust fans is simultaneously modulated by the CNP to maintain exhaust air flow at setpoint. This setpoint is the difference between supply air flow and a constant value representing the amount of air exhausted by other systems.					
	The speed of exhaust fans is limited by the CNP to prevent excessive negative pressure in the exhaust duct. If the measured pressure exceeds the critical setpoint, the system is shutdown.					
	The humidifier is modulated by the CNP to maintain the relative humidity in the exhaust at setpoint. The CNP limits the relative humidity in the supply at a maximum of 80% R.H.					
Heating Mode: Outdoor Temperature	The speed of the heat recovery wheel is modulated by the CNP in sequence with the dual-mode coil's control valve to maintain the supply air temperature at setpoint.					
	The CNP limits the speed of the heat recovery wheel to maintain the exhaust temperature above 1 °C.					
Cooling Mode: Outdoor Temperature Above 14	The heat recovery wheel stops when the outdoor temperature is both above 10 °C and below room temperature plus 3 °C. When the outdoor temperature is above room temperature plus 3 °C the CNP starts the heat recovery wheel at full speed.					
	The dual-mode coil's control valve is modulated by the CNP to maintain supply temperature at setpoint.					
Local Protection	The humidifier stops when either the low flow switch (IDA) or the high humidity limit switch (IH) is triggered.					
	The supply fan is stopped when the freezestat switch (IG) is triggered. The freezestat is set to 5 °C (41 °F).					
	A fire alarm contact stops the system.					

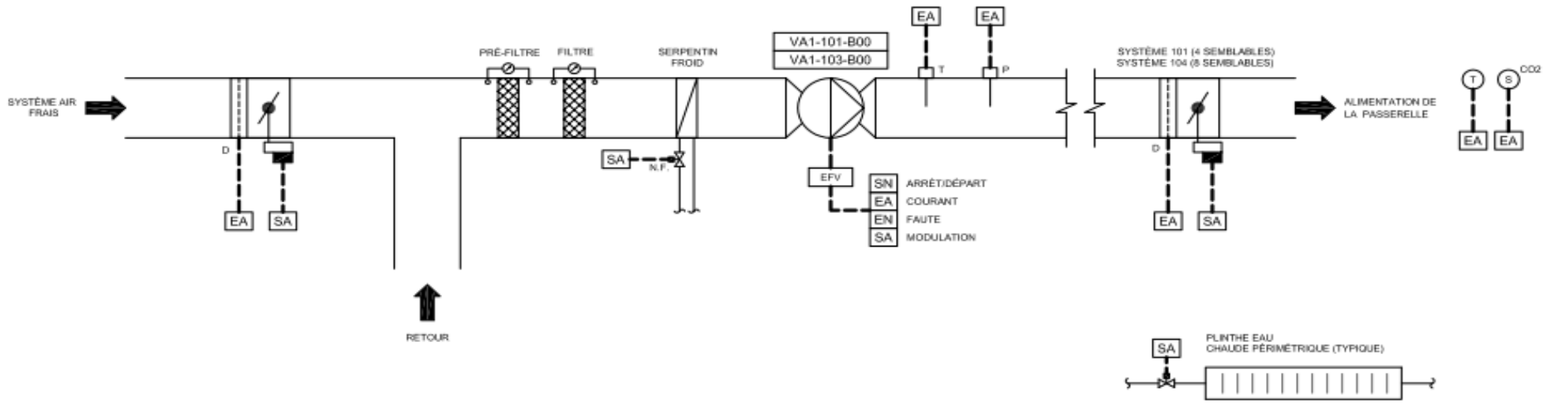
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Humidifier fault is sent to the CNP.					
	Status of filters is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: • Supply temperature: SP ± 2 °C; • Exhaust relative humidity: < 15 % R. H.; • Supply relative humidity: > 90 % R.H. (when humidifying); • Supply static pressure: SP ± 60 Pa.					
Notes						



System 100: Fresh Air / Exhaust (General and East)
System 200: Fresh Air / Exhaust (West)
(2 Similars)

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	Supply (VA1) and exhaust (VE1) fans are stopped.					
	Outside air, exhaust and general exhaust dampers are closed.					
	When the outdoor temperature is above 5 °C (41 °F), the dual-mode coil's control valve is closed. Below 5 °C outside, the dual-mode coil's control valve is modulated by the CNP to maintain the setpoint at 13 °C (55 °F) between the heat recovery wheel and the filters inside the ventilation unit.					
	The heat recovery wheel is stopped.					
	The humidifier is stopped.					
System Start-Up	A command from the CNP opens the outside air damper according to an occupancy schedule.					
	Upon full-open confirmation of the outside air damper, the supply fan starts at low speed.					
	The exhaust damper opens by electrical interlock with the supply fan.					
	Upon full-open confirmation of the exhaust damper, the exhaust fan starts at low speed.					
	Supply fan speed is modulated by the CNP to maintain supply duct static pressure at setpoint.					

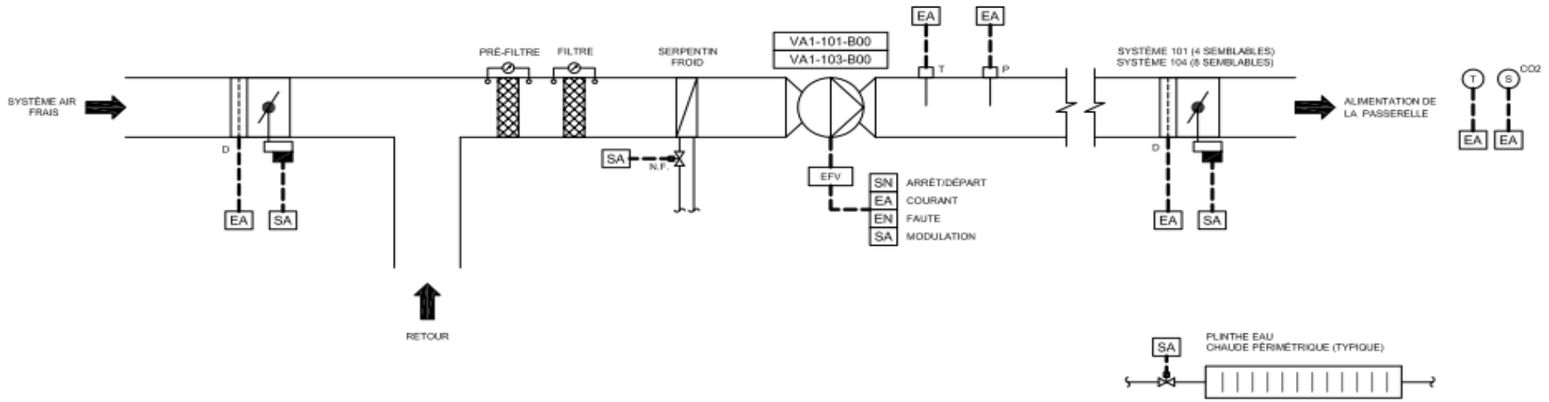
Normal Operation	Supply fan speed is limited by the CNP to prevent excessive pressure at the supply end of ventilation unit. If the measured pressure exceeds the critical setpoint, the system is shutdown.					
	Exhaust fan speed is modulated by the CNP to maintain exhaust air flow at setpoint. This setpoint is the difference between supply air flow and a constant value representing the amount of air exhausted by other systems.					
	Exhaust fan speed is limited by the CNP to prevent excessive negative pressure in the exhaust duct. If the measured pressure exceeds the critical setpoint, the system is shutdown.					
	The general exhaust damper is modulated by the CNP to maintain the sanitary exhaust air flow at setpoint (see balancing report for air flow value).					
	The humidifier is modulated by the CNP to maintain the relative humidity in the exhaust at setpoint. The CNP limits the relative humidity in the supply at a maximum of 80% R.H.					
Heating Mode: Outdoor Temperature Below 12 °C	The speed of the heat recovery wheel is modulated by the CNP in sequence with the dual-mode coil's control valve to maintain the supply temperature at setpoint.					
	The CNP limits the speed of the heat recovery wheel to maintain the exhaust temperature above 1 °C.					
Cooling Mode: Outdoor Temperature Above 14 °C	The heat recovery wheel stops when the outdoor temperature is both above 10 °C and below room temperature plus 3 °C. When the outdoor temperature is above room temperature plus 3 °C the CNP starts the heat recovery wheel at full speed.					
	The dual-mode coil's control valve is modulated by the CNP to maintain supply temperature at setpoint.					
Local Protection	The humidifier stops when either the low flow switch (IDA) or the high humidity limit switch (IH) is triggered.					
	The supply fan is stopped when the freezestat switch (IG) is triggered. The freezestat is set to 5 °C (41 °F).					
	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Humidifier fault is sent to the CNP.					
	Status of filters is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: • Supply temperature: SP ± 2 °C; • Exhaust relative humidity: < 15 % R. H.; • Supply relative humidity: > 90 % R.H. (when humidifying); • Supply static pressure: SP ± 60 Pa.					
Notes						



System 101: Multipurpose Room – Interior Zone (East)
System 103: Multipurpose Room – Interior Zone (West)
(2 Similars)

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	The supply fan is stopped.					
	Cooling coil's control valve is closed.					
	The fresh air variable volume box is closed.					
System Start-Up	The CNP starts the supply fan at low speed according to either an occupancy schedule or to limit the room temperature to a maximum value outside of regular operation times. The system can also start by special request.					
	The CNP opens the fresh air variable volume box to its minimum position according to the occupancy schedule.					
Normal Operation	The supply fan speed is modulated by the CNP to maintain duct static pressure at setpoint 2/3 downstream of supply fan.					
	The cooling coil's control valve is modulated by the CNP to maintain supply temperature at setpoint (13 °C).					
	The fresh air variable volume box is modulated by the CNP to maintain the carbon dioxide (CO_2) level of the least favored sector at its setpoint.					
	For each zone, as read by suspended temperature sensors from systems 102 and 104, the damper is modulated by the CNP to maintain zone temperature at setpoint.					

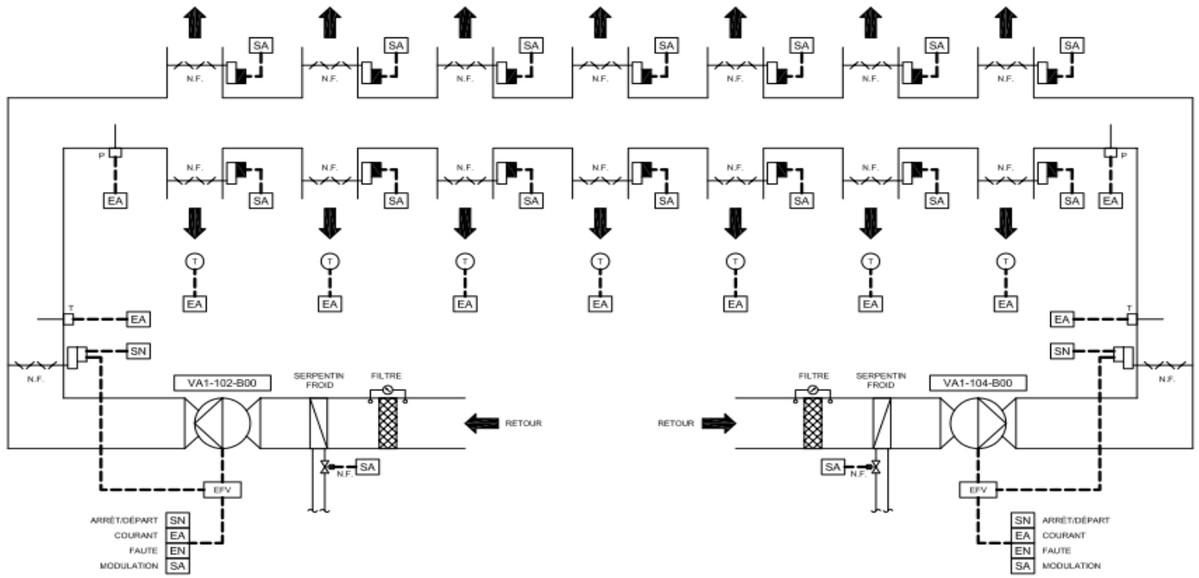
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: • Supply temperature: SP ± 2 ℃; • Carbon dioxide levels: > 1200 ppm; • Supply static pressure: SP ± 60 Pa.					
Notes						



System 101: Multipurpose Room – Interior Zone (East)
System 103: Multipurpose Room – Interior Zone (West)
(2 Similars)

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	The supply fan is stopped.					
	Cooling coil's control valve is closed.					
	The fresh air variable volume box is closed.					
System Start-Up	The CNP starts the supply fan at low speed according to either an occupancy schedule or to limit the room temperature to a maximum value outside of regular operation times. The system can also start by special request.					
	The CNP opens the fresh air variable volume box to its minimum position according to the occupancy schedule.					
Normal Operation	The supply fan speed is modulated by the CNP to maintain duct static pressure at setpoint 2/3 downstream of supply fan.					
	The cooling coil's control valve is modulated by the CNP to maintain supply temperature at setpoint (13 °C).					
	The fresh air variable volume box is modulated by the CNP to maintain the carbon dioxide (CO_2) level of the least favored sector at its setpoint.					
	For each zone, as read by suspended temperature sensors from systems 102 and 104, the damper is modulated by the CNP to maintain zone temperature at setpoint.					

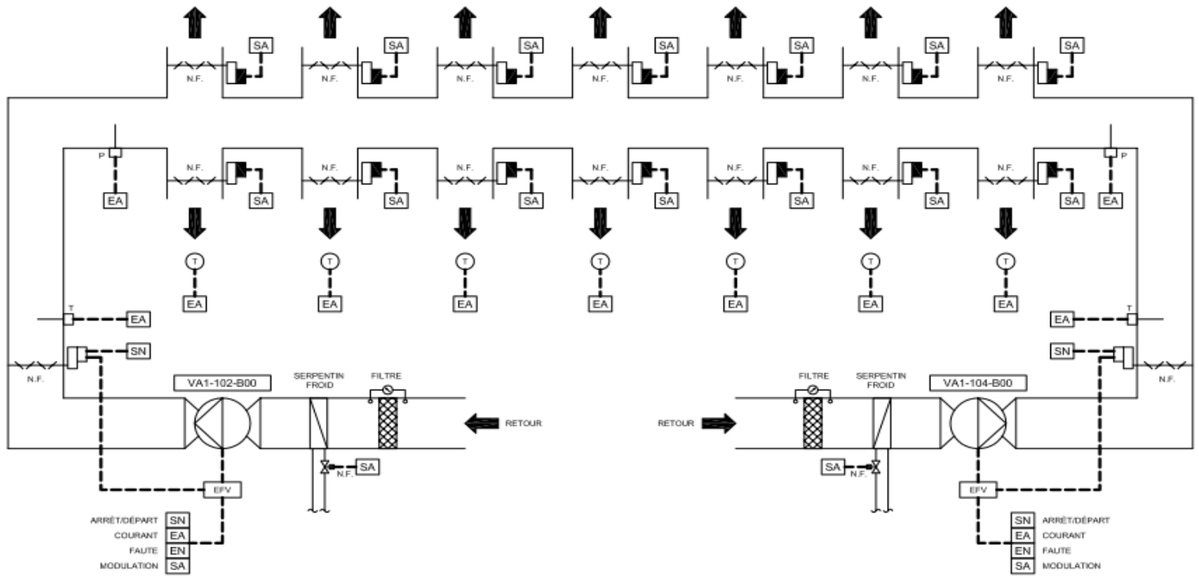
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: • Supply temperature: SP ± 2 ℃; • Carbon dioxide levels: > 1200 ppm; • Supply static pressure: SP ± 60 Pa.					
Notes						



System 102: Multipurpose Scenography Room (East)
System 104: Multipurpose Scenography Room (West)
(2 Similars)

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown:	Supply fan is stopped.					
	Cooling coil's control valve is closed.					
	System isolation damper is closed.					
	Zone dampers are closed.					
System Start-Up	The CNP opens the isolation damper of a supply fan (the one with the least running time) according to either an occupancy schedule or to limit the room temperature to a maximum value outside of regular operation times. The system can also start by special request.					
	Upon full-open confirmation of the isolation damper, the supply fan starts at low speed by electrical interlock with the limit switch of the damper's actuator.					
	The supply fan speed is modulated by the CNP to maintain the average of the two supply duct static pressure sensors at setpoint.					

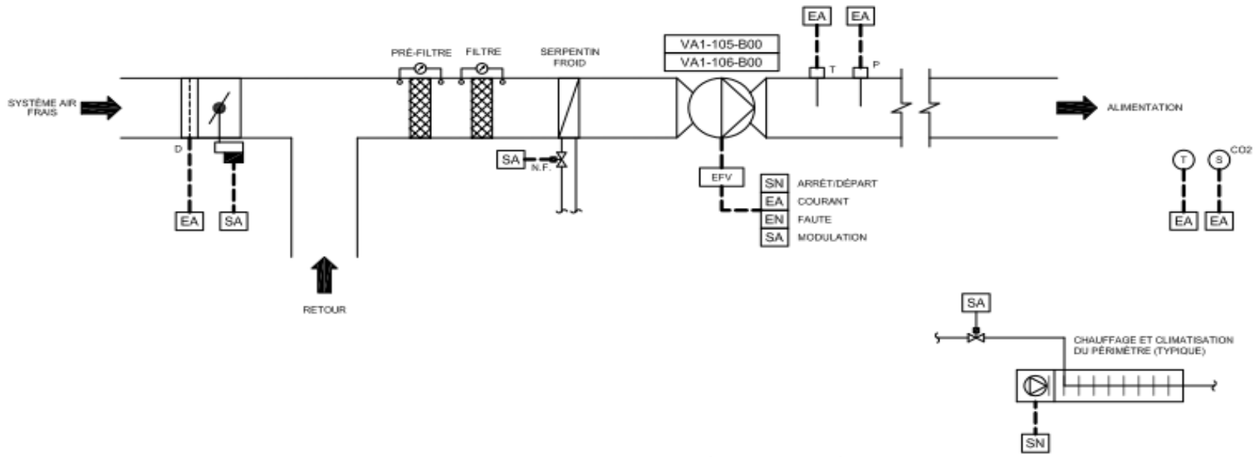
Normal Operation	If static pressure cannot be maintained with a single system, the second system is started and its isolation damper is opened by the CNP. The speed of the supply fans of both systems is then simultaneously modulated. Inversely, when the systems operate below 40% (adjustable) of their capacity, the system with the most running time is stopped.					
	The control valve of the cooling coil is modulated by the CNP to maintain supply temperature at setpoint (13 °C).					
	For each zone, the two zone dampers are modulated by the CNP to maintain zone temperature (suspended temperature sensors) at setpoint.					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: • Supply temperature: SP ± 2 °C; • Supply static pressure: SP ± 60 Pa.					
Notes						



System 102: Multipurpose Scenography Room (East)
System 104: Multipurpose Scenography Room (West)
(2 Similars)

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown:	Supply fan is stopped.					
	Cooling coil's control valve is closed.					
	System isolation damper is closed.					
	Zone dampers are closed.					
System Start-Up	The CNP opens the isolation damper of a supply fan (the one with the least running time) according to either an occupancy schedule or to limit the room temperature to a maximum value outside of regular operation times. The system can also start by special request.					
	Upon full-open confirmation of the isolation damper, the supply fan starts at low speed by electrical interlock with the limit switch of the damper's actuator.					
ion	The supply fan speed is modulated by the CNP to maintain the average of the two supply duct static pressure sensors at setpoint.					

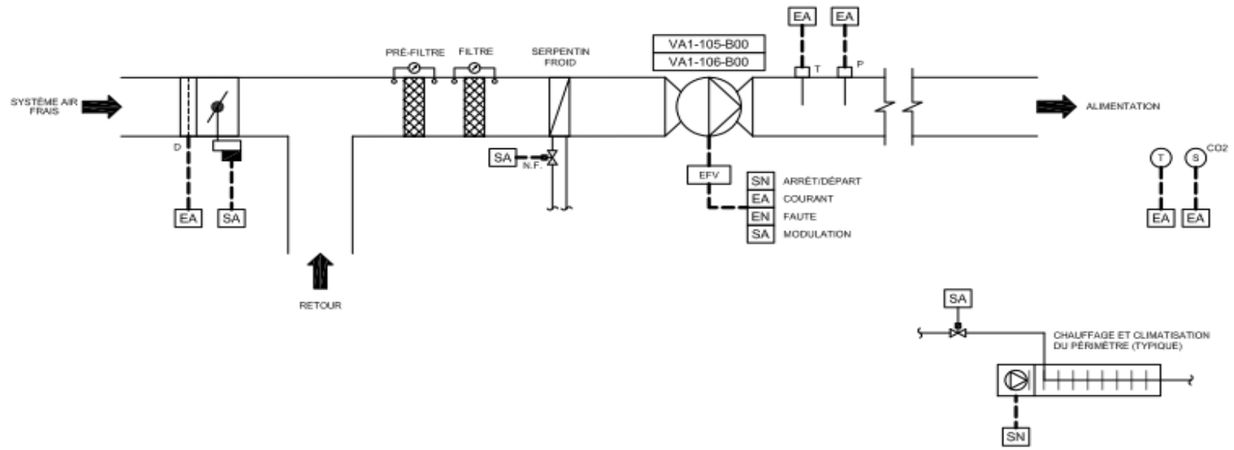
Normal Operati	If static pressure cannot be maintained with a single system, the second system is started and its isolation damper is opened by the CNP. The speed of the supply fans of both systems is then simultaneously modulated. Inversely, when the systems operate below 40% (adjustable) of their capacity, the system with the most running time is stopped.					
	The control valve of the cooling coil is modulated by the CNP to maintain supply temperature at setpoint (13 °C).					
	For each zone, the two zone dampers are modulated by the CNP to maintain zone temperature (suspended temperature sensors) at setpoint.					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: • Supply temperature: SP ± 2 °C; • Supply static pressure: SP ± 60 Pa.					
Notes						



Systems 105 & 106: Lobby (Interior Zone)
(2 Similars)

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	Supply fan is stopped.					
	Cooling coil's control valve is closed.					
	The fresh air variable volume box is closed.					
System Start-Up	The CNP starts the supply fan at low speed according to either an occupancy schedule or to limit the room temperature to a maximum value outside of regular operation times. The system can also start by special request.					
	According to the occupancy schedule, the CNP opens the fresh air variable volume box to its minimum position.					
Normal Operation	The supply fan speed is modulated by the CNP to maintain the supply static pressure at setpoint.					
	The cooling coil's control valve is modulated by the CNP to maintain supply temperature at setpoint. This setpoint is readjusted from a high of 20 ℃ to a low of 13 ℃ to maintain room temperature setpoint at 22 ℃.					
	The CNP modulates the fresh air variable volume box to maintain the room's carbon dioxide level (CO2) at setpoint.					
	Allow a minimum of 60 minutes (adjustable) before switching from one mode to another.					

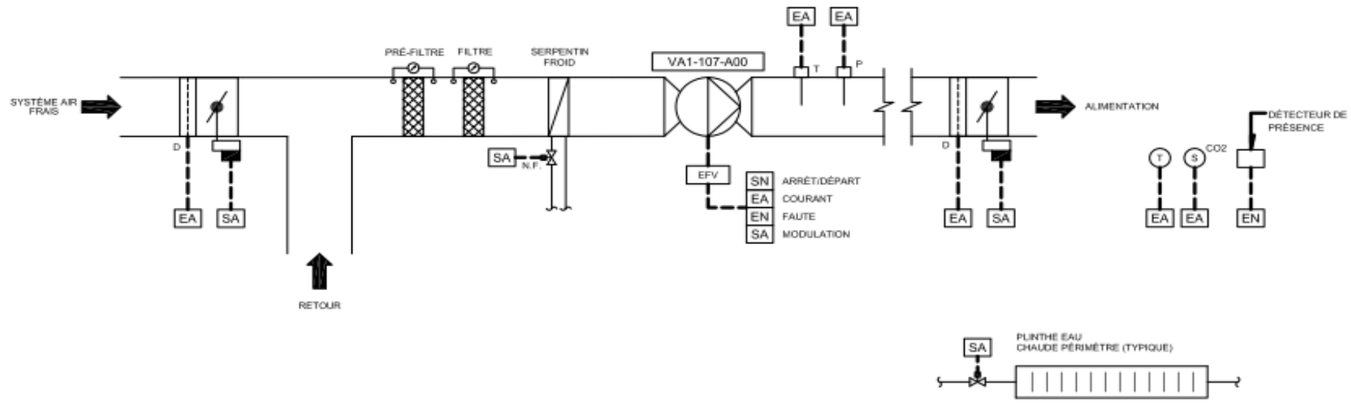
Normal Operation of Heating Mode	When the perimeter zone switches from cooling to heating, the modulating valve is closed and the isolation valves on the secondary cold water network are closed. The isolation valves on the low temperature hot water network are then opened and the baseboard's control valve is then allowed to modulate.					
	The baseboard's control valve is modulated in sequence with the baseboard's fan by the Specific Application Controller (CNA) to maintain room temperature at setpoint. Setpoint is according to occupation mode (occupied, unoccupied, summer and winter).					
	When room temperature is below setpoint, the sequence is as follows: • Gradual opening of baseboard's control valve; • When control valve is 50% open the fan starts at medium speed (on room temperature rise, stop fan when valve is 10% open); • When the control valve is 100% open, the fan is set to high speed (on room temperature rise, reduce fan speed to medium when valve is 60% open).					
Normal Operation of Cooling Mode	Upon a cooling demand of the interior zone, the perimeter zone setpoint is reduced.					
	When the perimeter zone switches from heating to cooling, the modulating valve is closed and the isolation valves on the low temperature hot water network are closed. The isolation valves on the secondary cold water network are then opened and the baseboard's control valve is then allowed to modulate.					
	The baseboard's control valve is modulated in sequence with the baseboard's fan by the CNA to maintain temperature setpoint. Setpoint is according to occupation mode (occupied, unoccupied, summer and winter).					
	When room temperature is above setpoint, the sequence is as follows: • Gradual opening of baseboard's control valve; • When control valve is 50% open the fan starts at medium speed (on room temperature decrease, stop fan when valve is 10% open); • When the control valve is 100% open, the fan is set to high speed (on room temperature decrease, reduce fan speed to medium when valve is 60% open).					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: • Room temperature: SP ± 2 °C; • Supply temperature: SP ± 2 °C; • Carbon dioxide level: > 1200 ppm; • Supply static pressure: SP ± 60 Pa.					
Notes						



Systems 105 & 106: Lobby (Interior Zone)
(2 Similars)

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	Supply fan is stopped.					
	Cooling coil's control valve is closed.					
	The fresh air variable volume box is closed.					
System Start-Up	The CNP starts the supply fan at low speed according to either an occupancy schedule or to limit the room temperature to a maximum value outside of regular operation times. The system can also start by special request.					
	According to the occupancy schedule, the CNP opens the fresh air variable volume box to its minimum position.					
Normal Operation	The supply fan speed is modulated by the CNP to maintain the supply static pressure at setpoint.					
	The cooling coil's control valve is modulated by the CNP to maintain supply temperature at setpoint. This setpoint is readjusted from a high of 20 °C to a low of 13 °C to maintain room temperature setpoint at 22 °C.					
	The CNP modulates the fresh air variable volume box to maintain the room's carbon dioxide level (CO_2) at setpoint.					
	Allow a minimum of 60 minutes (adjustable) before switching from one mode to another.					
al tion	When the perimeter zone switches from cooling to heating, the modulating valve is closed and the isolation valves on the secondary cold water					

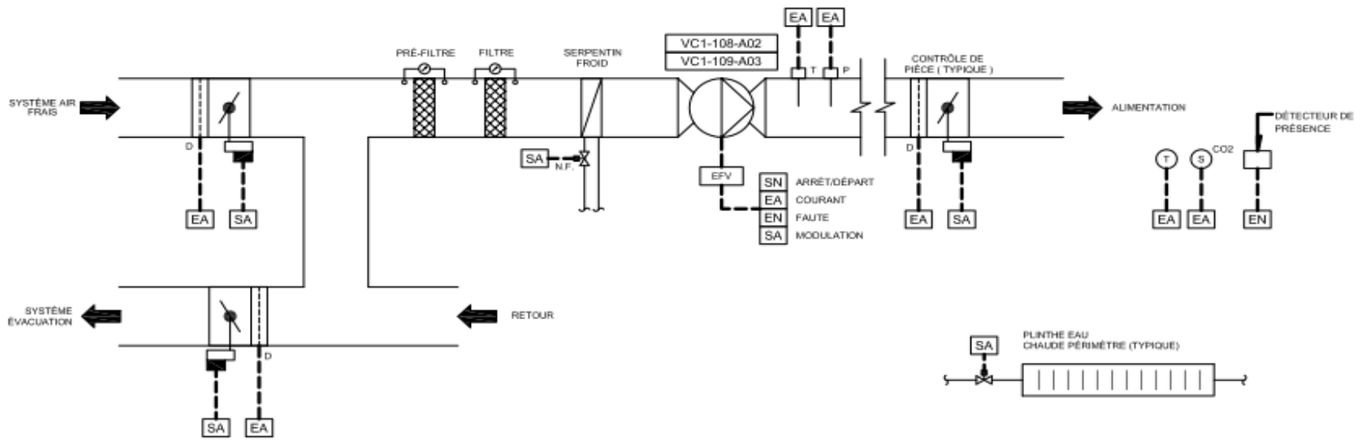
Norm Operat	The baseboard's control valve is modulated in sequence with the baseboard's fan by the Specific Application Controller (CNA) to maintain room					
	When room temperature is below setpoint, the sequence is as follows:					
Normal Operation of Cooling Mode	Upon a cooling demand of the interior zone, the perimeter zone setpoint is reduced.					
	When the perimeter zone switches from heating to cooling, the modulating valve is closed and the isolation valves on the low temperature hot					
	The baseboard's control valve is modulated in sequence with the baseboard's fan by the CNA to maintain temperature setpoint. Setpoint is according to occupation mode (occupied, unoccupied, summer and winter).					
	When room temperature is above setpoint, the sequence is as follows: • Gradual opening of baseboard's control valve; • When control valve is 50% open the fan starts at medium speed (on room temperature decrease, stop fan when valve is 10% open); • When the control valve is 100% open, the fan is set to high speed (on room temperature decrease, reduce fan speed to medium when valve is 60% open).					
Local Protection	A fire alarm contact stops the system.					



System 107: East Building – North Part

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	The supply fan is stopped.					
	Cooling coil's control valve is closed.					
	The fresh air variable volume box is closed.					
System Start-Up	The CNP starts the supply fan at low speed according to either an occupancy schedule or to limit the room temperature to a maximum value outside of regular operation times. The system can also start by special request.					
	The CNP opens the fresh air variable volume box to its minimum position according to the occupancy schedule.					
al Operation	The supply fan speed is modulated by the CNP to maintain duct static pressure at setpoint 2/3 downstream of supply fan.					
	The cooling coil's control valve is modulated by the CNP to maintain supply temperature at setpoint (13 °C).					
	The fresh air variable volume box is modulated by the CNP to maintain the carbon dioxide (CO_2) level of the least favored zone at its setpoint.					

Norma	The air flow through the terminal variable volume box is modulated by the CNA in sequence with the baseboard's control valve to maintain the room temperature at setpoint. The terminal unit is authorized to open for a minimum period of 30 minutes (adjustable) if permitted by the occupancy schedule and if a person is detected inside the room (by the presence detector, if applicable).					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: • Supply temperature: SP ± 2 °C; • Carbon dioxide level: > 1200 ppm; • Supply static pressure: SP ± 60 Pa.					
Notes						

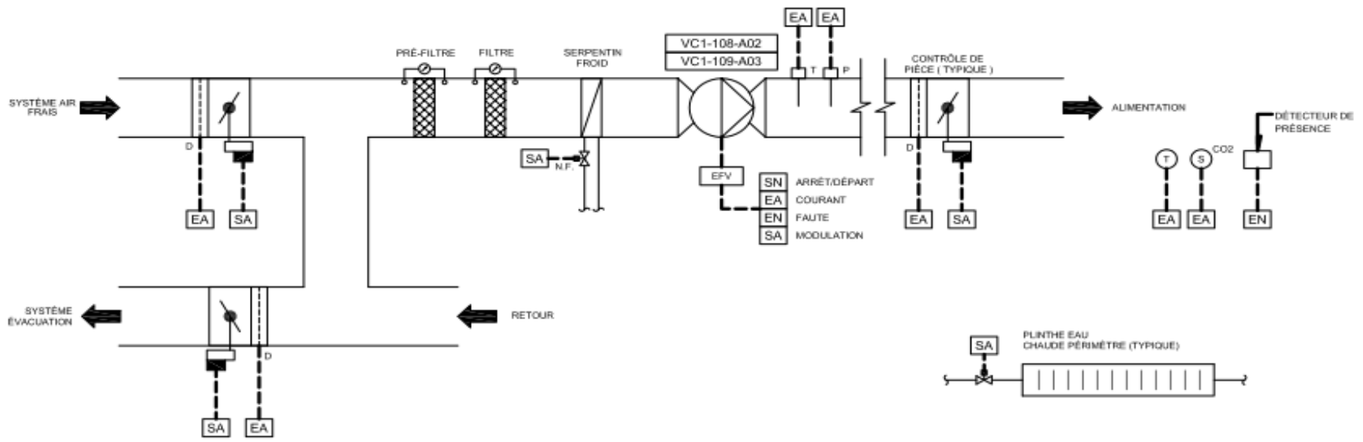


System 108: East Building – South Part

<u>System 108: East Building – South Part</u>
<u>System 109: East Building – Mess</u>
(2 Similars)

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	The supply fan is stopped.					
	Cooling coil's control valve is closed.					
	The fresh air variable volume box is closed.					
System Start-Up	The CNP starts the supply fan at low speed according to either an occupancy schedule or to limit the room temperature to a maximum value outside of regular operation times. The system can also start by special request.					
	The CNP opens the fresh air variable volume box to its minimum position according to the occupancy schedule.					
al Operation	The supply fan speed is modulated by the CNP to maintain duct static pressure at setpoint 2/3 downstream of supply fan.					
	The cooling coil's control valve is modulated by the CNP to maintain supply temperature at setpoint (13 °C).					
	The fresh air variable volume box is modulated by the CNP to maintain the carbon dioxide (CO_2) level of the least favored zone or in the return duct at its setpoint.					

Norm	The air flow through the terminal variable volume box is modulated by the CNA in sequence with the baseboard's control valve to maintain the room temperature at setpoint. The terminal unit is authorized to open for a minimum period of 30 minutes (adjustable) if permitted by the occupancy schedule and if a person is detected inside the room (by the presence detector, if applicable).					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: • Supply temperature: SP ± 2 ℃; • Carbon dioxide level: > 1200 ppm; • Supply static pressure: SP ± 60 Pa.					
Notes						



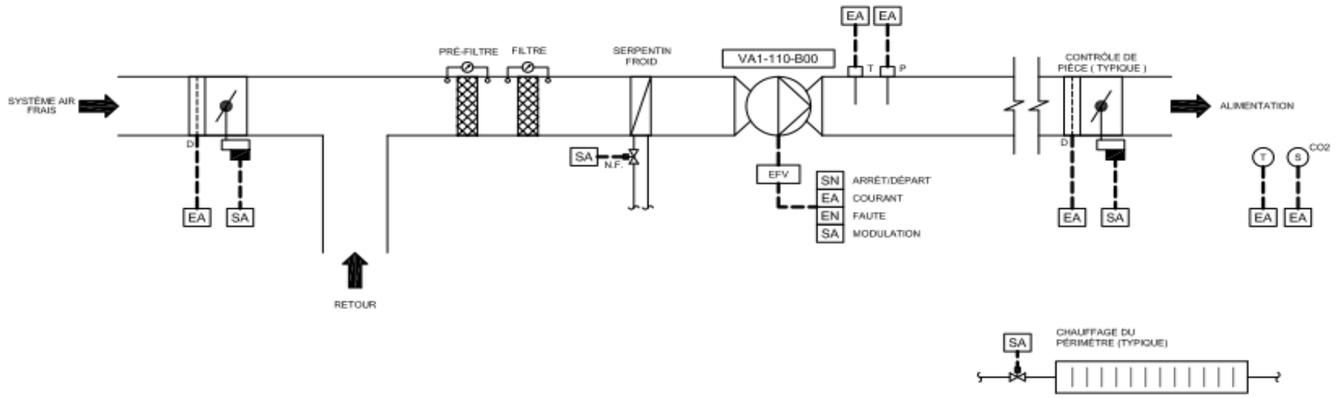
System 108: East Building – South Part

System 109: East Building – Mess

(2 Similars)

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	The supply fan is stopped.					
	Cooling coil's control valve is closed.					
	The fresh air variable volume box is closed.					
System Start-Up	The CNP starts the supply fan at low speed according to either an occupancy schedule or to limit the room temperature to a maximum value outside of regular operation times. The system can also start by special request.					
	The CNP opens the fresh air variable volume box to its minimum position according to the occupancy schedule.					
al Operation	The supply fan speed is modulated by the CNP to maintain duct static pressure at setpoint 2/3 downstream of supply fan.					
	The cooling coil's control valve is modulated by the CNP to maintain supply temperature at setpoint (13 °C).					
	The fresh air variable volume box is modulated by the CNP to maintain the carbon dioxide (CO2) level of the least favored zone or in the return duct at its setpoint.					

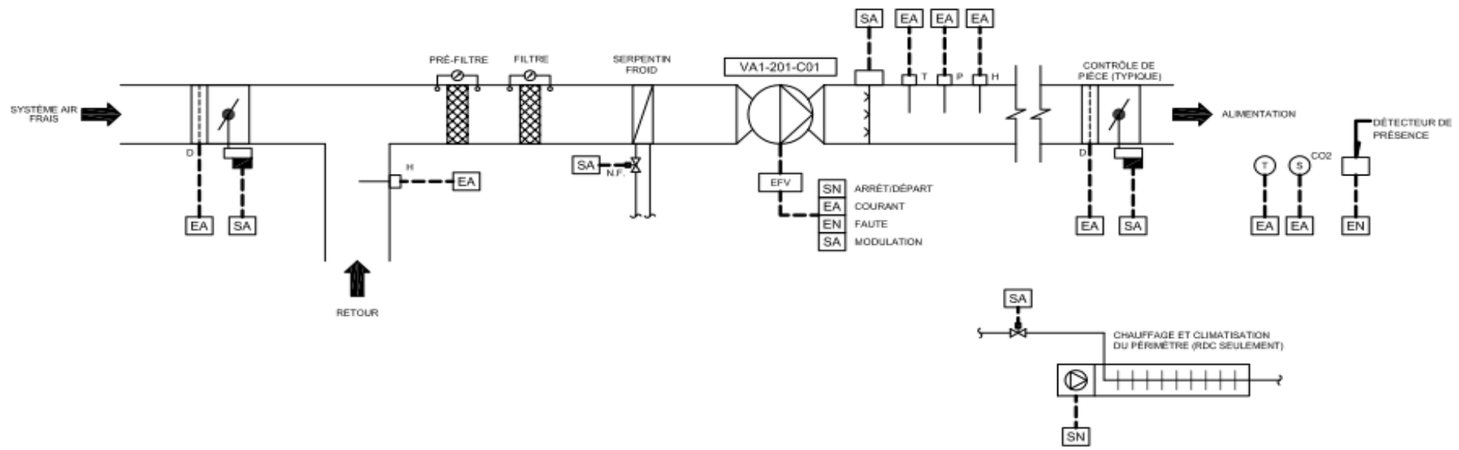
Norm	The air flow through the terminal variable volume box is modulated by the CNA in sequence with the baseboard's control valve to maintain the room temperature at setpoint. The terminal unit is authorized to open for a minimum period of 30 minutes (adjustable) if permitted by the occupancy schedule and if a person is detected inside the room (by the presence detector, if applicable).					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: • Supply temperature: SP ± 2 °C; • Carbon dioxide level: > 1200 ppm; • Supply static pressure: SP ± 60 Pa.					
Notes						



System 110: Commemorative Space

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown:	The supply fan is stopped.					
	Cooling coil's control valve is closed.					
	The ground floor terminal heating coil's control valve is closed.					
	The fresh air variable volume box is closed.					
System Start-Up	The CNP starts the supply fan at low speed according to either an occupancy schedule or to limit the room temperature to a maximum value outside of regular operation times. The system can also start by special request.					
	The CNP opens the fresh air variable volume box to its minimum position according to the occupancy schedule.					
	The supply fan speed is modulated by the CNP to maintain duct static pressure at setpoint 2/3 downstream of supply fan.					

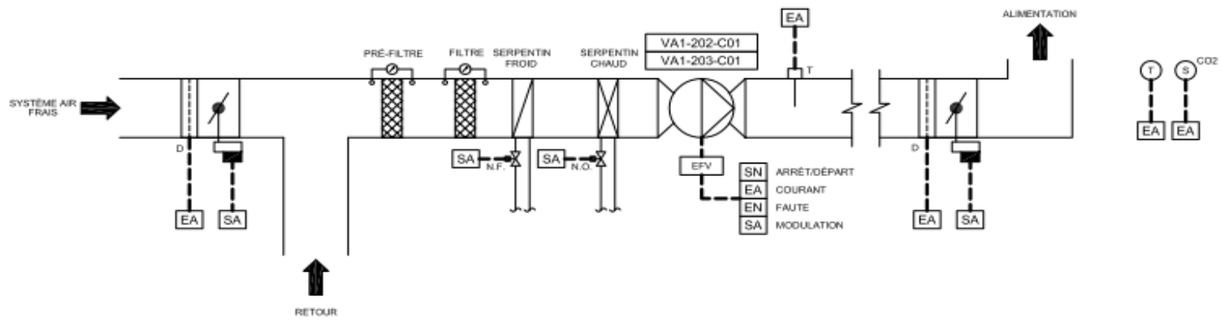
Normal Operation	The cooling coil's control valve is modulated by the CNP to maintain supply temperature at setpoint (13 °C).					
	The fresh air variable volume box is modulated by the CNP to maintain the carbon dioxide (CO2) level of the least favored zone at its setpoint.					
	The air flow through the terminal unit is modulated by the CNA in sequence with the baseboard's control valve to maintain the room temperature at setpoint.					
	The ground floor terminal heating coil's control valve is modulated by the CNP to maintain the façade temperature at setpoint.					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: • Supply temperature: SP ± 2 °C; • Carbon dioxide level: > 1200 ppm; • Supply static pressure: SP ± 60 Pa.					
Notes						



System 201: West Building (interior zone)

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	The supply fan is stopped.					
	Cooling coil's control valve is closed.					
	The humidifier is stopped.					
	The fresh air variable volume box is closed.					
System Start-Up	The CNP starts the supply fan at low speed according to either an occupancy schedule or to limit the room temperature to a maximum value outside of regular operation times. The system can also start by special request.					
	The CNP opens the fresh air variable volume box to its minimum position according to the occupancy schedule.					
on	The supply fan speed is modulated by the CNP to maintain duct static pressure at setpoint 2/3 downstream of supply fan.					
	The cooling coil's control valve is modulated by the CNP to maintain supply temperature at setpoint (13 ℃).					

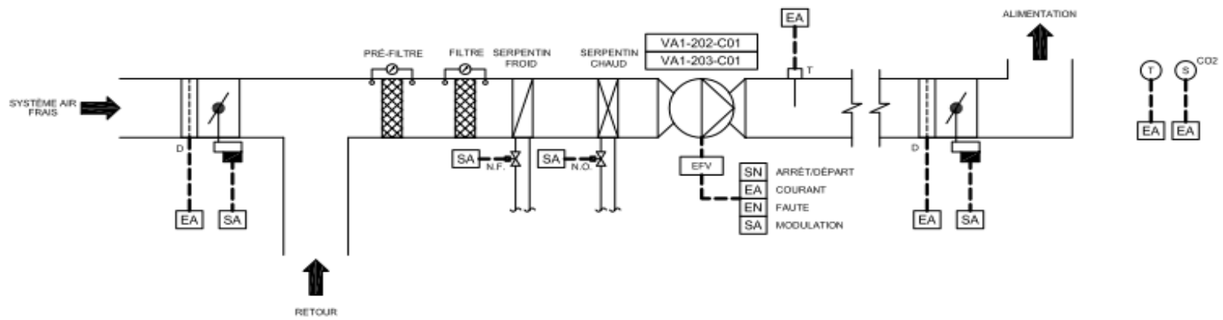
Normal Operati	The fresh air variable volume box is modulated by the CNP to maintain the carbon dioxide (CO2) level of the least favored zone or return duct at its setpoint.					
	The humidifier is modulated by the CNP to maintain the relative humidity in the return at setpoint. The CNP limits the relative humidity in the supply at a maximum of 80% R.H.					
	The air flow through the terminal variable volume box is modulated by the CNA in sequence with the baseboard's control valve and fan to maintain the room temperature at setpoint. The terminal unit is authorized to open for a minimum period of 30 minutes (adjustable) if permitted by the occupancy schedule and if a person is detected inside the room (by the presence detector, if applicable).					
	Allow a minimum of 60 minutes (adjustable) before switching from one mode to another.					
Normal Operation of Heating Mode	When the perimeter zone switches from cooling to heating, the modulating valve is closed and the isolation valves on the secondary cold water network are closed. The isolation valves on the low temperature hot water network are then opened and the baseboard's control valve is then allowed to modulate.					
	The baseboard's control valve is modulated in sequence with the baseboard's fan by the CNA to maintain temperature at setpoint. Setpoint is according to occupation mode (occupied, unoccupied, summer and winter).					
	When room temperature is below setpoint, the sequence is as follows: • Gradual opening of baseboard's control valve; • When control valve is 50% open the fan starts at medium speed (on room temperature rise, stop fan when valve is 10% open); • When the control valve is 100% open, the fan is set to high speed (on room temperature rise, reduce fan speed to medium when valve is 60% open).					
Normal Operation of Cooling Mode	When the perimeter zone switches from heating to cooling, the modulating valve is closed and the isolation valves on the low temperature hot water network are closed. The isolation valves on the secondary cold water network are then opened and the baseboard's control valve is then allowed to modulate.					
	The baseboard's control valve is modulated in sequence with the baseboard's fan by the CNA to maintain temperature at setpoint. Setpoint is according to occupation mode (occupied, unoccupied, summer and winter).					
	When room temperature is below setpoint, the sequence is as follows: • Gradual opening of baseboard's control valve; • When control valve is 50% open the fan starts at medium speed (on room temperature rise, stop fan when valve is 10% open); • When the control valve is 100% open, the fan is set to high speed (on room temperature rise, reduce fan speed to medium when valve is 60% open).					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: • Supply temperature: SP ± 2 °C; • Carbon dioxide level: > 1200 ppm; • Supply static pressure: SP ± 60 Pa.					
Notes						



System 202: West Building (East Perimeter Zone)
System 203: West Building (West Perimeter Zone)
(2 Similars)

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	The supply fan is stopped.					
	Heating coil's control valve is closed.					
	Cooling coil's control valve is closed.					
	The fresh air variable volume box is closed.					
System Start-Up	The CNP starts the supply fan at low speed according to either an occupancy schedule or to limit the room temperature to a maximum value outside of regular operation times. The system can also start by special request.					
	The CNP opens the fresh air variable volume box to its minimum position according to the occupancy schedule.					
Operation	.1 The supply fan speed is modulated by the CNP to maintain duct static pressure at setpoint 2/3 downstream of supply fan.					
	.2 The heating coil's control valve is modulated in sequence with the cooling coil's control valve by the CNP to maintain the supply temperature at setpoint. This setpoint is readjusted from 12 ℃ to 30 ℃ according to outdoor temperature.					

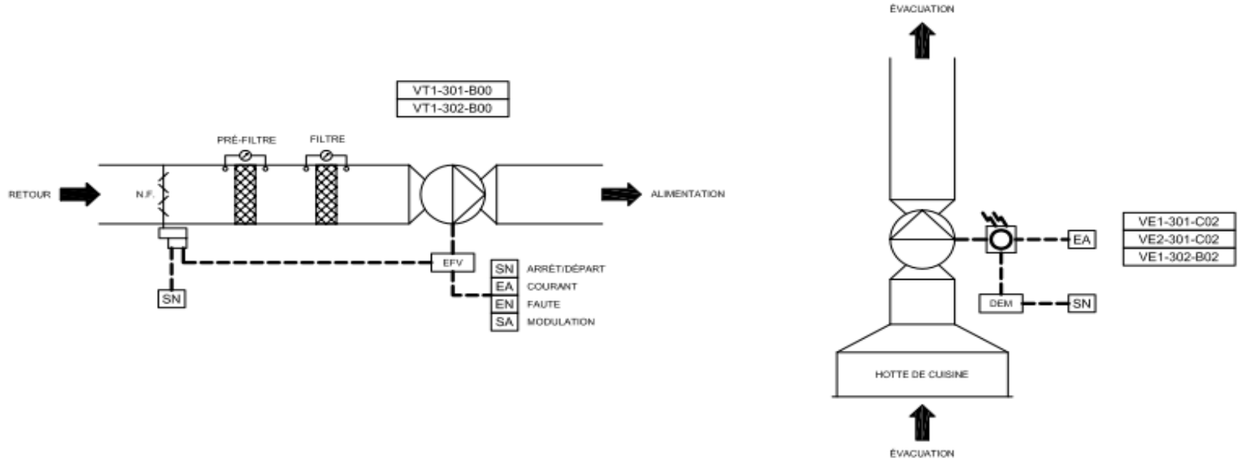
Normal C	.3 The CNA modulates the terminal unit air flow to maintain façade temperature at setpoint. The façade temperature is the average of the temperature sensors in the façade zone.					
	.4 The fresh air variable volume box is modulated by the CNP to maintain the carbon dioxide (CO2) level in the return duct at setpoint.					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: • Supply temperature: SP ± 2 °C; • Carbon dioxide level: > 1200 ppm; • Supply static pressure: SP ± 60 Pa.					
Notes						



System 202: West Building (East Perimeter Zone)
System 203: West Building (West Perimeter Zone)
(2 Similars)

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	The supply fan is stopped.					
	Heating coil's control valve is closed.					
	Cooling coil's control valve is closed.					
	The fresh air variable volume box is closed.					
System Start-Up	The CNP starts the supply fan at low speed according to either an occupancy schedule or to limit the room temperature to a maximum value outside of regular operation times. The system can also start by special request.					
	The CNP opens the fresh air variable volume box to its minimum position according to the occupancy schedule.					
Operation	The supply fan speed is modulated by the CNP to maintain duct static pressure at setpoint 2/3 downstream of supply fan.					
	The heating coil's control valve is modulated in sequence with the cooling coil's control valve by the CNP to maintain the supply temperature at setpoint. This setpoint is readjusted from 12 °C to 30 °C according to outdoor temperature.					

Normal	The CNA modulates the terminal unit air flow to maintain façade temperature at setpoint. The façade temperature is the average of the temperature sensors in the façade zone.					
	The fresh air variable volume box is modulated by the CNP to maintain the carbon dioxide (CO2) level in the return duct at setpoint.					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: • Supply temperature: SP ± 2 ℃; • Carbon dioxide level: > 1200 ppm; • Supply static pressure: SP ± 60 Pa.					
Notes						

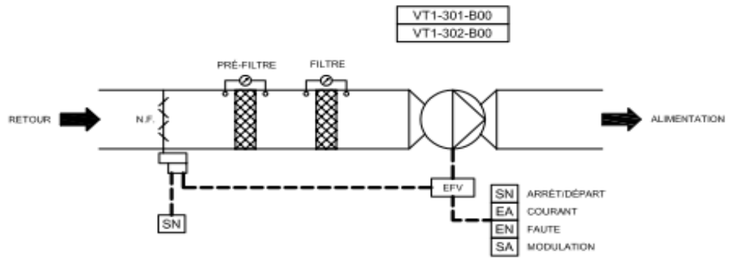


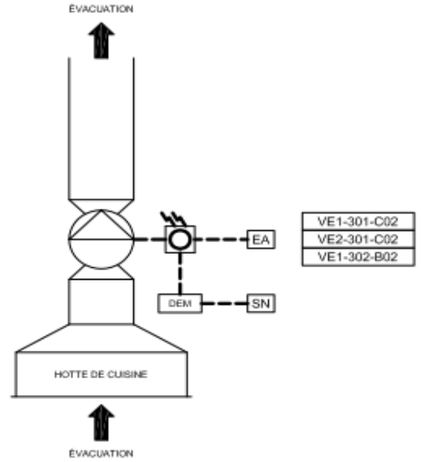
System 301: West Kitchen

System 301: West Kitchen
System 302: East Kitchen
(2 Similars)

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	Transfer and exhaust fans are stopped.					
	The transfer and exhaust damper is closed.					
System Start-Up	The CNP starts the east kitchen office's (100-13) exhaust fan according to the occupancy schedule of the east kitchen. The system can also start by special request. The exhaust damper opens by electrical interlock with the exhaust fan.					
	The CNP commands the transfer fan and the kitchen hood exhaust fan according to an occupancy schedule or from a request of the hood control panel. The system can also start by special request.					
	The CNP also commands hood control panel according to the same occupancy schedule.					
	Upon full-open confirmation of the transfer damper, the transfer fan starts at low speed by electrical interlock with the limit switch of the damper's actuator.					
	Upon full-open confirmation of the exhaust damper, the exhaust fan starts at low speed by electrical interlock with the limit switch of the damper's actuator.					
on	The transfer fan speed is modulated by the CNP to maintain the kitchen to a slightly negative pressure and doing so compensate for the air evacuated by the kitchen hoods.					

Normal Operati	Upon a sudden lost of kitchen pressurisation, opening of the door, the transfer fan speed remains constant at the last controlled value. The control starts when the door is shut (pressurisation is re-establish inside the kitchen).					
	The hood control panel commands the exhaust fan at its maximum speed.					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Hood control panel fault is sent to the CNP.					
	Status of filter is sent to the CNP.					
Notes						

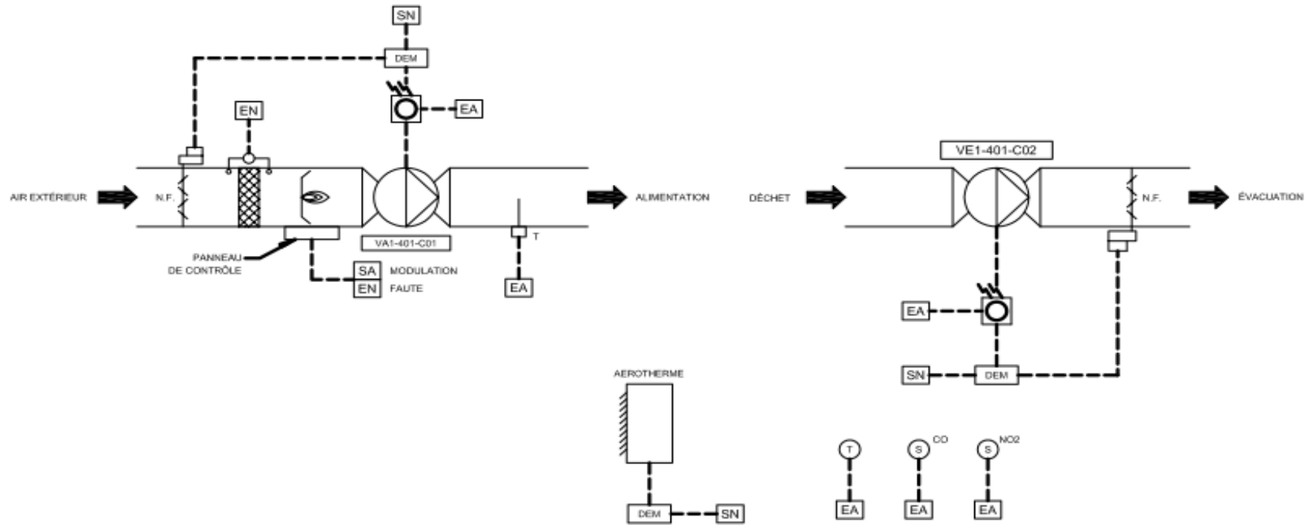




System 301: West Kitchen
System 302: East Kitchen
(2 Similars)

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	Transfer and exhaust fans are stopped.					
	The transfer and exhaust damper is closed.					
System Start-Up	The CNP starts the east kitchen office's (100-13) exhaust fan according to the occupancy schedule of the east kitchen. The system can also start by special request. The exhaust damper opens by electrical interlock with the exhaust fan.					
	The CNP commands the transfer fan and the kitchen hood exhaust fan according to an occupancy schedule or from a request of the hood control panel. The system can also start by special request.					
	The CNP also commands hood control panel according to the same occupancy schedule.					
	Upon full-open confirmation of the transfer damper, the transfer fan starts at low speed by electrical interlock with the limit switch of the damper's actuator.					
	Upon full-open confirmation of the exhaust damper, the exhaust fan starts at low speed by electrical interlock with the limit switch of the					
Normal Operatio	The transfer fan speed is modulated by the CNP to maintain the kitchen to a slightly negative pressure and doing so compensate for the air					
	Upon a sudden lost of kitchen pressurisation, opening of the door, the transfer fan speed remains constant at the last controlled value. The					
	The hood control panel commands the exhaust fan at its maximum speed.					

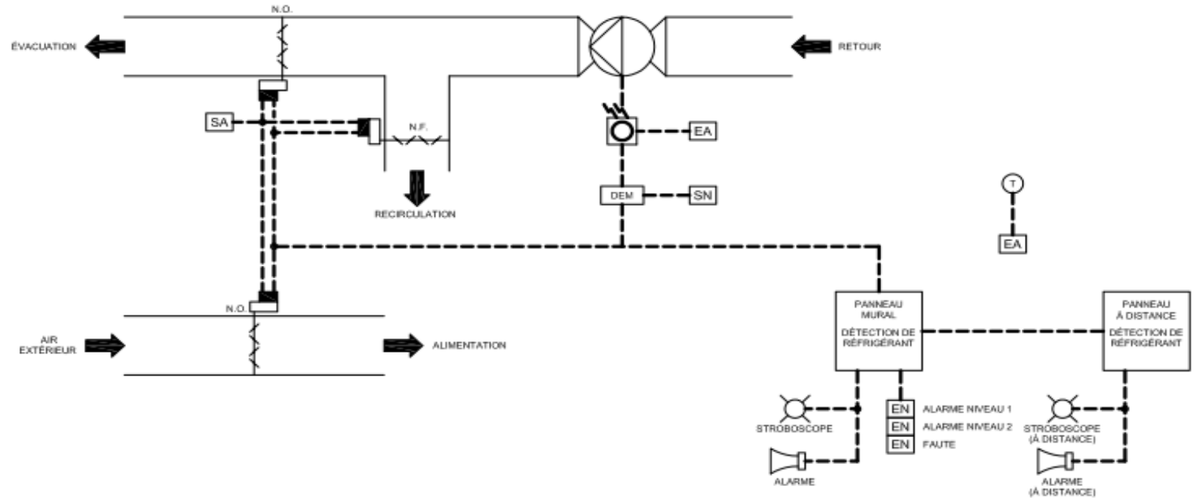
Local Protection	A fire alarm contact stops the system.					
rm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					



System 401: Loading Dock

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	Gas heating unit is stopped.					
	Exhaust fan is stopped.					
	Outdoor air and exhaust dampers are closed.					
	On a call for heating the unit heaters are controlled by the CNP to maintain room temperature at setpoint.					
System Start-Up	The exhaust fan is started by the CNP to maintain the CO (<25 ppm) and NO2 (< 0.7 ppm) levels at setpoint.					
	The exhaust damper opens by electrical interlock with the exhaust fan.					
	Upon confirmation of the operating status of the exhaust fan, the CNP starts the gas heating unit.					
	The outdoor air damper opens by electrical interlock with the gas heating unit.					
	On a call for heating the unit heaters are controlled by the CNP to maintain room temperature at setpoint.					

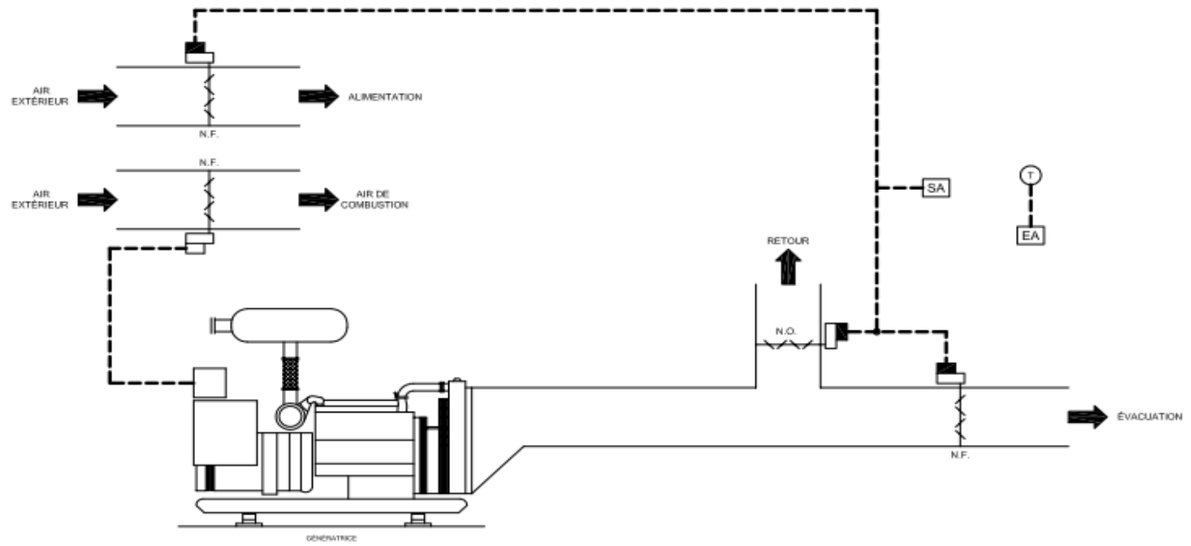
Normal Operation:	The gas heating unit is modulated by the CNP to maintain supply temperature at setpoint.					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: • Room temperature: < 18 °C; • CO level: > 200 ppm; • NO2 level: > 2 ppm					
Notes						



System 402: Chiller Room Ventilation

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	Supply (VA1-402-B00) and return (VR1-402-B00) fans are stopped.					
	Outdoor air and exhaust dampers are closed.					
	Recirculation dampers are open.					
System Start-Up:	The system runs continuously in regular conditions. The supply and return fans are started by the CNP.					
	Mixing dampers remain in complete recirculation for five (5) minutes following system start-up.					

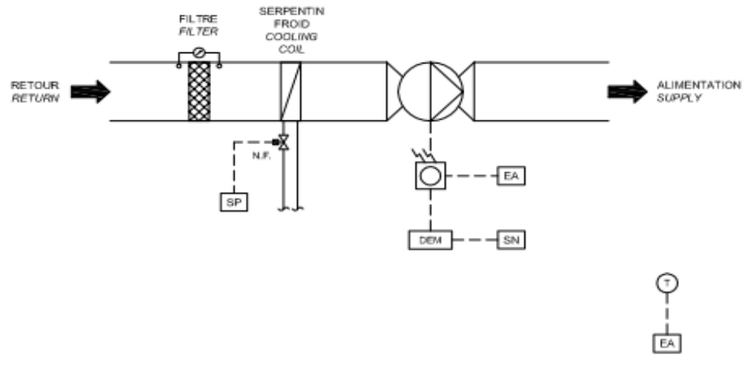
Normal Operation	Outside air, exhaust and recirculation dampers are modulated by the CNP to maintain room temperature at setpoint. The CNP limits the supply temperature to a minimum of 12 °C.					
Local Protection	When a first level refrigeration detection alarm is generated, a start command is sent by electrical interlock to start the supply and return fans, to fully open the outside air and exhaust dampers and to close the recirculation dampers.					
Alarm	Fans operating status is sent to the CNP.					
	Refrigerant detection panel fault, first and second level alarms are transmitted to the CNP.					
	Alarms are generated when the following variables exceed their limits: - Room temperature: < 18 °C; - Supply temperature: < 10 °C.					
Notes						



System 403: Generator Room

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	The outdoor air, combustion air and exhaust dampers are closed.					
	The recirculation dampers are open.					
System Start-Up	The combustion air damper opens by electrical interlock with the start of the generator.					
Normal Operation	The outdoor air, exhaust and recirculation dampers are modulated by the CNP to maintain the room temperature at setpoint.					

Local Protection	Not applicable.					
Alarm	Alarms are generated when the following variable exceeds its limits: - Room temperature: < 18 ℃.					
Notes						

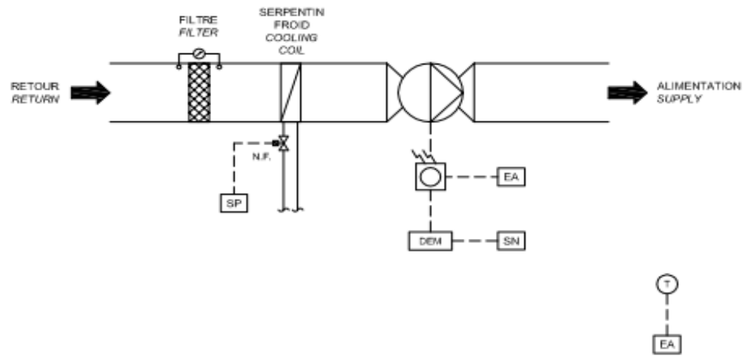


SYSTÈME *SYSTEM*	PIÈCE *ROOM*	# PIÈCE *# ROOM*
VC1-501-B00	**SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE** ***SECONDARY ELECTRICAL DISTRIBUTION ROOM***	S 100-17
VC1-502-B00	SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE *SECONDARY ELECTRICAL DISTRIBUTION ROOM*	S 100-16
VC1-503-C01	SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE *SECONDARY ELECTRICAL DISTRIBUTION ROOM*	100-46
VC1-504-C01	PLACARD ÉLECTRIQUE *ELECTRICAL CLOSET*	100-67
VC1-505-C02	ENTREPÔT AUDIO-VISUEL *AUDIOVISUAL STORAGE*	200-12
VC1-506-C00	SALLE ÉLECTRIQUE *ELECTRICAL ROOM*	S100-22
VC1-507-A00	SALLE ÉLECTRIQUE EST *ELECTRICAL ROOM EAST*	S 100-32
VC1-508-A04	SALLE MÉCANIQUE ASCENSEUR *ELEVATOR MECHANICAL ROOM*	400-03

SYSTÈME 5xx: SALLE ÉLECTRIQUE
SYSTEM 5xx: ELECTRICAL ROOM

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	The fan coil is stopped.					
	The cooling coil's control valve is closed.					
System Start-Up	The CNP starts the fan coil on a call for cooling. The system can also start by special request.					

Normal Operation:	The cooling coil's control valve is modulated by the CNP to maintain room temperature at setpoint. When the control valve is less than 5% open for a 10-minute period the fan coil is stopped.					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variable exceeds its limits: • Room temperature: > 30 °C.					
Notes						

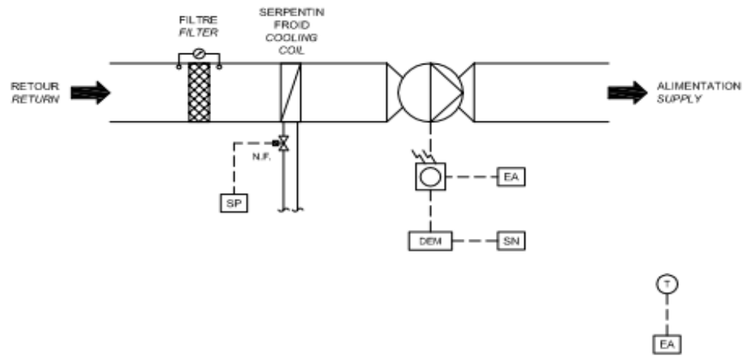


SYSTÈME *SYSTEM*	PIÈCE *ROOM*	# PIÈCE # *ROOM*
VC1-501-B00	**SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE** ***SECONDARY ELECTRICAL DISTRIBUTION ROOM***	S 100-17
VC1-502-B00	SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE *SECONDARY ELECTRICAL DISTRIBUTION ROOM*	S 100-16
VC1-503-C01	SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE *SECONDARY ELECTRICAL DISTRIBUTION ROOM*	100-46
VC1-504-C01	PLACARD ÉLECTRIQUE *ELECTRICAL CLOSET*	100-67
VC1-505-C02	ENTREPÔT AUDIO-VISUEL *AUDIOVISUAL STORAGE*	200-12
VC1-506-C00	SALLE ÉLECTRIQUE *ELECTRICAL ROOM*	S100-22
VC1-507-A00	SALLE ÉLECTRIQUE EST *ELECTRICAL ROOM EAST*	S 100-32
VC1-508-A04	SALLE MÉCANIQUE ASCENSEUR *ELEVATOR MECHANICAL ROOM*	400-03

SYSTÈME 5xx: SALLE ÉLECTRIQUE
SYSTEM 5xx: ELECTRICAL ROOM

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	The fan coil is stopped.					
	The cooling coil's control valve is closed.					
System Start-Up	The CNP starts the fan coil on a call for cooling. The system can also start by special request.					

Normal Operation:	The cooling coil's control valve is modulated by the CNP to maintain room temperature at setpoint. When the control valve is less than 5% open for a 10-minute period the fan coil is stopped.					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variable exceeds its limits: • Room temperature: > 30 °C.					
Notes						

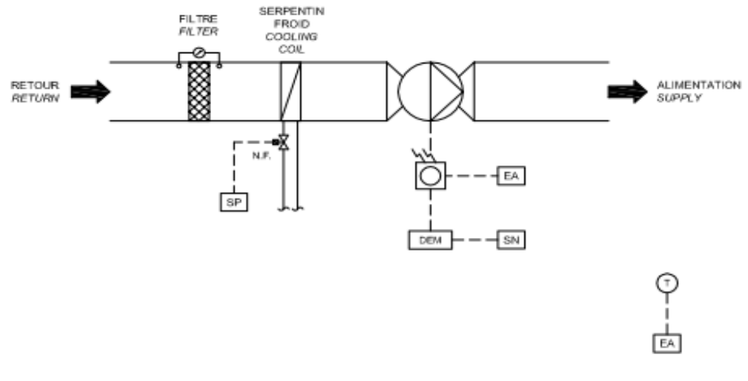


SYSTÈME *SYSTEM*	PIÈCE *ROOM*	# PIÈCE *# ROOM*
VC1-501-B00	**SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE** ***SECONDARY ELECTRICAL DISTRIBUTION ROOM***	S 100-17
VC1-502-B00	SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE *SECONDARY ELECTRICAL DISTRIBUTION ROOM*	S 100-16
VC1-503-C01	SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE *SECONDARY ELECTRICAL DISTRIBUTION ROOM*	100-46
VC1-504-C01	PLACARD ÉLECTRIQUE *ELECTRICAL CLOSET*	100-67
VC1-505-C02	ENTREPÔT AUDIO-VISUEL *AUDIOVISUAL STORAGE*	200-12
VC1-506-C00	SALLE ÉLECTRIQUE *ELECTRICAL ROOM*	S100-22
VC1-507-A00	SALLE ÉLECTRIQUE EST *ELECTRICAL ROOM EAST*	S 100-32
VC1-508-A04	SALLE MÉCANIQUE ASCENSEUR *ELEVATOR MECHANICAL ROOM*	400-03

SYSTÈME 5xx: SALLE ÉLECTRIQUE
SYSTEM 5xx: ELECTRICAL ROOM

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	The fan coil is stopped.					
	The cooling coil's control valve is closed.					
System Start-Up	The CNP starts the fan coil on a call for cooling. The system can also start by special request.					

Normal Operation:	The cooling coil's control valve is modulated by the CNP to maintain room temperature at setpoint. When the control valve is less than 5% open for a 10-minute period the fan coil is stopped.					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variable exceeds its limits: • Room temperature: > 30 °C.					
Notes						

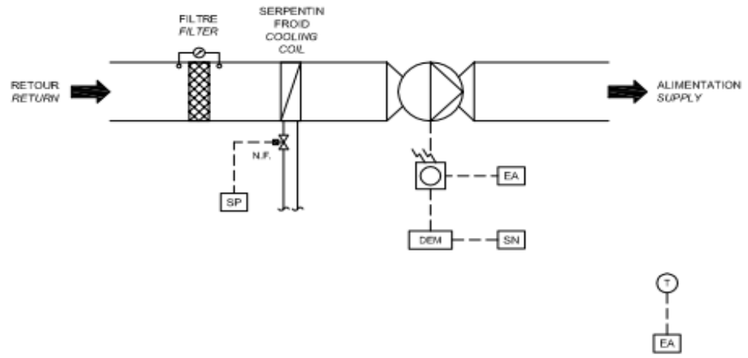


SYSTÈME *SYSTEM*	PIÈCE *ROOM*	# PIÈCE *# ROOM*
VC1-501-B00	**SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE** ***SECONDARY ELECTRICAL DISTRIBUTION ROOM***	S 100-17
VC1-502-B00	SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE *SECONDARY ELECTRICAL DISTRIBUTION ROOM*	S 100-16
VC1-503-C01	SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE *SECONDARY ELECTRICAL DISTRIBUTION ROOM*	100-46
VC1-504-C01	PLACARD ÉLECTRIQUE *ELECTRICAL CLOSET*	100-67
VC1-505-C02	ENTREPÔT AUDIO-VISUEL *AUDIOVISUAL STORAGE*	200-12
VC1-506-C00	SALLE ÉLECTRIQUE *ELECTRICAL ROOM*	S100-22
VC1-507-A00	SALLE ÉLECTRIQUE EST *ELECTRICAL ROOM EAST*	S 100-32
VC1-508-A04	SALLE MÉCANIQUE ASCENSEUR *ELEVATOR MECHANICAL ROOM*	400-03

SYSTÈME 5xx: SALLE ÉLECTRIQUE
SYSTEM 5xx: ELECTRICAL ROOM

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	The fan coil is stopped.					
	The cooling coil's control valve is closed.					
System Start-Up	The CNP starts the fan coil on a call for cooling. The system can also start by special request.					

Normal Operation:	The cooling coil's control valve is modulated by the CNP to maintain room temperature at setpoint. When the control valve is less than 5% open for a 10-minute period the fan coil is stopped.					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variable exceeds its limits: • Room temperature: > 30 °C.					
Notes						

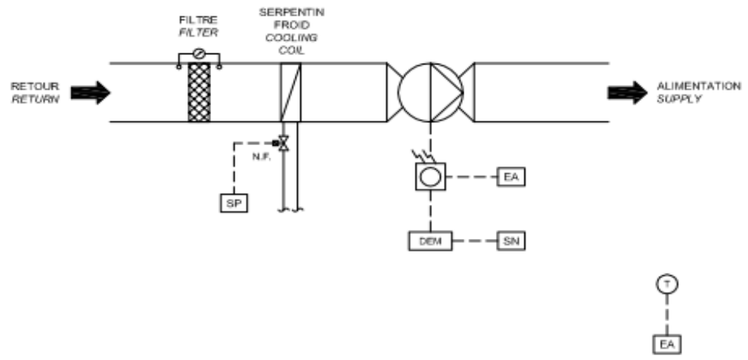


SYSTÈME *SYSTEM*	PIÈCE *ROOM*	# PIÈCE # *ROOM*
VC1-501-B00	**SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE** ***SECONDARY ELECTRICAL DISTRIBUTION ROOM***	S 100-17
VC1-502-B00	SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE *SECONDARY ELECTRICAL DISTRIBUTION ROOM*	S 100-16
VC1-503-C01	SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE *SECONDARY ELECTRICAL DISTRIBUTION ROOM*	100-46
VC1-504-C01	PLACARD ÉLECTRIQUE *ELECTRICAL CLOSET*	100-67
VC1-505-C02	ENTREPÔT AUDIO-VISUEL *AUDIOVISUAL STORAGE*	200-12
VC1-506-C00	SALLE ÉLECTRIQUE *ELECTRICAL ROOM*	S100-22
VC1-507-A00	SALLE ÉLECTRIQUE EST *ELECTRICAL ROOM EAST*	S 100-32
VC1-508-A04	SALLE MÉCANIQUE ASCENSEUR *ELEVATOR MECHANICAL ROOM*	400-03

SYSTÈME 5xx: SALLE ÉLECTRIQUE
SYSTEM 5xx: ELECTRICAL ROOM

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	The fan coil is stopped.					
	The cooling coil's control valve is closed.					
System Start-Up	The CNP starts the fan coil on a call for cooling. The system can also start by special request.					

Normal Operation:	The cooling coil's control valve is modulated by the CNP to maintain room temperature at setpoint. When the control valve is less than 5% open for a 10-minute period the fan coil is stopped.					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variable exceeds its limits: • Room temperature: > 30 °C.					
Notes						

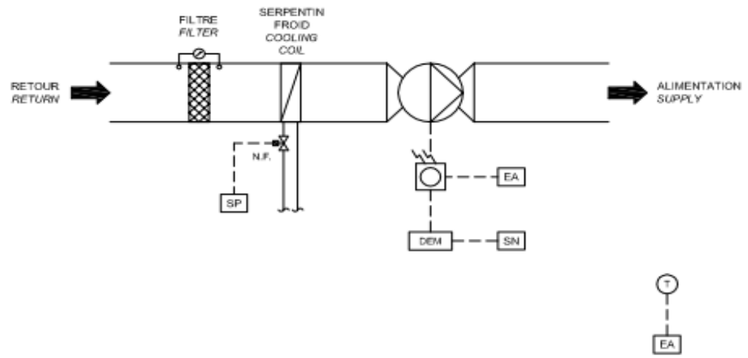


SYSTÈME *SYSTEM*	PIÈCE *ROOM*	# PIÈCE # *ROOM*
VC1-501-B00	**SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE** ***SECONDARY ELECTRICAL DISTRIBUTION ROOM***	S 100-17
VC1-502-B00	SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE *SECONDARY ELECTRICAL DISTRIBUTION ROOM*	S 100-16
VC1-503-C01	SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE *SECONDARY ELECTRICAL DISTRIBUTION ROOM*	100-46
VC1-504-C01	PLACARD ÉLECTRIQUE *ELECTRICAL CLOSET*	100-67
VC1-505-C02	ENTREPÔT AUDIO-VISUEL *AUDIOVISUAL STORAGE*	200-12
VC1-506-C00	SALLE ÉLECTRIQUE *ELECTRICAL ROOM*	S100-22
VC1-507-A00	SALLE ÉLECTRIQUE EST *ELECTRICAL ROOM EAST*	S 100-32
VC1-508-A04	SALLE MÉCANIQUE ASCENSEUR *ELEVATOR MECHANICAL ROOM*	400-03

SYSTÈME 5xx: SALLE ÉLECTRIQUE
SYSTEM 5xx: ELECTRICAL ROOM

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	The fan coil is stopped.					
	The cooling coil's control valve is closed.					
System Start-Up	The CNP starts the fan coil on a call for cooling. The system can also start by special request.					

Normal Operation:	The cooling coil's control valve is modulated by the CNP to maintain room temperature at setpoint. When the control valve is less than 5% open for a 10-minute period the fan coil is stopped.					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variable exceeds its limits: • Room temperature: > 30 °C.					
Notes						

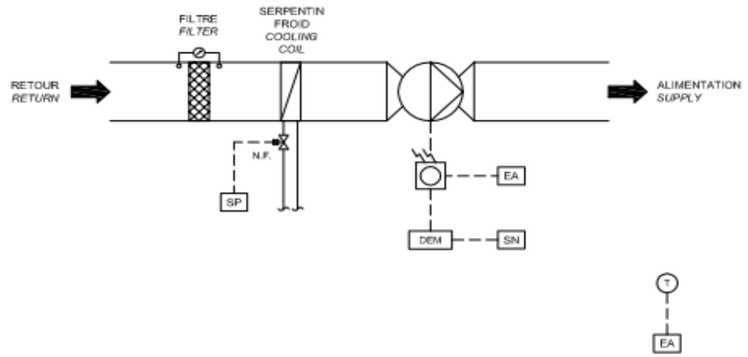


SYSTÈME *SYSTEM*	PIÈCE *ROOM*	# PIÈCE *# ROOM*
VC1-501-B00	**SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE** ***SECONDARY ELECTRICAL DISTRIBUTION ROOM***	S 100-17
VC1-502-B00	SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE *SECONDARY ELECTRICAL DISTRIBUTION ROOM*	S 100-16
VC1-503-C01	SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE *SECONDARY ELECTRICAL DISTRIBUTION ROOM*	100-46
VC1-504-C01	PLACARD ÉLECTRIQUE *ELECTRICAL CLOSET*	100-67
VC1-505-C02	ENTREPÔT AUDIO-VISUEL *AUDIOVISUAL STORAGE*	200-12
VC1-506-C00	SALLE ÉLECTRIQUE *ELECTRICAL ROOM*	S100-22
VC1-507-A00	SALLE ÉLECTRIQUE EST *ELECTRICAL ROOM EAST*	S 100-32
VC1-508-A04	SALLE MÉCANIQUE ASCENSEUR *ELEVATOR MECHANICAL ROOM*	400-03

SYSTÈME 5xx: SALLE ÉLECTRIQUE
SYSTEM 5xx: ELECTRICAL ROOM

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	The fan coil is stopped.					
	The cooling coil's control valve is closed.					
System Start-Up	The CNP starts the fan coil on a call for cooling. The system can also start by special request.					

Normal Operation:	The cooling coil's control valve is modulated by the CNP to maintain room temperature at setpoint. When the control valve is less than 5% open for a 10-minute period the fan coil is stopped.					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variable exceeds its limits: • Room temperature: > 30 °C.					
Notes						

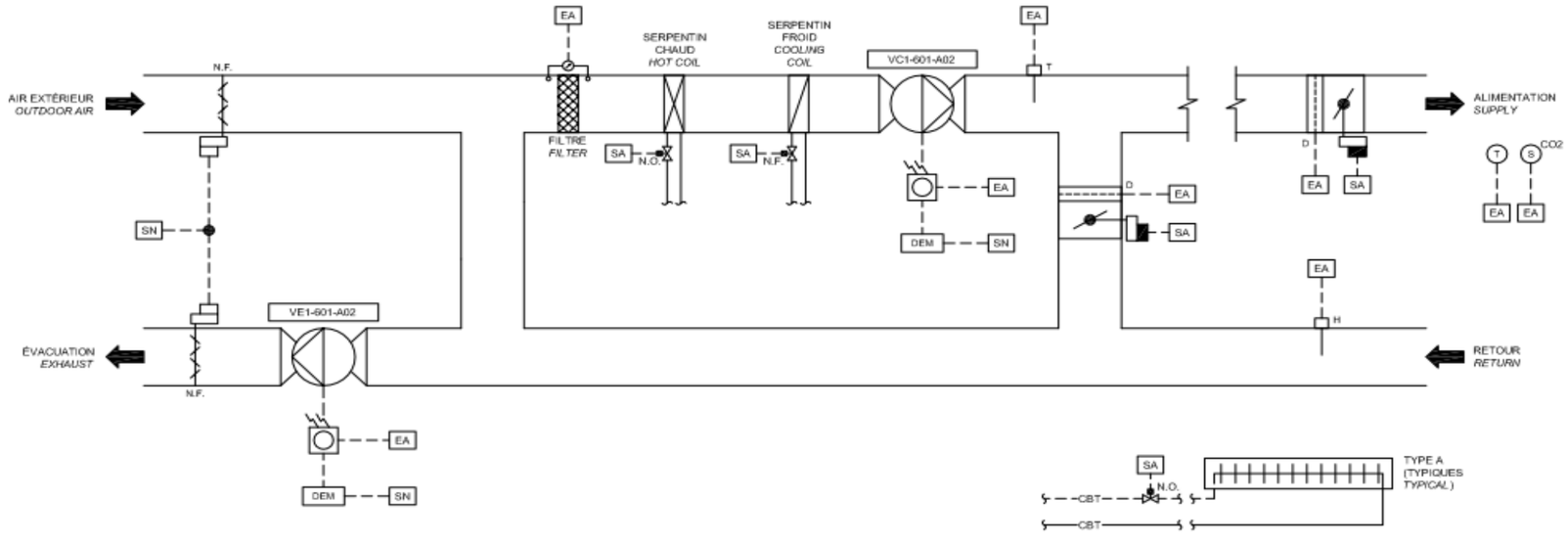


SYSTÈME *SYSTEM*	PIÈCE *ROOM*	# PIÈCE *# ROOM*
VC1-501-B00	**SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE** ***SECONDARY ELECTRICAL DISTRIBUTION ROOM***	S 100-17
VC1-502-B00	SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE *SECONDARY ELECTRICAL DISTRIBUTION ROOM*	S 100-16
VC1-503-C01	SALLE DE DISTRIBUTION ÉLECTRIQUE SECONDAIRE *SECONDARY ELECTRICAL DISTRIBUTION ROOM*	100-46
VC1-504-C01	PLACARD ÉLECTRIQUE *ELECTRICAL CLOSET*	100-67
VC1-505-C02	ENTREPÔT AUDIO-VISUEL *AUDIOVISUAL STORAGE*	200-12
VC1-506-C00	SALLE ÉLECTRIQUE *ELECTRICAL ROOM*	S100-22
VC1-507-A00	SALLE ÉLECTRIQUE EST *ELECTRICAL ROOM EAST*	S 100-32
VC1-508-A04	SALLE MÉCANIQUE ASCENSEUR *ELEVATOR MECHANICAL ROOM*	400-03

SYSTÈME 5xx: SALLE ÉLECTRIQUE
SYSTEM 5xx: ELECTRICAL ROOM

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	The fan coil is stopped.					
	The cooling coil's control valve is closed.					
System Start-Up	The CNP starts the fan coil on a call for cooling. The system can also start by special request.					

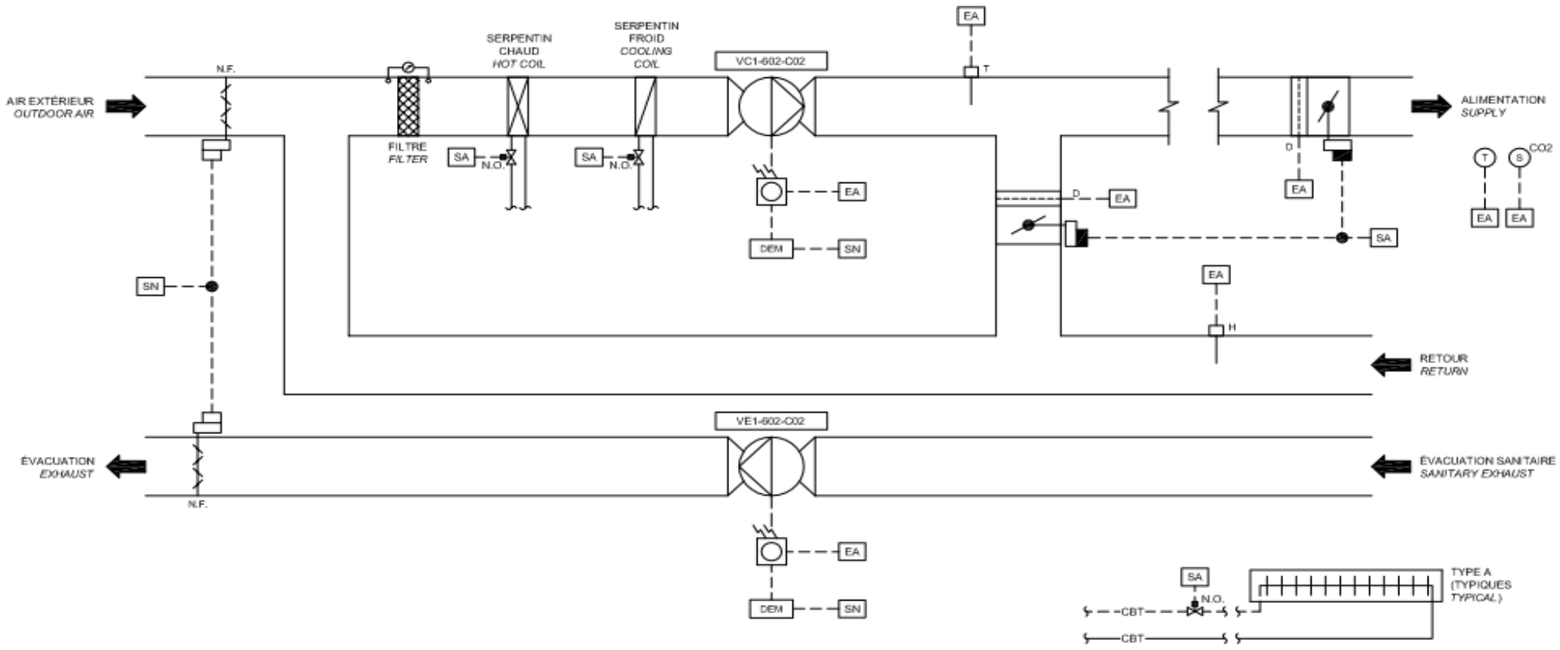
Normal Operation:	The cooling coil's control valve is modulated by the CNP to maintain room temperature at setpoint. When the control valve is less than 5% open for a 10-minute period the fan coil is stopped.					
Local Protection	A fire alarm contact stops the system.					
Alarm	Fan operating status is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Alarms are generated when the following variable exceeds its limits: • Room temperature: > 30 °C.					
Notes						



SYSTÈME 601: TOUR CARRÉE EST
SYSTEM 601: EAST SQUARE TOWER

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	Fan coil is stopped.					
	Exhaust fan is stopped.					
	Outdoor air and evacuation dampers are closed.					
	Cooling coil's control valve is closed.					
	Heating coil's control valve is closed.					
System Start-Up	Outdoor air and evacuation dampers are opened by the CNP according to an occupancy schedule. The system can also start by special request.					
	Exhaust fan is started and supply fan is started at low speed by the CNP.					
	To maintain a maximum temperature outside of regular operating hours, the supply fan is started at low speed by the CNP. Outdoor air and evacuation dampers remain closed.					
	The supply fan speed is modulated by the CNP to maintain duct static pressure at setpoint 2/3 downstream of supply fan.					

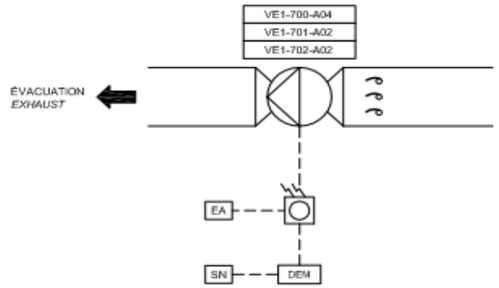
Normal Operation	The heating coil's control valve is modulated by the CNP in sequence with the cooling coil's control valve to maintain supply temperature at setpoint (13 °C).					
	The air flow through the terminal variable volume box is modulated by the CNA in sequence with the baseboard's control valve to maintain the room temperature at setpoint. The terminal unit is authorized to open for a minimum period of 30 minutes (adjustable) if permitted by the occupancy schedule and if a person is detected inside the room (by the presence detector, if applicable).					
Local Protection	A fire alarm contact stops the system.					
	The supply fan is stopped when the freezestat switch (IG) upstream of the cooling coil is triggered. The freezestat is set to 5 °C (41 °F).					
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Freezestat switch (IG) status is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: - Supply temperature: SP ± 2 °C; - Supply static pressure: SP ± 60 Pa.					
Notes						



SYSTÈME 602: TOUR CARRÉE OUEST
SYSTEM 602: WEST SQUARE TOWER

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown	Fan coil is stopped.					
	Exhaust fan is stopped.					
	Outdoor air and evacuation dampers are closed.					
	Cooling coil's control valve is closed.					
	Heating coil's control valve is closed.					
System Start-Up	Outdoor air and evacuation dampers are opened by the CNP according to an occupancy schedule. The system can also start by special request.					
	Exhaust fan is started and supply fan is started at low speed by the CNP.					
	To maintain a maximum temperature outside of regular operating hours, the supply fan is started at low speed by the CNP. Outdoor air and evacuation dampers remain closed.					
mal ation	The supply fan speed is modulated by the CNP to maintain duct static pressure at setpoint 2/3 downstream of supply fan.					
	The heating coil's control valve is modulated by the CNP in sequence with the cooling coil's control valve to maintain supply temperature at setpoint (13 °C).					

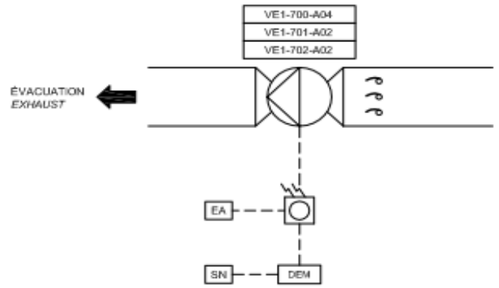
Nor Oper	The air flow through the terminal variable volume box is modulated by the CNA in sequence with the baseboard's control valve to maintain the room temperature at setpoint. The terminal unit is authorized to open for a minimum period of 30 minutes (adjustable) if permitted by the occupancy schedule and if a person is detected inside the room (by the presence detector, if applicable).					
Local Protection	A fire alarm contact stops the system.					
	The supply fan is stopped when the freezestat switch (IG) upstream of the cooling coil is triggered. The freezestat is set to 5 °C (41 °F).					
Alarm	Fan operating status is sent to the CNP.					
	Variable frequency drive fault is sent to the CNP.					
	Status of filter is sent to the CNP.					
	Freezestat switch (IG) status is sent to the CNP.					
	Alarms are generated when the following variables exceed their limits: - Supply temperature: SP ± 2 °C; - Supply static pressure: SP ± 60 Pa.					
Notes						



SYSTÈME 7XX: ÉVACUATION SANITAIRE
SYSTEM 7XX: SANITARY EXHAUST

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown:	The fan is stopped.					
System Start-Up	The CNP starts the fan according to the occupancy schedule of the associated supply system: - VE1-700-A04 with system 107; - VE1-701-A02 with system 110; - VE1-702-A02 with systems 105 and 106.					

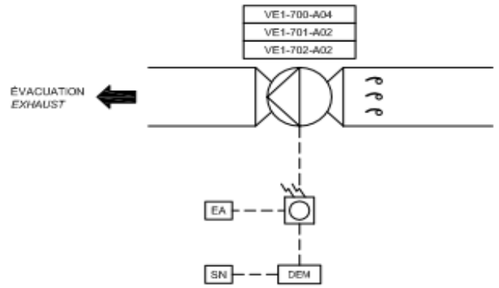
Normal Operation:	Not applicable.					
Local Protection	Not applicable.					
Alarm	Fan operating status is sent to the CNP.					
Notes						



SYSTÈME 7XX: ÉVACUATION SANITAIRE
SYSTEM 7XX: SANITARY EXHAUST

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown:	The fan is stopped.					
System Start-Up	The CNP starts the fan according to the occupancy schedule of the associated supply system: - VE1-700-A04 with system 107; - VE1-701-A02 with system 110; - VE1-702-A02 with systems 105 and 106.					

Normal Operation:	Not applicable.					
Local Protection	Not applicable.					
Alarm	Fan operating status is sent to the CNP.					
Notes						



SYSTÈME 7XX: ÉVACUATION SANITAIRE
SYSTEM 7XX: SANITARY EXHAUST

	Sequences	Program completed	Simulation / Real test	Satisfactory result	Accepted by	Note
System Shutdown:	The fan is stopped.					
System Start-Up	The CNP starts the fan according to the occupancy schedule of the associated supply system: - VE1-700-A04 with system 107; - VE1-701-A02 with system 110; - VE1-702-A02 with systems 105 and 106.					

Normal Operation:	Not applicable.					
Local Protection	Not applicable.					
Alarm	Fan operating status is sent to the CNP.					
Notes						

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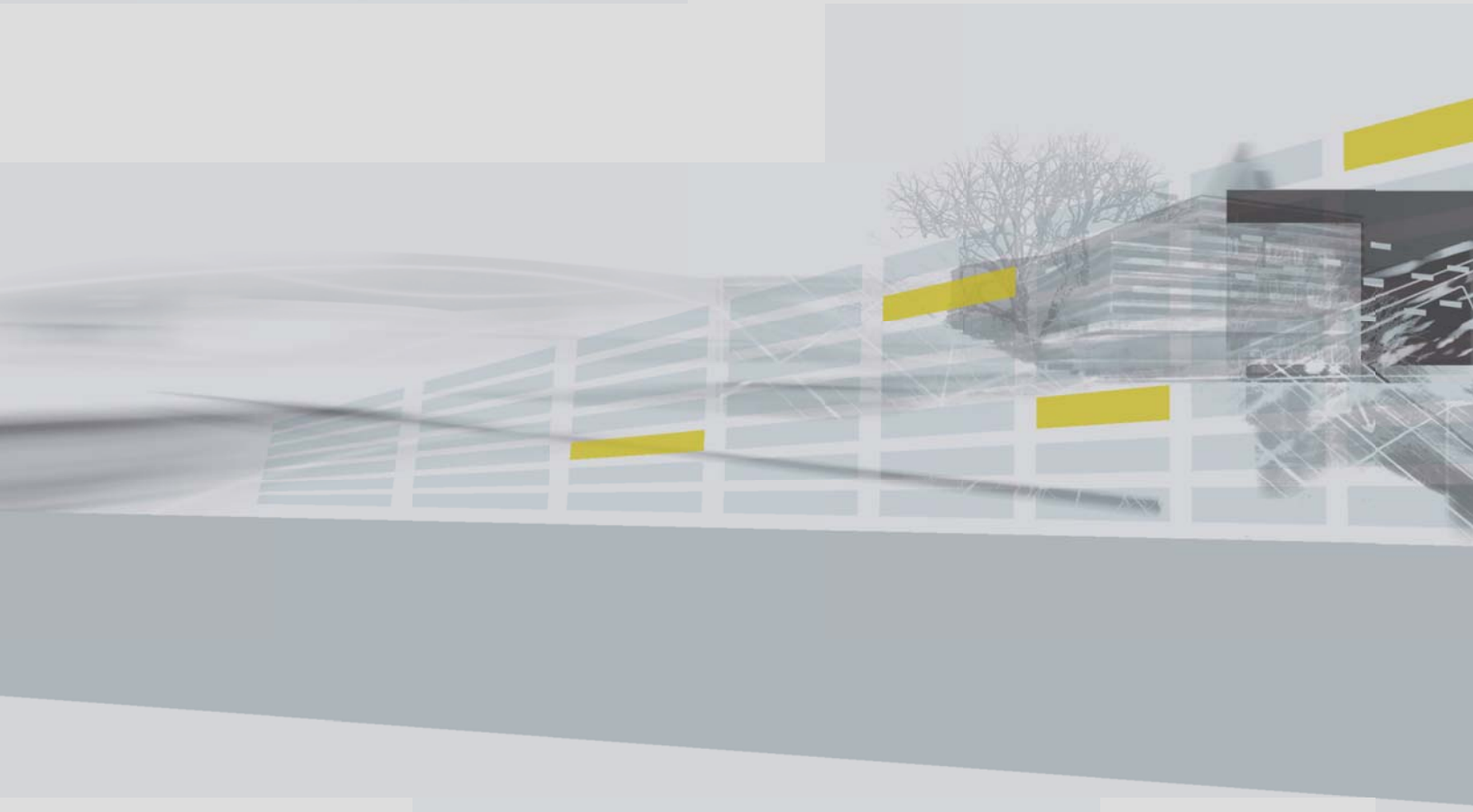

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