FineFIRE

Quick Start Guide

Preface

This Quick Start Guide provides a fast and friendly introduction on FineFIRE main features and functionalities. All the features and functions of the program are presented and explained in detail within the complete User's Guide, along with informative examples.

FineFIRE, the **F**ully **IN**tegrated **E**nvironment for **Fire Fighting** Installations combines both designing and calculations in a uniform, integrated environment, consisting of two main components, CAD and Calculations:

- Concerning the **CAD component**, it is based on an autonomous CAD embedding IntelliCAD engine adopting the common cad functionality and open dwg drawing file format. The CAD component helps the user to design and then calculates and produces completely automatically the entire calculations issue for every Sanitary project, as well as all the drawings in their final form.
- Concerning the **Calculations component** (called also as ADAPT/FCALC), it has been designed according to the latest technological standards and stands out for its unique user - friendliness, its methodological thoroughness of calculations and its in-depth presentation of the results. The FIRE Calculation module acquires data directly from the drawings (automatically), thus resulting in significant time saving and maximum reliability of the project results. It can also be used independently, by typing data within the calculation module spreadsheets.

Despite its numerous capabilities, FineFIRE has been designed in order to be easy to learn. Indeed, the simplicity in the operation philosophy is realised very soon and all that the user has to do is to familiarise with the package.

This Guide is divided into 3 short parts:

- Part 1 describes the installation procedure and the main menu structure.
- Part 2 deals with the CAD component of FineFIRE, showing its philosophy and main features.
- Part 3 describes the calculation environment of FineFIRE.

1. Installation - Launching

1.1 Installing FineFIRE

1. Insert the CD in your computer CD-ROM drive (e.g. D:, E:) or, if you received your software via Internet, run the installation application you downloaded.
2. When the Setup window appears, choose the language for the installation and click OK.
3. When the Welcome page appears (as shown below), click **Next**.

4. When the License Agreement appears, read it carefully. If you agree with the terms, check the respective “radio button” and then click **Next** (you must agree with the terms to proceed with the installation).
5. In the next screen enter your username and organization information and check if you want to create a desktop icon. Then click **Next** to see if the information is correct (see the following window) and finally click **Install** for the installation procedure to begin.

6. Upon completion of the installation procedure, the following last window appears on screen and all needed is to click **Finish.** In case that the **Run FINE 10NG** checkbox is selected, the program will start running.

7. After installation, the program is located within the programs list.

2. CAD Component

2.1 Overview

FineFIRE is the powerful Workstation for Fire Fighting installation design that automatically performs the necessary calculations directly from the drawings, producing all the Project results (Calculation issue, technical descriptions, full-scale drawings, Bills of materials etc). FineFIRE automates the designing processes providing the user with the appropriate installation designing solutions.

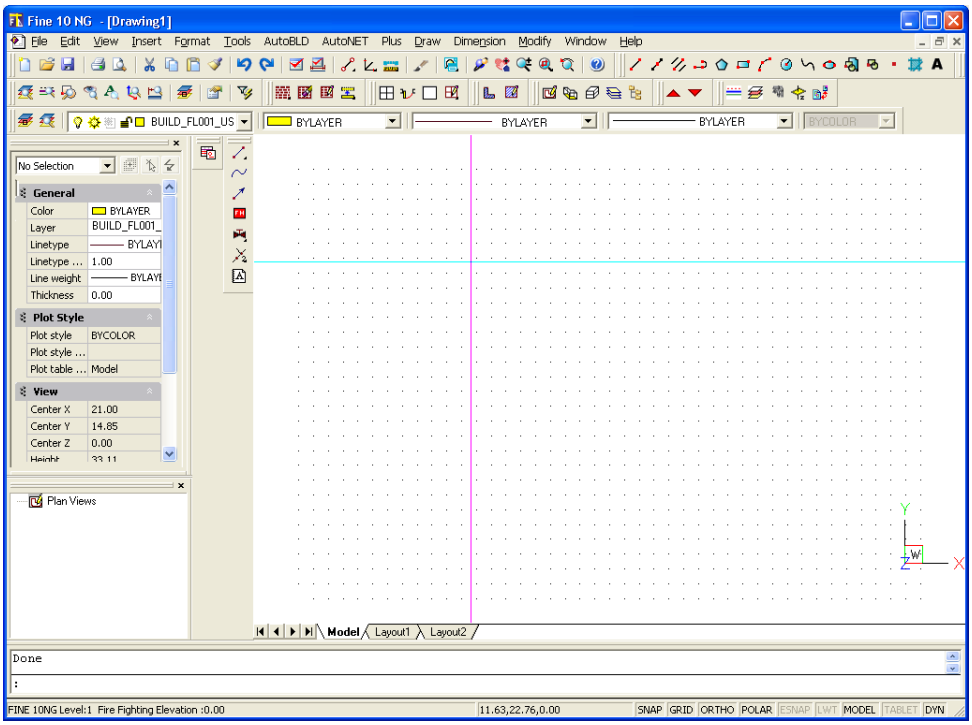
This first Part (Part I) of the user's guide describe the operation of the CAD component of FineFIRE. As mentioned in the preface, the CAD component is based on IntelliCAD technology, including IntelliCAD (and of cource its licence since 4M is a member of IntelliCAD Consortium ITC- see www.intellicad.org).

Regarding technical aspects, it should be mentioned that the package follows a completely object oriented philosophy (OOP). This practically means that the package considers the building and the FIRE installations as logical entities which consist of individual objects clearly related to each other and with accurately defined characteristics. These intelligently structured “information” of the building and its sanitary installations combined with the advanced technology (C++) that was utilised for its development, provide the package with an experienced behaviour, resulting in an Intelligent Workstation, that is an invaluable helping hand to every Designer.

FineFIRE CAD Component includes 2 main modules, which co-operate closely and give the Designer the impression he virtually works on the building: It is about a) the AutoBUILD (or AutoBLD) that is used to load-identify the building and b) the AutoNET that is used to design and identify the network installations. Those two subsystems are supported by a third one, with the name PLUS, which includes many useful designing facilities.

2.2 Main menu

As soon as the program is loaded, the main menu screen appears for the first time:

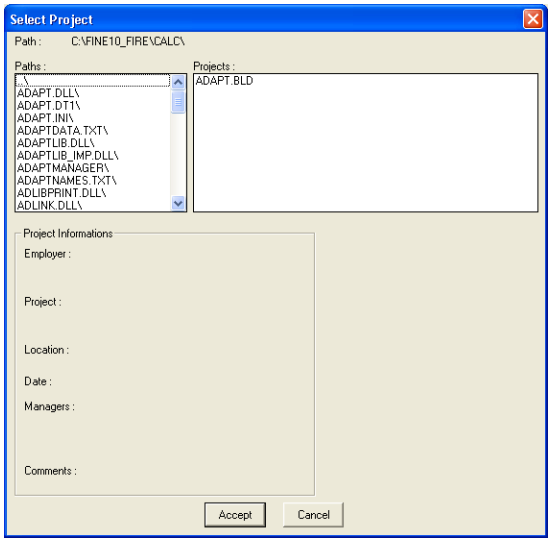


Among the commands of the designing environment, we notice the following main options of the package:

1. Project files management options (New Project, Open Project and Project Information) which are located into the options group FILE.
2. Option Group with the name **AutoBLD**, which includes all the commands required for the Architectural designing.
3. Option group with the name **AutoNET**, which includes all the commands required for the designing and calculation of the application (Single-pipe system, Twin-pipe System, Electrical Wiring etc).
4. Auxiliary option group with the name **PLUS**, which contains a series of designing facilities for the user.

To start creating a project with FINE, a new project should be defined by utilising the corresponding option in the project FILE management menu mentioned above. In case that "NEW PROJECT" is selected, a window appears on the screen where the name of the Project should be typed.

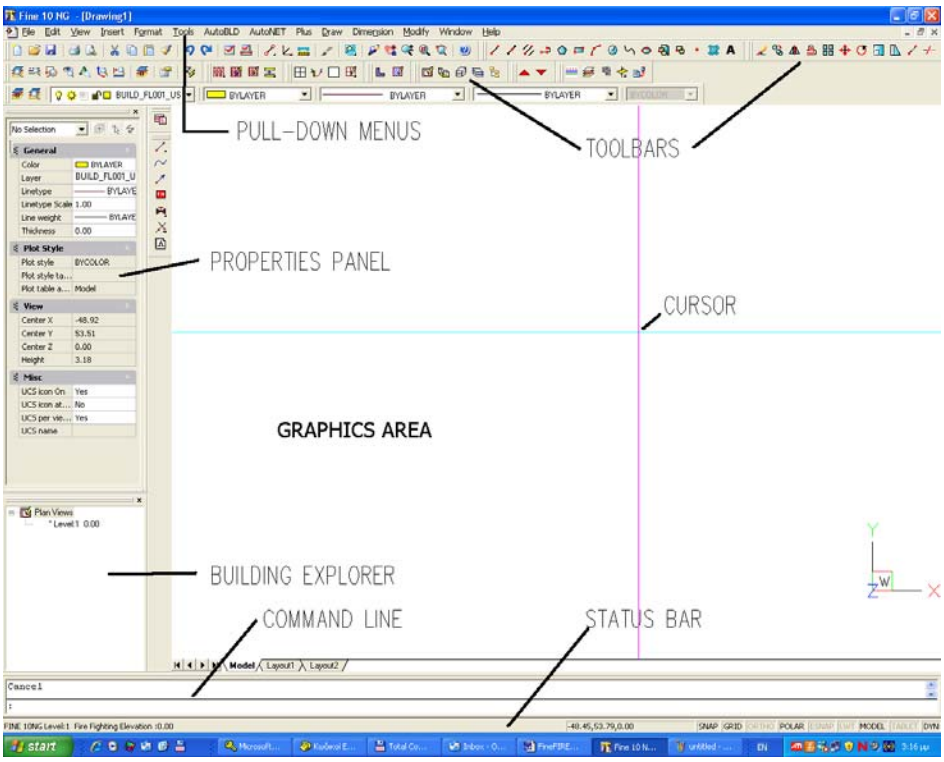
In order to "load" an existing project, that is a project which has been created with the program and you want to further edit it or just view it, then you should select "Select Project", and a list with the existing projects in the hard drive will be displayed on the screen. At first, the list displays all the projects that exist in the FINE directory, but with the use of the mouse or the keyboard and acting correspondingly, you can transfer to any other directory, viewing at the same time the existing projects. It is noted that the projects are included into directories with the extension BLD. If an existing project is selected, it is loaded and displayed on the screen.



No matter if a new project is created or a saved one loaded, you can now begin working with the use of the subsystem commands described above. Let us remind you again, that a detailed description of these commands is available in the sections of chapters 3-6, which follow. Before this detailed description, a short reference of the basic designing principles featured in the designing environment of the package is recommended, in chapter 2 that follows next. If you are familiar with the use of Autocad or IntelliCAD, you may page through or even skip chapter 2, while if you are not you should read it carefully.

2.3 Drawing Principles & Basic Commands

A great advantage of the package is that the structure and the features of the drawing environment follow the standards of the CAD industry adopted by AutoCAD, IntelliCAD etc. In particular, the available working space is as follows:



As shown in the above figure, the screen is divided into the following "areas":

- ***Command line:*** The command line is the area where commands are entered and the command messages appear.
- ***Graphics area****:* The largest area of the screen, where drawings are created and edited.
- ***Graphics cursor***: The cursor is used for drawing, selecting objects and running commands from the menus or the dialog boxes. Depending on the current command or action, the cursor may appear as a graphics cursor (crosshairs), a selection box, a graphics cursor with a selection box etc.
- ***Pull-down menus***: These menus appear by placing the cursor on the Status line.
- ***Status Line***: It is the line on the top of the screen where the current layer (slide), the drawing status and the current cursor coordinates are displayed.
- ***Cursor menu***: This menu appears when the cursor is in the graphics area and you press either the middle mouse button or <SHIFT> and the right mouse button simultaneously.
- ***Properties Panel***: Displays the properties of selected entities
- ***Building Explorer***: Displays and helps the user to explore the building.

Please note that each mouse button performs a specific function. The functions of the mouse buttons are the following:

Left button: Selection of a command, point or object.

Right button: Enter

Middle button: "Esnap" command

2.3.1 Drawing aids

This section describes the basic drawing aids available to the user. These are the commands **Esnap** (object snap), **Ortho** (vertical/horizontal drawing), **Grid** and **Snap** (movement increment). More specifically:

ESNAP: The "Esnap" command forces the cursor to select a snap point of an object, which is within the Pick box outline. The snap points are characteristic geometric points of an object (i.e. endpoint of a lne). If you have specified a snap point and move the cursor close to it, the program will identify it with a frame. The "Esnap" command can be activated either by holding down the "SHIFT" key and right clicking the mouse or by clicking the middle mouse button or through the additional toolbar.

ORTHO: The "Ortho" feature restricts the cursor to horizontal or vertical movement. The status bar shows whether the "Ortho" command is activated by displaying "ORTHO" in black characters (in AutoCAD 12, the indication "**O**" also appears on the top left side of the screen).The command is activated or deactivated by clicking the corresponding button-icon or by pressing **F8**.

GRID: The screen grid is a pattern of vertical and horizontal dots, which are placed at the axes intersection points of an imaginary grid. The grid can be activated or deactivated by clicking the corresponding button-icon or by pressing **F7** (If the grid is active, it appears on the Status Bar).

SNAP: The graphics cursor position coordinates appear in the middle of the upper part of the graphics area. If "Snap" is selected, the graphics cursor movement may not be continuous but follow a specific increment (minimum movement distance).

When "Snap" is on, the cursor seems to adhere, or "snap", to an invisible grid. "Snap" can be turned on and off either by clicking the corresponding button/icon or by pressing **F9**. (If it is activated, it appears on the Status Bar). The default Snap setting is ***0.05 m*** for both axes (X and Y).

2.3.2 Drawing Coordinates

When you need to determine a point, you can either use the mouse (by seeing the coordinates in the status bar or using the snap utilities), or enter the coordinates directly in the command line. Moreover, you can use either Cartesian or polar coordinates, either absolute or relative values, in each method (relative coordinates are usually more convenient).

Relative coordinates: Enter the @ symbol (which indicates relative coordinates) and then the x,y,z coordinates (Cartesian system) or the r<θ<φ coordinates (polar system) in the command line. The system used (Cartesian or polar) is defined by the "," or "<" symbol. If you do not insert a value for z or φ, it will be automatically taken as zero. For example, if you are prompted to locate the second (right) endpoint of a 2m horizontal line, you should enter:

@2,0 if you use the Cartesian coordinates (which means that the distance of the second point from the first is 2 m on the x axis and 0 m on the y axis), or

@2<0 if you use the polar coordinates [which means that the second point is at a distance of 2m (r=2) and an angle of 0 degrees (θ=0) from the first].

Absolute coordinates: These are specified like the relative coordinates, but without using the @ symbol. The absolute coordinates are specified in relation with the 0,0 point of the drawing.

The measurement system can be activated, deactivated or changed with the F6 key.

2.3.3 Drawing Basic Entities

Line: "Line" option is used for drawing segments. When you select "Line" from the menu or type "Line" in the command line, you will be prompted to specify a start point (by left clicking or by entering the point coordinates – relative or absolute – in the command line) and an endpoint (determined in the same way).

Arc: The "Arc" command is used for drawing arcs. An arc can be drawn in different ways: The default method is to specify three points of the arc ("3-Points"). Alternatively, you can specify the start point and endpoint of the arc as well as the center of the circle where it belongs (St, C, End). The user will not find it difficult to understand and become familiar with the various methods of drawing an arc.

Polyline: This command allows you to draw polylines, which are connected sequences of line or arc segments created as single objects. The command is executed by either using the menu or typing "pline" in the command line. You will be prompted to specify a start point and an endpoint (by right clicking the mouse or by entering the point coordinates – relative or absolute – in the command line). Then, the command options will appear (Arc, Close, Length etc). Select **A** to switch to Arc mode, **L** to return to Line mode and **C** to close the polyline.

2.3.4 Useful Commands

This section includes brief descriptions of the basic program commands, which will be very useful to the user. These are the commands "Zoom", "Pan", "Select", "Move", "Copy" and "Erase". In particular:

Zoom: "Zoom" increases or decreases the apparent size of the image displayed, allowing the user to have a "closer" or "further" view of the drawing. There are different zooming methods, the most functional of which is the real-time zooming ("lens / ±" button). You can use the mouse to zoom in real time – that is to zoom in and out by moving the cursor. There are a number of zoom options as shown by typing "Zoom" in the command line: All/Center/Dynamic/Extents/Left/Previous/Vmax/window/<Scale(X/XP)>

Pan: "Pan" ("hand" icon) moves the position of the visible part of the drawing, so that you can view a new (previously not visible) part. The visible part of the screen moves towards the desired area and to the desired extent.

Select: This command selects one or more objects (or the whole drawing), in order to execute a specific task (erase, copy etc.). Select is also used by other CAD commands (for example, if you use the "Erase" command, "Select" will be automatically activated in order to select the area that will be erased).

Move: This command allows moving of objects from one location to another. When the "Move" command is activated, the "Select" command is also activated so that the object(s) the user wants to move (in the way described in the previous paragraph) can be selected.

After you have selected the desired object(s), you are prompted to specify the base point (using the snap options), which is a fixed point of the drawing. When you are prompted to specify the position where the base point will be moved, use either the mouse or the snap options. After you have completed this procedure, the selected object(s) will move to the new position. Please note that the base and the new location points can be also specified with the use of coordinates (absolute or relative, see related paragraph).

Copy: The "Copy" option allows the copying of objects from one location to another. The "Copy" procedure is similar to the "Move" procedure and the only difference is that the copied object remains at its original location in the drawing.

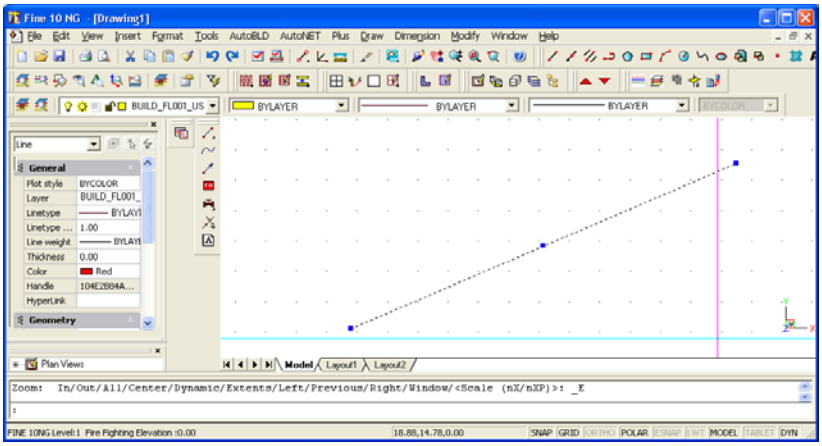
Erase: Choose this option to delete objects. The procedure is simple: Select the objects you wish to erase (as described above), type "E" in the command line and press <Enter>. Alternatively, you may first type "E" in the command line, then select the object(s) by left clicking and finally right click to erase the object(s).

DDInsert (Insert Drawing): This command allows the user to insert another drawing (DWG file) or block in the drawing. When this command is selected, a window appears in which you should select block or file and then select the corresponding block or file from disk. Then you are prompted to specify the insertion point, the scale factor etc, so that the selected drawing is properly inserted.

Wblock: The "Wblock" command allows us to save part of a drawing or the entire drawing in a file, as a block. When this command is selected, you are prompted to enter the file name and then you should select the drawing or the part of the drawing you wish to save. The use of this command is similar to the "Screen Drawing" command, which will be described in a following section. In order to insert a block in a drawing, you should use the "ddinsert" command described above.

Explode: The "Explode" command converts a block in a number of lines so that you can edit it in that form. If it is selected, the program will prompt you to select the block ("Select object") you wish to explode.

2.3.5 Grips



Grips are some characteristic points of an object which appear after it is selected (by moving the cursor on the object and left clicking). Then object is displayed with grips (small squares), which mark control locations and are powerful editing tools. When you click a grip, it turns red and the following prompt appears in the command line: **STRETCH** <stretch to point> /Base point /copy/ undo/ exit. If you press <Enter> (or right click), the first characters of the corresponding word are entered, e.g. “sc and enter” for the "Scale" command).

When a command is executed, grips disappear and the objects are deselected. If the command is an editing command (correction or copy), which can be preselected, the objects take part in the execution of the command automatically. In this case, the command overrides the "Select objects" prompt and proceeds. To deselect grips and objects you should press <Esc> twice: Once to deselect the objects and twice to deactivate the grips.

In each object the positions of the grips are different. Namely, for a point the grip is the point itself, for a segment the grips are the midpoint and the two endpoints, for an arc the midpoint and the two endpoints, for a circle the center and the quadrants, for a polyline the endpoints of the line and arc segments and the midpoints points of the arc segments, for a spline the spline points, for a block the insertion point, for text the insertion point etc.

2.3.6 Print

This section may be read after the user has created a drawing and wants to print it. Any drawing can be printed using a printer or plotter or to a file. Printing is performed using "PRINT" (or "PLOT") command, selected either from the "FILE" menu or typing it in the command line, provided there is a drawing already loaded.

Viewing a drawing before printing gives you a preview of what your drawing will look like when it is printed. This helps you see if there are any changes you want to make before actually printing the drawing.

If you are using print style tables, the preview shows how your drawing will print with the assigned print styles. For example, the preview may display different colors or lineweights than those used in the drawing because of assigned print styles.

To preview a drawing before printing

1. If necessary, click the desired Layout tab or the Model tab.

2. Do one of the following:

- Choose File > Print Preview.
- On the Standard toolbar, click the Print Preview tool ().
- Type ppreview and then press Enter.

3. After checking the preview image, do one of the following:

- To print the drawing, click Print to display the Print dialog box.

- To return to the drawing, click Close.

The Print dialog box is organized by tabs into two functional areas: scaling and viewing, and advanced printing options. For help defining print settings before you print, see Customizing print options.

To print a drawing

1. If necessary, click the desired Layout tab or the Model tab.

2. Do one of the following:

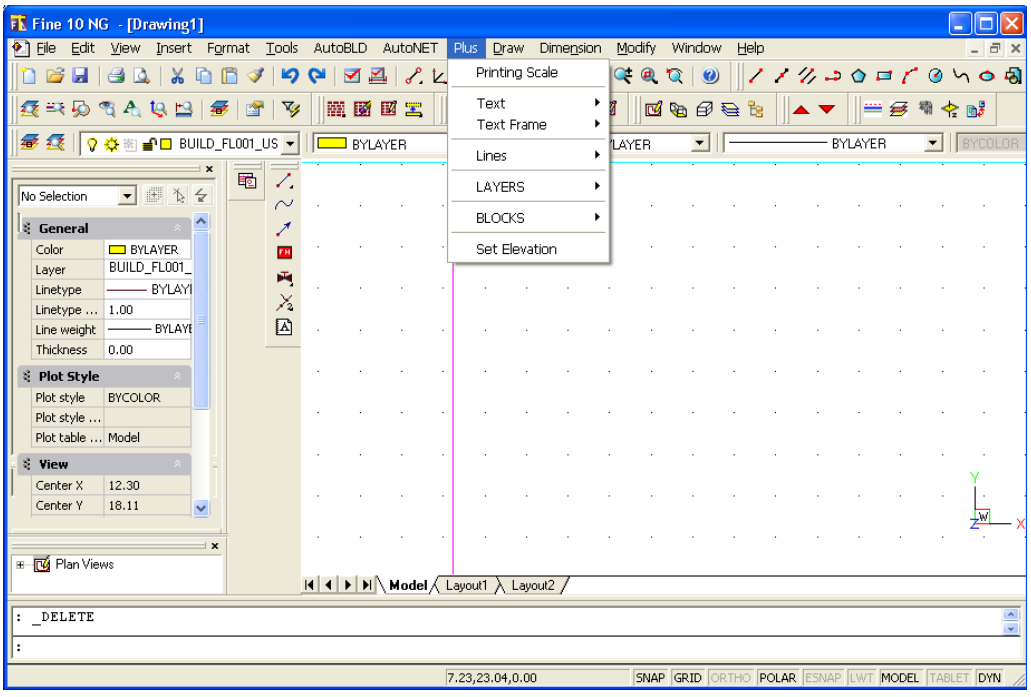
- Choose File > Print.
- On the Standard toolbar, click the Print tool (). If you click the Print tool, the Print dialog box does not display. Your drawing will be sent directly to the selected printer.
- Type print and then press Enter.

3. From the Print dialog box, make any adjustments to the settings.

4. Click Print.

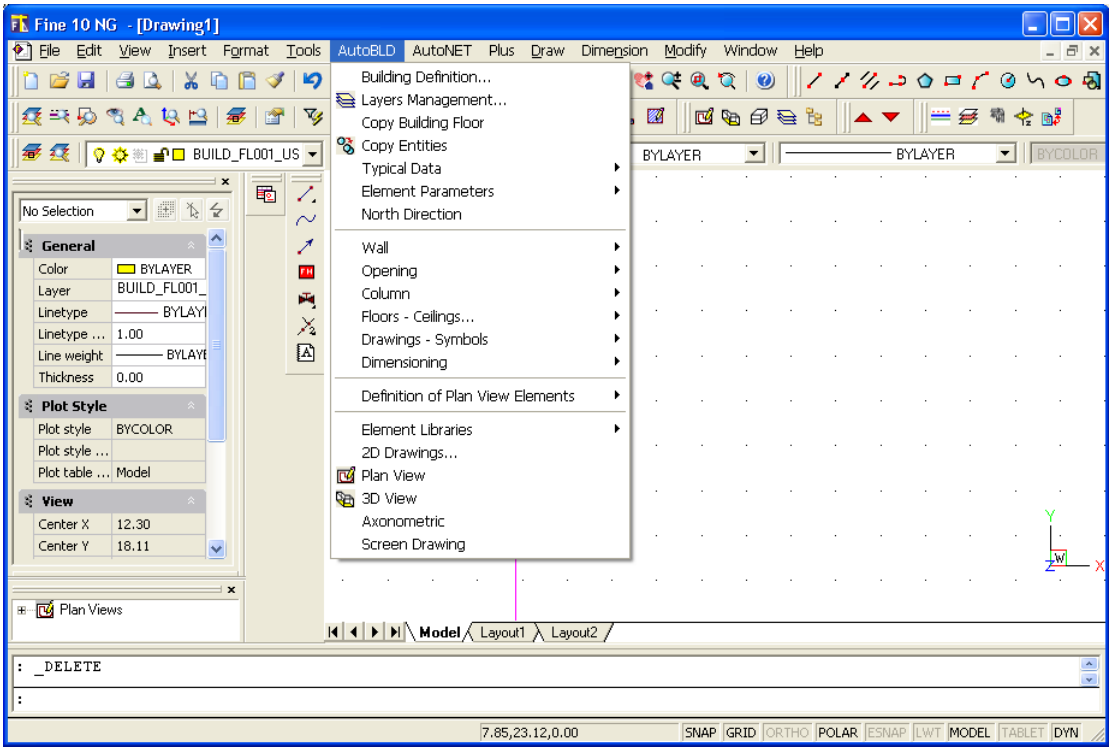
2.3.7 Plus Drawing Tools

Those tools belong to the large group of options under the general menu PLUS. These are a series of additional drawing tools, which have been embodied in the package in order to help the user during drawing, and are described within the Full User's Guide.



2.4 AutoBUILD: Architectural Drawing

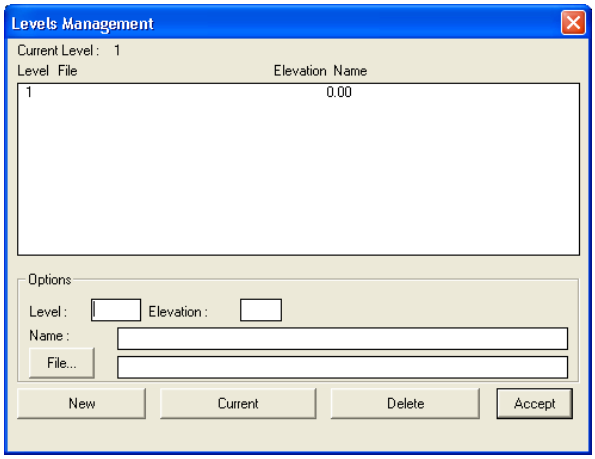
The AutoBUILD option group, as we will see in detail below, includes all the facilities required to insert a building, that is to create an Architectural drawing. As it is shown in the corresponding AutoBLD menu, the various options are divided into sub-groups.



In general, the first sub-group includes commands for the definition of the project parameters, the second sub-group includes drawing commands, the third sub-group includes commands for linking to the calculations, the fourth sub-group includes management options for the AutoBLD libraries and the fifth sub-group includes commands for the building supervision. In the following sections, the options reported above are described one by one, beginning with the "Building Definition" option.

2.4.1 Building Definition

First of all you should press <Enter> in the "BUILDING DEFINITION" option and the floor management menu appears.



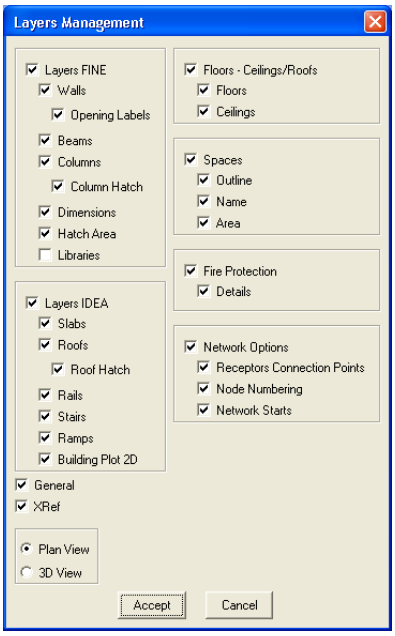
On this screen the floors of the project building are defined, which means that you should determine the level and the corresponding architectural drawing (ground plan) (DWG file) of each building floor (only in case you use a drawing that was created by another architectural designing program). More specifically:

- In the "Level" field, define the Level (floor) number.
- In the "Elevation" field, define the height of the floor level. The user may define manually a benchmark for level measurement (e.g. the pavement). You may also define negative levels (e.g. -3 m).

- In the "Name" field, define the name of the level (e.g. Ground floor).
- In the "File" field, define the path and the name of the relevant DWG drawing-file, only if you refer to an already existing drawing (which means that you do not intend to draw the ground plan from the start). If there is no DWG architectural drawing available, leave the filename blank.

The insertion and the management of ground plans are performed with use of the xref command. At the bottom of the dialog box there are three functions available which are actually used to manage the floor files. More specifically:

Press the “New” button to save a new floor or the changes in the data of a floor (e.g. level, DWG drawing).



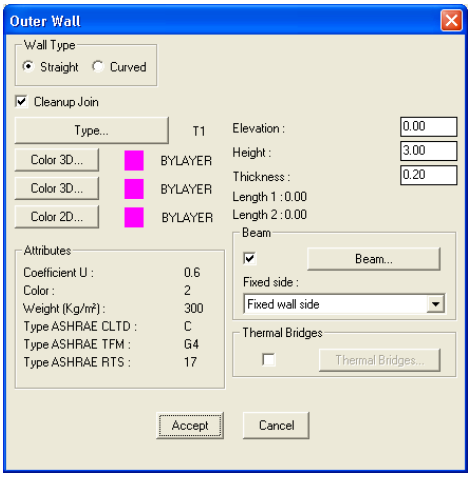
- Use the "Current" option to select the ground plan/file you want to work on each time.
- Select the "Delete" option to delete the floor you want to (after you have clicked it). The "Delete" command removes the ground plan of the relevant floor in the project without deleting the original architectural DWG file. If you have designed the Architectural on your own using AutoBLD, its elements are not deleted but are simply rendered inactive. If you want to delete them, you should have previously used the AutoCAD "Delete" command.

The “OK” command closes the dialog box (does not save the floor data). This can be managed with the “New” command). FineFIRE *enables also the use of a “scanned” ground plan, which is a ground plan in a bitmap file created by a scanner. In this particular situation the steps to follow are described in detail within the User’s Guide.*

The “Layers Management” option enables the user to define in a quick and very practical way (during working) the logical minor drawings of the ground plans (layers). If the user wishes, he may disable any element group, by simply clicking inside the indicator-box of the corresponding group. When the box is checked, the corresponding group is enabled.

2.4.2 Drawing Walls

AutoBLD contains all the commands required for drawing and editing walls, such as parallel moving of walls, trimming, extending, joining and breaking walls as well as placing openings of any kind on them (windows, sliding doors, openings, arches). During the initial drawing, as well as during any modification at any stage, the drawing is automatically updated (e.g. placing an opening on a wall does not break the wall in two parts, the opening moves easily from side to side whether you are working on the ground-plan or on a 3D view, the wall is restored without leaving undesirable lines after deleting an opening etc).



The **Wall** option, located at the second subgroup of the AutoBLD group of commands, includes the Outer, Inner, Outer wall from polyline, Inner wall from polyline and Outline options as well as the option subgroup Modify, Delete, Extend, Break, Join, Trim and Move. The first subgroup concerns the wall drawing, while the second with their further processing after being drawn. Finally, there is also the Elevation of Merge Intersection option, which affects the view plan drawing presentation. By selecting Outer Wall, first of all its attribute dialog appears with a series of parameters (type, dimensions, colors etc), which are described in detail within the User's Guide.

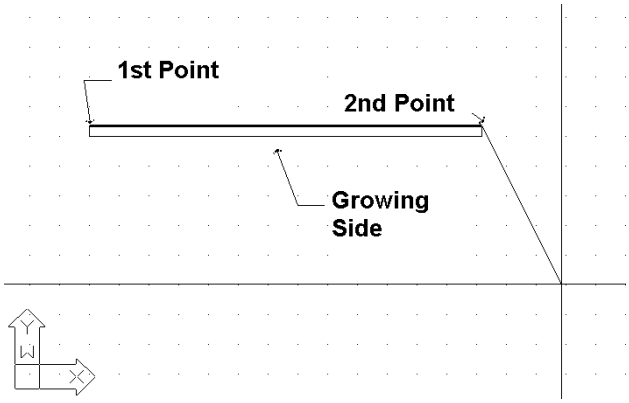
In order to start drawing a wall, you should click OK and then follow the instructions shown below:

Outer wall (straight / arc): After activating the command (by pressing <Enter> in the menu), you are required to successively provide:

i) the starting point of the wall (the application message in the command prompt is: *''Wall start \ Relative to wall \ Toggle shape <Linear>''*

ii) the ending point of the wall (the application message in the command prompt is *''Wall end \ Relative to wall \ Toggle shape <Linear>''*

iii) the direction towards which the wall shall grow, by providing any point on one of the two half-planes defined by the wall line (the application message in the command prompt is *"Enter Side Point"*).



After the above actions, you can see that the wall has been drawn and that you can continue to draw another wall starting from the ending point you defined earlier, unless you right click, which means that you want to stop. You can change the wall drawing from linear into circular, typing **T** in the following programme prompts and pressing <Enter>. During drawing, one can come to the conclusion that the ability of drawing consecutive walls is very convenient, since it saves the user from making many movements. As mentioned further below, in the "Element Parameters" section, the thickness of the wall, its height and its level in relation to the floor level (when the level is 0, the wall starts from the floor), are stored within the "Element Parameters" for the wall. By providing proper values for the wall height and level, any possible case of walls of unequal height can be dealt with. The techniques and tools for creating walls are described in detail within the User's Guide.

Further to the drawing functions, the program also provides the user with powerful editing tools, such as erase, modify (through the wall dialog box), multiple change etc. Within the User's Guide there are complete instructions regarding the above commands plus also the applicable commands Copy, Stretch, Extend, Trim, Break, Unify, Mirror, Rotate, Scale, Base point. Two other commands that are widely used while drawing the walls are a) the Undo command, which enables the user to reverse the previous command executed and b) the Properties command, which enables the user to view (and change) the attributes of the selected wall.

2.4.3 Drawing Openings

Once the command "Opening" is activated, a second option menu is displayed, including a variety of opening types (window, sliding door, door etc) to draw, plus also a set of editing functions such as "Erase", "Modify" or "Move", applied to existing openings. Besides, at the bottom of this menu lies the option “Libraries”, which enables the user to define his/her own opening freely, to create various shapes of windows.

Window: The option "Window" demands that you select the wall on which the opening will be placed and then define the beginning and the end of the opening (all these actions are carried out using the mouse and pressing <Enter> each time). The window will automatically obtain the data that are predefined in the “Attributes”, namely the corresponding values for the height, the rize, the coefficient k etc). Of course, you can draw the window from the ground plan as well as in the three-dimensional (3D) view. During drawing a window, it is very helpful to the user the fact that, after the wall where the window will be automatically placed is selected, the distance from the wall edge is displayed in the coordinates position on the top of the screen, while the crosshair is transferred parallel to the wall for supervision reasons. The measurement starting point (distance 0) as well as the side (internal or external) are defined by which one of the two edges is closer and which side was "grabbed" during the wall selection. Similar functionality exists for other types of openings, such as Sliding Doors, Doors, Openings etc. All the details are included within the User’s Guide.

2.4.4 Other Entities

AutoBLD provides tools for designing columns and other elements, as well as drawing libraries including drawings and symbols to place within the drawing (i.e. general symbols, furniture, plants etc). Details are shown within the User Guide of FineFIRE.

Finally, the Building model of a FineFIRE project can be viewed through the commands:

- Plan View (2D): The two-dimensional plan view of the respective building level is shown.
- 3D View: A three-dimensional supervision of the ground plan of the current floor (with given viewing angles) is shown.
- Axonometric: Provides three-dimensional supervision of the whole building (for all floors), with the given viewing angles as they have been selected in "Viewing Features".

2.5 AutoNET: Network Drawing Principles

The option group AutoNET includes all those tools the designer needs in order to draw (and then calculate) the Sanitary installations. More specifically, the main AutoNET instructions are described below:

Drawing Definition: Layers for each installation are organized properly and the information is shown on the respective dialog. The command "Color" is used to assign the desired colour to each network while the command "Linetype" is used to select the desired line type.

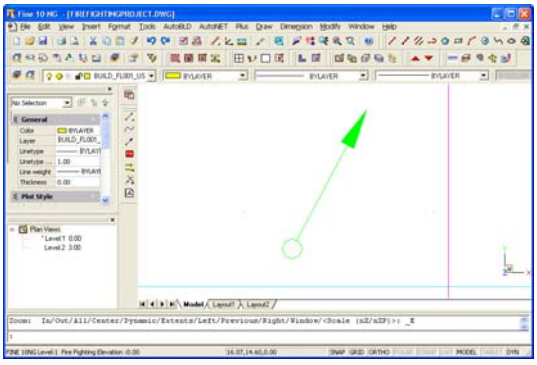
Copy network of Level: AutoNET enables copying of typical (installation) plan views and pasting them on other floors through this command, which functions similarly to the “copy level” AutoBLD option.

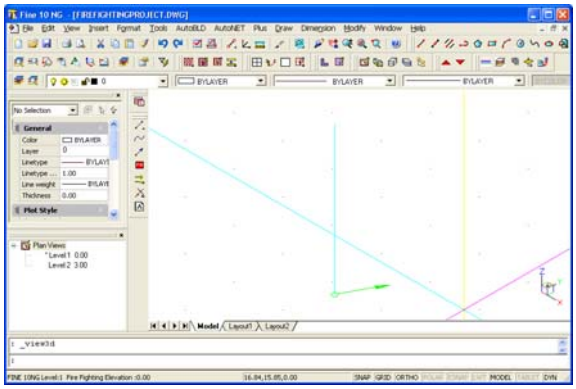
The basic principles and rules for drawing a network are described below:

Network Drawing: The installation network drawing is carried out with a single line, by drawing lines and connecting them to each other, exactly as the network is connected in fact. The user should keep in mind some general principles regarding drawing and connecting between straight or curved, horizontal or vertical network branches.

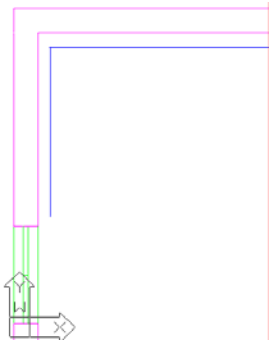
Horizontal & Vertical Piping: In any case, the piping drawing is carried out exactly as the line drawing (in Autocad or IntelliCAD). The user is able to draw horizontal or vertical network branches. Note that vertical branches are different from columns, which will be described below, as they are within the borders of the active floor and do not "cross" floors like columns. The pipe installation elevation is the current elevation. Modification of the pipe installation elevation is possible through the command "elev". If you type "elev" (in the command line), you are prompted to determine the new current elevation. Press <Enter> if it is 0 or type 0 if there is another value but 0. At this point it should be emphasised that, if a horizontal piping which is found on a specific level is drawn and it is connected to another piping or a contact point (receptor), the program automatically "elevates" or "lowers" the pipe so that connecting to the other pipe or receptor, respectively, is possible. In this way, the programme facilitates the drawing of piping in three dimensions while the designer is actually working in a two-dimension environment. In any case of a network design, all facilities provided by AutoCAD can be utilised through relative co-ordinates.

Column Drawing: Drawing vertical branches which cross floors (one or more) is possible through the option "(Building) Column". When the respective option is selected from the menu, the programme asks for the column position ("Enter xy Location") and then for the height of the starting point ("Enter Height for First Point") as well as the height of the ending point ("Enter Height for Second Point"). For example, if you want to d*raw a vertical branch (column) from 0 to 3, by inserting the location point (XY) and then the numbers 0 and 3 successively, the symbol for direction change appears on the ground plan and in 3D View.*





Vertical branches within the same floor: If you want to elevate or lower a pipe within the same floor without having the elevation-lowering symbol inserted (Mark1), you can use the command "Pipe", having a common functionality to the line drawing. You can draw piping in 2D or 3D drawing mode.

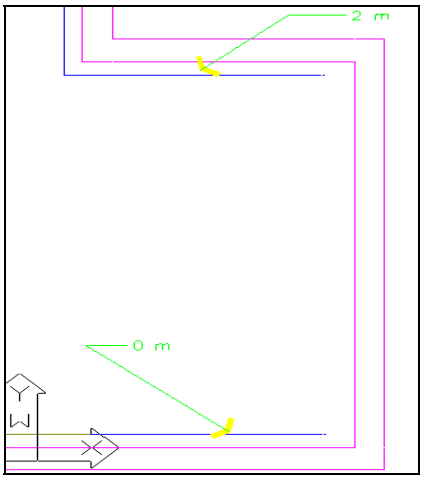


Drawing of Curved Pipes: Draw curved pipes by inserting the points from which the curved pipe is to pass. The respective command prompts for the following:

- First point: Insert the starting point of the pipe.
- Next point: Insert next point, the one after that and so on (successively), defining the pipe routing in this way.

The user can easily modify curved pipes using “grips". As soon as the pipe is selected, grips appear which you can move, altering this way the pipe routing. In the Bill of Materials and the Calculations phase, the program will measure the pipe length precisely.

Connecting network sections: Connections between network sections (horizontal, vertical or both) as well as between network parts and receptors can be easily executed by using the CAD "Snap" commands. For example, suppose that the two horizontal parts of the ground plan below, which are placed in different heights, have to be connected. If you start by "grabbing" the "upper" pipe end and then end up at the "lower" pipe end, the result in the three dimension representation will be as on the right.



Special Commands for Pipe Construction: This is actually a set of commands aiming at the facilitated drawing of the installation piping. More specifically, there are two basic commands:

- **Double Pipe ->Supply-Return**: A double pipe (e.g. supply-return) can be drawn, when the in between distance is known, by simply defining the routing.
- **Pipe parallel to Wall:** A pipe parallel to the wall (walls) marked by the user is drawn, with a given distance from the wall, in printing mm (which depends on the printing scale as well). The program asks for the first point and afterwards the wall or the walls (successively) parallel to which (in a certain fixed distance) the pipe is to be drawn. For instance, if the connection point of the tub is inserted as the first point in the ground plan detail shown below and then the three walls of the room are "marked", a pipe parallel to these walls will be constructed.

The reason for that is that the program draws a vertical line from the first point to the parallel line defined by the other two points.

Pipe parallel to Points: A pipe is drawn parallel to the points defined by the user (supported by automatic snap), with a given distance from the crooked line defined by these points. The program asks for the first point and then for the other points (successively) parallel to which it is desired to have the pipe drawn. When all points are inserted (and you right click), the distance will be requested.

Pipe parallel to Wall (or Points) and Receptor Connection: This is a particularly useful command similar to the two commands above "Pipe parallel to wall" and "Pipe parallel to points", which, however, enable selecting the receptors to be connected on the routing (piping or wiring) which will be drawn parallel to the walls or the points. Therefore, it is possible to connect a whole set of radiators to the nearest vertical column, or grills to the corresponding Air-duct, or multiple illuminators to the main panel, with 2-3 moves.

For better understanding of the command function, assume that in a given bathroom with its receptors it is desired to install a pipe parallel to the wall and connect the receptors to this line. The steps are the following:

- Select the "Pipe parallel to points and receptor connection" command and the following options will appear:
- Select receptors: Select the receptors to be connected to the pipe applied in a parallel arrangement against the wall by defining certain points on the wall.
- Enter the 1st point & Enter the next point: Provide the points parallel to which you want to install the pipe. The points are shown on the drawing with an X.
- Distance from a point <1.00>: Provide the distance in printing mm where the pipe is going to be drawn starting from the inserted points.

The program draws the pipe and connects it to the receptors.

Modifying an existing network: The user can edit an existing network by using any CAD command (i.e. copy, move or erase etc of a network section) or utility (i.e. grips) during the design process. The only rules to apply are the following: Pipes supplying the appliances (receptors) should be connected to the touch points of these receptors. Obviously only one pipe can be connected to a touch point. The connection with the touch points which appear as "stars" in the ground plan can be executed with the "esnap" function.. Piping can be branched to one another and extend in any way as long as they do not form loops, something which does not apply to reality anyway. If however a mistake occurs, the program (during the identification procedure) will perform all checks and indicate the mistake and its location to the user. A necessary step before the "identification" (recognition) is defining the point (1) where the network starts, that is the supply point (1). In reality, this point corresponds to the Fire Pump. In FineFIRE application, the menu includes the specific options, so that the user can be easily guided when drawing any installation. Although there are no limitations regarding the order of actions followed in drawing an installation, the following order is suggested:

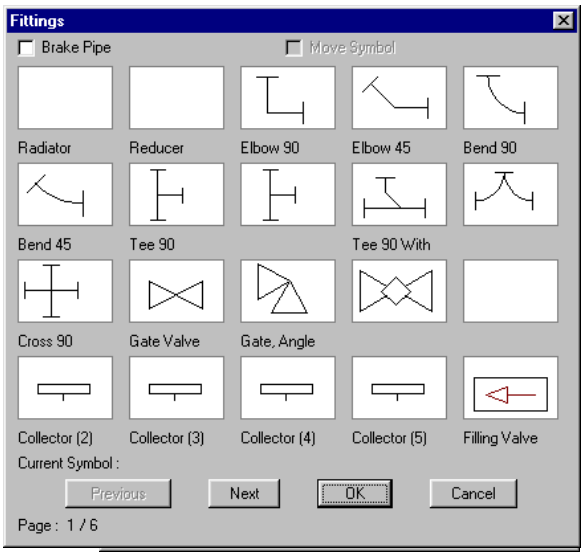
- Receptor Placement (Sprinklers, Fire Hose Cabinets etc)
- Drawing the piping columns
- Drawing the horizontal sections
- Defining the Supply point(s)
- Network Recognition

Placing receptors: Locating a receptor can be done simply through the following steps:

- Select a receptor, press <Enter> and then press "OK" (or alternatively double click). Then it can be observed that the receptor moves on the ground plan with the graphic cursor.
- If you move the mouse properly, the receptor can be carried in such a way that its base point (which coincides with the cross of the graphic cursor) can be placed in the desired point. Right click to confirm your selection.
- If you move the mouse again, the receptor will rotate around the base point. Thus, if you confirm the angle in which you desire to have the receptor placed (again by right clicking), the receptor "freezes" in its final position.

You can also insert and place either the whole receptor or only its touch points in the ground plan. This is significant when an existing ground plan includes drawn receptors and there is no need to redraw them, but just move the touch points so that the information for the respective supplies will be available.

Selecting the whole receptor or the touch points only is facilitated by the correspondent indications on the upper side of the receptor screen, which should be activated by using the mouse properly. Regarding the installation height of a receptor, it should be pointed out that receptors are always installed in the current height. The current height can be changed with the "Change Height" command.



Fittings: The "Fittings" command selects the accessories to be also inserted in the drawings, which applies exactly the same to the receptors. Fittings have "touch points" upon which the piping will be connected so that the network can be identified. A symbol may also have more than one touch points (e.g. a collector), in which case the accessory will be numbered as a junction point in the "Net Recognition". The program provides the capability of cutting off the line automatically when a symbol is inserted on the line, exactly where the accessory interjects. This capability is defined by the indication of the accessories box "Brake Pipe". If this option is activated, then the program will automatically "Break" the pipe when the accessory is placed. Moreover, the "Move Symbol" indication is in the same box, which defines whether the accessory will be moved in relation to the position it was initially placed (so that it will be placed parallel and on top of the pipe) or the pipe will be moved (so that the accessory can be attached).

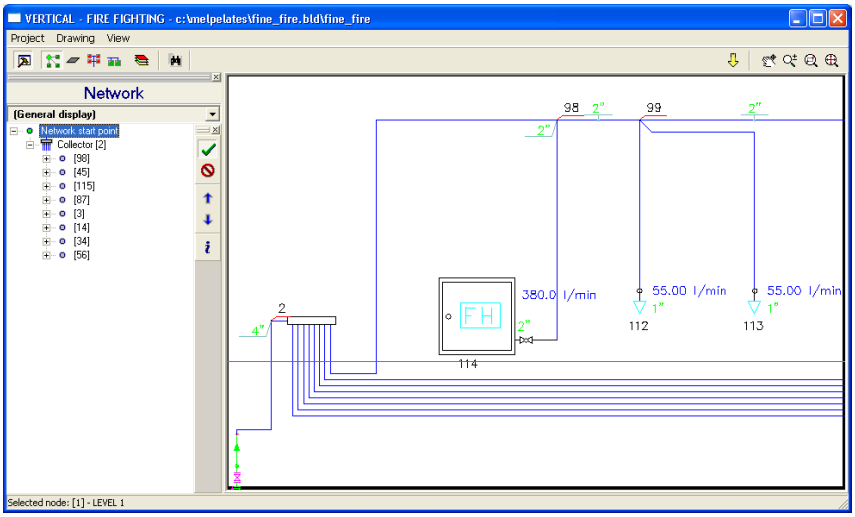
Symbols: "Symbols" include various general symbols, layout of machines and other drawings that can be used in the corresponding installation.

Network Recognition and Numbering: Since the network has been drawn according to the current rules and the supply point has been determined, the "Net Recognition" option converts the network in the required standard pattern and updates appropriately the calculation sheets. During updating, junction points and receptors are numbered on the ground plan. Note that if a receptor is not numbered, means that the receptor is not connected to the network. Besides, if a network section has a different colour it cannot be connected to the network. Connect it or select "Break at selected point" at the connection point with the previous pipe.

Calculations: The "Calculations" option leads you in the corresponding calculating environment (ADAPT/FCALC), which means that the window of the current application is “opening”, while FINE always remains "open". In order to transfer the data from the drawings, you should select "Update from Drawing" in the menu "Files" of the corresponding calculating application (In order to carry out the corresponding calculations, answer "Yes" to the question "Calculate" that appears). From now on, apply all the capabilities mentioned in the ADAPT/FCALC User's Guide for the respective application. It has to be noticed that the numbering of the sections, the lengths of the network sections, the receptors with their supplies and the accessories (from the piping routing) are transferred in the calculation sheets. Of course, if the user wants to, he can intervene in the calculations in order to make any modifications.

Legend: The "Legend" option creates a legend with all the symbols that have been used in this specific project. By selecting it, the program asks for the location where the Legend is going to be inserted. Use the mouse to define the location and the legend will appear automatically on your screen, exactly under the location point.

Vertical Diagram: This option is used for the automatic creation of the vertical diagram of the installation and in its appearance on the screen, within few seconds. In case there is already a vertical diagram, the program asks if you want to update it. It is obvious that, in order to create a vertical diagram, you should draw and identify a network and enter the calculation sheets, so that the program knows all the data needed for the vertical diagram creation (pipe dimensions, junction points numbering, etc).

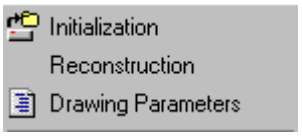


By the “creation” command the window of the vertical diagrams manager appears on screen. This window is composed of two parts, the part with the network tree and the part with the vertical diagram. Through appropriate commands, the user can intervene in several ways on the output of the diagram:

- Enable or disable various branches of the network
- Change the order of the columns of subnetworks in the vertical diagram
- Change the subnetworks direction connection on the vertical colums (right or left)
- Read the information of each node
- Describe the subnetworks

The changes done in the vertical diagram with the help of the above icons are displayed in real time, in the second part of the window. On the upper side of this window there are also icons for processing the diagram (real time zoom and pan, zoom extends etc). In addition, in the upper-left side there are some other icons having to do with the appearance of the screen, such as the hiding of the left part of the window, the appearance of the level names and heights on the left to be edited, the appearance of the numbers of the receptors, the layers and others.

Finally there are some options for the initialization of the vertical diagram, its recreation and the definition of the drawing parameters. In particular, these parameters depend on the application and include the following options:

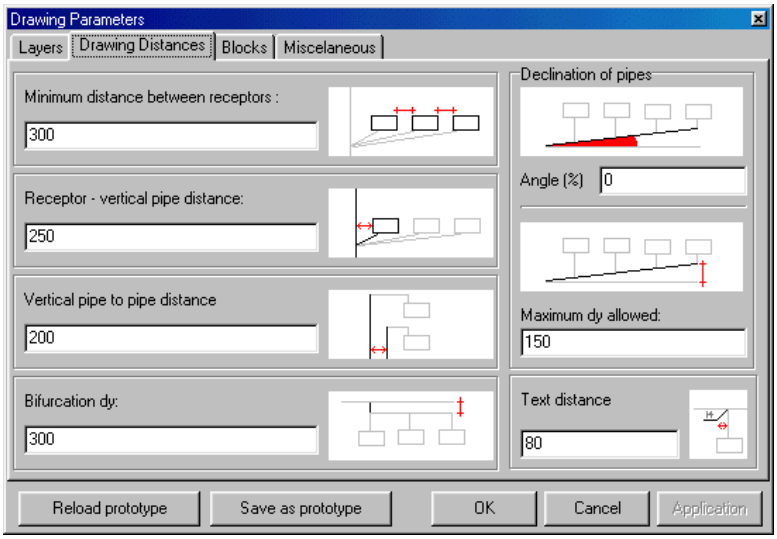


Layers: Through a supervisory window table, The user can define the drawing scale, the colours corresponding to the various layers and the height of the texts (in mm drawn on paper) placed on the vertical diagram.

Drawing dimensions: The drawing dimensions that will be considered on the creation of the diagram, are also defined on mm drawn on paper.

Blocks: There can be defined on each application different network starting points and type of tables. The user can choose from a set of dwg drawings.

Others: A set of attributes concerning the form of the vertical diagram is defined, such as the condensation of the columns, the number of branches over whom the node is considered as collector, whether the z height information will be considered in the diagram creation and whether the sub-networks pipes on the vertical diagram will be placed over or under the receptors. Finally, it should be mentioned that during the editing procedure concerning the vertical diagram manager, if there are mistakes the program displays the proper messages and warnings.



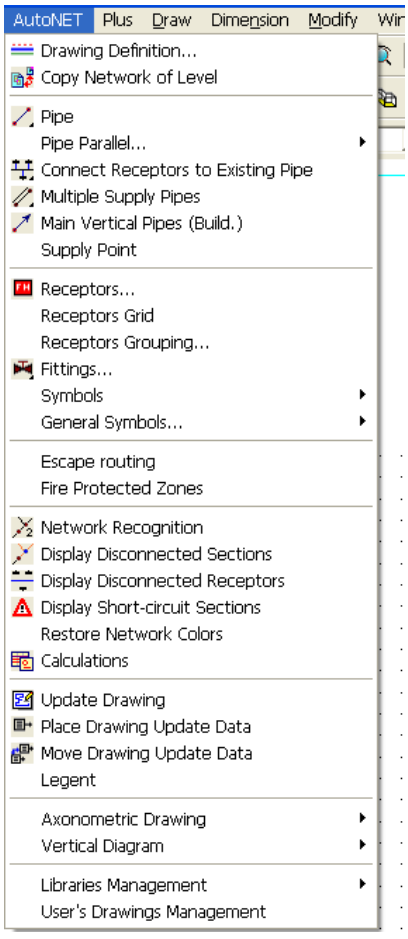
Library Management: The Library Manager leads to a submenu including the options "Numerical data" and "Drawing data". The first option leads to the libraries with all the numerical data of the materials. The "Drawings" option leads to a dialog box where the following data can be seen, regarding each application.

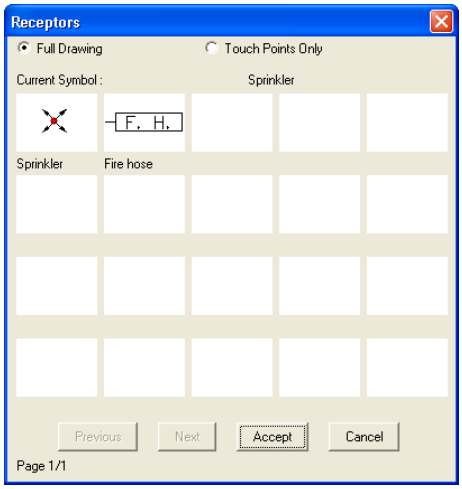
2.6 AutoNET: FineFIRE Installation

The previous chapter described the drawing principles, while the present one describes those commands in relation to the special features of FineFIRE.

Regardless the fact if there is an AutoBLD building model, an on xref or digital image or even no architectural drawings, a Fire Fighting installation can be drawn and then calculated.

Placement of the Receptors to the draws: We select “Receptors” either from the AutoNet menu or from the “Fire Fighting” toolbar. When all receptors' windows appear, the user selects the type of receptor, which will be placed at the specific point.

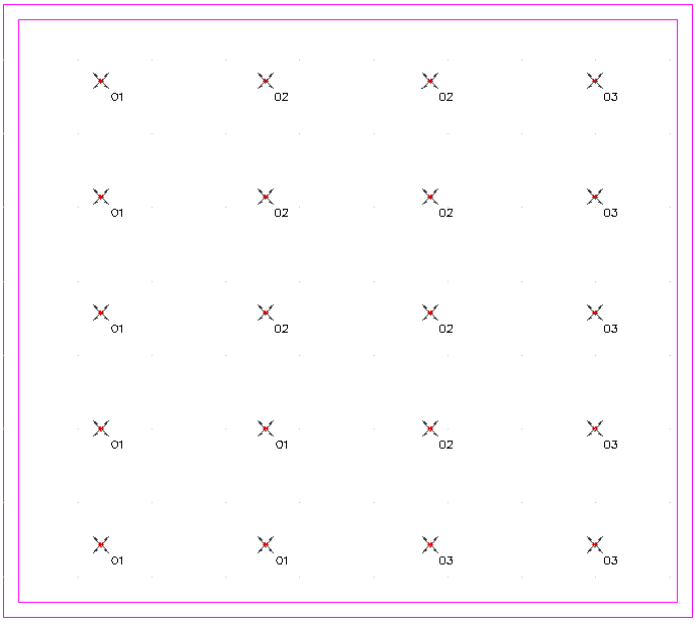




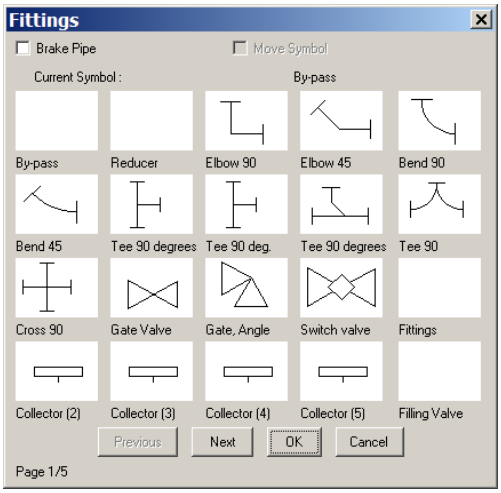
The receptors are placed as referred earlier. In case they already exist on the architectural plan view, then we just click at the “Touch points Only” field.

Receptors Grid: This is about a useful command that gives us the capability to locate easily a number of receptors. After selecting a receptor (through the slides dialog), then we can define the parallelogram inside which the selected receptor is supposed to be located.

Receptors Grouping: Through this command we can organize into groups the receptors, considering that all the receptors of a certain group are supposed to operate together in case of a fire incident. Groups can be also defined or modified within the calculation sheet. By defining a group, the indication of the group (i.e. G1, G2 etc) is displayed on screen and updates properly the Sprinkler_group" layer.



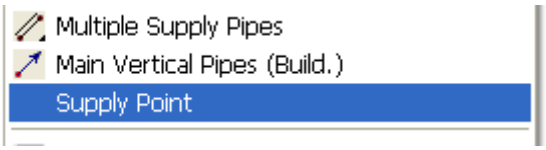
Placement of the Fittings to the draws: We select “Fittings” either from the AutoNet menu or from the “Fire Fighting” toolbar. When all Fittings' windows appear, the user selects the type of fitting, which will be placed at the specific point.



Horizontal networks design: After we place the connectors, as described earlier, we proceed with the design of the vertical and horizontal pipes of the level. After the design of the vertical and horizontal pipes, we perform the connection of the piping to the receptors. For the reduction of both the time needed for the specific work and of the errors we suggest the use of the “Connect of receptors with the existing line” (hot and cold network) command, analyzed within the User’s Guide.

Design of the networks’ Columns: We fix position and the starting-ending height of the vertical columns at the ichnography. Note that in most cases we provide the level only with a cold water column. In case we have a storage boiler or a sun heater, or for the provision of hot water of a maisonette, we use a hot water column. We must point out that the heights of the columns are dependent upon the level heights of the building. All pipes will be connected to the vertical columns through the “Vertical” heave point. The display of the column is indicated by the dot in the centre of an arrow and not the small arrow. It displays the vertical column in the draw. In the case that the floors are of standard dimensions, we can take advantage of the “Floor network copy” command.

Set of Supply Point(s): From the edge of the vertical columns, using straight pipes, we design the piping section ending to the supply points.

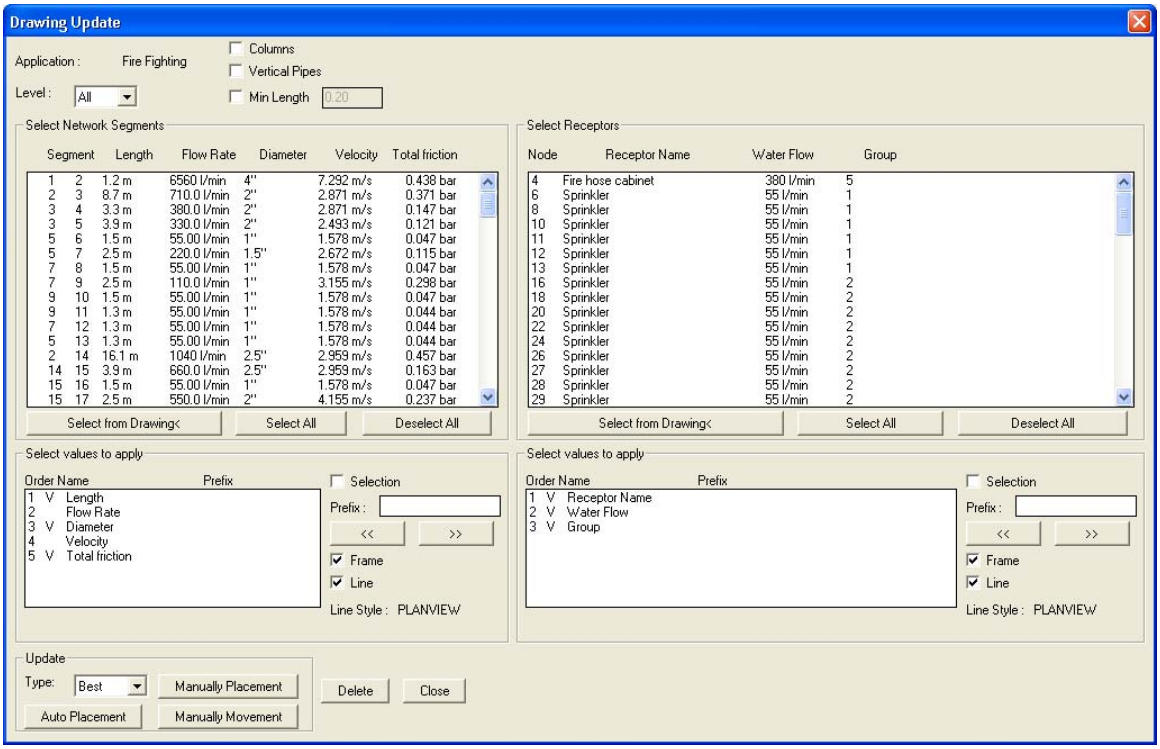


It is important to set the **ending** of the pipe using osnap.

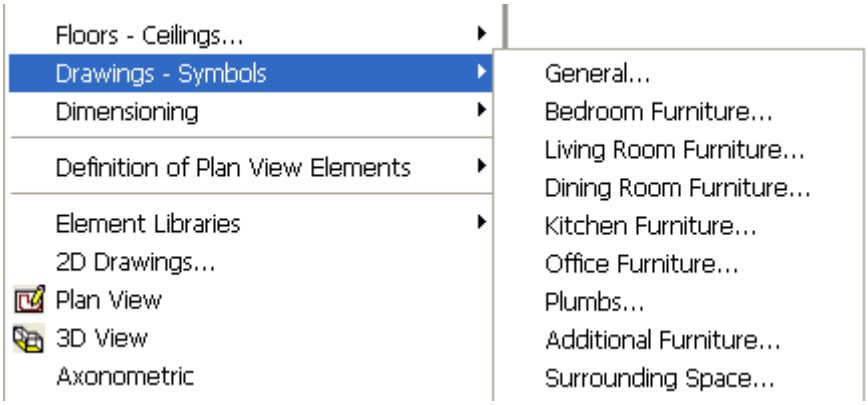
Network recognition: Select “Network recognition”, in order for AutoNet to recognize the logic as well as the position of the receptors in the spaces and to prepare the files for the connection with the calculations. During the recognition of the logic, messages warning the user for drawing errors may appear. For example there might be closed routes of the hot or cold water. points at which different types of pipes end, lack or false placement of the beginning of the hot or cold water network, elements unconnected etc. Besides, no “white” parts should appear on the network, which means that they haven’t been “recognized”.

Calculations: When the control is completed we're ready to go to the computing environment. By selecting "Computations" the Fire Fighting computations are displayed in AutoNet. When select "Files" and "Update from design", the data is transferred at the calculation sheet.

Update Drawing: After the study on the calculation part of the program is completed, we save the project file. We refer back to the drawing programme (FINE) and select "Update Drawing". Then the calculation results are transferred to the drawings. If this procedure is repeated, the program will ask if the user wants to delete the previous update and replace it with the new one.

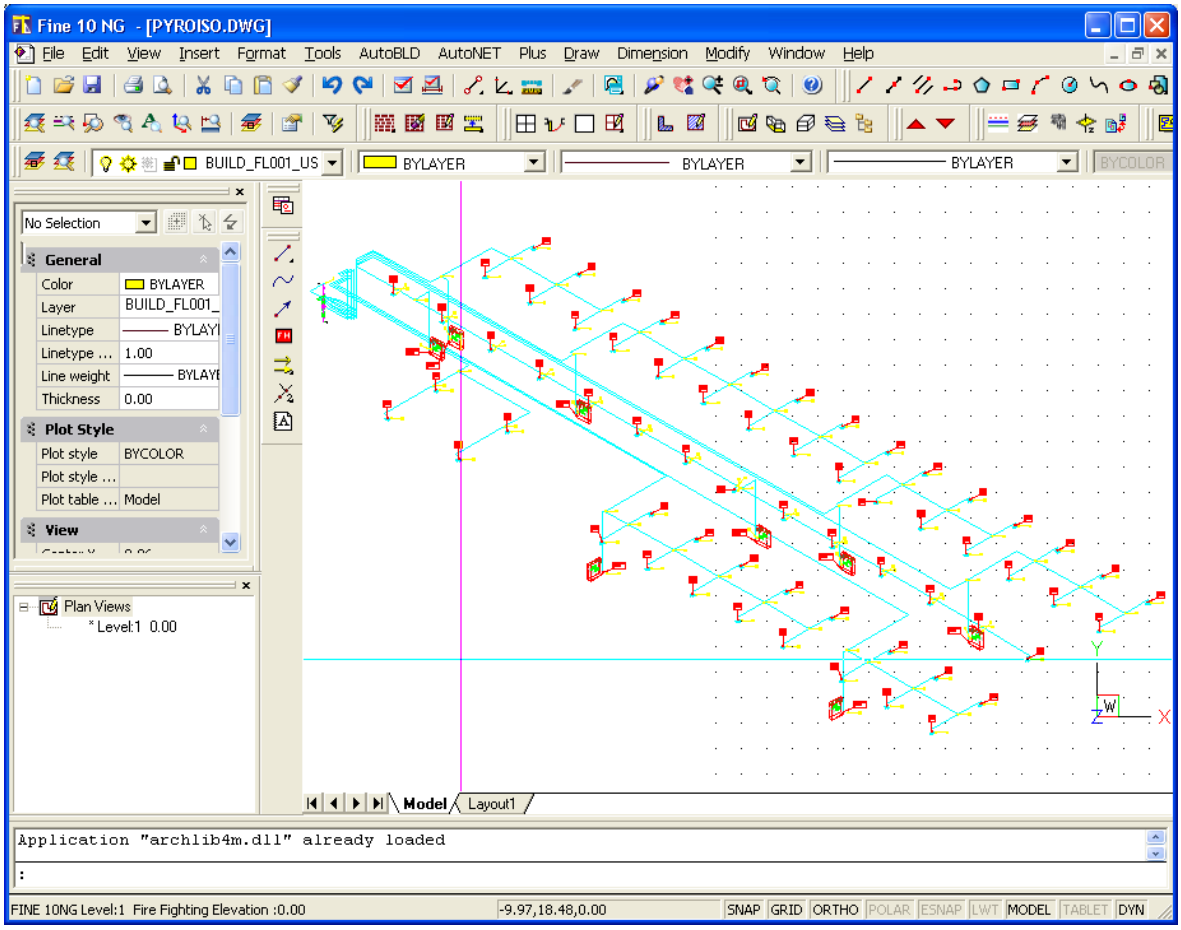


Other drawing actions – Completion of the draws: Next, we place a control faucet in frond of each apartment or property, or wherever else it is required. The placing of the faucet is performed through the "Elements" command or from the "Fire Fighting " toolbar. From the dialogue box we select the faucet having checked the "Pipe Cutting" box. We select the pipe and place the faucet. Next, we must place the counters (flow-meters). The draws regarding the counters, general assemblies manufacturing details and so on can be selected from the respected AutoNET databases or from the "Fire Fighting" toolbar and the corresponding icon.

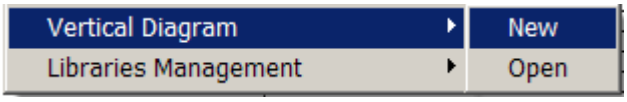


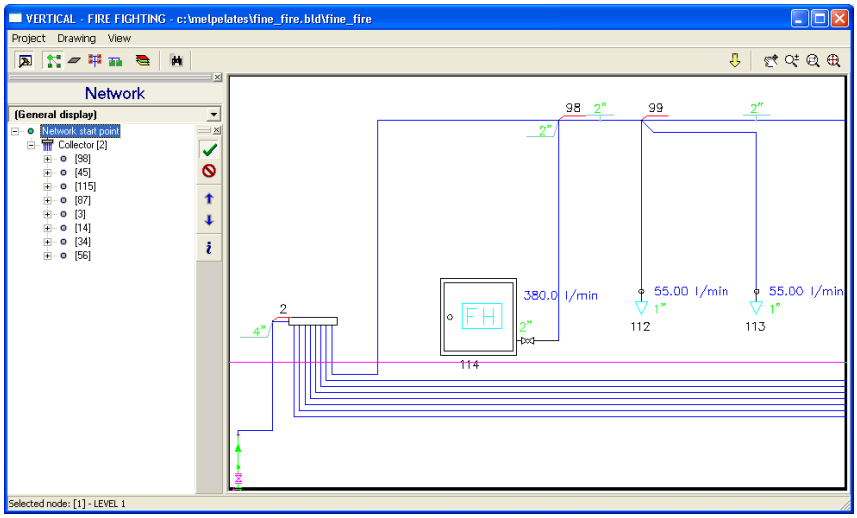
Finally, we can attach a legend.

Axonometric Drawing: The axonometric drawing produced automatically with the use of FINE provided that the network was designed at the specific programme. From AutoNET we select “Axonometric Drawing” > “Create”. Then the following window appears:



Vertical Chart: The vertical chart is produced automatically with the use of FINE provided that the network was designed at the specific programme. From AutoNET we select “Vertical diagram” > “Create”. Then the following window appears:



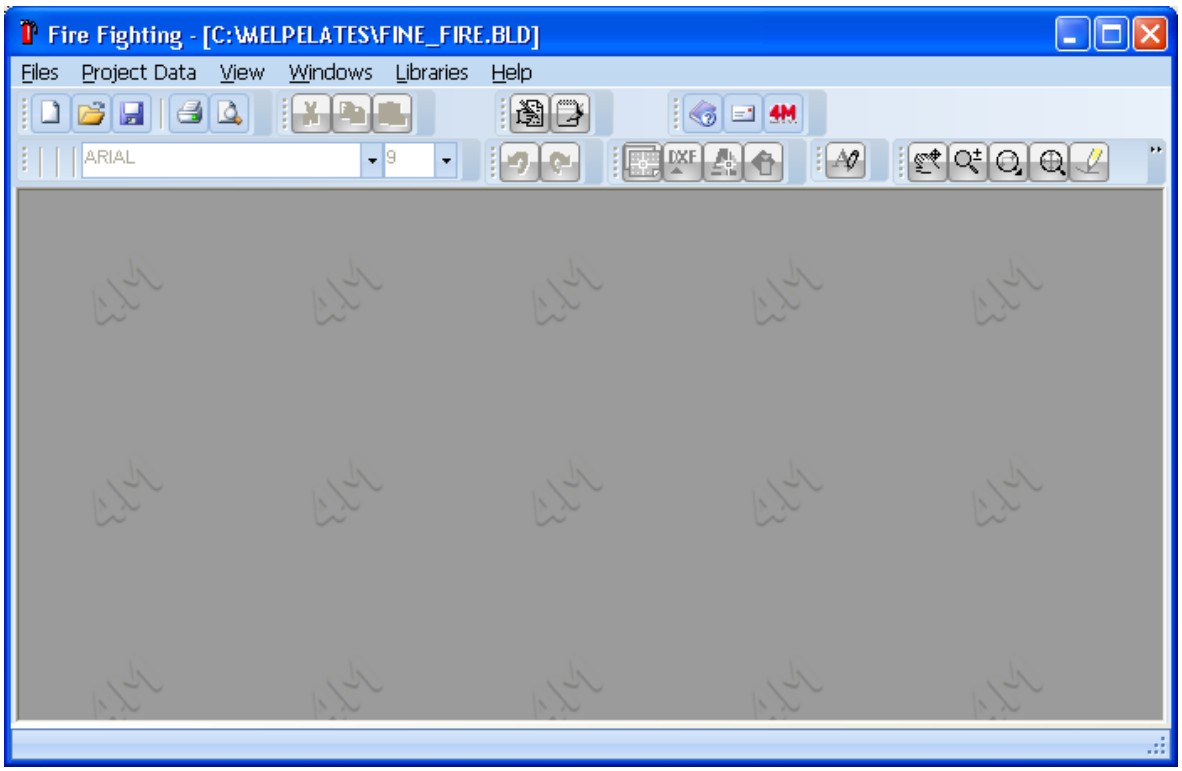


The user can apply all desired changes or close the window, which will result to the display of the design in a DWG form, which can modify using the provisions of CAD programmes. Details regarding the function of the vertical diagram maker can be found in the User's Guide.

3. Calculations

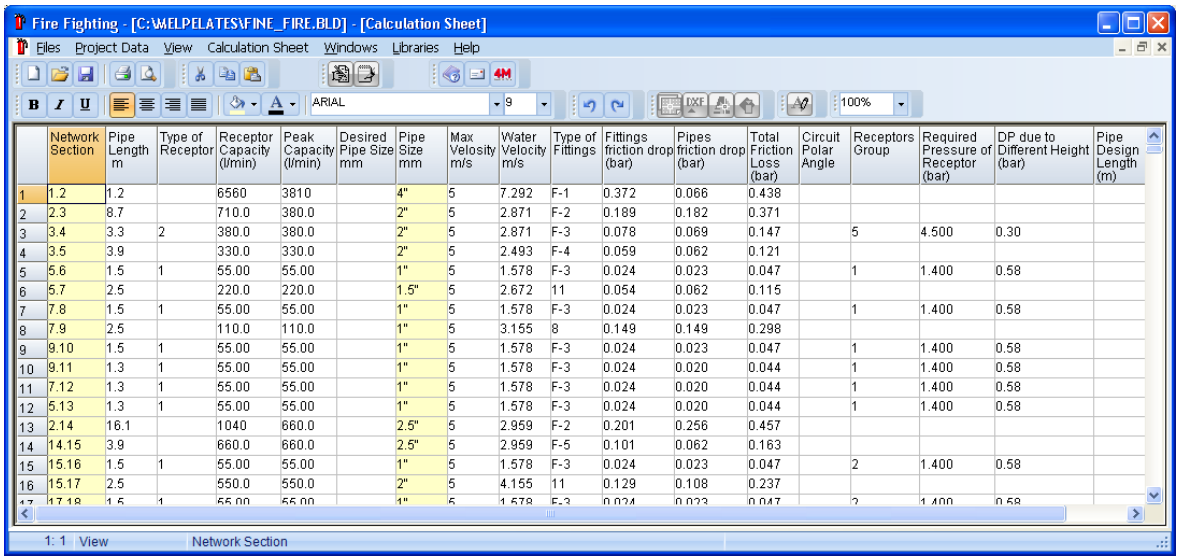
3.1 Introduction

This chapter provides a description of the Calculations Component of FineFIRE. This module can be used either independently, by filling the numeric data, or in co-operation with the CAD component of FineFIRE, in which case the calculation environment acquires the data directly from the drawings.



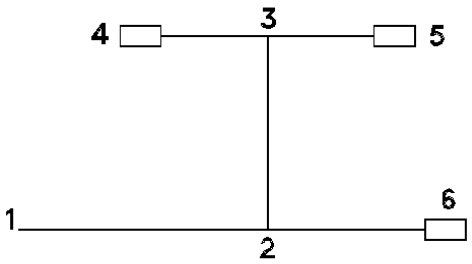
At the top of the application window appear the general options of each application menu, constituted of the group options **"Files", "Project Data", "View", "Windows", "Libraries"** and **"Help"**.

The core of the calculations is the calculation sheet, a spreadsheet-like environment with specific capabilities and facilities tailor-made for each application. More specifically, regarding FineFIRE, which refer to an installation network, the calculation sheet is shown in a spread sheet using lines corresponding to the network branches, and columns containing primary data (e.g. length) and results of calculations (e.g. water velocity) for each branch. An example of such a sheet for the Fire Fighting Application is shown below:



	Network Section	Pipe Length m	Type of Receptor	Receptor Capacity (l/min)	Peak Capacity (l/min)	Desired Pipe Size mm	Pipe Size mm	Max Velocity m/s	Water Velocity m/s	Type of Fittings	Fittings friction drop (bar)	Pipes friction drop (bar)	Total Friction Loss (bar)	Circuit Polar Angle	Receptors Group	Required Pressure of Receptor (bar)	DP due to Different Height (bar)	Pipe Design Length (m)
1	1.2	1.2		6560	3810		4"	5	7.292	F-1	0.372	0.066	0.438					
2	2.3	8.7		710.0	380.0		2"	5	2.871	F-2	0.189	0.182	0.371					
3	3.4	3.3	2	380.0	380.0		2"	5	2.871	F-3	0.078	0.069	0.147		5	4.500	0.30	
4	3.5	3.9		330.0	330.0		2"	5	2.493	F-4	0.059	0.062	0.121					
5	5.6	1.5	1	55.00	55.00		1"	5	1.578	F-3	0.024	0.023	0.047		1	1.400	0.58	
6	5.7	2.5		220.0	220.0		1.5"	5	2.672	11	0.054	0.062	0.115					
7	7.8	1.5	1	55.00	55.00		1"	5	1.578	F-3	0.024	0.023	0.047		1	1.400	0.58	
8	7.9	2.5		110.0	110.0		1"	5	3.155	8	0.149	0.149	0.298					
9	9.10	1.5	1	55.00	55.00		1"	5	1.578	F-3	0.024	0.023	0.047		1	1.400	0.58	
10	9.11	1.3	1	55.00	55.00		1"	5	1.578	F-3	0.024	0.020	0.044		1	1.400	0.58	
11	7.12	1.3	1	55.00	55.00		1"	5	1.578	F-3	0.024	0.020	0.044		1	1.400	0.58	
12	5.13	1.3	1	55.00	55.00		1"	5	1.578	F-3	0.024	0.020	0.044		1	1.400	0.58	
13	2.14	16.1		1040	660.0		2.5"	5	2.959	F-2	0.201	0.256	0.457					
14	14.15	3.9		660.0	660.0		2.5"	5	2.959	F-5	0.101	0.062	0.163					
15	15.16	1.5	1	55.00	55.00		1"	5	1.578	F-3	0.024	0.023	0.047		2	1.400	0.58	
16	15.17	2.5		550.0	550.0		2"	5	4.155	11	0.129	0.108	0.237					

In order to make the network understandable by the program a specific standardization should be followed, which is more or less the same in all applications. Said standardization is easily understood with the following simple example.



Suppose we have the network shown in the adjacent figure. This network comprises several branches (i.e. parts of the network), junction points and terminals (end points). Thus in this network, we have assigned arbitrary numbers to both the junction points (1,2,3) and the hydraulic terminals (4,5,6). Each junction point may be assigned a number or a letter (lower or upper case, e.g. A, d etc) or a combination of letters and numbers (e.g. A2, AB, eZ, 2C etc.). The main logical restriction is that the starting point is always assigned the number 1. Also, assignment of the same number twice in the same network is not permitted for obvious reasons, with the exception of junction point 1 for which assignment may be repeated as desired (for networks with more than one starting points). After numbering the junction points and terminals according to the above rule and in order to represent the network in the spread sheet it is enough to give a name to the various sections of the network entered in the first column of the spread sheet. Having in mind that the order of network sections is not important, we fill in the first column with the two junction points of each section (putting a dot in between) so that the sequence of junction points matches the direction of water flow in the pipe. In the above example the sections 1.2, 2.3, 2.6, 3.4 and 3.5 should be filled in (order is arbitrary). In some other columns of the row we fill in a series of data (e.g. length of section, accessories included in the section etc.) which depend on the type of installation while the output resulting from calculations and updating the remaining columns depend also on the particular installation.

Taking as a reference point the above spread sheet and ignoring initially the filled in values, we can see the **columns heading zone** (every column has its title and units), **the zone for filling in values** with a number of rows (separated with dotted lines for better supervision and clarity) and a **status bar** where helpful information appear depending on the position in the spread sheet we are in. Since the spread sheet contains usually a lot of information and is the core of the calculations in each application, it is particularly useful to have it maximized on screen by clicking on the upper arrow (located at top right of the window), so that the whole computer screen area is utilized.

Next section will familiarize you with the “Calculation Sheet”, as the basic functions described therein hold good for every application.

Besides, the Calculation Sheet, provides its user with all the editing functions, which are described below:

First of all, the user has the possibility, as stated earlier, to use **in the frames where the Calculation Sheets appear** the "Font" option for both the calculations zone (so that values appear with the desired size and style) and the headings zone (so that headings are shown to the user satisfaction).

As far as the **headings zone** is concerned the user has also the possibility to increase or decrease the column width using the mouse: As long as the mouse pointer rests on the vertical line separating two adjacent columns, it takes the form of a double arrow and then by pressing (and keeping pressed) the left mouse button and dragging, the column width is increased or decreased depending on the direction of mouse movement.

Above alternative supervision possibilities available to the user depend on several factors such as the resolution of the graphics card and screen size, and for this reason any possible interventions are left to the user discretion. For that matter, there is also the possibility of “Load Prototype” from the user. Note however, that best supervision results are achieved with higher resolutions and large screens.

Access to the positions of the zone for filling in values is carried out by means of the mouse and the arrow keys of the keyboard. Moving the mouse pointer in the zone for filling in values we can see that in some columns the pointer takes the form of a vertical line (|) while in other columns it takes the form of a prohibitive traffic sign. We cannot modify the values contained in these last columns (because they result from calculations).

If we move the mouse pointer (having the form of a cross) in to a cell or small square and click the left mouse button, we’ll see that the cell contour (outline) becomes dark and we can fill in a value or modify the cell content. In the same way we can move to any other cell, or using the <Enter> key we move to the next cell below and using the <Tab> key we move to the next cell at the right and so on. Besides, in case the window width is not large enough to accommodate all columns, we can review the entire calculation sheet by manipulating it up-down or left-right using the vertically or horizontally sliding keys (potentiometer like). In addition, when access to a column for filling values is denied the mouse pointer takes the form of a prohibitive traffic sign. This way, the user is informed that the quantity under examination is a derivative one i.e. resulted automatically from calculations.

The user should keep in mind the following useful commands when **entering values** in the Calculation Sheets of any application:

Deleting cell content: Pressing the <Del> key on a cell, the value it contains is deleted, and the cell is blank.

Deleting a row: Pressing the keys <Ctrl>&<Del> in combination, the row we are in is deleted.

Inserting a row: Pressing the keys <Ctrl>&<Ins> in combination, a new (blank) row is inserted immediately below the cell we are in.

Moving to the beginning of a row: Pressing the <Home> key we move automatically in the first column of the row we are in.

Moving to the end of a row: Pressing the <End> key we move automatically in the last column of the row we are in.

Moving to the upper part of the sheet (first column-first row): Pressing the keys <Ctrl>&<PgUp> in combination, we automatically move in the first column-first row of the calculation sheet.

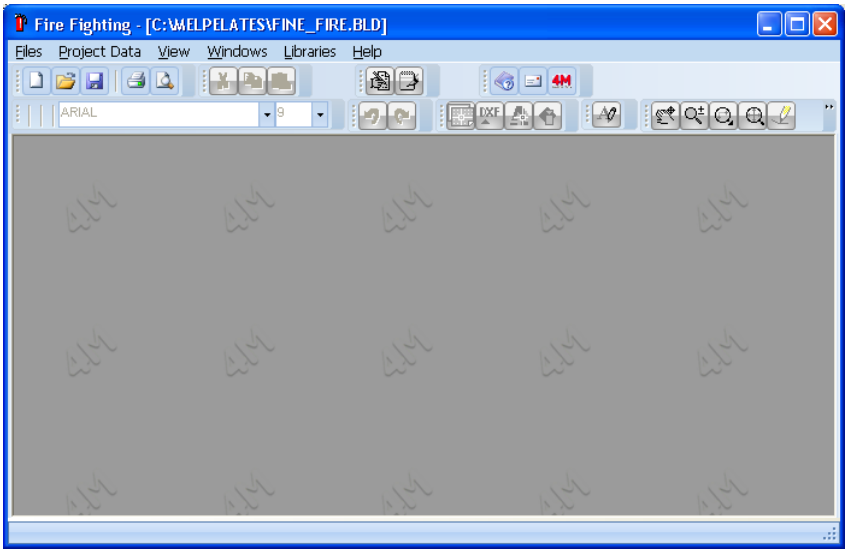
Moving to the lower part of the sheet (first column-last row): Pressing the keys <Ctrl>&<PgDn> in combination, we automatically move in the last row of the calculation sheet.

Finally, you can move **from an upper to a lower cell using the <Enter>** key and from a **left cell to a right cell using the <Tab> key.**

In addition, the calculation sheet provides the user with a **set of Spreadsheet Functions, which are available in most windows applications**, such as the Cut-Copy-Paste type of commands of a subset of lines (or even the whole calculation sheet), the row and columns width definition, the font type (as well as font attributes, justification etc) of a selected area, and so on. By selecting a certain area of the sheet (or all of it by "select all") and then pressing the right button of the mouse, a small menu appears on screen, with the relative commands. Another useful command is the Undo/Redo command concerning the calculations. All those editing commands are also applied to other windows. Apart from the copy-paste command, in case we want to repeat a row (typical branch), it is sufficient to fill in the content of the first column, i.e. the section name, that will make a copy of the row except for the section name which remains blank. When the calculation sheet is activated, you will see in the main menu options an additional one namely "Calculation Sheet" with a secondary option "Printing Parameters". Selecting "Printing Parameters" the adjacent dialog box appears from where the user may affect the appearance of the printed Calculation Sheet. Specifically, the user may define a bold outline (frame), a normal outline, or no outline, horizontal and/or vertical lines, as well as a raster for the titles (headings) of the spread sheet with the desired shading of tints (using the sliding key). As previously emphasized, the Calculation Sheet window is the core for all applications. Since, however, not all calculation results related to a study can be confined within the Calculation Sheet, every application has additional windows where these complementary results are accommodated to form the complete set of the study. The advisability and functional description of these windows is the subject matter of each application. For all that, we can pick out, among the available windows, some of them with common philosophy regardless of application (e.g. ''Bill of Material – Costing'' Window, ''Technical Description'' Window etc.). The "forms" of these windows are described in the following sections not necessarily in the order found in the applications.

3.2 Main Menu

If you want the Fire Fighting System application to be executed, point with the mouse and double click on the relevant icon, and the main menu window will appear:



As you can see, the basic menu options are divided into the groups **"Files"**, **"Project Data"**, **"View"**, **“Windows”**, **"Libraries"** and **"Help"**, which are described below along with their secondary options.

3.3 Files

The "Files" option includes the usual file management options according to the windows standards:

New project: Type a name for the new project you want to be saved in a file.

Select project: A window appears where you can select the desired (existing) project file and load it.

Caution! *If neither a new nor an existing project is selected, the programme automatically considers that the UNNAMED project is active. If you add new data to the UNNAMED project and you want to save it with a different name, select “Save as” and type the new project name.*

Update from Drawing: In the case of co-operation with the FINE package, the project calculation sheets are updated with the drawing data.

Caution! *If the option "Update from Drawing" is selected, without previously opening a project and inserting rooms in the ground-plans using the FINE package, any existing data in the calculation sheets will be replaced with blanks.*

Save: The project you are currently working on is saved to the hard disc (with the previously given name).

Save as: The project you are currently working on is saved in a different file with a new name.

Load Prototype: The saved prototype appears on the screen.

Save as Prototype: The form, which has been created by the user and is displayed on the screen when this option is selected, is saved as a Prototype.

Printing Prototypes: The printing prototype management window is activated.

Print: The project issue is printed according to the previously selected options in "Printing Contents" and "Printing Parameters" as well as according to the print preview output.

Printing Contents: You can select the Fire Fighting System project items you want to be printed:

Printing Parameters: The desired printing parameters can be selected in this window.

Print Preview: The complete project issue appears on the screen, exactly as it will be printed, page to page.

Export to RTF file: An Rtf file, containing the project items, is created (within the project directory, with the name PYRO.RTF).

Link to WORD: An Rtf file, containing the project items, is created (within the project directory, with the name PYRO.RTF). At the same time, the MS-Word application is activated (if it is installed in your PC).

Link to 4M editor: An Rtf file, containing the project items, is created (within the project directory, with the name PYRO.RTF). At the same time, the 4M text editor is activated for further editing.

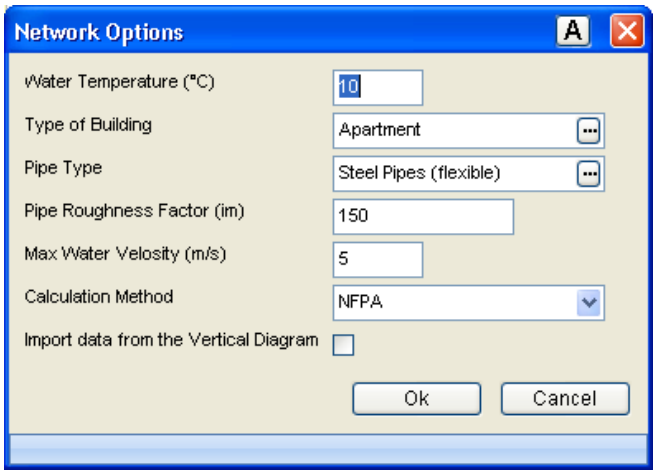
Link to Excel: An xls file, containing the project items, is created (within the project directory, with the name PYRO.xls).

Export to pdf: An pdf file, containing the project items, is created (within the project directory, with the name PYRO.pdf).

Exit: Exit from the application.

3.4 Data

This is about the basic project data, which are divided into general data (project headings) and network data. The general data refer to titles and headings related to the project identity, while the option "Network Data" refers to the general network data that the project designer should specify and are related to:



Water temperature: The water temperature value is filled in, and the relevant viscosity is taken automatically into consideration for the calculations.

Building type: According to one of the cases "residence", "office", "hotel", "store", "hospital" the relevant coincidence curve is taken into consideration.

Pipe type: With the key <**F11**> or by pressing the key in the field, you can select from the pipe library window that appears, the pipe type which shall be used in the project (e.g. Copper pipe)

Pipe roughness: The above selected pipe roughness appears in (μm), which can be modified if the user wishes to do that.

Maximum water velocity: It is the maximum water velocity based on which the cross-sections are calculated. That is to say the smallest possible cross-section, for which the velocity does not exceed this value, shall be selected. This value can be modified here as a whole by the designer (and it shall be applicable in every part of the network), and also within the calculations sheet, in selective parts.

Import data from the Vertical Diagram: This option enables you to draw the vertical chart firstly with the aid of an expert system and thereafter to transfer the data in the calculation sheet. If the check box is checked, the option “Insert vertical” appears in the program menu and you can use it in order to draw the vertical chart.

Methodology: The user has the option to select between a) the NFPA 13/2002 Pipe Schedule Method (recommended for new installations up to 5000 ft2 / 465 m²) and b) the Hydraulic Calculation Method which meets the needs of Fire installation projects of any size.

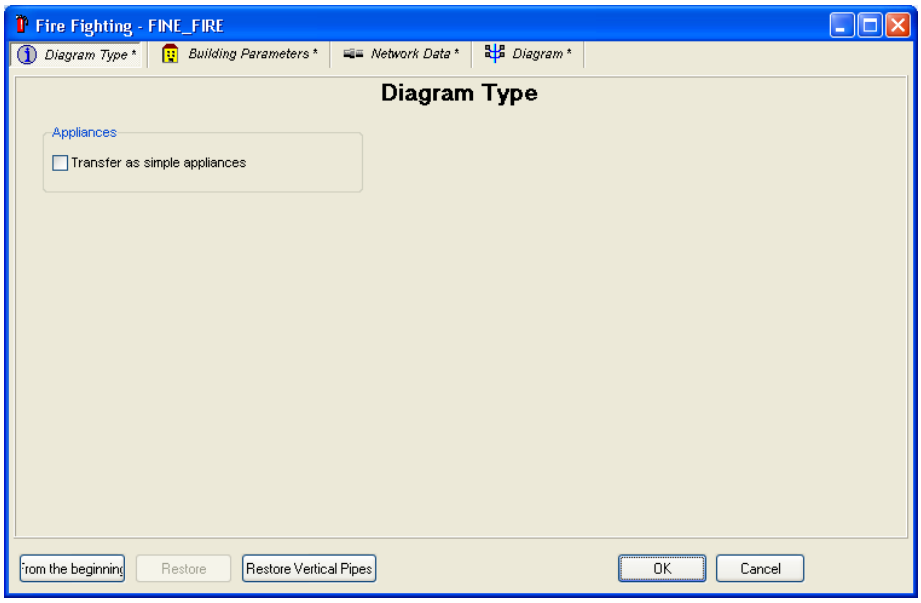
3.5 Draw Vertical Diagram

This option includes the two secondary options “Vertical Diagram Creation” and “Update from vertical Diagram”, which are explained in the following sections.

3.5.1 Vertical Diagram Creation

This option has the following secondary options:

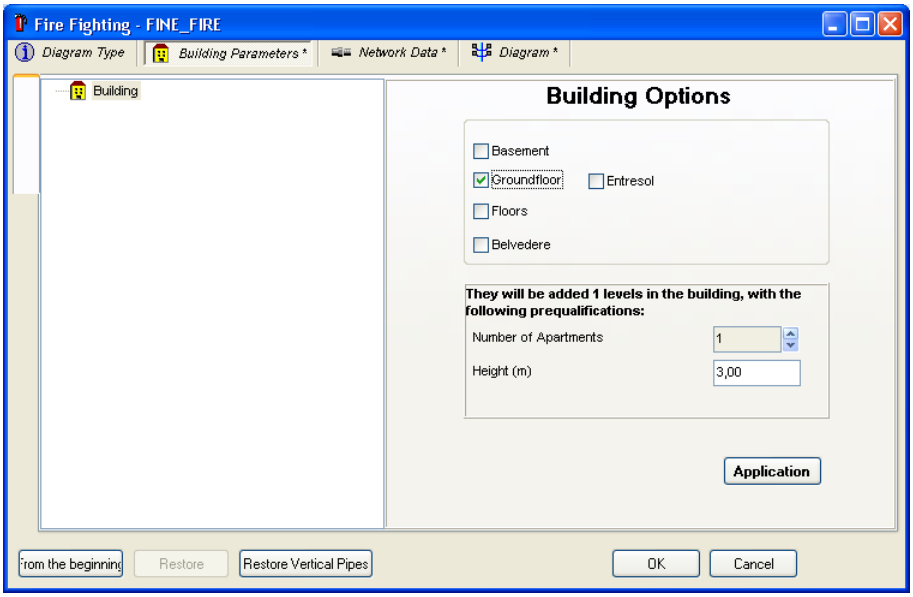
1. **Chart type**



- **Receptors > Transfer as simple receptors**

It is specified whether each receptor is defined separately in the vertical chart or if it will be integrated in a receptor group. In case that the check box is checked, the network is analyzed thoroughly in nodes.

2 Building data



If you select the building in the upper left part of the screen, the building data will appear.

The topology of the building as well as the layout of the installation network in it are included in the building data. There are two distinct secondary options:

A. Building definition

Here the levels (floors), which constitute the building, are defined. In the box “Levels with Fire Fighting” the levels with water consumption are checked. In particular, if you select the Underground and the Floors, an additional field will appear where the user should fill in their number. You can also define the number of the apartments in each floor as well as the height of each floor.

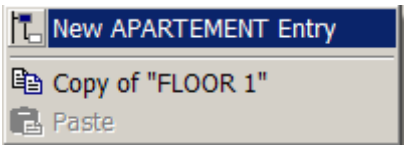
After the user has defined the building data, he can press the key “Apply” and the building will appear in the left column in a tree form with an icon in front of it that shows the floor type.

Working with levels

If you click with the left mouse key on the level name, the level data “Level Name”, “Level Height (m)” and “Number of Apartments” appear on the right side. The user can enter the fields “Level Name” and “Level Height (m)” and edit the level data.

If you double click with the left mouse key on the level name, the floor topology with the apartments will appear in tree form.

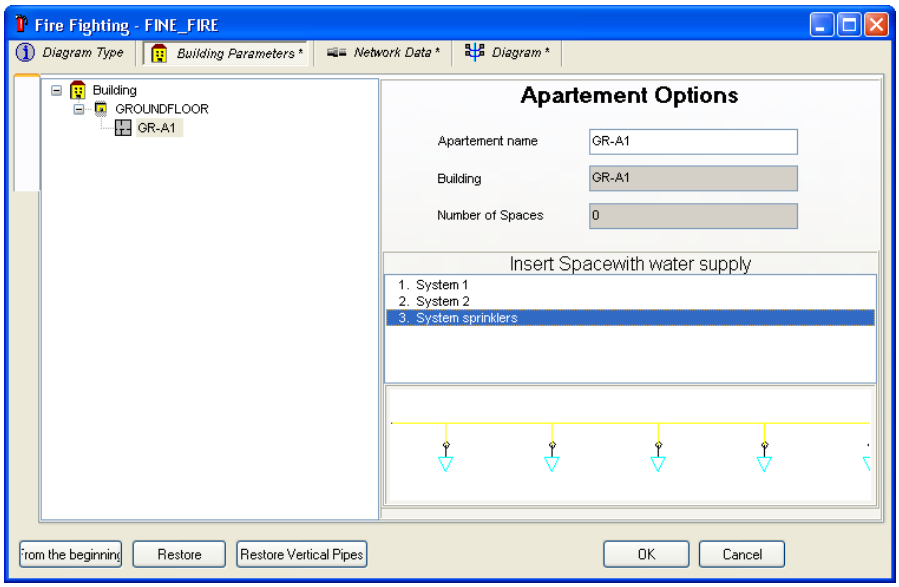
If you click with the right mouse key on the floor name, a menu with the following options will appear:



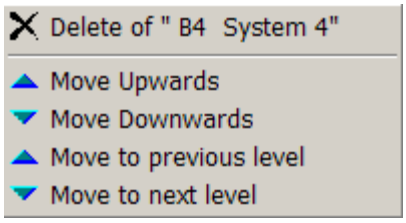
- **Insert new Apartment:** You can insert a new apartment besides the ones that are defined so far.
- **Copy FLOOR:** Copies in the PC memory (clipboard) the floor network in order to paste (copy) it later on a different floor.
- **Paste FLOOR:**Copies the network data that are saved in the clipboard to the selected floor. The data that are already entered in the floor shall be overwritten by the new data.

Working with apartments

If you double click on the floor the apartments will appear and in the right side will appear the option “Insert room with Fire Fighting”, where a list with various room types will be shown. If you double click on each room the room drawing will appear underneath it. If you double click on the desired room, this will be transferred automatically in the apartment selected in the left column. In the same way you can add more rooms in the same apartment or in different apartments.



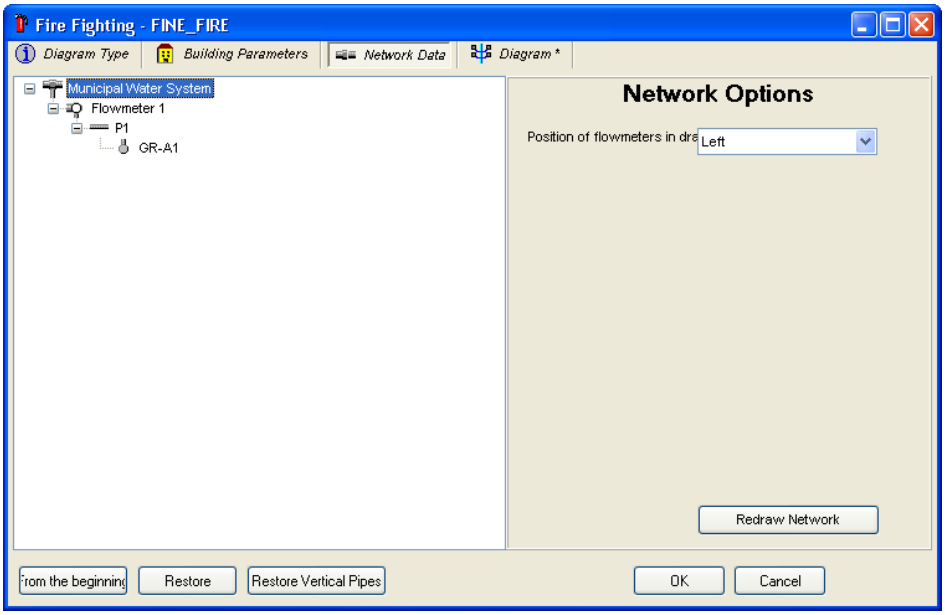
If you right click on an apartment room the list shown in the next window will appear, with which you can manage the rooms:



- The command “Delete“, deletes a room.
- The commands “Move upwards” and “Move downwards” alter the order of the room inside the apartment.
- If you click with the left mouse key on an apartment room the room drawing will be shown enlarged.

3. Network data

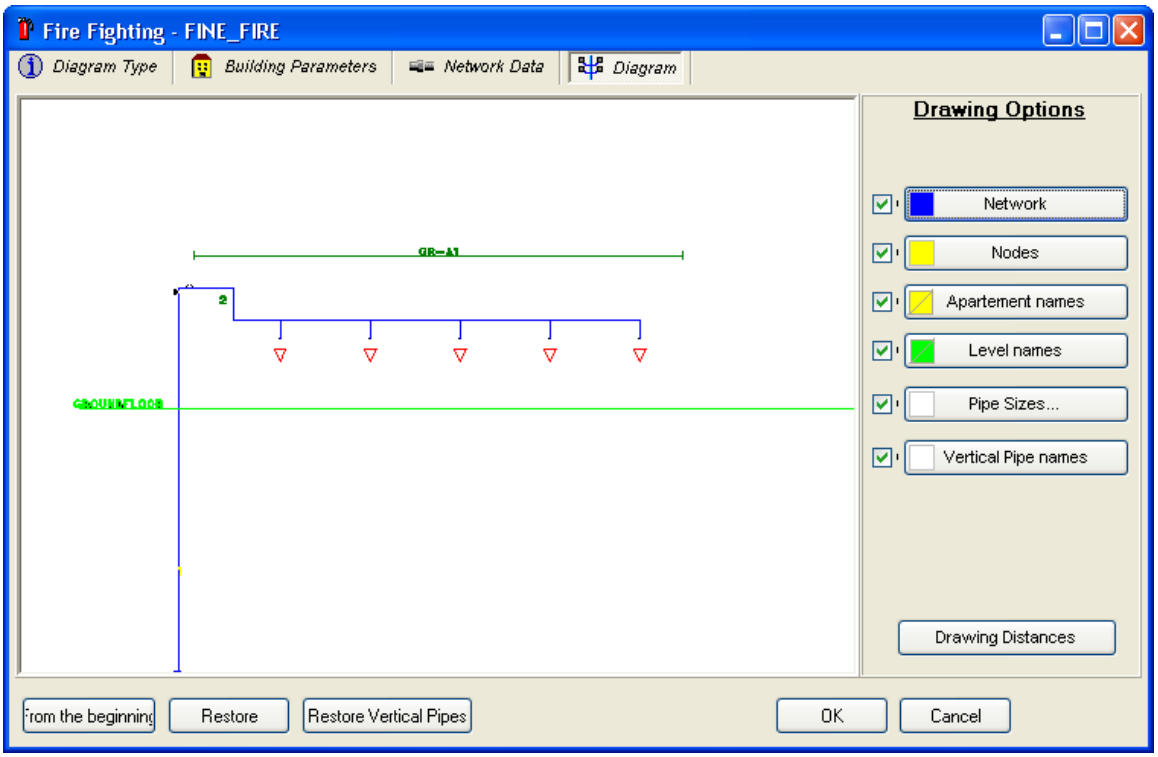
In the option connections you can see the network structure from the Fire Fighting until each apartment.



In this option, the user can manage the Fire Fighting systems. At first, there is a separate Fire Fighting system for every apartment. If for example, there are two apartments in the building with common ownership, which are located in different floors, then the user can transfer the Fire Fighting from a column to a different one, to delete a column or a certain flow gauge. This is achieved by right clicking on an element. Depending on the "tree" element on the left side of the window that you right click, a menu appears which enables you to move or delete or even add an element. Hence, the user is able to modify the network as it is desired.

4. Vertical chart

With this option, the vertical chart of the previously mentioned installation appears. Moreover, you can change the colours that appear in the chart.



3.5.2 Update from vertical diagram

This command is used to transfer the network data in the vertical chart in the “Calculation sheet”.

3.6 View

This option includes the secondary option "Toolbars" and follows in general the windows standards.

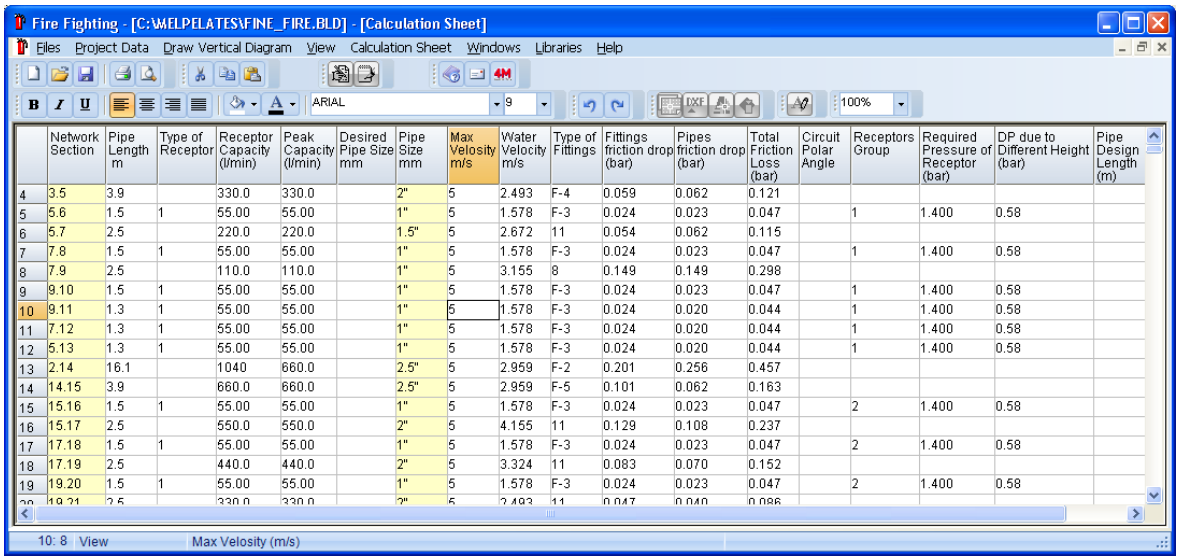
3.7 Windows

The option “Windows” includes a series of calculation and result windows, in which the analytical project calculations are presented. The main window which comprises the core of the application calculations is the Calculation Sheet, and is described in the following section.

3.7.1 Calculation Sheet

The Calculation Sheet of the Fire Fighting System is the core of the calculations for the Fire Fighting System application and conforms with the general rules of the Network Calculation Sheets, which are described in the 1st section. Therefore, each row of this sheet corresponds to a different network section while each column refers to the data that will be filled-in or will ensue automatically during the procedure of completing data. Help instructions concerning data entering appear at the bottom of the screen (status bar). In each row, the fields of the first column, which refer to section designations, should be filled-in first of all.

The method for the network standardization is based exactly on the standardization rules that were explained earlier. Here is a short description of the columns of the calculation sheet:

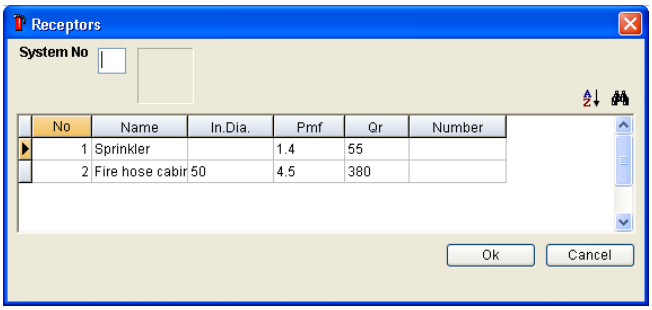


	Network Section	Pipe Length m	Type of Receptor	Receptor Capacity (l/min)	Peak Capacity (l/min)	Desired Pipe Size mm	Pipe Size mm	Max Velosity m/s	Water Velocity m/s	Type of Fittings	Fittings friction drop (bar)	Pipes friction drop (bar)	Total Friction Loss (bar)	Circuit Polar Angle	Receptors Group	Required Pressure of Receptor (bar)	DP due to Different Height (bar)	Pipe Design Length (m)
4	3.5	3.9		330.0	330.0		2"	5	2.493	F-4	0.059	0.062	0.121					
5	5.6	1.5	1	55.00	55.00		1"	5	1.578	F-3	0.024	0.023	0.047		1	1.400	0.58	
6	5.7	2.5		220.0	220.0		1.5"	5	2.672	11	0.054	0.062	0.115					
7	7.8	1.5	1	55.00	55.00		1"	5	1.578	F-3	0.024	0.023	0.047		1	1.400	0.58	
8	7.9	2.5		110.0	110.0		1"	5	3.155	8	0.149	0.149	0.298					
9	9.10	1.5	1	55.00	55.00		1"	5	1.578	F-3	0.024	0.023	0.047		1	1.400	0.58	
10	9.11	1.3	1	55.00	55.00		1"	5	1.578	F-3	0.024	0.020	0.044		1	1.400	0.58	
11	7.12	1.3	1	55.00	55.00		1"	5	1.578	F-3	0.024	0.020	0.044		1	1.400	0.58	
12	5.13	1.3	1	55.00	55.00		1"	5	1.578	F-3	0.024	0.020	0.044		1	1.400	0.58	
13	2.14	16.1		1040	660.0		2.5"	5	2.959	F-2	0.201	0.256	0.457					
14	14.15	3.9		660.0	660.0		2.5"	5	2.959	F-5	0.101	0.062	0.163					
15	15.16	1.5	1	55.00	55.00		1"	5	1.578	F-3	0.024	0.023	0.047		2	1.400	0.58	
16	15.17	2.5		550.0	550.0		2"	5	4.155	11	0.129	0.108	0.237					
17	17.18	1.5	1	55.00	55.00		1"	5	1.578	F-3	0.024	0.023	0.047		2	1.400	0.58	
18	17.19	2.5		440.0	440.0		2"	5	3.324	11	0.083	0.070	0.152					
19	19.20	1.5	1	55.00	55.00		1"	5	1.578	F-3	0.024	0.023	0.047		2	1.400	0.58	

1. Network section: In the rows of the first column you should fill-in all the network sections (one section in each row) one by one. For the better organization and supervision it is recommended to fill-in the sections of the cold water network at first, and in the following the sections of the hot water network. The sections are defined by their end nodes. You may assign a number (from 1 to 9999) or a letter (lower or upper case, e.g. A2, AB, 3c, Aa etc.) to each node. The basic restriction in numbering is that number 1 is always assigned to the point that is connected to the gauge, while number 1 is also assigned to each water heater. Except the number "1", the same number should not appear in the network twice. After the numbering you can enter in the calculation sheet all the sections independently one by one (the sequence of the sections is not important), by filling-in the first column:

In the case of typical (similar) sections it is possible to recall them (with their name from the first column) in order to automatically transfer them.

2. Pipe length: You must state the pipe length in (m) in every section between two nodes (e.g. section 2.3).



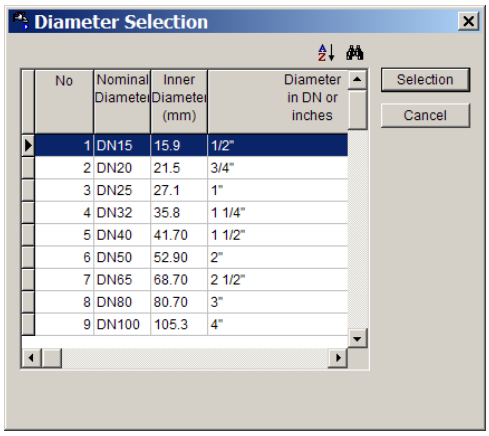
3. Receptor type: If there is a receptor (appliance) at the specific network section, that is to say if the section ends up to a receptor, you can select a receptor from the library with the Fire Fighting network receptors, after pressing the key **F11** or by pressing the key inside the field in this column. A window will appear with the list of the receptors. The type of the appliance (hydraulic receptor) is defined when a unit is filled-in in the last column, in the row that corresponds to the receptor, and the key “enter” is pressed after that in order to validate the data entered. By pressing "OK" you can return to the calculation sheet in column 6 where you can notice that the order number of the receptor is filled-in. Alternatively, except defining only one receptor, you can also define a receptor group (Receptor System) with up to 10 different types of receptors in each section. Since you are working with receptor groups, the program enables the user to define an order number of the hydraulic receptors system i in the upper part, and the relevant receptor System appears in the sixth column of the Calculation Sheet with the form Σ-i, where i represents the order number of the defined System.

With this feature you avoid filling-in again the same hydraulic receptors, since you can fill-in directly the order number of the System in column 6 where the receptors are defined. The method with receptor systems is indicated in the case of very large installations, where the cases are grouped in a few systems and the data volume is radically decreased in the calculation sheet.

4. Receptor capacity: The receptor capacity $\mathbf{Q_R}$, or in general the network section capacity (theoretical sum of the capacities if all the receptors work at the same time) is automatically calculated. The program calculates automatically the capacity for the intermediate sections based on the capacity of the receptors that are supplied from this section.

5. Peak capacity: The peak capacity $\mathbf{Q_s}$ is calculated based on the total capacity of the previous column. The peak capacity is calculated from the relevant peak curve that depends on the "building type" which is defined in the "Network Data".

6. Desirable diameter: From this column the user can select a different diameter from the one that is calculated by the program (and is shown in the next column). If you press **F11** or the key in the field, the list with the diameters of the selected in the "Network Data" pipe type is shown.



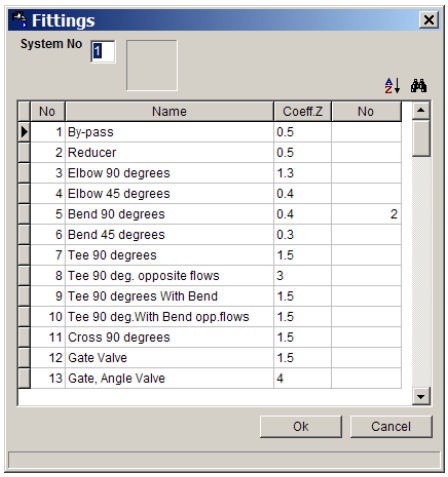
With the option "Select" you can select the desirable diameter, and the user can see the effects of his/her choise in the rest of the network parameters (e.g. velocity, friction values etc). If you press <Del> in the relevant component of the calculation sheet you can delete the selected diameter, and the program calculates again the diameter.

7. Pipe diameter: The pipe diameter of the network section, as it is calculated by the program, is shown in this column.

8. Maximum velocity: The velocity limit that is defined in the "Network Data" in (m/s), which the user can modify if he/she wants for the particular network section, is shown here. You should have in mind that, if you change later the general limit in the "Network Data" this will not affect the modified values, but only the initial ones (the ones that have the same value with the “Maximum network velocity” which is defined in the “Building Data”).

9. Water velocity: The water velocity in (m/s) as it is calculated in the specific network section, is shown here.

10. Fittings: This column refers to the type of fittings (elbows, tee sections, valves etc) that appear in the network section. If you want to fill-in the components in detail you should press F11 or the key in the field in this column, and the window with the list of the Fire Fighting system components from the relevant library will appear. If only one component exists, this is defined by writing the number 1 in the last column, in the row that corresponds to the component. By pressing "OK" you can return to the calculations sheet in column 10 where you can notice that the order number of the defined component is filled-in.



For more than one components you can fill-in correspondingly the last column of the table with components, giving also the quantities of each component (up to 10 different types of components per section). In the case that you have more than one components, in the column 10 of the calculation sheet the indication E- appears, which means in general "Components". If, in the upper part of the component table, you define a component system number a, in column 10 of the calculations sheet the indication E-a will appear. In this way you can group the components and also avoid filling-in the same groups (systems), since in column 10 where the components are defined you can fill-in directly the System number.

11. Component friction: The calculated component friction value for the specific network section in MWC (meters of water column) is shown here.

12. Piping friction: The calculated friction value for the Piping in the specific network section in MWC (meters of water column) is shown here. This friction is calculated from the water flow in the said section, based on hydraulic calculations.

13. Total friction: The total friction in the section, that is to say the sum of the Friction of Components and the Friction of Piping, also in MWC, is shown here.

Following you will see the items "Polar angle", "Parallel Branch of Hot Water", "Required Pressure of Receptor", "Pressure Difference between Different Levels", "Pipe Type" and "Pipe length for drawing". These items can be filled-in directly in the relevant columns, or from an additional window, which appears when you press the key F12 in any column or if you press the right mouse button and select from the list "Secondary Items" that appears. The use of these items is explained below:

14. Polar Angle: It is necessary to fill-in the polar angle of the network only in the case that you desire to draw a vertical chart (and a rough drawing) from the calculation sheet, that is to say in the case that you have not drawn the ground plans with the FINE application. The vertical chart that is drawn takes into consideration the length and the polar angle (in relation to the horizontal axis) of each branch.

15. Receptors Group: Here is the number of the group of the receptor. Usually, a group consists of a number of sprinklers, or a Fire hose cabinet plus some sprinklers.

16. Required Pressure of Receptor (R.P.R.): Here you have to fill-in the required pressure of the receptor, which must be at least equal to the minimum discharge pressure of the receptor. The above mentioned pressure is filled-in only in the case that you have given a direct flow or a receptor system, since in the case that you select a receptor from the library the discharge pressure from the library is filled-in automatically.

17. Pressure Difference between Different Levels (MWC): Here you fill-in the Pressure Difference (PD) due to the receptor level elevation (positive or negative values), in meters of water column. This is the elevation from the supply point up to the receptor. **This is provided only in the sections with receptors and not in intermediate sections.**

18 Pipe length for drawing (m): Some times, when drawing a vertical chart, you may design very short or very long sections. For that reason, the user may define an arbitrary pipe length in this column, which however can result to the desired **aesthetical** aspect in his design. Regardless of the length that the user defines in this field, the program shall write the **real pipe length** on the drawing. It should be pointed out that in case the user does not fill-in this field, the program shall draw the vertical chart based on the second column of the "Calculation Sheet", that is to say the "Pipe Length".

Fixed column: Moreover, through the "Calculation Sheet" menu, the user is enabled to select the "Fixed Column" so that the first column of the sheet "freezes" on the screen. Thus, as the user fills in the fields of the sheet and is "led" towards the right, he knows exactly on which network section he is working on anytime. When the "Fixed Column" option is active, a yellow point (pin) appears at the bottom of the "frozen" field.

3.7.2 Fire Pump Calculation

The program enables the user to select either an air pre-pressure assembly (used mostly in large installations) or a simple pressure device with a membrane diaphragm, by calling one of the two relevant windows which appear on screen.

3.7.3 Sections Friction drop

In this window you can calculate and view in the screen the total frictions in all branches (or routes), starting from the gauge and ending in each terminal node. Moreover, for more convenience, the most unfavourable branch appears in the bottom of the window.

3.7.4 Systems of Receptors

Here the Receptor Systems that are used in the specific project are presented and analyzed in the receptors constituting them.

3.7.5 Receptors Legend

The receptors used in the project are presented.

3.7.6 Network Drawing

The numbered network drawing is shown on the screen, provided that polar coordinates have been inserted in every network branch (see calculation sheet).

3.7.7 Vertical drawing (Chart)

If the user wants to create a vertical chart using the calculation sheet (and not automatically, using AutoFINE package), the above option creates the vertical chart provided that the polar coordinates have been inserted in every network branch. At the bottom we find the Counters.

It is pointed out that it is possible to select a drawing for the engine room from the menu "Vertical chart".

3.7.8 Bill of Materials Cost Estimation

The bill of materials-cost estimation results regarding the specific project are presented. The user can edit the bill of materials-cost estimation sheet, modifying costs or quantities, inserting discounts, adding jobs or materials followed by their costs and quantities.

3.7.9 Technical Description

The window “Technical Description” supports the creation of the project technical description, enabling the user to select among various technical description prototypes and text editing styles.

3.7.10 Assumptions

The text of the project general assumptions, which may be included in the printed project as long as it is selected in "Printing Contents", is stated. If the option “Assumptions” is selected, the option "Assumptions" with the secondary option "Select Prototype" appear in the menu.

3.7.11 Cover Page

The “Cover page**”** window is the first printed page of the project and the program enables the user to select among different types of cover pages, or even create his own cover page, exactly as he wants it.

Note: *The cover page files are stored in \CALC\PYRO\ , named PYROCV01.RTF, PYROCV02.RTF, etc; their descriptions are stored in the file PYROCV.LST.*

3.7.12 Water Tank Calculation

The program calculates the size of the water tank which is necessary for the installation.

3.7.13 Detailed Bill of materials

The exact quantity of the materials that have been used in the specific installation (i.e. pipes, number of sprinklers etc) is being generated by the program in an editable table form.

3.8 Libraries

The Fire Fighting Libraries comprise the following material categories, with their respective features:

- **Fire Fighting network components,** with specified characteristics (resistance, life circle, cost)
- **Pipes** (pipe types) with a given roughness, standardization (nominal, internal diameter) and cost.
- **Full-featured Fire Fighting receptors** (minimum connection diameter minimum discharge pressure, cold Fire Fighting, hot Fire Fighting).
- **Pressure blocks,** with all their features and their performance.
- **Receptors systems:** The library is fitted with a tool that allows the design of new receptor systems as well as the modification of the existing ones.

3.9 Help

This option provides the user with the instructions of the program, according to the windows standards.