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HVSP TECHNICAL DRAWINGS GRAPHICS STANDARDIZATION GUIDELINES

HVSP graphics standardization guidelines

April 27th 2005

1. GENERAL

1.1 Terminology

Based on the “Cahier Technique” (Technical terms) SIA 2014 (Swiss norm for construction), the terms CAO (Conception Assistée par Ordinateur) for Computer Aided Creations, and CAD are valid designations for the creation of electronic drawings.

1.2 Norm Reference

Drawings layer organization as refered to in the “Cahier Technique” SIA 2014 : " CAO Layer Organization " can be ordered at SIA, Selnaustrasse 16, 8039 Zurich, tél. 01/283 15 60.

The « Domaine Immobilier et Infrastructures » Exploitation unit (DII-E) reserves the right to adapt these guidelines to new norms.

2. PARTICIPANTS AND RESPONSABILITIES

The Exploitation unit (DII-E) at EPFL has elaborated norm guidelines, which are in accordance with the guidelines previously developed by SC (Service de Construction) for architectural drawings. They are designed to reduce errors and the possiblity of information loss, and to insure accurate exchange of data among all participants of the project, including those within EPFL

The “Domaine Immobilier et Infrastructures” Exploitation unit (DII-E) is responsible for its drawing plans, digital diagrams, and for user’s compliance with these directives as well as its adaptation and revision: updates, organization on server, listing, backups, hard- and CAD software evolution.

Contractors are responsible of transmitting information to subcontractors and insuring compliance with guidelines.

3. CAO/DAO FILES ACQUISITION PROCESS

3.1 The process

CAD 2D drawing acquisition has 4 stages:

The first stage consists of communicating information and familiarizing contractors with the project’s digital environment. The second stage is dedicated to identifying the contractor’s specific demands in view of complementing guidelines instructions if necessary. The third and fourth stages concern quality control.

Phase 1 : Evaluation of the Software chosen by the contractor

- Preparing data exchange test by evaluating the contractor’s CAD system
- Preparation, distribution and presentation of CAD exchange test to contractors. Exchange test is designed to anticipate potential incompatibilities, and to point out adequate corrective measures.
- Technical support while test is being carried out
- Reception and analysis of test
- Writing of a compliance report

Phase 2 : Adaptation of guidelines to contractors specificific needs

- Collecting data from the person in charge of CAD (examples, experiences, etc.)
- Preparation of final guidelines proposal concerning HVSP
- Complementing guidelines with specific instructions if necessary

Phase 3 : File control by the contractor

- Analysis of files by the contractor in order to establish the degree of their compliance with guidelines.

Phase 4 : File reception

- Reception and approval by “Domaine Immobilier et Infrastructures”, Exploitation unit (DII-E)” of submitted documents
- Instructions explaining adequate working methods will be provided to help adjust files with considerable differences with existing guidelines.

4. EPFL CAD SYSTEM

4.1. The " Domaine Immobilier et Infrastructures ", Exploitation unit’s reference CAD system

- PC compatible along with Operating System Windows 2000, XP ou NT.
- Software AutoCAD, version 2004 or above.

4.2. CAD system chosen by contractor

4.2.1. Evaluation of CAD system chosen by contractors

Verification and validation of CAD system chosen by the contractor will take place in time of data transfer.it should be

- Configured to suit both structure and the needs of data exchange, in order to create files in compliance with all functions of the reference system of « Domaine Immobilier », Exploitation Unit (DII-E).
- CAD system needs to allow data transfer in DWG and/or DXF format without alteration or loss of information (It will be specified by EPFL when to use either DWG and/or DXF data exchange format)
- Allows total compliance with « Domaine Immobilier », Exploitation Unit (DII-E)’s guidelines
- It is the contractor’s duty to submit a demand for permission to update their CAD software if such need was observed during the project; software new versions needs to be approved by the « Domaine Immobilier », Exploitation Unit (DII-E).

4.2.2. Data exchange test

At the start of a project, contractors need to take a data exchange test to check if their system is compatible with dwg or dxf format.

With no obligation to justify it, EPFL reserves the right to require such a test at any moment during the project.

Test objectives:

- To improve the quality of data exchange
- To reduce configuration tasks
- To define all adaptation tasks before and after transmission
- To develop a foundation for long term collaboration

The test is mandatory:

- If a new contractor becomes a CAD data provider
- If the contractor or EPFL (DII-E) update their software
- If the contractor or EPFL (DII-E) update their computer Operating System

The estimated time for such a test is one work day of a draftsman. The contractor becomes a data provider for the concerned project if this test is performed according to the EPFL requirements/guidelines.

4.2.3. Test results

If the contractor finalizes the expected adjustments, and if the improvements on some elements were accomplished, a written report will establish the conformity of the test with EPFL's requirements/guidelines.

If the contractor by adopting the required modifications of some details achieves success in his compliance with EPFL's demands, a written report confirms that the test's results was globally positive. Otherwise, an additional training will be given or modifications will be made by EPFL(DII-E).

5. CAD GUIDELINES

5.1. Applicability and responsibilities

5.1.1. Guideline validity

Guidelines constitute a pertinent component of the contract between an external contractor and EPFL. They are developed and meticulously defined to help contractors achieve their tasks within the guiding principles of EPFL whether it was new construction or transformation job. Nevertheless, complementary detailed conventions proper to individual contracts have priority over these guidelines.

5.1.2. Restrictions

2D drawings are the only elements concerned by these guidelines. Reference scale is 1:50.

5.1.3. Corrective measures

When contractor's CAD system is incompatible with EPFL's, or when compliance with guidelines is not totally respected, the "Domaine Immobilier et Infrastructures », Exploitation unit (DII-E) reserves all rights to update all files in-house or by a third party if necessary.

5.2. Data management guidelines

5.2.1 Data transmission support

All media support will be clearly labeled according to EPFL's chart (defined at the beginning of each job agreement)

Elements to be taken in consideration while transfering data files between EPFL (DII-E) and Contractors:

- Data support: disk 1.44, Iomega ZIP100 ou 250, CDRom.
- Software compressors (example: pkzip.exe): are admitted as long as transferred data is delivered with the adequate software to un-compress it, or in case of compressed files that are auto-extractible (.EXE).
- Other types (.BAK etc.) are not accepted.
- Virus: The supplier has to ensure delivered digital files are virus-free. If a contractor causes EPFL system to be contaminated via a transmitted file. EPFL will undertake legal pursuit and demand compensation.
- All files require recent updated anti-virus software verification.
- E-mail: EPFL may well require data submission by electronic mail.
- To keep up with new technical developments, EPFL may well require new media supports for data transfer.

5.2.2 Data backup

The last version of transferred data (electronic or paper) has to be conserved by the contractor for 5 years minimum, (starting: submission date).

It is prohibited to destroy data without EPFL's (DII-E) authorization. If a contractor needs to delete data, EPFL reserves the right to take possession of electronic files (free of charge).

5.2.3 CAD File format

Data will be exchanged exclusively in DWG and/or DXF formats. The following points should be taken into consideration: (DWG and DXF are supplied by the company AutoDesk: AutoCAD software designer)

At the start of a job, and regardless of their individual CAD system, contractors are responsible for verifying compatibility issues concerning their system and that of EPFL's, Today, it is AutoCAD software that is adapted by EPFL, it is thus the reference system for all files, any transferred element which is unreadable by AutoCAD would be rejected, even if exchange with other systems is possible.

Contractor needs to insure that all links to other drawings, data banks, external documents are deleted. Only exception concerns architect plans inserts in the HVSP drawings, and HVSP inserts in coordination plans (as external reference insert on layer 0) (see chapters 0 and 0)

If a contractor is equipped with AutoCAD 2004 or 2006, compliance with EPFL's technical specifications is an easy matter.

5.2.3. Submission requirements

Plans and graphics that are created and finalized by a contractor during a job need to be delivered with the following elements:

- Labled digital supports containing DWG or DXF formats plans.
- Plans in hard copy, folded to A4 format where legend/stamp makes figure of a cover page.
- A delivery sheet containing a list of all pieces digital and printed.
- A detailed list explaining layers organization (in case of non-compliance with guidelines)
- A list explaining style correlation: screen colors, line thickness for print.

The volume and the content of submitted elements may subsequently be defined by EPFL on a project-by-project basis.

5.2.5. Non compliance with data management guidelines

Unless it is previously specified by bothe parties, disrespect of guidelines mentioned by CVSE directives would result in rejection of submitted files.

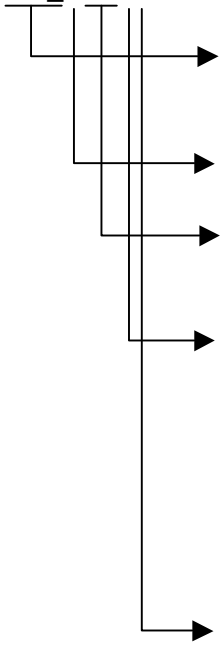
When incorrect or incomplete files are submitted they will be returned for correction and update, at the expense of the supplier.

6. STRUCTURE AND PLANS / FILES GUIDELINES

6.1. Names and content of files

Names of digital files obey EPFL (DII-E) system used for designation of buildings at EPFL, it respects the following rules:

ME_H01SP



Field 1: 3 building designation letters, for example ME_ for mécanique

Field 2: 1 zone letter, here H

Field 3: 2 level letter (…-4, -3, -2, -1, 00, 01, 02,…), here 01 for the 1st floor.

Field 4: 1 contractor letter:
A = Architect
C = Heating
V = Ventilation
S = Sanitary
E = Electricity
X = Coordination drawing HVSP

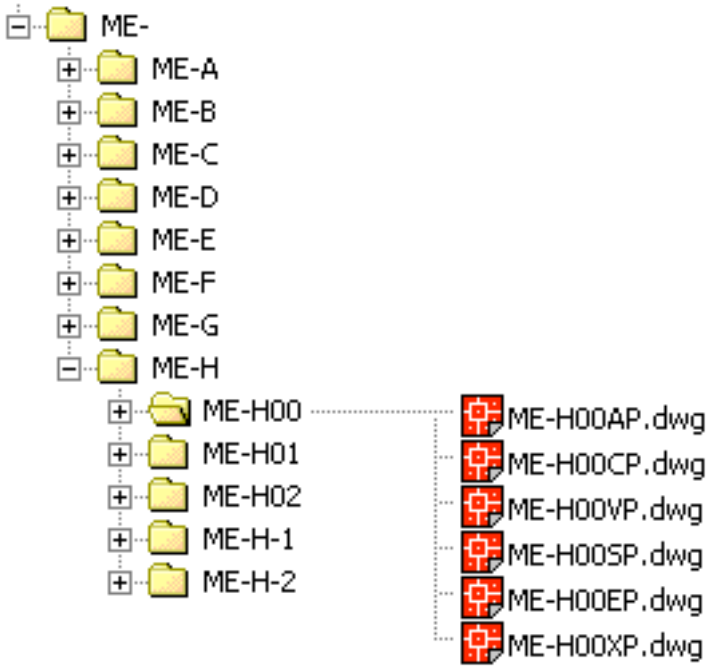
Field 5: 1 letter for the type of drawing, here "P" for plan
P =Plan
C= Section
E= Elevation
D= Details
S= Schéma de principes
T= Electrical diagram

Field 6 (electrical diagram only): for further information – see chapter 12.5.1.

6.2. File structure and the use of xrefs

HVSP drawings are incorporated in the folders according to the classification as described above:

- The “building”-folder gets the building-name, for example: ME- (for mécanique) it also contains individual sub-folders per zone
- The "zone" folder acquires a composed name like “ME-H”, it consists of the building name and the zone name. Zone folders also contain a sub-folder per floor.
- The "floor" folder acquires the building, the zone and the level names, for example: ME-H01. It contains the architectural, heating, ventilation and electrical drawings as well as the coordination drawing in AutoCAD format (*.dwg or *.dxf),
  Examples: ME-H01AP.dwg, ME-H01CP.dwg, ME-H01VP.dwg, ME-H01SP.dwg, ME-H01EP.dwg, ME-H01XP.dwg



Drawings in the floor folder are usually linked (see image below) :

- Architectural drawings are enclosed as external references in each HVSP drawing.
- HVSP drawings are enclosed as an external references in the HVSP coordination drawing
- External references will always be enclosed in the model space; on layer "0 insert", coordination point number (0,0), scale 1, rotation 0, this rule for placing external references is definite.

These are the only accepted external references.

6.3. Coordination Plans

Coordination plans need to include a minimum of information that are necessary to the understanding of the functions and relationships among all installations. A Coordination plan contains the architectural plan and 4 HVSP attached plans as external references.
For printouts, only layers with large objects, and those that are difficult to move around would be visible, –like big machines, ventilation and sanitary ducts, pipelines, etc.–

All elements referring to a specific activity should have the same color printouts, heating-AC: Red, Ventilation: Blue, Sanitary: Green, Power: Yellow 40. (see table in page 14)

The choice of layers to print for coordination plans is indicated in the tables containing lists of layers for each activity or profession. however, these rules should be readjusted to every new job.

6.4. Units and ccordinate system

Plans obey to the national Swiss coordinates system, and are based on the plans supplied by EPFL (DII-E) architect. Architectural plans will be enclosed in HVSP plans as external references on layer "0 insert", coordination point number (0,0), scale=1, rotation 0, these factors should never be altered.

Plan mesurment unit is 1cm. AutoCAD's "measurement" and "measureinit" should be set to 1 (metric system). Objects contained in the drawings are at scale 1:1, the starting point of a drawing should be point (0,0). Those units do not concerne the schematic drawings.

6.5. Object scale choice according to drawings' scale

Guidelines were designed for 1/50 scale. For all other scale values, guidelines should be readjusted in agreement with the "Domaine Immobilier et Infrastructures", Exploitation unit (DII-E).

In case of smaller scale printouts, plan's details should still be readable (example: printout at 1/100 of a drawing designed at 1/50), in this case, color printouts are required.

Graphics of content details of a plan will be defined by "Domaine Immobilier et Infrastructures", Exploitation unit (DII-E) and adjusted according to printout scale of every individual job.

No 3D object is allowed in the digital files.

6.6. Layers Organization

It is important to attribute specific content information to different layers. This equally means that graphic objects are distributed on different layers according to their content.

The aim of such organization is:

- Drawings are independent in respect to central computer system and tasks can be executed everywhere in EPFL system.
- Make it possible to use in all construction work and in different construction types.
- A subdivision by themes and categories, based on the hierarchical structure of objects, elements and components.
- Compatible with ISO and SIA, as well as international tendencies of CAD in construction.
- Assembly of different plans.
- Using standard formats DWG or DXF for file exchange.

Inspired by the technical regulations of SIA 2014, EPFL (DII-E) had introduced certain demands concerning layers in a CAD document:

- Structures and hierarchy
- Information they possess.
- Directories.

HVSP layers are grouped by professions (AC, ventilation, heating, power..). Each profession has layers by element types according to the Catalogue des Frais par Eléments (CFE) and the Catalogue des Eléments Calculés (CEC).

For every type of element CFE/CEC, there is a layer containing a physical installation element (like ducts, pipes, machines, etc.) as well as related graphic elements (like texts, hatches, symbols and dimensions).

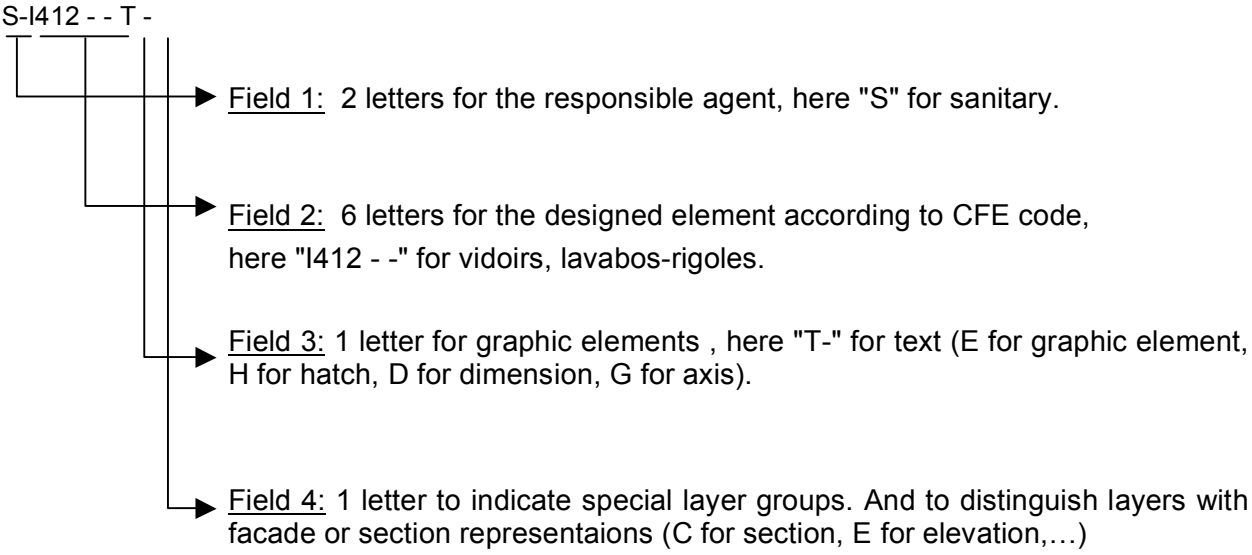
> *ATTENTION: TO ENSURE CORRECT DISTRIBUTION OF ELEMENTS IN THEIR RESPECTIVE LAYERS, IT IS IMPORTANT THAT THEY ARE CREATED OR TRANSFERED TO THE RIGHT (PREDETERMINED) LAYER DIRECTLY, THERE IS NO EXCEPTION FOR THIS RULE*

Ideally a file would be completely managed by AutoCAD system, concerning color, and line type "BYLAYER". This will ensure that a user is able to change the general preferences of a layer, thus changing all the elements it contains without having to make individual selections. however, this principle works perfectly well with construction professions, but not as easily applicable to HVSP techniques. Some technical elements of HVSP are illustrated with changed colors and line types.

The regulations concerning layer organization are individually specified for each acivity subsequently in this document (chapters 0, 0, 0 and 0). Elements that are NOT included in the following special regulations obey the directives set previously by "BYLAYER".

6.6.1. Layer Regulations

Layer names are composed with 10 characters divided by 4 fields as follows:



Detailed layer lists are available in the individual professions chapters (chapter 9 page 15, 10 page 20, 11 page 25 and chapter 12 page 30).

7. GRAPHIC CHOICES INSTRUCTIONS

7.1. Type face

Some typefaces are replaced with standard typefaces during file transfer in dxf format, furthermore, only hight is preserved in a transferred text, this might result in overlapping and illegibility of transferred texts.

Microsoft True Type typefaces are well integrated in AutoCAD (used by EPFL). In order to minimize incompatibility problems during file transfer, Arial was designated to be the only typeface allowed by contractors, Arial is used to define text style as well as dimension styles.

If a contractor's system does not have Arial, a typeface with strong similarities to Arial should be used, a special attention is to be paid to letters with "accents" because they have difficulties in transferring correctly in situations of conversion.

In order to anticipate potential problems related to typeface transfer, contractors will be provided with a trial sample of the legend/stamp during the compatibility test.

7.2. Text Style: ISO- print hight

Texts are adapted to printing at 1:50 scale (2.5mm minimal hight when printing at 1:50 scale). They should be legible when printed at 1:100 lower scale. The designation of text style is: ISO-print hight (in mm), examples: ISO-2-5, ISO-3, ISO-4, etc..

Text style ISO-3 is required to the specific line types of HVSP, it is mandatory to define this style in every drawing.

7.3. Dimension styles

Dimesion lines could be disintegrated into their primary units (texts and lines) when transferring data to other systems. In this case dimensions relating to elements of the drawing are not functional in that system. These dimensions have several caracters of information.

Dimensions have to be associated and conserved in their specific layers. They should be adapted to a printout 1:50 scale and readable at a reduced printout at 1:100 scale.

Dimension style ISO-50 is defined as following:

- Used text in dimensions:Typeface Arial at 2.5mm height for printout at 1:50 scale.
- Arrow limits: oblique line
- Units:cm with approximation to 0.5 cm

7.4. Line types

It is recommended to use AutoCAD library line types (Autocad files by default: acad.lin and acadiso.lin). as well as CVSE.lin, which is a special library file elaborated by “Domaine Immobilier et Infrastructures”, Exploitation unit (DII-E) at EPFL

Attention ! in order to use CVSE.lin line types, drawing unit should be set up at 1cm, (chapter 0).

The regulations "echltp" –line type scale– should be adapted to plan scale, as specified in the next table:

Drawing scale	echltp	Reduction	echltp
1/20	0.8	1/20 ⟶ 1/50	1
1/50	2	1/50 ⟶ 1/100	2
1/100	3 ou 4	1/100 ⟶ 1/200	4
1/200	6	1/200 ⟶ 1/500	10
1/500	15	1/500 ⟶ 1/1000	20
1/1000	30		

The regulations "psltscale" –scale on paper– are to be at 0.

Line types that are specific to each activity are described on the page 10 for Heating, 23 for Ventilation, 29 for sanitary, 35 for Power (chapters 0, 0, 0 and 0).

7.5. Special signs, Letters with accents, Symbols.

Software programs do not all have the same technical approach to character conversion tables (strating from 8th bit). A special attention is to be paid to special signs (+/-, °, diameter, etc.), and to letters with “accents”. A mistake might results in inaccurate replacement of a misinterpreted character, and consequently in incorrect reading of the information.

In order to anticipate potential problems related to the transfer of symbols, special signs and letters with “accents”, a compatibility test is to be taken.

7.6. Textures (hatches, solid colors)

During transfer, textures like hatches and solid colors occasionally fail to conserve their original form, they disintegrate into lines, which causes the size of digital files to become huge. The use of pre-assigned layers for hatches will prevent this kind of errors.

Interior hatches will be designed in a way to never decompose into its original lines. Information about their significance will be provided in the explanatory legend of plans. The pattern "solid" will be used to solid colors designations. "Dense hatches" are not allowed.

7.7. Library

When using elements from the library, all links to files in the original library will be eliminated.

Suppliers will attest total respect to intellectual property issues when employing library and/or protected symbols.

7.8. Purge and control

Contractor apply "purge" and "controle" on all files before submission. The drawing has to be saved in the model space as an extended zoom.

8. LAYOUT AND PRINTOUTS GUIDELINES

8.1 Printout Colors and Line thickness

In all CAD systems, lines have three basic properties; Thickness, color and line type. In addition, AutoCAD offers the possibility of associating these properties with screen line color that is used to define line style, thickness and color in printouts.

There is a possibility to assign line style, color and thickness to each and every one of the 255 screen colors, and to record this information in a .CTB type file. Instead of attributing properties directly to objects, it is recommended to use this method for HVSP drawings. On the other hand it is not possible to assign line styles to layers, because a layer contains different objects with different printing characteristics.

On screen, using polylines with thickness to draw forms is not allowed, due to limitation in the treatment of these forms. It is also recommended to avoid attributing thickness to lines in individual objects. Objects should be executed according to "BYLAYER" line properties. Line thickness for objects and layers should have a "default" value.

All 255 Autocad colors will be distributed among the different professions according to the following rules:

- Color 1 to 9 are assigned to architectural plans, they describe different width black lines.
- Color numbers ending with 0 (10.20.30.etc.) are reserved for electricity plans.
- Color numbers ending with 1 (11.21.31.etc.) along with grey scale from 250 to 255 are reserved for solid hatches..
- Color numbers ending with 2 (12.22.32.etc.) are reserved for heating, AC plans.
- Color numbers ending with 3 (13.23.33.etc.) are reserved for ventilation plans.
- Color numbers ending with 4 (14.24.34.etc.) are reserved for sanitary plans.
- The remainder of colors is to be used according to project needs.

“HVSP Technical Plans” chart establishes the relationship between lines on a screen (their colors and width) and lines in printouts of Heating-AC, Ventilation, Sanitary and Power plans on paper.

Coordination plans are printed with a variety of line style configurations. Heating-AC are red, Ventilation: Blue, Sanitary: Green, Power: Yellow 40 (except for cooling distribution and hatches). The table "coordination Plans" (p.15) defines the relationship between line properties on the screen (line color, thickness) and line style in printouts.

CVSE techniccal Plans

Screen Color	Print Color	Line thickness	
		1:50 (1:20)	1:100, 1:500
1 red	7 black	0.15	0.09
2 yellow	7 black	0.20	0.10
3 green	7 black	0.50	0.25
4 cyan	7 black	0.35	0.18
5 blue	7 black	0.80	0.40
6 magenta	7 black	0.70	0.35
7 black 9 light grey	7 black	0.25	0.13
8 dark grey	7 noir	0.18	0.09
10, 40, 90, 130, 160 31, 51, 61, 121, 141 32, 62, 122, 142, 192, 232 13, 43, 53, 63, 93, 123, 163, 183, 213, 223, 243 14, 44, 54, 74, 84, 114, 124, 134, 144, 154, 184, 214, 244	= screen color	0.35	0.18
12, 22, 152, 202, 212 23, 33, 73, 83, 143, 153, 233 94	= screen color	0.50	0.25
24, 34, 64	= screen color	0.70	0.35
50, 104, 173, 242	= screen color	0.20	0.10
other	Free choice	Free choice	Free choice

Coordination Plans

Screen Color	Print Color	Line thickness	
		1:50	1:100, 1:500
1 red	7 black	0.15	0.09
2 yellow	7 black	0.20	0.10
3 green	7 black	0.50	0.25
4 cyan	7 black	0.35	0.18
5 blue	7 black	0.80	0.40
6 magenta	7 black	0.70	0.35
7 black, 9 light grey	7 black	0.25	0.13
8 dark grey	7 black	0.18	0.09
121	101	0.35	0.18
31, 51, 61, 141, 250-255	= screen color	0.35	0.18
32, 62, 122, 142, 192, 232	1 red	0.35	0.18
13, 43, 53, 63, 93, 123, 163, 183, 213, 223, 243	6 blue	0.35	0.18
14, 44, 54, 74, 84, 114, 124, 134, 144, 154, 184, 214, 244	3 green	0.35	0.18
10, 40, 90, 130, 160	40 yellow	0.35	0.18
202	= screen color	0.50	0.25
12, 22, 152, 212	1 red	0.50	0.25
23, 33, 73, 83, 143, 153, 233	6 blue	0.50	0.25
94	3 vert	0.50	0.25
24, 34, 64	3 green	0.70	0.35
104	3 green	0.20	0.10
173	6 blue	0.20	0.10
242	1 red	0.20	0.10
50	= screen color	0.20	0.10
other	Depending on content	Free choice	Free choice

Configuration files containing line thickness CVSE1-50.ctb, CVSE1-100.ctb, CVSE-coordination1-50.ctb and CVSE-coordination1-100.ctb are provided in supplement to HVSP guidelines.

8.2. Frame, legend/stamp and printout format

Printout management is suggested in the layout mode; Elements used in the layout are saved in the layout mode. A minimun of one layout sheet in the layout mode (with the frame, legend/stamp) correctly filled in, is to be presented with the document.

The drawing legend/stamp contains specific drawing information; The stamp is a vertical A4 format placed at the bottom right of the drawing. Each intervention is indicated on a reserved place within the legend/stamp. A standard legend/stamp is delivered as a supplement by the “Domaine Immobilier et Infrastructures” service at EPFL.

> *NOTE: In the legend/stamp, the name and address of the executing draftsman is written in black (layer A1PAPIER02), the names of other actors are in grey (layer A1PAPIER03).*
>
> *In Free Space there will be a reference system to indicate zones in the drawing with the help of grey hatches (layer A1PAPIER04).*

For printouts, a thin line is used to represent plan frame, it holds marks to help fold it to A4 format. The space inside frames contains graphic elements, horizontal projections, elevations, details of sections, and even some details of objects if its dimensions allow it.

Contractors are asked to supply all needed symbols on all plans, this includes the North orientation sign, scale and titles of layouts, etc. as well as the position and orientation of the project in relation to existing EPFL buildings. This is achieved by means of a reference system of graphic sections. The represented zone will be grey. And all comments (except for section lines) will be held in the layout mode.

Drawing Paper (or synthetic support) is an A4 multiples format. Today, maximum paper width is set to 900mm

For 1/50 scale drawing, they should be legible at 1/100 printouts (color print)

9. DETAILED HEATING GUIDELINES

9.1. Heating layers list

Layers	Content	Line	Colors	Coordination
Paper				
A1PAPIER01	Frame	continuous	7 white	
A1PAPIER02	Legend/stamp - text and line thickness	continuous	7 white	
A1PAPIER03	Legend/stamp – grey text	continuous	253 grey	
A1PAPIER04	Legend/stamp - hatches	continuous	254 light grey	
A1PAPIER05	Windows in layout mode	continuous	2 yellow	
Object				
0	unused	continuous	7 white	
0 insert	To insert blocks and xrefs	continuous	7 white	
C-I20---G-	Axis, geometry	ACAD_ISO10W100	242 red	X
C-I20---D-	idem - dimensions	continuous	242 red	

C-I20---T-	idem - texts	continuous	242 red	
C-I21---E-	Energy elements storage (containers, euipment, ducts)	continuous	142 blue	X
C-I21---D-	idem - dimensions	continuous	242 red	
C-I21---T-	idem - texts	continuous	242 red	
C-I22---E-	Heat production (heat pumps, solar panels, heat transfer station)	continuous	142 blue	X
C-I22---D-	idem - dimensions	continuous	242 red	
C-I22---T-	idem - texts	continuous	242 red	
C-I23---E-	Heat distribution (heating two-ways, renewal, AC two-ways)	continuous	7 white	X
C-I23---D-	idem - dimensions	continuous	242 red	X
C-I23---T-	idem - texts	continuous	242 red	X
C-I24---E-	Heat release (radiators)	continuous	32 red	X
C-I24---D-	idem - dimensions	continuous	242 red	
C-I24---T-	idem - texts	continuous	242 red	
C-I241--E-	Ground heating	continuous	32 red	
C-I241--D-	idem - dimensions	continuous	242 red	
C-I241--T-	idem - texts	continuous	242 red	
C-I26---E-	Taps (heating regulator control panel)	continuous	62 light green	
C-I26---D-	idem - dimensions	continuous	242 red	
C-I26---T-	idem - texts	continuous	242 red	
C-I27---E-	Smoke ducts (chimney)	continuous	232 red	X
C-I27---D-	idem - dimensions	continuous	242 red	
C-I27---T-	idem - texts	continuous	242 red	
C-I28---E-	Special Installations	continuous	122 turquoise	X
C-I28---D-	idem - dimensions	continuous	242 red	
C-I28---T-	idem - texts	continuous	242 red	
C-I281--E-	Cooling distribution	continuous	192 purple	X
C-I281--D-	idem - dimensions	continuous	242 red	X
C-I281--T-	idem - texts	continuous	242 red	X
C-I29---E-	Control panels, Measuring devices	continuous	242 red	X
C-I29---D-	idem - dimensions	continuous	242 red	
C-I29---T-	idem - texts	continuous	242 red	
C-I291--E-	Electricity control board	continuous	12 red	X
C-I291--D-	idem - dimensions	continuous	242 red	
C-I291--T-	idem - texts	continuous	242 red	

9.2. Heating Line styles

AutoCAD heating line styles library by default is: acadiso.lin.

Line Thickness is configured to be used according to line styles as in the following table (see chapter 0 "thickness and colors of lines for print")

Application	Line style	color
in Heating	BYLAYER (Continuous)	22 (red)
out Heating	Interrupted, dashed (ACAD_ISO02W100)	152 (light blue)
Recuperation	BYLAYER (Continuous)	212 (pink)
in AC	BYLAYER (Continuous)	202 (purple)
out AC	Interrupted, dashed (ACAD_ISO02W100)	202 (purple)

BYLAYER guidelines are applied to all elements that did not figure in the previous table.

9.3. Indications to figure in Heating-AC plans.

Symbol	Descriptions, attached texts	Example
Ducts	Dimension (inch or mm) Insulation and thickness Materials Fluid direction Fluid nature Levels	Ø… …mm
valve	Kinds Dimensions (inch or mm) Function	Ø… close, regulate, purge, drain, etc.
Distribution battery	Group designation Dimension (inch or mm)	Ø…
Equipment	Type and label Dimensions	
Miscellaneous	Identifying ascending pipes Identifying spaces (according to EPFL number system) and temperature. Dilating placing and fixed points	

9.4. Indications to figure in diagrams of Heating-AC concept

SIA 410 standard is the source of all conventional signes, furthermore, their colors depend on duct types.

The main diagram's outlines offer a general idea about installation functions. This is achieved by citing a big number of information.

Information in the principal diagram's outlines should be as complete as possible, so that the "Domaine Immobilier et Infrastructures", Exploitation Unit (DII-E) can make optimal use of all available information:

9.4.1. Distribution Groups

Symbol	Descriptions, attached texts	Example
Collector distributor	Diameter Insulation type and thickness	263 / 273 PIR – 60 + aluman steel sheet
Primary Groups	Temperature out / in Full power Debit Outlet point	50 / 30 °C ….kW …m3/h SG Beta Galery
Heating groups	Temperature out / in Type of un-serviced group Full power Debit	 South Radiators …. kW …m3/h
Ventilation groups	Temperature out / in Type of un-serviced group Full power Debit	 Central Ventil level +4 …. kW …m3/h
Reserved Groupes	Full power	…. kW
General informations	*Any schematic drawing should contain the indications about : distribution battery dimensioning calculation, installed power, power reserve capacity and simultaneity coefficient.*	

9.4.2. Equipments and taps

Symbol	Descriptions, attached texts	Example
Pumps	Electric count figure	M…
	Trademark and type	
	Electric power	…kW
	Electric Intensity	…A
	Speed and speed type	1,2, Var.
	Debit	…m3/h
Powered valves	Electric count figure	
	Diameter	
Exchangers	Thermal power	…kW
	Primary temperature in/out	…°C/ …°C
	secondary temperature in/out	…°C/ …°C
	(Any schematic drawing should contain the indications about : exchanger dimensioning calculation, installed power, power reserve capacity and simultaneity coefficient.)	
Flow unit	Electric count figure	
	Trademark and type	
Energy Calculators	Electric count figure	
	Trademark and type	
Stopping valves	Diameter	
Regulator valves	Regulating value	
	Debit	… m3/h ou …l/h
Compensators	Trademark and type	
	Diameter	
	Space number	
Radiator	Trademark and type	
	Connection	
	Regulated debit	…l/h
	Power	….W
	Space number	
Floor heating	Control panel ID number	
	Regulated debit	…l/h
	Power	….W
	Space number	
	(Each collector must be detailed for each loop, it will be necessary to indicate following information : the length, the regulated flow as well as the destination room)	
ventilo-convector	Electric count figure	
	Trademark and type	
	Thermal power / cool	
	Space number	

This list is non exhaustive.

All taps and equipments such as fixed points, purging, exhaust, safety valves, thermometers and implementation details like points of control boards, air containers, etc. should figure in the main diagram.

9.4.3. Ducts

Symbol	Descriptions, attached texts	Example
To figure on a duct	Diameter	
	Water debit	…m3/h ou l/h
	Liquid direction	
	Insulation type and thickness	PIR - 30
	Liquid type	glycol, freon…

9.4.4. Peripheries

Symbol	Descriptions, attached texts	Example
Probe	Electric count figure	
	Measured value	°C, ΔP…
Thermostat	Electric count figure	
	Measured value	°C
Pressure controller	Electric count figure	
	Measured value	ΔP
Servo – engine	Electric count figure	
	Mode	0 – 100 %
		0 – 1
Miscellaneous without values	Electric count figure	
Converters	Electric count figure	
	Electric power	…kW

9.4.5. Switchboards

Symbol	Descriptions, attached texts	Example
Board	Switchboard count figure	+…/V…

9.4.6. Technical miscellaneous

Symbol	Descriptions, attached texts	Example
Installation	ID numbers of installation	P…/E…
Technical ducts	ID numbers of ascending ducts	
	Constructions Axis	
Equipment positions	Technical spaces ID numbers	
	Treated rooms	

9.4.7. Independent technical Installations

All independent technical installation such as cooling is to be defined according to the same system explained previously in the Heating-AC installations table.

10. DETAILED VENTILATION GUIDELINES

10.1 Ventilation layers List

Layers	Content	Line	Colors	Coordination
Paper				
A1PAPIER01	frame	continuous	7 white	
A1PAPIER02	Legend/stamp - text and line thickness	continuous	7 white	
A1PAPIER03	Legend/stamp – grey text	continuous	253 gris	
A1PAPIER04	Legend/stamp - hatches	continuous	254 gris clair	
A1PAPIER05	Windows in layout mode	continuous	2 jaune	
Object				
0	non used	continuous	7 white	
0 insert	To insert blocks and xrefs	continuous	7 white	
V-I30---G-	Axis, geometry	ACAD_ISO10W100	173 blue	X
V-I30---D-	idem - dimensions	continuous	173 blue	
V-I30---T-	idem - texts	continuous	173 blue	
V-I31---E-	AC equipment, switchboards	continuous	143 light blue	X
V-I31---D-	idem - dimensions	continuous	173 blue	
V-I31---T-	idem - texts	continuous	173 blue	
V-I32---E-	Separate components (ventilators, heat conversation components, humidifiers, filters)	continuous	143 light blue	X
V-I32---D-	idem - dimensions	continuous	173 blue	
V-I32---T-	idem - texts	continuous	173 blue	
V-I34---E-	Air ducts (pipes, tubes)	continuous	7 white	X
V-I34---D-	idem - dimensions	continuous	173 blue	X
V-I34---H-	idem - hatches	continuous	7 white	X
V-I34---T-	idem - texts	continuous	173 blue	X
V-I35---E-	Incoming and evacuation air systems	continuous	7 blanc	X
V-I35---D-	idem - dimensions	continuous	173 blue	
V-I35---T-	idem - texts	continuous	173 blue	
V-I351--E-	evacuation air system (mesh, ceiling diffusers : with slit, with kneecaps, with perforated plates, with helicoid jet, with air volume displacement, with air terminal devices)	continuous	243 red	X
V-I351--D-	idem - dimensions	continuous	173 blue	
V-I351--T-	idem - texts	continuous	173 blue	
V-I352--E-	Incoming air system (mesh, cieling diffusers, with slit, with kneecaps, with perforated plates, with helicoid jet, with air volume displacement, with air terminal devices)	continuous	53 yellow	X
V-I352--D-	idem - dimensions	continuous	173 blue	
V-I352--T-	idem - texts	continuous	173 blue	
V-I353--E-	Kitchen evacuation hood	continuous	33 orange	X
V-I353--D-	idem - dimensions	continuous	173 blue	
V-I353--T-	idem - texts	continuous	173 blue	
V-I36---E-	Accessories (debit volume regulator	continuous	63 light green	X

	powered valves, anti-fire valves)			
V-I36---D-	idem - dimensions	continuous	173 blue	
V-I36---T-	idem - texts	continuous	173 blue	
V-I37---E-	AC equipment (air cooling, equipments, ducts, valves)	continuous	233 magenta	X
V-I37---D-	idem - dimensions	continuous	173 blue	
V-I37---T-	idem - texts	continuous	173 blue	
V-I38---E-	Special installations	continuous	123 turquoise	X
V-I38---D-	idem - dimensions	continuous	173 blue	
V-I38---T-	idem - texts	continuous	173 blue	
V-I381--E-	Fume hood	continuous	73 green	X
V-I381--D-	idem - dimensions	continuous	173 blue	
V-I381--T-	idem - texts	continuous	173 blue	
V-I382--E-	Gas closets	continuous	83 green	X
V-I382--D-	idem - dimensions	continuous	173 blue	
V-I382--T-	idem - texts	continuous	173 blue	
V-I383--E-	Products closets	continuous	23 orange	X
V-I383--D-	idem - dimensions	continuous	173 blue	
V-I383--T-	idem - texts	continuous	173 blue	
V-I384--E-	Vacuum pump Installation	continuous	183 purple	X
V-I384--D-	idem - dimensions	continuous	173 blue	
V-I384--T-	idem - texts	continuous	173 blue	
V-I39---E-	Switchboards, control panels and measurements boards	continuous	173 blue	X
V-I39---D-	idem - dimensions	continuous	173 blue	
V-I39---T-	idem - texts	continuous	173 blue	
V-I391--E-	Switchboard	continuous	153 blue	X
V-I391--D-	idem - dimensions	continuous	173 blue	
V-I391--T-	idem - texts	continuous	173 blue	

10.1.1 Ventilation hatches line styles

AutoCAD heating line styles library by default is: acad.lin.

Line Thickness is configured to be used according to line styles as in the following table (see chapter 0 "thickness and colors of lines for print")

Line styles are used according to the following table for both plans and sections drawings:

Application	Line style	Color
Evacuated air	BYLAYER (Continuous)	BYLAYER (red 13)
Evacuated air – hidden elements	CACHE2	BYLAYER (red 13)
Fresh air	BYLAYER (Continuous)	BYLAYER (green 93)
Fresh air – hidden elements	CACHE2	BYLAYER (green 93)
Recycled air	BYLAYER (Continuous)	BYLAYER (yellow 43)
Recycled air – hidden elements	CACHE2	BYLAYER (yellow 43)
Rejected air	BYLAYER (Continuous)	BYLAYER (blue 163
Rejected air – hidden elements	CACHE2	BYLAYER (blue 163)

BYLAYER guidelines are applied to all elements that did not figure in the previous table

The following table illustrates some examples of hatches to be used in different scales ventilation planes:

Element	Pattern	Color	Hatch scale				
			1:50	1:100	1:200	1:500	1:1000
Evacuated air	solid	31	1	1	1	1	1
Fresh air	solid	61	1	1	1	1	1
Recycled air	solid	51	1	1	1	1	1
Rejected air	solid	141	1	1	1	1	1
Shaded	solid	253	1	1	1	1	1

10.2. Indications to figure in ventilation diagrams

10.2.1. Equipment

Symbol	Descriptions, attached texts	Example
Ventilator	Air debit Trademark and type	…m3/h
Servo - engine		SM
Filter	Filtration level	G, F, A, …
Batteries (general)	Thermal power	…kW
Recycling (general)	Recycled thermal power Trademark and type	…kW
Humidifier (general)	Steam debit Trademark and type	…l/h
Régulateur de débit	Air debit Trademark and type	…m3/h - …m3/h
Mixing board	Total air debit Trademark and type	…m3/h - …m3/h
Anti-fire valve	Protection level Trademark and type Dimensions	F90
Miscellaneous	Trademark and type Dimensions	

10.2.2. Ducts

Symbol	Descriptions, attached texts	Example
Duct	Air debit	…m3/h
	Liquid direction	arrow → ←
	Connected spaces, zone, floor level	
	Insulation type and thickness	Armaflex / 30 mm
	Dimensions	Ø … / …x…/…
	Duct material	PPS, Inox, …
	Lining type	Classe C

10.2.3. Accessoires

Symbol	Descriptions, attached texts	Example
Diffusion	Air debit Liquid direction Trademark and type Dimensions	…m3/h
Recycling	Air debit Liquid direction Trademark and type Dimensions	…m3/h
Noise-proof	Trademark and type Number and thickness of slides Dimensions	
Waterproof Grille	Trademark and type Dimensions	
Miscellaneous	Trademark and type Dimensions	

10.2.4. Switchboards

Symbol	Descriptions, attached texts	Example
Boards	Switchboards ID numbers	+…/V…

10.3. Indications to figure in the main diagram

SIA 410 standard is the source of all conventional signes, furthermore, their colors depend on duct types

The main diagram's outlines offer a general idea about installation functions. This is achieved by citing the largest number of information possible.

10.3.1. Equipment

Symbol	Descriptions, attached texts	Example
Ventilator	Electric count figure Electric power Electric intensity Air debit	M… …kW …A …m3/h
Off valve	Electric count figure Mode	 0 – 100 % 0 – 1
Filter	Electric count figure Filtration level	 G, F, A, …
Battery (general)	Electric count figure Thermal power Temperature in Temperature out Water debit	 …kW …°C …°C …l/h
Recycling (general)	Electric count figure Recycled thermal power	 …kW
Humidifier (general)	Electric count figure Electric power Steam debit	 …kW …l/h
Debit regulator	Electric count figure Mode Air debit	 50 – 100 % 0 – 1 …m3/h

Mixing board	Electric count figure	
	Mode	50 – 100 %
	Cool air debit	…m3/h - …m3/h
	Hot air debit	…m3/h - …m3/h
	Total air debit	…m3/h - …m3/h
Anti-fire valve	Electric count figure	
	Protection level	F90

10.3.2. Ducts

Symbol	Descriptions, attached texts	Example
Duct	Air debit	…m3/h
	Liquid direction	arrow → ←
	Connected spaces	

10.3.3. Accessoires

Symbol	Descriptions, attached texts	Example
Diffusion	Air debit	…m3/h
	Liquid direction	arrow → ←
Recycling	Air debit	…m3/h
	Liquid direction	arrow → ←

10.3.4. Peripheries

Symbol	Descriptions, attached texts	Example
Probe (tube, sample, drill)	Electric count figure	
	Measured value	°C, ΔP, Hr, …
Thermostat	Electric count figure	
	Measured value	°C
Hygrostat	Electric count figure	
	Measured value	Hr
Pressostat	Electric count figure	
	Measured value	ΔP
Servo – engine	Electric count figure	
	Régime	0 – 100 % / 0 – 1
	State on no-tension	NO - NF

Symbol	Descriptions, attached texts	Example
Miscellaneous	Electric count figure	
Converters	Electric count figure	
	Electric power	…kW

10.3.5. Switchboards

Symbol	Descriptions, attached texts	Example
board	Switchboard count figure	+…/V…

10.3.6. Technical miscellaneous

Symbol	Descriptions, attached texts	Example
Installations	ID numbers of installation	P…/E…
Equipment positions	Technical spaces ID numbers	
	Treated rooms	

11. DETAILED SANITARY GUIDELINES

11.1 Sanitary layers list

Layers	Content	Line type	Colors	Coordination
Papier				
A1PAPIER01	frame	continuous	7 white	
A1PAPIER02	Legend/stamp- text and line thickness	continuous	7 white	
A1PAPIER03	Legend/stamp -grey text	continuous	253 grey	
A1PAPIER04	Legend/stamp -hatches	continuous	254 light grey	
A1PAPIER05	Windows in layout mode	continuous	2 yellow	
Objet				
0	non used	continuous	7 white	
0 insert	To insert blocks and xrefs	continuous	7 white	
S-I40---G-	Axis, geometry	ACAD_ISO10W100	104 GREEN	X
S-I40---D-	idem - dimensions	continuous	104 green	
S-I40---T-	idem - texts	continuous	104 green	
S-I41---E-	Sanitary equipment (usual sanitary equipment, Water exhaust tubes, sink- plumbing)	continuous	134 cyan	X
S-I41---D-	idem - dimensions	continuous	104 green	
S-I41---H-	equipment - hatches	continuous	121 light cyan	X
S-I41---T-	idem - texts	continuous	104 green	
S-I42---E-	Intake equipment (wash and laundry rooms, water treatment, water pressure installations, rain water utilization)	continuous	134 cyan	X
S-I42---D-	idem - dimensions	continuous	104 green	
S-I42---T-	idem - texts	continuous	104 green	
S-I43---E-	Evacuation equipment (pumps, used water recycling)	continuous	134 cyan	X
S-I43---D-	idem - dimensions	continuous	104 green	
S-I43---T-	idem - texts	continuous	104 green	
S-I44---E-	Water distribution ducts (cool water, hot water, sanitary water	continuous	7 white	X
S-I44---D-	idem - dimensions	continuous	104 green	X
S-I44---T-	idem - texts	continuous	104 green	X
S-I45---E-	Water evacuation ducts (used and rain water drains, used and industrial water evacuation)	continuous	7 white	X
S-I45---D-	idem - dimensions	continuous	104 green	X
S-I45---T-	idem - texts	continuous	104 green	X
S-I46---E-	Exterior installations	continuous	114 green	X
S-I46---D-	idem - dimensions	continuous	104 green	
S-I46---T-	idem - texts	continuous	104 green	
S-I461--E-	Tubes (for used or fresh waters)	continuous	7 white	X
S-I461--D-	idem - dimensions	continuous	104 green	X
S-I461--T-	idem - texts	continuous	104 green	X
S-I462--E-	Fire point and water intake	continuous	134 cyan	X
S-I462--D-	idem - dimensions	continuous	104 green	

S-I462--T-	idem - texts	continuous	104 green	
S-I48---E-	Special installations	continuous	124 green	X
S-I48---D-	idem - dimensions	continuous	104 green	
S-I48---T-	idem - texts	continuous	104 green	
S-I481--E-	Natural gas tubes	ACAD_ISO09W100	54 yellow	X
S-I481--D-	idem - dimensions	continuous	104 green	
S-I481--T-	idem - texts	continuous	104 green	
S-I482--E-	Toxic and/or non-toxic gas tubes	continuous	7 white	X
S-I482--D-	idem - dimensions	continuous	104 green	
S-I482--T-	idem - texts	continuous	104 green	
S-I483--E-	Compressed air	COMPRESSED AIR	144 blue	X
S-I483--D-	idem - dimensions	continuous	104 green	
S-I483--T-	idem - texts	continuous	104 green	
S-I484--E-	Sprinkler	continuous	244 red	X
S-I484--D-	idem - dimensions	continuous	104 green	X
S-I484--T-	idem - texts	continuous	104 green	X
S-I49---E-	Switchboards, control panels and measurements boards	continuous	104 green	X
S-I49---D-	idem - dimensions	continuous	104 green	
S-I49---T-	idem - texts	continuous	104 green	
S-I491--E-	Switchboard	continuous	94 green	X
S-I491--D-	idem - dimensions	continuous	104 green	
S-I491--T-	idem - texts	continuous	104 green	

11.2. Sanitary hatches line styles

AutoCAD line styles library by default is: acad.lin and acadiso.lin. as well as styles document CVSE.lin, elaborated by “Domaine Immobilier et Infrastructures”, Exploitation Unit (DII-E)

Attention ! in order to correctly use the line styles library contained in the CVSE.lin document, it is important to set the drawing unit to 1cm (see chapter0)

Line Thickness is configured to be used according to line styles as in the following table (see chapter 0 "thickness and colors of lines for print"):

Application	Line style	Color
Compressed air	COMPRESSED AIR AC AC	BYLAYER (blue 144)
Hot water distribution	HOT WATER long dash short dash	red 14
Sanitary hot water	HOT WATER long dash short dash	orange 44
Industrial water in	INDUSTR. WATER IN — EI — EI—	green 124
Industrial water out	INDUSTR. WATER OUT EI EI	green 124
Drink water BP	BYLAYER (Continuous)	green 84
Drink water HP	BYLAYER (Continuous)	blue 154
Eaux claires	BYLAYER (ACAD_ISO02W100) Interrupted	green 64
Eaux usées	BYLAYER (Continuous)	brown 34
Used labo water	USED LABO WATER Trait point	brown 24
Natural gas	BYLAYER (ACAD_ISO09W100) Tiret long 2 tirets courts	BYLAYER (yellow 54)
Non-toxic gas	According to gas type —XX —XX —	green 74
Toxic gas	According to gas type XX XX	cyan 134

BYLAYER guidelines are applied to all elements that did not figure in the previous table.

The following table illustrates some examples of hatches to be used in different scales sanitary planes:

Element	Pattern	Color	Hatch scale				
			1:50	1:100	1:200	1:500	1:1000
Sanitary equipment	solid	BYLAYER 121	1	1	1	1	1

11.3. Indications to figure in sanitary plans

Symbol	Descriptions, attached texts	Example
Tubes	Dimensions (inch / mm) Insulation and thickness Materials Liquid direction and inclination Levels Liquid type Gas type	Ø… …mm …%
Valves	Types Dimensions (inch / mm) Role	 Ø… off, regluator, purge, drain, etc
Distribution Battery	Groups identification Dimensions (inch / mm)	 Ø…
Miscellaneous	Identifying ascending ducts Identifying the space (EPFL number system) Positioning of the compensators for dilatation and other fixed points.	

11.4. Indications to figure in the main diagram

SIA 410 standard is the source of all conventional signes, furthermore, their colors depend on duct types. The main diagram's outlines offer a general idea about installation functions. This is achieved by citing the largest number of information possible.

11.4.1 Groupes de distribution

Afin que le Domaine Immobilier et Infrastructures, unité Exploitation, puisse connaître le mode de fonctionnement des installations, les informations à porter sur les schémas de principe doivent être les plus complètes possibles. Les éléments à apporter sur les plans sont au minimum les suivants :

Symbol	Descriptions, attached texts	Example
Collectors distributors	Diameter Insulation type and thickness Connection point	263 / 273 PIR – 60 + aluman steel sheet Galerie Bêta SG
Distribution Hot and cool water	Disconnected installation type Debit	EF Sanitary …m3/h
Natural gas distribution	Disconnected groups type Total power Nominal capacity	Kitchens … …. kW …m3/h
Industrial water distribution	Disconnected groups type Nominal capacity	garden etx. BC …m3/h
Compressed air	Disconnected groups type	Laboratories BC

distribution	Nominal capacity	…m3/h
Treated water distribution	Disconnected groups type Nominal capacity	Water treatment kitchen …m3/h
Groups reserves	Total power and/or Nominal capacity	…. kW / … m3/h
General information	*Any schematic drawing should contain the indications about : distribution battery dimensioning calculation, installed power, power reserve capacity and simultaneity coefficient.*	

11.4.2 Equipment and taps

Symbol	Descriptions, attached texts	Example
Pumps, circulation, reading, etc.	Electric count figure Trademark and type Electric power Electric intensity Speed or speed type Debit / connection unit	M… …kW …A 1,2, Var. …m3/h / 200UR
Reservoir, container	Material types Dimensions Size Insulation type and thickness	 …m3/h ou litres
Water heater and sanitary equipment	Trademark and type Size Power	
Powered valves	Electric count figure Diameter	
Exchangers	Thermal power Primary temperature in/out Secondary temperature in/out *(Any schematic drawing should contain the indications about : exchanger dimensioning calculation, installed power, power reserve capacity and simultaneity coefficient)*.	…kW …°C/ …°C …°C/ …°C
Debit meter	Electric count figure Trademark and type	
Vanne d'arrêts	Diameter	
Power surge breaker	Trademark and type Diameter Space ID number	

This list is non-exhaustive.

11.4.3. Tubes

Symbol	Descriptions, attached texts	Example
Pressure tubes	Diameter Material types Water debit Liquid direction Insulation type and thickness	…DN Inox …. …m3/h ou l/h PIR - 30
No-pressure tubes (EU, EP, etc.)	Diameter Material types Water debit Liquid direction	…DN Pe …. …m3/h ou UR

	Flow inclination	…%

11.4.4. Peripheries

Symbol	Descriptions, attached texts	Example
Sonde (tube, sample, drill)	Electric count figure Measured value	°C, ΔP, Hr, …
Thermostat	Electric count figure Measured value	°C
Pressostat	Electric count figure Measured value	ΔP
Servo – engine	Electric count figure Mode	0 – 100 % 0 – 1
Miscellaneous	Electric count figure	
Converters	Electric count figure Electric power	…kW

11.4.5. Switchboards

Symbol	Descriptions, attached texts	Example
board	Switchboard count figure	+…/V…

11.4.6. Technical miscellaneous

Symbol	Descriptions, attached texts	Example
Installations	ID numbers of installation	P…/E…
Gaines techniques	ID numbers of ascending columns Construction axis	
Equipment positions	Technical spaces ID numbers Treated rooms	

11.4.7 Independent technical Installations

All independent technical installations such as water treatment equipment, water neutralization equipment is to be defined according to the same system explained previously in the sanitary installations table.

12. DETAILED ELECTRICITY GUIDELINES

12.1. Electricity layers list

Layers	Content	Line type	Colors	Coordination
Papier				
A1PAPIER01	Frame	continuous	7 white	
A1PAPIER02	Legend/stamp - text and line thickness	continuous	7 white	
A1PAPIER03	Legend/stamp – grey text	continuous	253 grey	
A1PAPIER04	Legend/stamp - hatches	continuous	254 light grey	
A1PAPIER05	Windows in layout mode	continuous	2 yellow	
Objet				
0	unused	continuous	7 white	
0 insert	To insert blocks and xrefs	continuous	7 white	
Powerful current				
E-I02---E-	Powerful current generators (reactive current compensation installations, generating groups, ASI, battery installations)	continuous	10 red	X
E-I02---D-	idem - dimensions	continuous	9 light grey	
E-I02---T-	idem - texts	continuous	9 light grey	
E-I03---E-	Anti-static system (foundations electrodes, equipotential connections, lightning conductors).	traittillé	40 yellow	
E-I03---D-	idem - dimensions	continuous	9 light grey	
E-I03---T-	idem - texts	continuous	9 light grey	
E-I04---E-	Distribution installations (cables and installations hoses, control panels, distribution canals)	continuous	40 yellow	X
E-I04---D-	idem - dimensions	continuous	9 light grey	X
E-I04---H-	idem - hatches	continuous	50 light yellow	X
E-I04---T-	idem - texts	continuous	9 light grey	X
E-I05---E-	Powerful current installations (secondary distribution baords and control panels, regulator boards, epquipment, outlets)	continuous	10 red	
E-I05---D-	idem - dimensions	continuous	9 light grey	
E-I05---T-	idem - texts	continuous	9 light grey	
E-I053--E-	HVS: MCR (Measure, Control, Regulation) - equipment)	continuous	10 red	
E-I053--D-	idem - dimensions	continuous	9 light grey	
E-I053--T-	idem - texts	continuous	9 light grey	
E-I053-CE-	CVS: MCR - cablâge	continuous	10 red	
E-I0531-E-	CVS: switch boards	continuous	7 white	X
E-I0531-D-	idem - dimensions	continuous	9 light grey	
E-I0531-T-	idem - texts	continuous	9 light grey	
E-I061--E-	Permanent lighting (including secure-equipment)	continuous	160 bleu	X
E-I061--D-	idem - dimensions	continuous	9 light grey	
E-I061--T-	idem - texts	continuous	9 light grey	
E-I061-CE-	Permanent lighting (including secure-cables)	continuous	130 cyan	
E-I063--E-	Emergency lights– equipment	continuous	160 blue	X

E-I063--D-	idem - dimensions	continuous	9 light grey	
E-I063--T-	idem - texts	continuous	9 light grey	
E-I063-CE-	Luminaires de secours – cablâge	continuous	130 cyan	
E-I07---E-	Powerful current special installations	continuous	10 red	X
E-I07---D-	idem - dimensions	continuous	9 light grey	
E-I07---T-	idem - texts	continuous	9 light grey	

Weak current (Telecommunications, security)

E-I11---E-	Telecommunications (equipment- tools, outlets, domestic Appliances …)	continuous	90 green	
E-I11---D-	idem - dimensions	continuous	9 light grey	
E-I11---T-	idem - texts	continuous	9 light grey	
E-I11--CE-	Telecommunications: universal cabling (main distributor, intermediate distributor, rising lines, distribution canals)	continuous	90 green	
E-I121--E-	Doorbell, intercom, equipment	continuous	90 green	
E-I121--D-	idem - dimensions	continuous	9 light grey	
E-I021--T-	idem - texts	continuous	9 light grey	
E-I121-CE-	Doorbell, intercom,– cables	continuous	90 green	
E-I122--E-	Clocks - equipment	continuous	90 green	
E-I122--D-	idem - dimensions	continuous	9 light grey	
E-I022--T-	idem - texts	continuous	9 light grey	
E-I122-CE-	clocks – cables	continuous	90 green	
E-I123--E-	Intercom installations (call research, antenna, and equipment)	continuous	90 green	
E-I123--D-	idem - dimensions	continuous	9 light grey	
E-I123--T-	idem - texts	continuous	9 light grey	
E-I124--E-	Gongs - equipment	continuous	90 green	
E-I124--D-	idem - dimensions	continu	9 light grey	
E-I124--T-	idem - texts	continuous	9 light grey	
E-I124-CE-	Gongs – cables	continuous	90 green	
E-I13---E-	Radio TV (audio-Video) reception equipment	continuous	90 green	
E-I13---D-	idem - dimensions	continuous	9 light grey	
E-I13---T-	idem - texts	continuous	9 light grey	
E-I13--CE-	Installation of radio TV (audio-Video) reception equipment cable	continuous	90 green	
E-I15---E-	Security devices installation (smoke and gas detectors, fire alarms, movement detectors) - equipment	continuous	90 green	
E-I15---D-	idem - dimensions	continuous	9 light grey	
E-I15---T-	idem - texts	continuous	9 light grey	
E-I15--CE-	Security equipment installation – cables	continuous	90 green	
E-I16---E-	Surveillance Installations (TV surveillance for doors, and accesses, time recording systems, electronic control center) - equipment	continuous	90 green	
E-I16---D-	idem - dimensions	continuous	9 light grey	
E-I16---T-	idem - texts	continuous	9 light grey	
E-I16--CE-	Surveillance installations– cables	continuous	90 green	
E-I17---E-	Weak current special installations	continuous	90 green	
E-I17---D-	idem - dimensions	continuous	9 light grey	
E-I17---T-	idem - texts	continuous	9 light grey	

12.2. Line types and electricity hatches

All the elements in electricity plans – except CVS tables- are placed in their respective layers, and they follow the parameters designed in BYLAYER concerning their line styles and line thickness

HVS tables are represented by the colors assigned to particular types of tables (red 12 for heating-AC, blue 153 for ventilation and green 94 for sanitary)

Line Thickness is configured to be used according to line styles directives (see chapter 0 "thickness and colors of lines for print"). Generally speaking, print line thickness is 0.35mm at 1/50 –reference- scale.

The following table illustrates some examples of hatches to be used in different scales electricity planes:

Element	Hatch	Color	Hatch scale				
			1:50	1:100	1:200	1:500	1:1000
Cables hoses	ANSI31	BYLAYER (yellow 50)	2	4	8	20	40

12.3. Indications to figure in electricity plans

Symbol	Descriptions, attached texts	Example
Switch board	N°	-1/T1
Electric circuit	N°	T4 / 122
Light	S if secure	
Detector	Detector number N° of loops	
Conductors	Number Section	3 x 1.5
Outlets	Number Type	3 x T13
Computer outlets	Connection N°	A201-8 / CB-A
Other elements	Number	

12.4. Indications to figure in the main diagram

SIA 410 standard is the source of all conventional signes.
The main diagram's outlines offer a general idea about installation functions. This is achieved by citing the largest number of information possible.

Symbol	Descriptions, attached texts	Example
	Building name connection type / network	
Switch board	N°	0/T4
Conductor	Type + section Type de réseau	TT-CLT 4x35 weak - blue strong - red
Power surg breaker	Value	
Circuit sections	Value	
Other elements	Name Text	

12.5. Circuit diagram

Circuit and Wiring diagrams need to fit in an A4 or A3 format printouts.

12.5.1. File names

Circuit diagram file names has 5 fields (see chapter 0) and an additional field –6- separated with an underscore. This field contains the following information:

- Level; for example -1 for 1st underground
- Switchboard number; for example T1_1 for switchboard T1.1
- Page; for example 002 for page 2

A file name as ME-H-1ET_-1_T1_1_002 is translated like in the following example:

Machanics building in the zone H, 1st level underground, electric diagram level 1, switchboard T1.1 page 002:

12.5.2. Indications to figure in electric diagrams

Symbol	Descriptions, attached texts	Example
	Building name electric current power Number of the connection circuit and its source	
Switch board	N°	0/T2
Borne	Type position	 high / low
Fuse	Type value	
Breaker	Type value	
Appliances	N° according to field and type	
	Field repertory	page1 = 10 - 19 page2 = 20 - 29 page3 = 30 - 39

12. ANNEXES

Gabarit (Standard presentation seting):

CVSE1-50.dwt CVSE1-100.dwt CVSE1-500.dwt	Digital document only

Printing Style Configurations :

CVSE1-50.ctb CVSE1-100.ctb CVSE-coordination1-50.ctb CVSE-coordination1-100.ctb	Digital document only
Line styles:	CVSE.lin
Layers:	Legend/stampCVSE.dwg
Standard title panel:	Legend/stampCVSE.dwg
Submission statement:	StandardizationCVSE-submission-01.02.0.xls