

ArCADia-VENTILATION SYSTEMS

User Manual

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1. INTRODUCTION

1.1. The purpose of the program

ArCADia-VENTILATION SYSTEMS is an industry-specific module of the ArCADia BIM system with the functionalities necessary to create professional mechanical ventilation installation designs. The software is meant both for ventilation installation designers, as well as all the people working in the sanitary and installations branches in the construction industry. The user of the ArCADia-VENTILATION SYSTEMS program has the possibility to create object-oriented drawings of the mechanical ventilation installation in architectural building projections and to automatically create calculation diagrams. The user may also employ a library of objects used when designing ventilation systems, along with the option to expand it, and to adapt it to his own needs regarding applied devices and types of duct materials.

The combination of specialized functions used in the program in order to make plans for ventilation systems within the scope of designing ducts and their routes, designing ventilation fixtures, with the possibility of performing calculations and checking the correctness of the designed installation is the perfect tool for creating designs of internal ventilation systems.

1.2. Features and functionalities of the program

The technical scope of functionalities provided by the ArCADia-VENTILATION SYSTEMS program and its basic functions:

- creating drawings of a complete mechanical ventilation system, from air intake/exhaust tubes, to ventilation devices, to elements distributing air to rooms,
- using ventilation ducts made of various materials, with the possibility of smart connecting,
- inserting fittings and devices from the producers' library (ventilation accessories, control elements, fire dampers, filters, silencers),
- inserting different types of devices with individually set shapes and dimensions (air handling units, fans, heaters),
- automatic creation of installation description and numbering points with the possibility of editing and creating the user's own templates,
- calculating of total and partial pressure losses for all or selected airflow paths, selecting the largest pressure loss path,
- calculating the sound power level for all or selected airflow paths in the middle octave bands in the range of 63-8000Hz,
- the 3D preview of the installation facilitating the correction of irregularities in the duct route that is not visible in the projection,
- checking the installation for correct connections; detecting and correcting errors in a clear way,
- checking the compliance with the condition of ensuring available pressure in the installation,
- generating reports of performed calculations which contain summaries of pressure losses and sound power levels at individual sections of the installation,
- generating lists of materials and appliances included in the project, intended for further processing, as well as creating cost estimates and investment valuations.

1.3. Substantive basis

Literature:

1. W.P. Jones; Klimatyzacja, Arkady, Warszawa 2001
2. M. Malicki; Wentylacja i klimatyzacja, PWN, Warszawa 1980
3. J. Ferencowicz; Wentylacja i Klimatyzacja, wyd. II, Arkady, Warszawa 1962
4. Baumgarth, Hörner, Reeker; Poradnik Klimatyzacji, tom I, Systherm D. Gazińska sp. j., Poznań 2010
5. H. Recknagel, E. Sprenger, E.R. Schramek; Kompendium wiedzy. Ogrzewnictwo, klimatyzacja, ciepła woda, chłodnictwo; wydanie: trzecie; OmniScala; Wrocław 2008
6. M. Popek, B. Wapińska; Rysunek zawodowy – Instalacje sanitarne, WSiP, Warszawa 2003

Standards:

1. PKN-CEN/TR 14788:2012 Wentylacja budynków – Projektowanie i wymiarowanie systemów wentylacji mieszkań.
2. PN-EN 15665:2012 – wersja polska – Wentylacja budynków – Wyznaczanie kryteriów działania systemów wentylacji mieszkań.
3. PN-83/B-03430 Az3:2000 Wentylacja w budynkach mieszkalnych zamieszkania zbiorowego i użyteczności publicznej. Wymagania.
4. PN-89/ B-01410 Wentylacja i klimatyzacja. Rysunek techniczny. Zasady wykonywania i oznaczenia.
5. PN-83/B-03430 Wentylacja w budynkach mieszkalnych, zamieszkania zbiorowego i użyteczności publicznej. Wymagania.
6. PN-67/B-03410 Wentylacja. Wymiary poprzeczne przewodów wentylacyjnych.
7. PN-73/B-03431 Wentylacja mechaniczna w budownictwie. Wymagania.
8. PN-68/B-01411 Wentylacja. Urządzenia i elementy urządzeń wentylacyjnych. Podział, nazwy i określenia.
9. PN-76/B-03420 Wentylacja i klimatyzacja. Parametry obliczeniowe powietrza zewnętrznego.
10. PN-78/B-03421 Wentylacja i klimatyzacja. Parametry obliczeniowe powietrza wewnętrznego w pomieszczeniach przeznaczonych do stałego przebywania ludzi.
11. PN-87/B-03433 Wentylacja. Instalacje wentylacji mechanicznej wywiewnej w budynkach mieszkalnych wielorodzinnych. Wymagania.
12. PN-EN 12354-5:2009 – Akustyka budowlana – Określanie właściwości akustycznych budynków na podstawie właściwości elementów – Część 5: Poziomy hałas pochodzące od wyposażenia technicznego.

2. WORKING WITH THE PROGRAM

2.1. General information about the program

The ArCADia-VENTILATION SYSTEMS program allows you to design a mechanical ventilation system, from intake/exhaust tubes, through ventilation devices to elements distributing air to the rooms. The program allows the location of fittings and devices necessary to create a full design of the ventilation system in terms of drawings. The program performs calculations checking the correctness of ducts selection based on the assessment of the speed and the critical pressure drop, as well as on the comparison with the minimum available pressure given for the installation.

The first stage of the project is the drawing part. To activate the program, it is enough to insert any element of the ventilation installation. The program has been designed in a way that allows flexible (free) workflow when creating a drawing.

Below, there is one of the possible ways to proceed when creating a project.

Stage I. Creating the drawing

1. Designing a ventilation system should be started by defining, in the *Options*, all the ventilation systems needed in the project, as well as their parameters regarding the type of system (supply, exhaust, intake, and outlet), relative humidity and air temperature. By default, 4 basic ventilation systems have been defined, however, you can edit and add further systems at any stage of project creation.
2. Drawing of a mechanical ventilation installation can be started by inserting an air handling unit and giving it appropriate geometrical dimensions. The properties of this object should include parameters such as available compression, air supply and exhaust efficiency, and sound power of the device.
3. In the next step, you can locate intake and exhaust ventilators in the rooms and plan the locations of air intakes and outlets. All elements should be given appropriate geometrical and technical parameters.
4. Then you can enter the installation route so as to logically connect the elements with the air handling unit. When drawing the duct route, you can assign them the shape, size and material.
5. When designing the duct route, you can insert appropriate regulating fittings, additional air treatment devices, damping elements, etc.
6. After drawing the installation, it is possible to check its correctness in terms of connections of all objects in the project, and to check its continuity.

Stage II. Calculations, lists and bills

1. After completing the drawings and checking the correctness of the installation, the user can run the calculations. Selection of calculations is possible for each of the installation routes, with the possibility of checking the most unfavourable one in terms of the pressure loss or the length. The user has the possibility to control the correction of the selected duct sizes. Applying a change automatically transfers it to the drawing part and results in recalculating the installation.
2. The program performs calculations for the air with the parameters pre-set when defining the systems (temperature, relative humidity).
3. The user receives information about:
 - the sum of linear and local pressure losses in a given section and the total pressure loss for the entire installation,

- the sound power transmitted to the room at a given section from the air handling unit / fan to the intake ventilator / (uptake/exhaust) ventilator.
4. Calculations and results for the selected installation path can be generated in the form of an RTF report.
 5. After confirming the correctness of the ventilation installation in the graphic and computational part, the user can generate:
 - the list of elements with the option of saving it to the RTF format,
 - the bill of materials with the option of saving it to the RTF format and exporting to the Ceninwest program in order to prepare a cost estimate and valuation using the simplified method.

3. DESCRIPTION OF PROGRAM ELEMENTS

3.1. The Project Manager

The *Project Manager* allows the user to manage all elements of the ArCADia-VENTILATION SYSTEMS program: ducts, ventilation grilles, fans, etc.

Activation:

ArCADia and ArCADia PLUS:

- The *Manage* ribbon ⇒ the *Project* logical group ⇒ *Project Manager*
- The *ArCADia-SYSTEM* toolbar ⇒ *Show/Hide Project Manager*

ArCADia LT

- The *View* ribbon ⇒ the *View* logical group ⇒ *Project Manager*

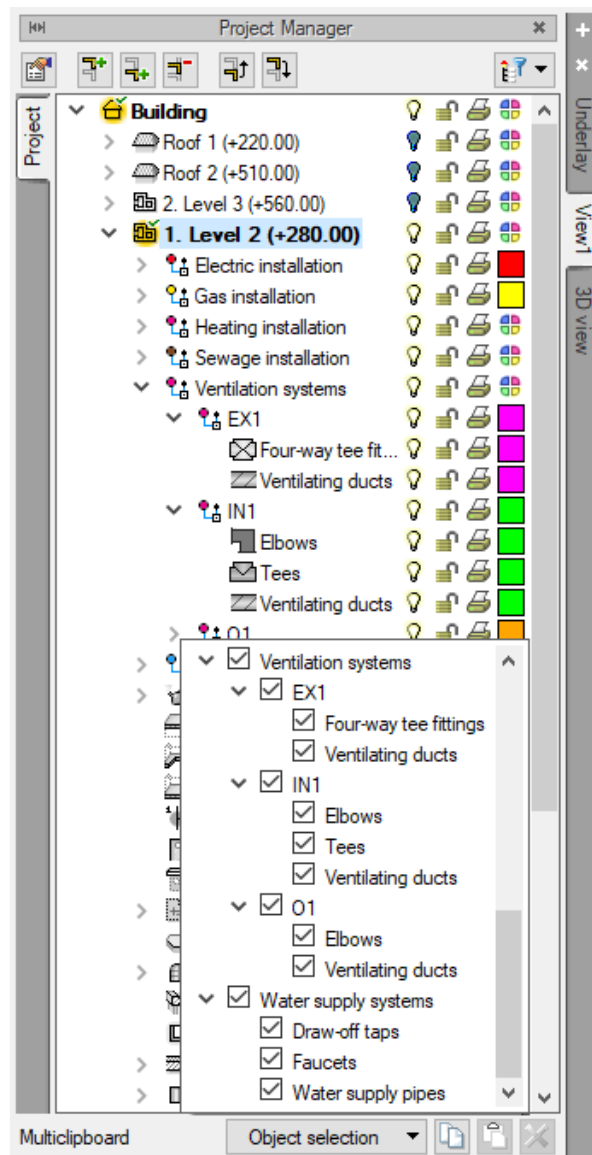


Fig. 1 The Project Manager window

In the *Project Manager* window, it is possible to add and remove floors, roof levels, define the external area and change their positions relative to each other. To switch between the created views you use the tabs on the left or right of the manager.

From the *Project Manager* window you can also manage the visibility (the light bulb symbol), blocking (the padlock symbol) and printing (the printer symbol) of selected elements of the ArCADia system. To turn off the visibility of elements (blanking) that are not useful during the design process, click on the light bulb symbol next to an element's name. The light bulb will "turn off and turn dark" (💡 -> 🌑), and the selected objects will not be displayed.

The other two functions work similarly. After clicking on the padlock (there will be a change to a closed, dark padlock 🔒 -> 🔐), you will not be able to make changes to the given element. After clicking on the printer symbol (the icon will turn dark and the page will disappear 🖨️ -> 🖨️🌑), you can exclude particular elements from the printing process. Clicking again on the items will restore the previous functions.

After selecting a level in the tree in the *Project Manager* window, the *Multiclipboard* will appear at the bottom of the window (The Project Manager window **Błąd! Nie można odnaleźć źródła odwołania.** Fig. 1). With its help, the user can copy elements located on a given level to the clipboard. It is possible to choose which of them to copy by selecting them from the list of items. They will be available for pasting, e.g. on the next floor.

3.1.1. Adding and editing systems and groups, object managing

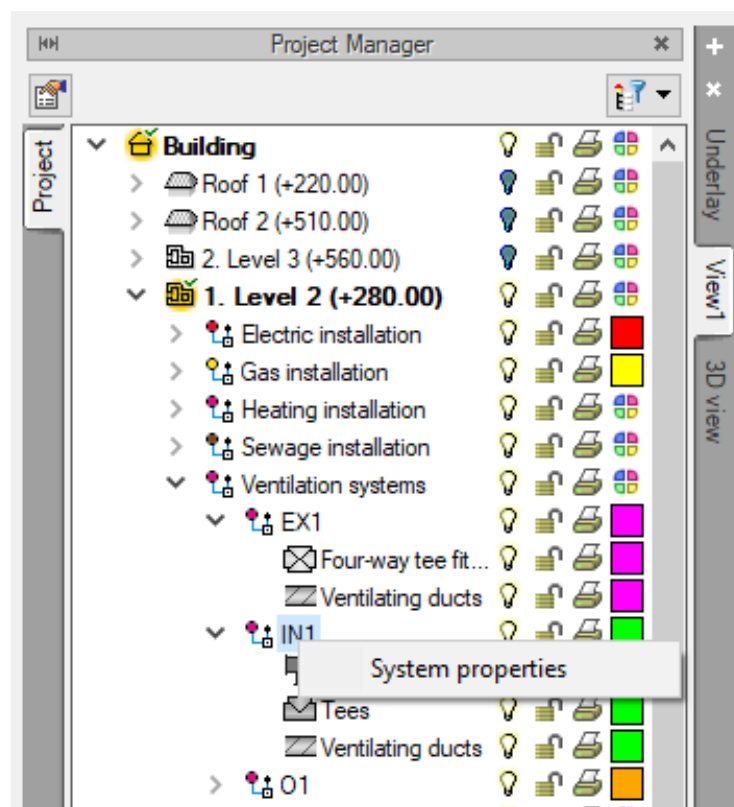


Fig. 2 The Project Manager window, object managing

After drawing an installation element, it will appear in the *Project Manager* window. If a ventilation system has been specified in an element, its symbol will appear on the floor and the element itself will be assigned to it. The system colour will be downloaded from the data entered in the program options.

From the above window, you can change the colour for a given group of objects. You can also select and edit the properties of all elements of the ventilation installation by right-clicking on a group of objects, e.g. *Bends*. After right-clicking on a given group, you can choose the operations to be performed. In the manager's tree it is possible to select e.g. all dampers and change the settings of the description, markers, fonts, or renumber the items, etc.

Additionally, subgroups can be introduced in each of the object groups in order to distinguish them, e.g. insulated ducts from the *Ventilating ducts* group. They will only be assigned selected ducts from the given system. This allows for better management of project elements.

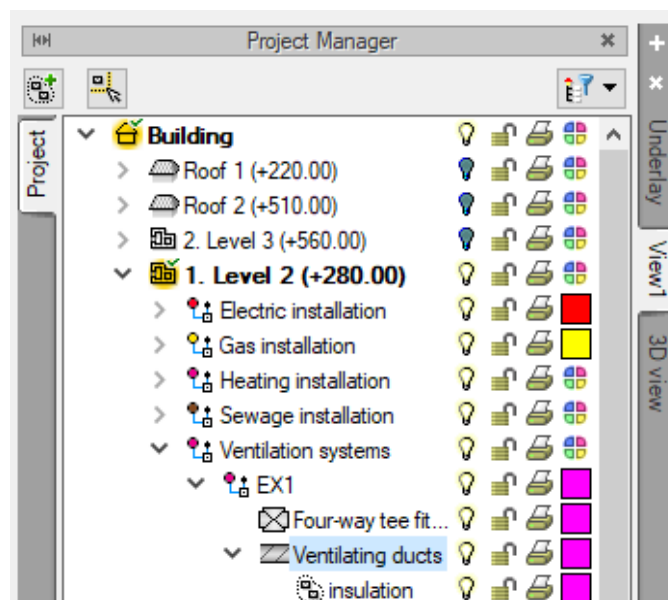


Fig. 3 A subgroup created in the Project Manager

3.2. The 3D view

Each object created in the ArCADia-VENTILATION SYSTEMS program is reflected in the 3D view. The 3D view tree differs from other views in that it is not possible to define printing of elements in it, because only a saved image (3D view) can be printed out. In the view tree, instead of printing, it is possible to glaze an element. To do this, the “glass” icon is used.

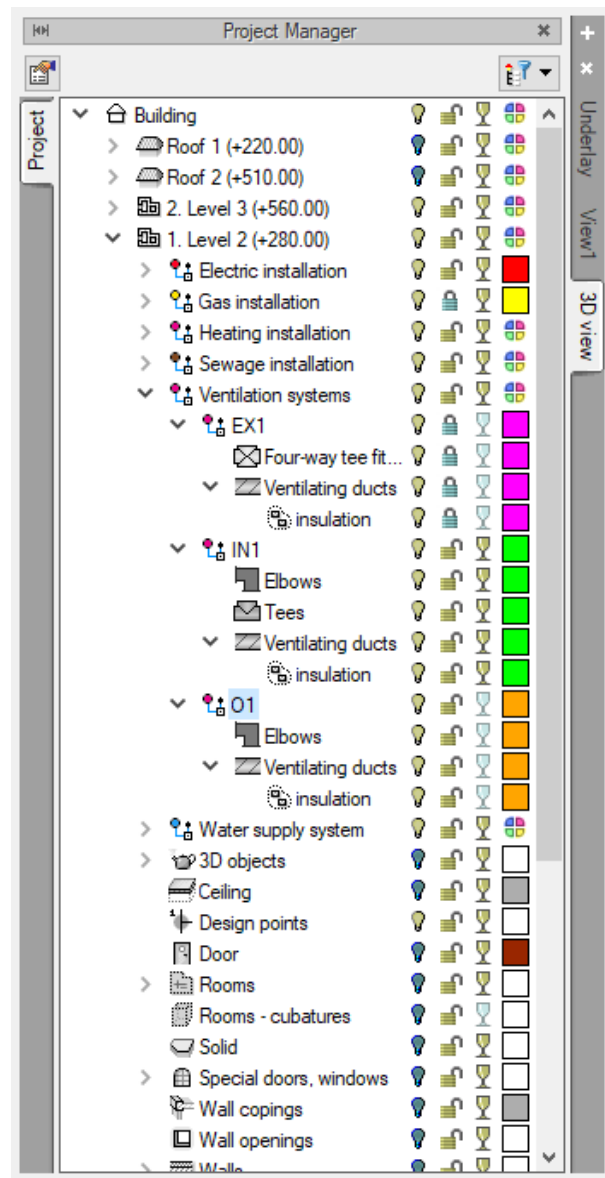




Fig. 4 3D View properties in the Project Manager window

Activation:

ArCADia and ArCADia PLUS:

- The *View* ribbon ⇒ the *Views* logical group ⇒  *3D view*
- The *ArCADia-SYSTEM* toolbar ⇒  *Show/Hide 3D view*



ArCADia LT

- The *View* ribbon ⇒ the *Insert* logical group ⇒ *3D view*

3.3. Project options

Activation:

ArCADia and ArCADia PLUS

- The *Manage* ribbon ⇒ the *Options* logical group ⇒  *Options*
- The *ArCADia-SYSTEM* toolbar ⇒  *Options*

ArCADia LT

- The *Home* ribbon ⇒ the *Options* logical group ⇒  *Options*

The user can also enable the options window from the ArCADia menu by selecting the *Options* icon. The general options window of ArCADia will be displayed, followed by ArCADia-VENTILATION SYSTEMS.

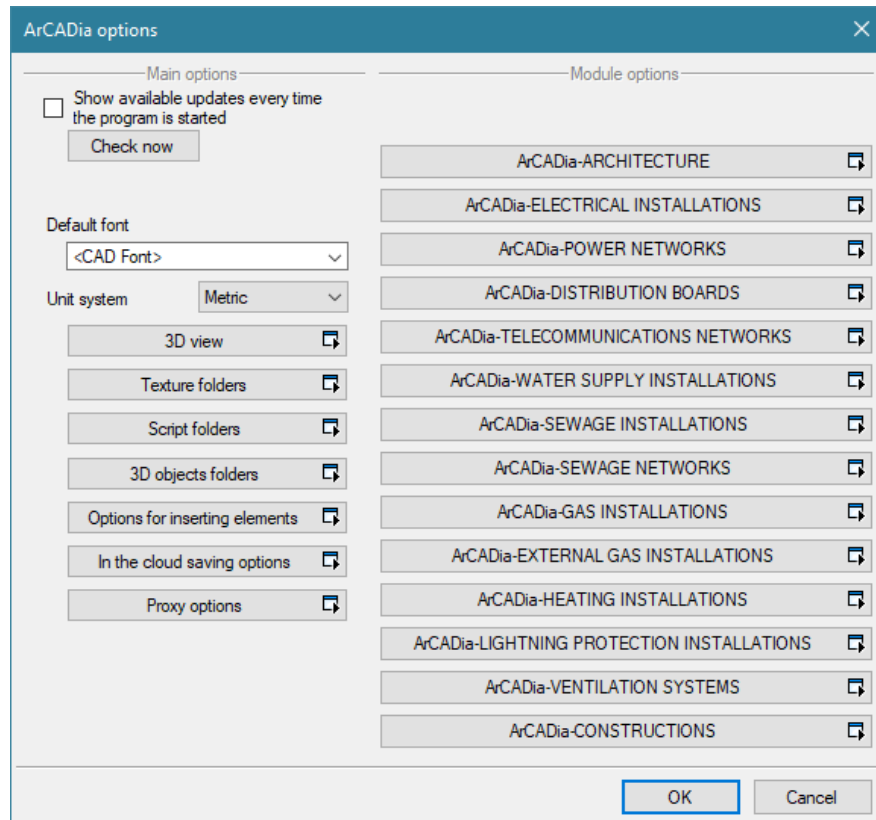


Fig. 5 The ArCADia options window

The *Options for inserting elements* button on the left side of the options window opens the window below:

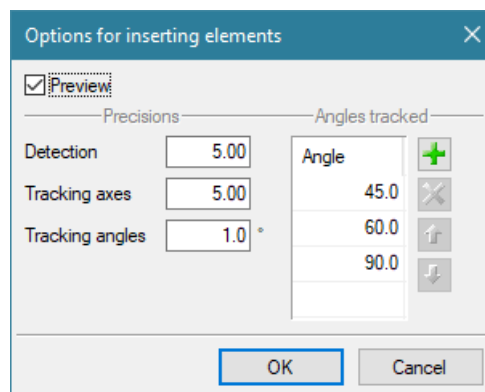







Fig. 6 The element insertion window

On the left you can set the precision (the maximum distance from the axis of an element that will allow detection) to detect elements, axes and angles, while the function of tracking the axes of elements  and angles  and detection of elements  is enabled.

It is possible to enter tracked angles on the right side of the window. In the table, by clicking the  button, the user has the option of adding another angle, which the program is to track when entering elements. If the user wants to delete one of the angles, he selects it by clicking on it in the table, and then, using the  button on the right, he deletes one of the values.

After specifying the precision of modifying the number and values of tracked angles, the user can confirm the changes with the *OK* button (the changes will be saved in the program) or cancel them with the *Cancel* button (all changes made in the tracking options window will be cancelled right away).

On the left side of the *ArCADia options* window (Fig. 5) **Błąd! Nie można odnaleźć źródła odwołania.**Fig. 5there are buttons that launch *Options* for specific modules. After clicking the *ArCADia-VENTILATION SYSTEMS* button, the *Project options* window will open (Fig. 7). This window can also be activated from the *VENTILATION* ribbon (Fig. 9) **Błąd! Nie można odnaleźć źródła odwołania.**– the *Options* command.

In the *Project options* properties the main features of the created project can be set. The user has 3 tabs at his disposal: *Systems*, *General* and *Default symbols*.

The *Systems* tab

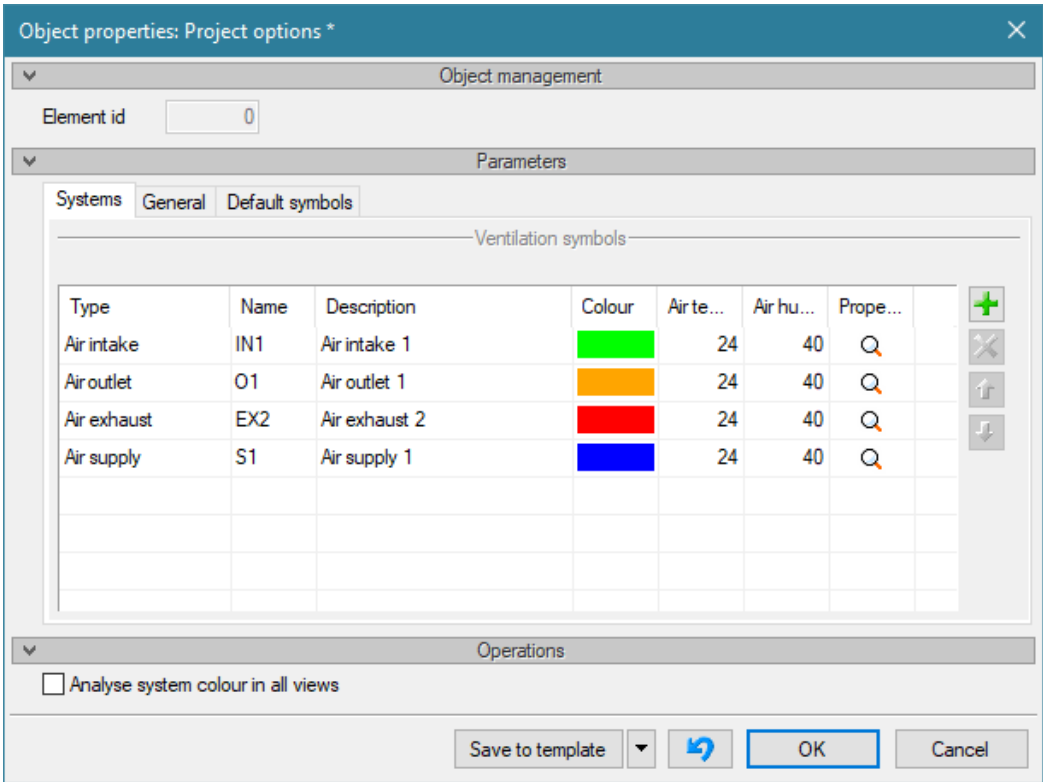


Fig. 7 The object properties window for Project options – Systems

Here, the user can define which ventilation system he wants to have available when working with the program. The systems can be added and removed as desired. Editing systems is possible regarding: the type (one of four to choose from: supply, exhaust, intake and outlet), name, description, pre-set default system colour, and parameters of the transported air – its temperature (°C) and relative humidity (%). After selecting *Properties* (clicking the “magnifying glass” symbol next to a given system), the user can edit the selected object type (e.g. a ventilation duct) entered in the given system (Fig. 8).

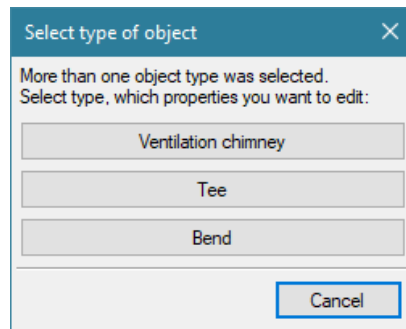


Fig. 8 The object type selection window for: Project options – Systems – Properties

At the bottom of the window, there is a checkbox: *Update system colour in all views*. After checking it, the system colour changes will be transferred to objects throughout the drawing. If the user changes the system colour but does not select the above option before confirming the changes with the *OK* button, the new colour will only appear on the elements inserted from that moment.

The *General* tab

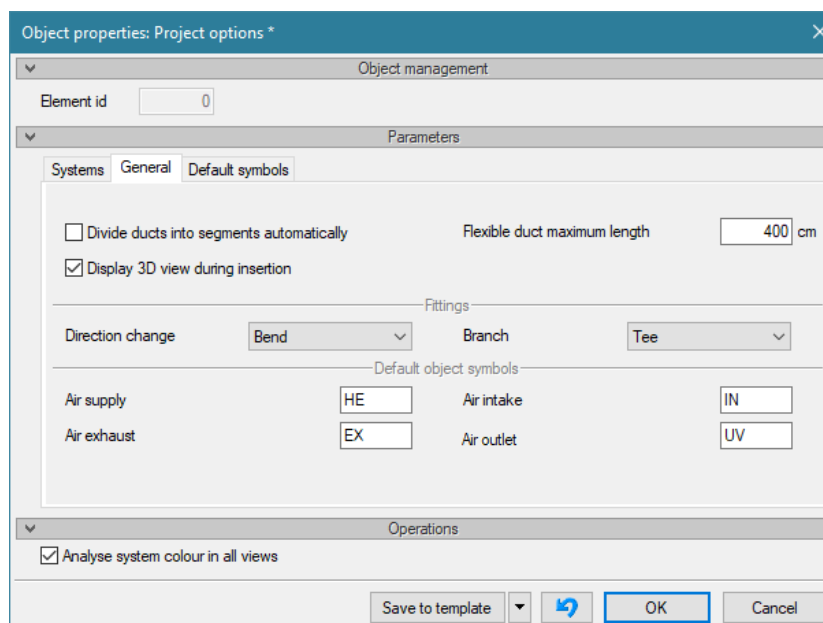


Fig. 9 The object properties window for: Project options – General

Here, the user can select several options related to the program functions used for automatic installation creation.

Divide ducts into segments automatically – checking this option will insert ventilation ducts divided into segments of the length set in the ventilation duct properties, in the *Segment length* field (Fig. 98).

Flexible duct maximum length – after performing the calculations, the entered value will be compared with the lengths of the designed flexible ducts.

Display 3D view during insertion – selecting this option causes the *3D View preview* window to appear when inserting and joining elements.

In the *Fittings* group, the user has options of how the automatic functions will be performed:

- direction changes: through a bend or elbow,
- branches: through a tee or saddle branch.

Default system symbols – the names of individual systems defined here will appear as default in the *Systems* window (Fig. 7).

The *Default symbols* tab

Here, the user can change the default symbols of ventilation installation elements set in the program.

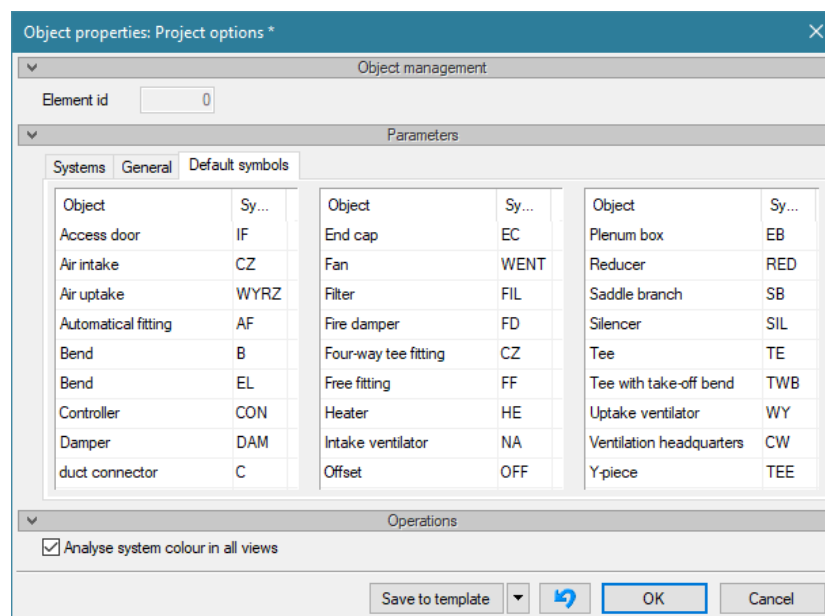


Fig. 10 The object properties window for: Project options – Default symbols of installation elements

3.4. The ArcADia-VENTILATION SYSTEMS module toolbar

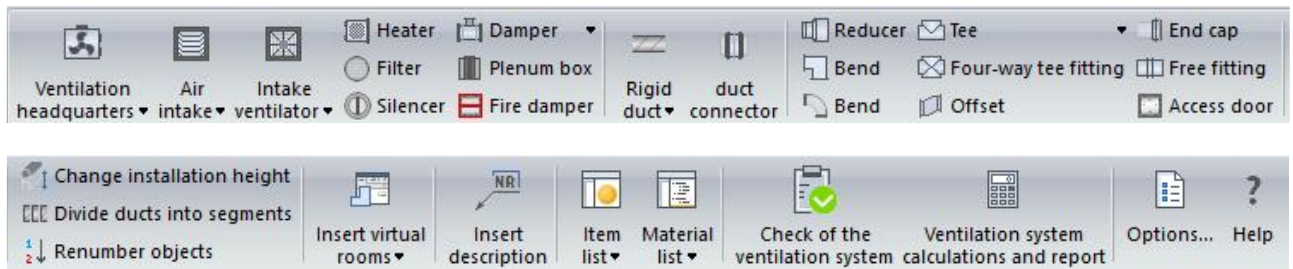









Fig. 11 The ribbon of the ArcADia-VENTILATION SYSTEMS module tools
(the ArcADia program)

Dropdown menus ▼ allow the user to choose one value from a predefined list.

The table below describes all the functions available from the toolbar. To make navigating the tool ribbon easier, groups of objects and commands with different functions have been parted with vertical separators.











**BIM* – options available to ArcADia BIM license holders, i.e. after purchasing one of the following programs: ArcADia, ArcADia LT or ArcADia PLUS.

Tab. 1 Options of the ArcADia-VENTILATION SYSTEMS module

Icon	Option	Description	*BIM
	Air handling unit	Inserts an air handling unit and enables selection and/or definition of parameters specific to air handling units.	√
	Air intake	Inserts an intake and allows the selection and/or definition of parameters specific to intakes.	√
	Air exhaust	Inserts an exhaust and allows the selection and/or definition of parameters specific to exhausts.	√
	Intake ventilator	Inserts an intake ventilator and allows the selection and/or definition of parameters specific to intake ventilators.	√
	Exhaust ventilator	Inserts an exhaust ventilator and allows the selection and/or definition of parameters specific to exhaust ventilators.	√
	Fan	Inserts a fan and allows the selection and/or definition of parameters specific to fans.	√
	Heater	Inserts a heater / a cooler and allows the selection and/or definition of parameters specific to heaters / coolers.	√

	Filter	Inserts a filter and allows the selection and/or definition of parameters specific to filters.	√
	Silencer	Inserts a silencer and allows the selection and/or definition of parameters specific to silencers.	√
	Damper	Inserts a damper and allows the selection and/or definition of parameters specific to dampers.	√
	Regulator	Inserts a regulator and allows the selection and/or definition of parameters specific to regulators.	√
	Plenum box	Inserts a plenum box and allows the selection and/or definition of parameters specific to plenum boxes.	√
	Fire damper	Inserts a fire damper and allows the selection and/or definition of parameters specific to fire dampers.	√
	Access door	Inserts an access door and allows the selection and/or definition of parameters specific to access doors.	√
	Saddle branch	Inserts a saddle branch and allows the selection and/or definition of parameters specific to saddle branches.	√
	Duct	Inserts a ventilation duct and/or allows the user to define the parameters of a given duct and select the insulation.	×
	Vertical duct	Inserts a vertical ventilation duct and/or allows the user to define the parameters of a given duct and select the insulation.	×
	Flexible duct	Inserts a flexible ventilation duct and/or allows the user to define the parameters of a given duct and select the insulation.	×
	Reducer	Inserts a reducer and allows the selection and/or definition of parameters specific to reducers.	√
	Elbow	Inserts an elbow and allows the selection and/or definition of parameters specific to elbows.	√
	Bend	Inserts a bend and allows the selection and/or definition of parameters specific to bends.	√
	Offset	Inserts an offset and allows the selection and/or definition of parameters specific to offsets.	√
	Tee	Inserts a tee and allows the selection and/or definition of parameters specific to tees.	√

	Y-piece	Inserts a Y-piece and allows the selection and/or definition of parameters specific to Y-pieces.	√
	Y-piece with bend	Inserts a Y-piece with a bend and allows the selection and/or definition of parameters specific to Y-pieces with bends.	√
	Y-piece with take-off bend	Inserts a Y-piece with a take-off bend and allows the selection and/or definition of parameters specific to Y-pieces with take-off bends.	√
	Pant Y-piece	Inserts a pant Y-piece and allows the selection and/or definition of parameters specific to pant Y-pieces.	√
	Four-way tee fitting	Inserts a four-way tee fitting and allows the selection and/or definition of parameters specific to four-way tee fittings.	√
	Duct connector	Inserts a duct connector and allows the selection and/or definition of parameters specific to duct connectors. In the BIM version a duct connector is used as a duct.	√
	End cap	Inserts an end cap and allows the selection and/or definition of parameters specific to end caps.	√
	Free fitting	Inserts any user-defined fitting and allows the user to select and/or define its characteristic parameters.	√
	Change installation height	Moves the ventilation installation vertically by a set value.	√
	Divide ducts into segments	Automatically divides ventilation ducts into segments of the lengths specified in the options.	X
	Insert virtual room	Inserts a virtual room (not reflected in the geometry of the building) with user-specified parameters (temperature, volume, amount of ventilation air).	√
	Room manager	Activates the Room manager window, in which the user can define room properties included in the project (the temperature, volume, and amount of ventilation air).	√
	Insert description	Inserts a default or user-defined description of a selected ventilation element.	√
	Renumber elements	Assigns new numbers and rennumbers existing elements in a given ventilation installation to identify elements in the specification.	X

	Connector editor	Activates the Connector Editor window, in which you can define the locations and parameters of custom object connector pipes.	√
	Object rotation	Activates the Object rotation window, in which you can define any 3D rotation of the objects in the drawing.	√
	Material list	Inserts the material list and enables its export to RTF and Ceninwest.	√
	Selected elements material list	Inserts the selected elements material list and enables its export to RTF and Ceninwest.	√
	Item list	Inserts the item list with the symbols used in the projection.	√
	Selected elements list	Inserts the selected elements list with the symbols used in the projection.	√
	Ventilation system calculations and report	Displays the ventilation installation calculation window.	X
	Check of the ventilation system	Displays the window with the system check, errors (if any occur), information and warnings.	√
	Options	Displays the project options window.	√
	Help	Displays the help file for the program.	√

3.5. Creating and inserting objects and systems

Activation:

ArCADia and ArCADia PLUS

- The *Insert* ribbon ⇒ The *Insert* logical group ⇒  *Object Explorer*
- The *ArCADia-SYSTEM* toolbar ⇒  Show *Object Explorer*

ArCADia LT

- The *View* ribbon ⇒ The *Insert* logical group ⇒  *Object Explorer*

The *Object Explorer* window is used to enter and insert defined 2D and 3D objects, as well as layouts.

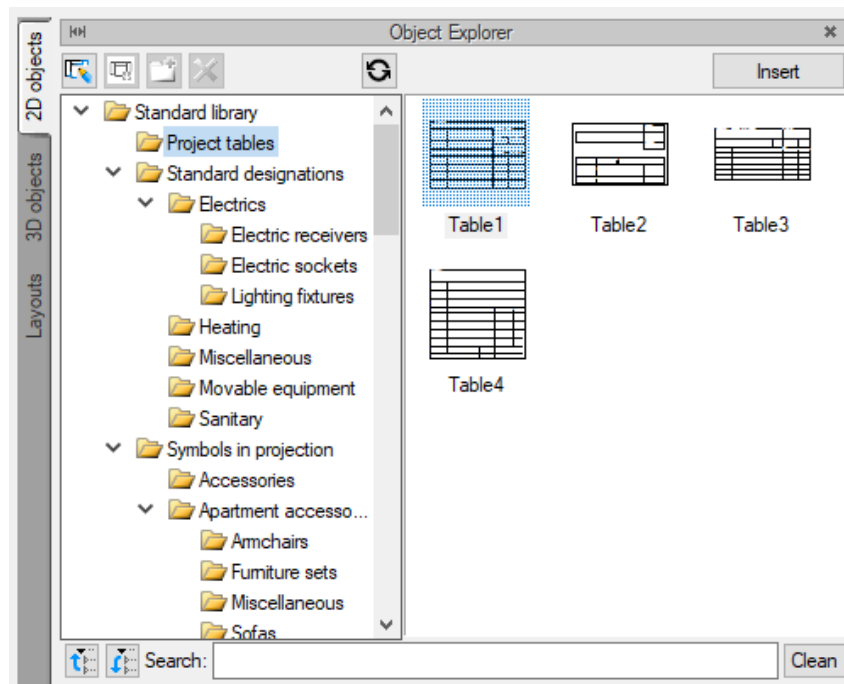



Fig. 12 The Object Explorer window

The following tabs are located on the left side of the *Object Explorer* window:

2D objects – this tab enables the selection of an existing 2D object or entering a new one, e.g. a title block.



3D objects – this tab enables the selection of an existing 3D object or entering a new one. Each of 3D objects (both from the *Standard library* and the *User library*) can be used to change the default appearance of ventilation devices. Such a change can be made in the *Object properties* window (Fig. 60) or using the *Connector editor* (3.6).

3.5.1. Inserting 3D objects

3D objects are inserted from the *Object Explorer* launched with the *Object Explorer* icon  from the toolbar or menu.

Activation:

ArCADia and ArCADia PLUS

- The *Insert* ribbon ⇒ the *Insert* logical group ⇒  *Object Explorer* ⇒ the *3D objects* tab
- The *ArCADia-SYSTEM* toolbar ⇒  Show *Object Explorer* ⇒ the *3D objects* tab

ArCADia LT

- The *View* ribbon ⇒ the *Insert* logical group ⇒  *Object Explorer* ⇒ the *3D objects* tab

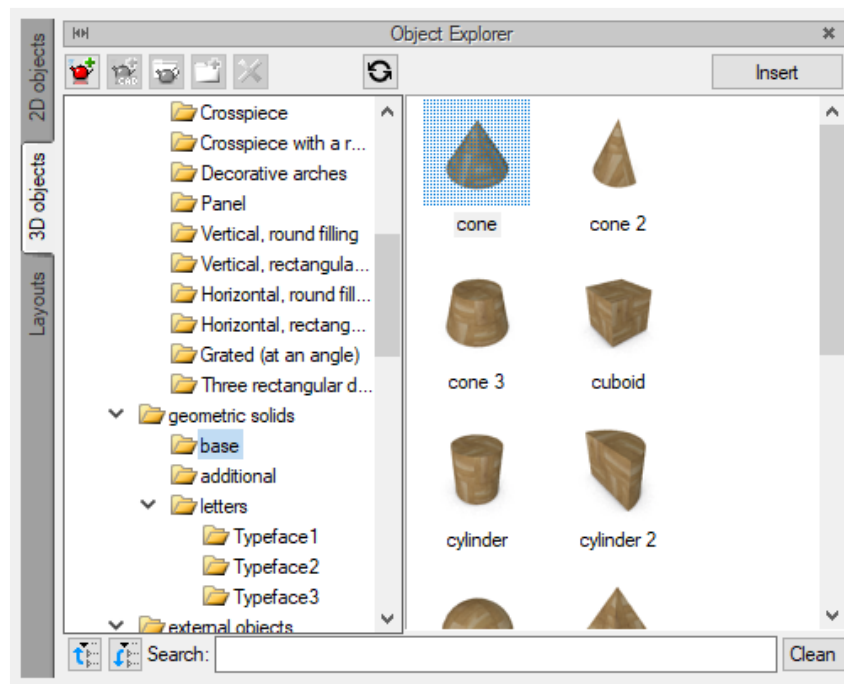



Fig. 13 The Program library, the 3D objects tab

The chosen element is selected by pointing it. Then, with the [Insert](#) button, it is inserted into the projection. The location and the insertion angle on the projection are shown.

3.5.1.1. The 3D objects import

We can load objects from files into the [Program library](#) (e.g. made available by their producers) with the extensions .3Ds, .obj., .o2c. We can also add .XOBJ3D files created in the ArcADia system by saving, for example, any defined blocks.

Such objects are inserted using the [Import 3D object](#)  command (Fig. 14). After the import, they can be found in the [User library](#) folder (Fig. 13).

Activation:

The [Object Explorer](#) window \Rightarrow the [3D objects](#) tab \Rightarrow  [Import 3D object](#)

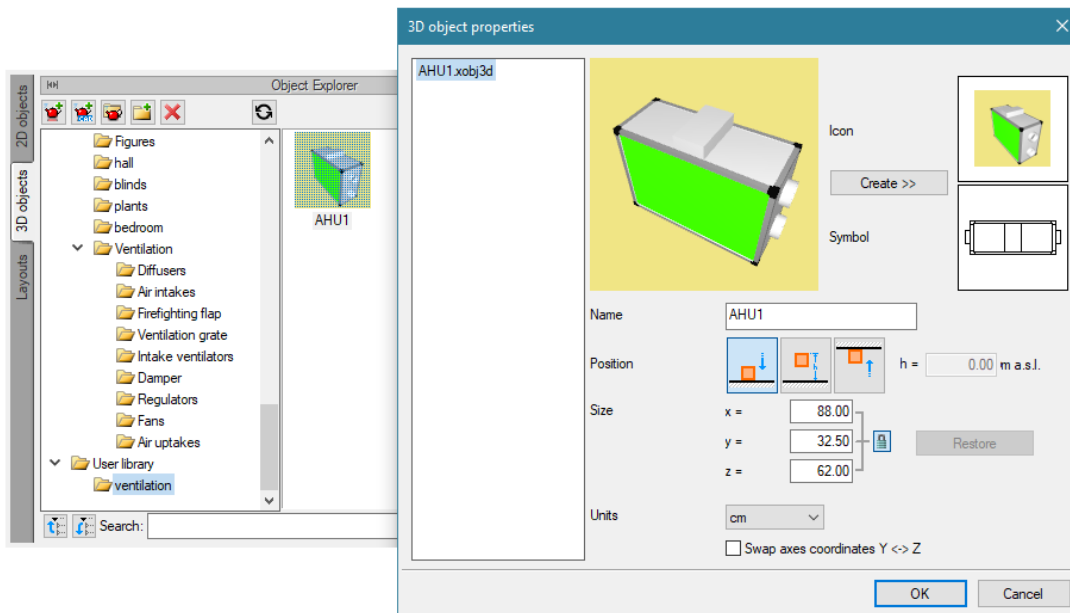


Fig. 14 The 3D objects properties window

The imported element can be named and its symbol can be created in the projection. In addition, after saving it to the library, it can be modified in the *Object Explorer* through activating it in the context menu of the *Properties* option.

Options available in the properties window:

Icon – a preview image displayed in the *Program library*. It is created automatically, but can be modified by changing the object's position in the preview window and pressing the *Create >>* button.

Create >> – a new preview of the imported object is created along with a 2D symbol shown in the projection.

Symbol – a view of the imported object, which will be available in the projection.


Name – the name of the element.

Location – the default height of the imported object.

Size – information about the size of the imported object.

NOTE! After changing the name of a 3D object, this object, if used in previous projects, will lose its 3D appearance. Changes to the size of an object do not affect previous projects.

3.5.1.2. DWG models

Models created in the 3-dimensional CAD space can be imported into the *System library* through opening such a file and using the *Import 3D objects from DWG*  icon in the *Object Explorer* window.

NOTE! The *Import 3D objects from DWG* icon will be available after selecting the directory in which the object should be located.

Activation:



The *Object Explorer* window \Rightarrow the *3D objects* tab \Rightarrow  *Import 3D objects from DWG*

After activating the command, the user has to select the model to be added to the library and confirm the selection with Enter.

3.5.1.3. RVT models

To insert an object from an RVT file, you must first import it into an ArCADia file. Projects saved in the RVT format are entered by the *Import data from the RVT format* command.

Activation:

- The *Insert* ribbon ⇒ the *Data* logical group ⇒  *RVT Import*
- The *ArCADia-SYSTEM* toolbar ⇒  *Import data from the RVT format*

After activating the command, the data import dialog box appears in which the project file is selected.

NOTE! The *RVT Import* option also supports *RFA* format files.

After loading an RVT model, a tab with the same name as the loaded model will be available on the left side of the *Project Manager* window.

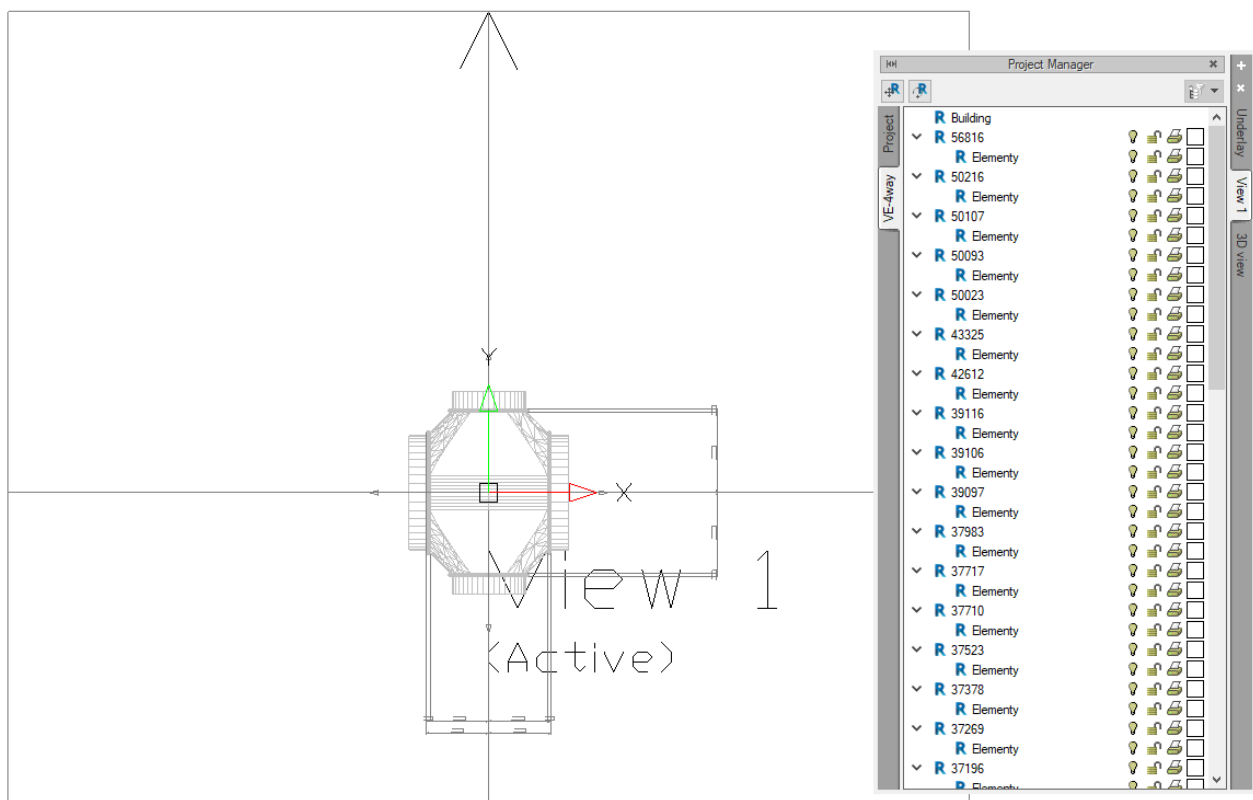



Fig. 15 The Project Manager window, the RVT model tab

Then, the loaded RVT model can be imported into the *System library* through: opening the *Object Explorer* window, using the  *Export to xobj3D file* icon, selecting the object and confirming the selection with Enter. After these steps, the *3D object properties* window opens.

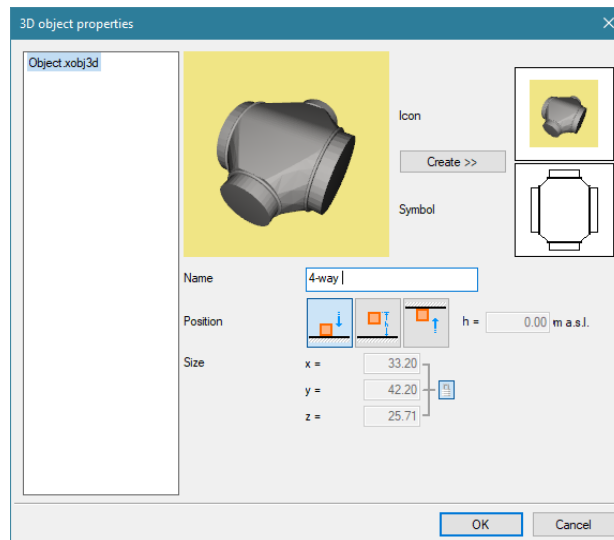


Fig. 16 The properties window of a 3D object created from an RVT model

The *3D object properties* window is described in paragraph 3.5.1.1.

3.5.2. Saving a project with objects added to the Object library

If the user's own 2D or 3D objects have been inserted into the *Object library* and used in a project that has to be transferred to another computer, these own elements must be transferred with the project. To do this, after saving the project to the disk, the *Project package* option has to be used. This way, a directory with the same name as the project will be created. It has to be moved together with the file.

Activation:

- The *Collaborate* ribbon ⇒ the *Export* logical group ⇒  *Project package*
- The *ArCADia-ARCHITECTURE* toolbar ⇒  *Create project package*


After moving the project to another computer, the project and catalogue must be in the same location. Then, when launched, the program reads additional libraries, textures and a template, loading the project together with additional elements.

NOTE! The **Project Package** will contain the following elements inserted in the project: from the **Object Explorer** from the **User library**, textures that were not installed with the program but were selected from any directory on the computer, and the drawing template, if it is changed.

3.5.3. Saving layouts to the library

When designing ventilation SYSTEMS, it sometimes happens that we use ready-made schemes which do not differ between particular projects regarding elements used, but e.g. their diameters. Often, manufacturers also offer products consisting of several different elements. For efficient design, an option has been created that allows you to create such a layout and save it to the *Layouts* library. It will allow the use of this layout in any project along with the initially set parameters.

To add a new layout of elements that are already drawn:

1. In the *Object Explorer* window, on the *Layouts* tab, select  *Create layout*.
2. Select the elements to be included in the group and confirm the selection by pressing Enter.
3. Indicate the base point for the layout.

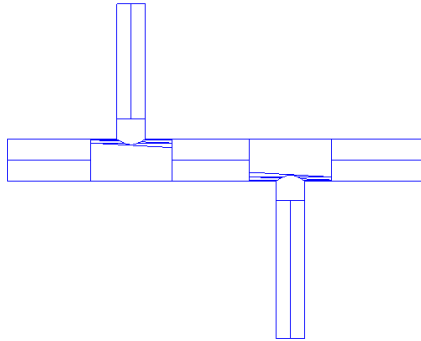


Fig. 17 Elements of a drawing before a layout has been saved

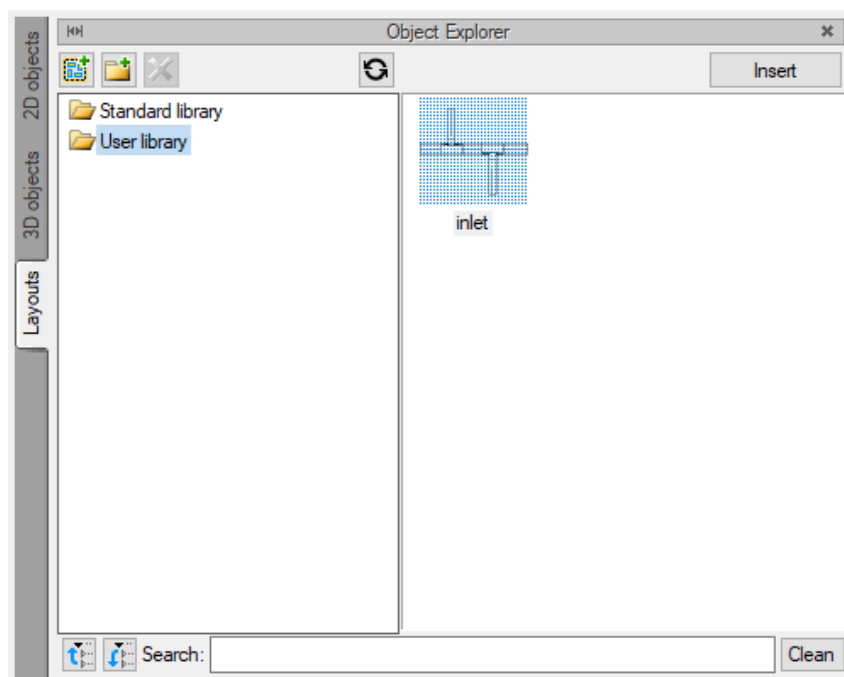



Fig. 18 A saved layout

To insert a layout into a drawing, do the following:

Activation:

Object Explorer ⇒ the *Layouts* tab

To add a new layout of elements that are already drawn:

1. In the *Object Explorer* window, on the *Layouts* tab, select  *Create layout*.
2. In the *Object Explorer* window, on the *Layouts* tab, select the layout to be inserted.

3. Press the *Insert* button and indicate the location of the layout in the project.

Objects inserted into the drawing in this way are grouped. To edit a layout, select the inserted layout and the *Different objects* window will appear.

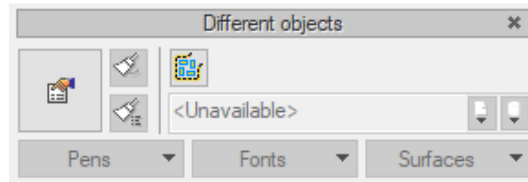



Fig. 19 The layout selection window

After entering the properties, we can change the properties of a given type of objects included in a layout, e.g. bends. The  icon is used to explode the inserted layout. After selecting this command it is possible to edit each object separately.


3.6. Connector editor

The *Connector editor* command allows users to define their own objects with the possibility of connecting them to the installation designed in the ArcADia system. It also allows them to use 3D objects made available by manufacturers, and therefore as close as possible in appearance and dimensions to real objects.

NOTE! The *Connector editor* works only on objects that are *Devices* (Fig. 46) or a *Free fitting*.

In the first step, the user inserts the type of device that interests him, e.g. a fan, and specifies its brand, e.g. a duct, in the properties.

It is possible to attach ArcADia objects to defined connectors.

The *Connector editor* command is activated with the  icon from the modification window that appears after selecting an object entered in the drawing (Fig. 20, Fig. 58).

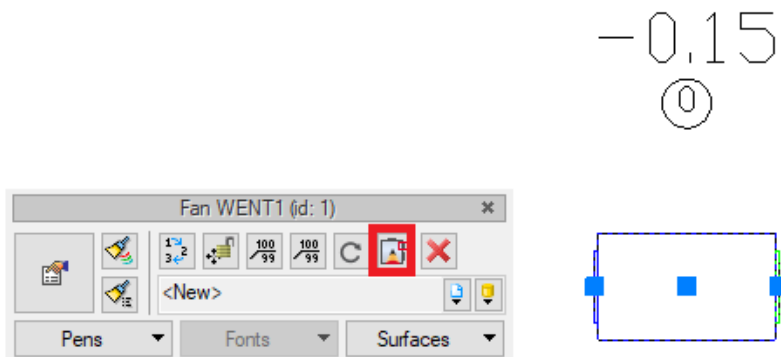


Fig. 20 Element modification window with the Connector editor command selected

After running the command, the *Connector editor* window will open (Fig. 21).

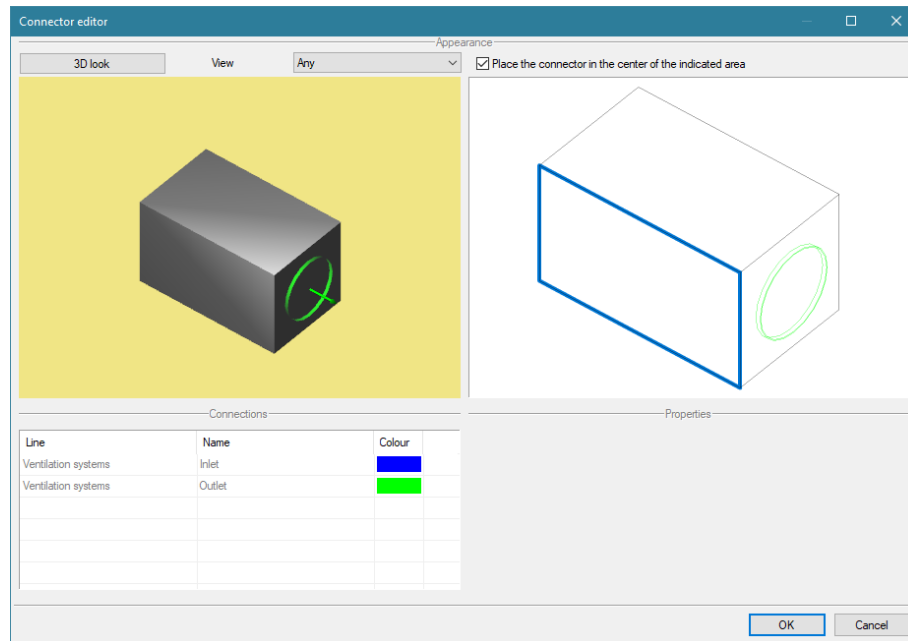


Fig. 21 The Connector editor window

The *Connector editor* window has two views. The view on a yellow background is a 3D preview of the edited element in the form of a homogeneous solid. We can rotate it freely and zoom it in and out. The right window also has a 3D view, however it allows the user to select individual areas on the object. As the element rotates in the left window, the right view is redrawn. The user can define any view of the object or choose one of 6 defined perpendicular views from the list at the top of the window (Fig. 22).

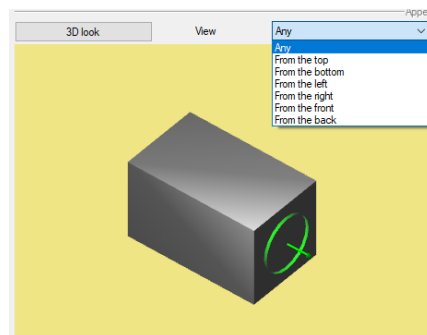


Fig. 22 Selecting a defined view in the Connector editor window

After moving the cursor to the right view, the recognized areas to which we can connect new connectors or change the locations of the predefined ones, are highlighted in blue.

To edit the location and size of connectors that are already defined, we should:

1. In the *Connector editor*, turn the layout in the left window so that the area to which we want to move the connector is clearly visible.
2. Under the left window, mark the line with the connector of interest. The current connector position will be highlighted in blue in the right window. Its properties will also appear on the right, i.e. the type,

shape, geometric dimensions, connection type and length. These properties can be edited at any stage of the work, both in the *Connector editor* window and in the *Object properties* window (Fig. 60).

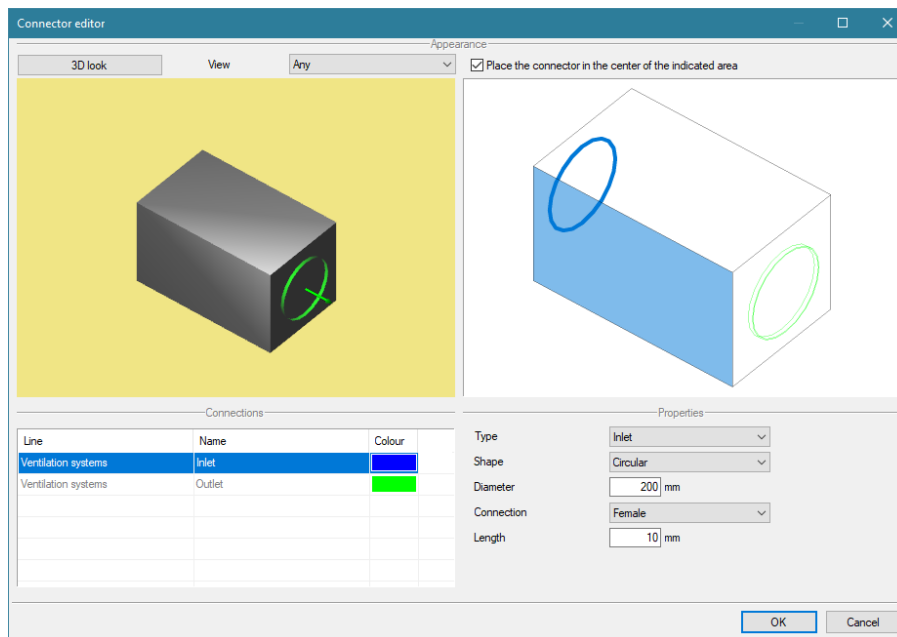


Fig. 23 Defining the connector location in the Connector editor window

3. Then, move the cursor to the location area of the new connector (it will be highlighted in blue) and click it (Fig. 23). If the *Place the connector in the centre of the indicated area* option is selected at the top of the window, the connector will be defined in the middle. Otherwise, the centre of the connector will be located at the point indicated by the cursor. The defined location can be freely changed by indicating the next points in the indicated areas.

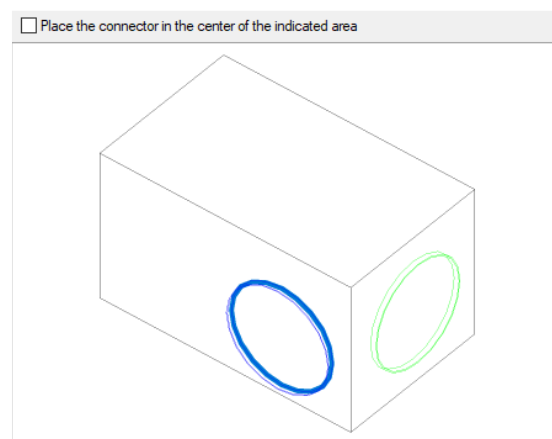


Fig. 24 Inserting a connector at the point indicated by the cursor

4. To define the location of another connector, select the next line (under the left window) for the next connector as active (highlighted in blue) and proceed as before.

For an easier identification of connectors (inlet, outlet) in a drawing, each of them can have a different colour defined. The colours of connectors can be freely changed.

Devices, depending on their types, have a defined number of connectors. In the case of a free fitting, the number of connectors can be defined freely – adding and subtracting connectors is done using “+” and “x” (Fig. 25).

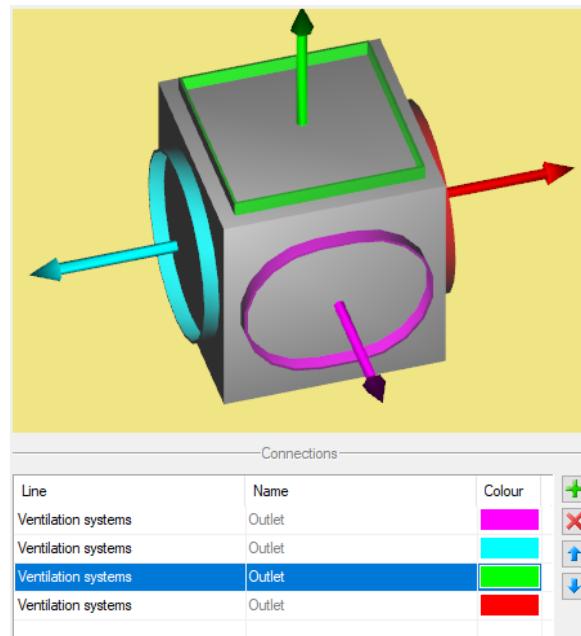


Fig. 25 The Connector editor – a free fitting with 4 connectors

In addition, in the *Connector editor* window, we can change the 3D appearance of an object (in a way similar to changing it in the properties window). After choosing the *3D appearance* option, the *Object Explorer* (3D objects library) window will open (Fig. 13). To change the appearance, select a 3D object file and confirm with *OK*. Changing the 3D appearance is described in more detail in section **Błąd! Nie można odnaleźć źródła odwołania..**

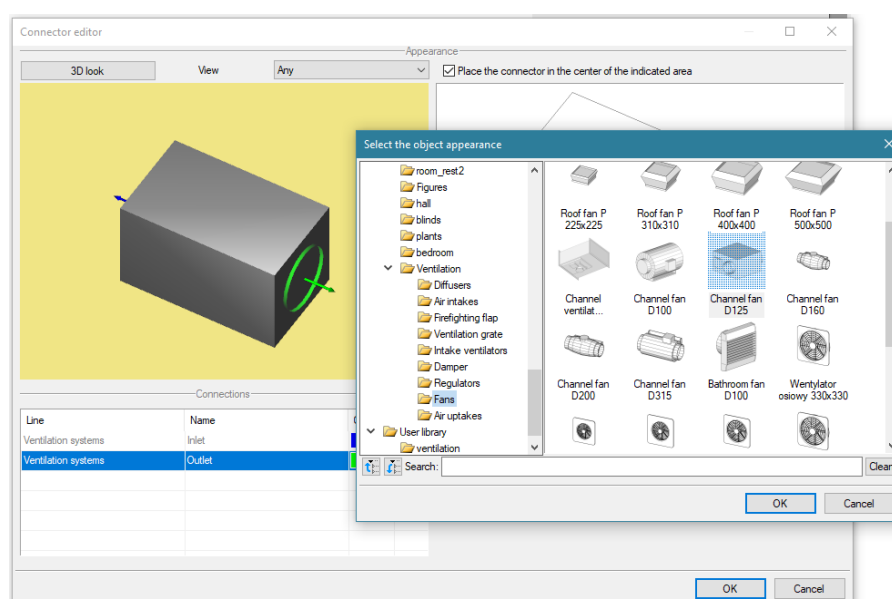


Fig. 26 Selecting an object's 3D appearance in the window opened from the Connector editor window

After selecting a new 3D appearance, you must correctly define the position and size of connectors in it.

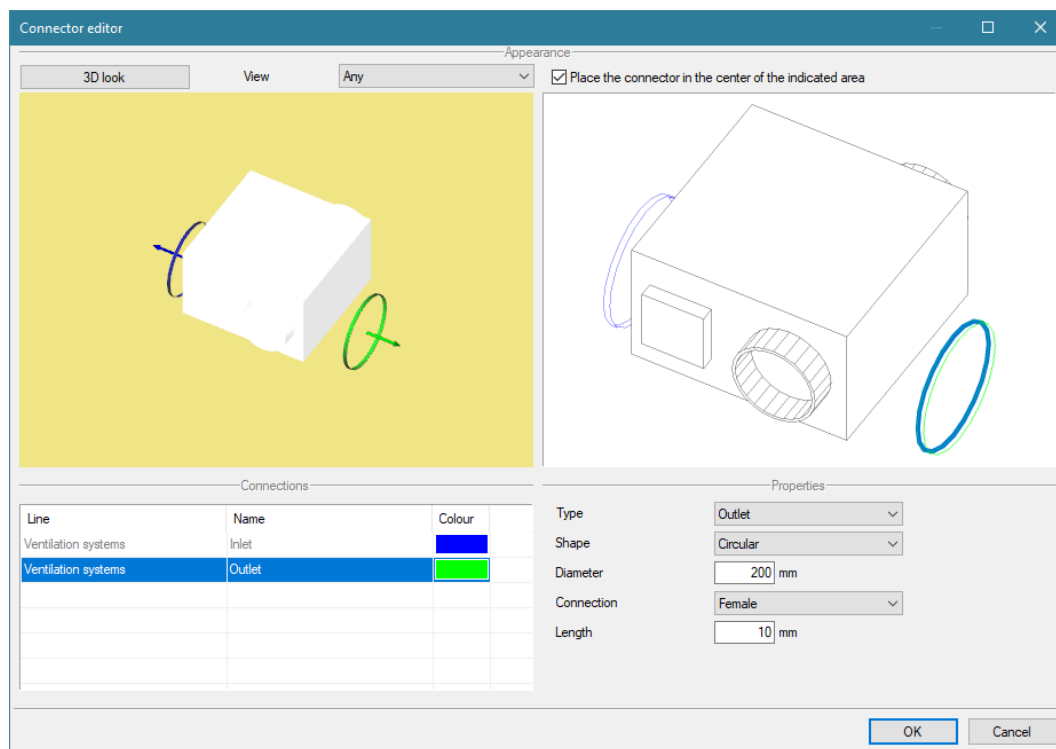


Fig. 27 The Connector editor window: a new 3D appearance of an object with connectors left in a default position

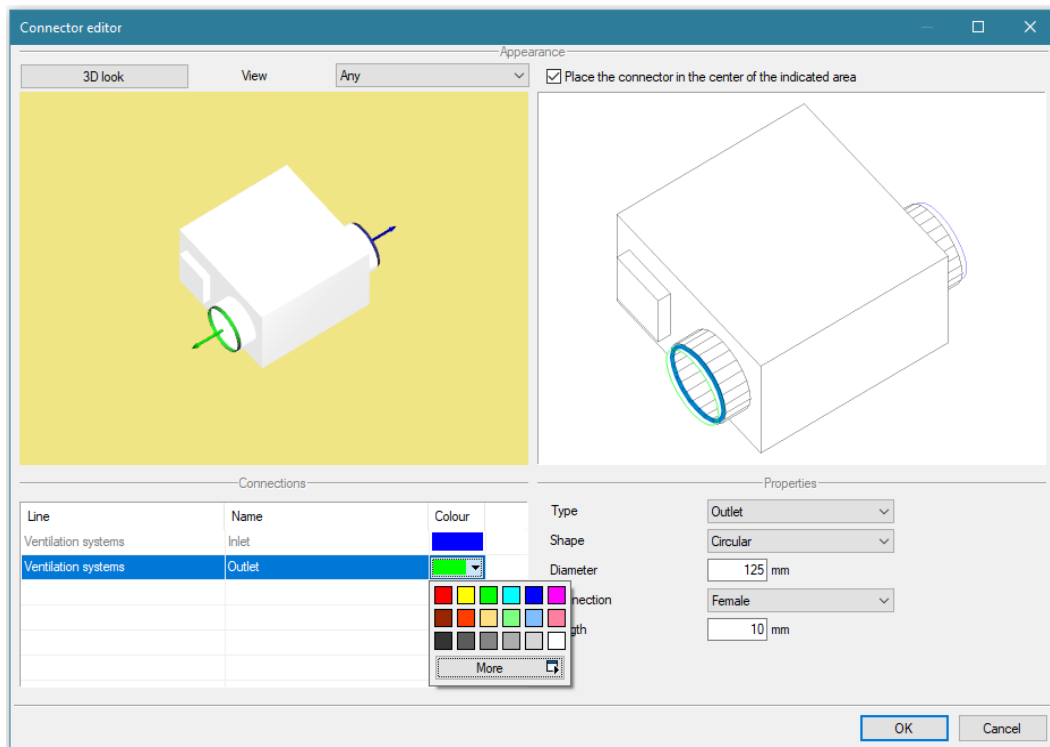



Fig. 28 The Connector editor window: a new 3D appearance of an object with correctly defined connectors

3.7. Saving a template

Activation:

ArCADia and ArCADia PLUS

- The *Manage* ribbon ⇒ the *Libraries* logical group ⇒  *Template manager*
- The *ArCADia-SYSTEM* toolbar ⇒  *Template manager*

ArCADia LT

- The *Home* ribbon ⇒ the *Libraries* logical group ⇒  *Template manager*

To save the settings of all elements, not only their width and height, but also pens, planes, storey heights, a new template option has been created that remembers the user-defined settings and activates them in a new project. The number of templates created is unlimited, and can be related to the industry, the scale at which the project will be printed or, e.g., the type of the building that is designed. The saved heights and storey parameters for industrial buildings and detached houses are different and each change consumes more time than creating a template file with settings of all necessary parameters.

This option does not match the element type, but saves additional parameters. For example, for a fire damper, it will save the thickness and colour of the assigned pens (all dampers will now be drawn with user-defined pens), and the height, which, by default, is the floor height. The entered parameters are saved to the active style after pressing the *Save to template* button, which is located at the bottom of each dialog box with object properties.

A template can be selected at any stage of work with the project.

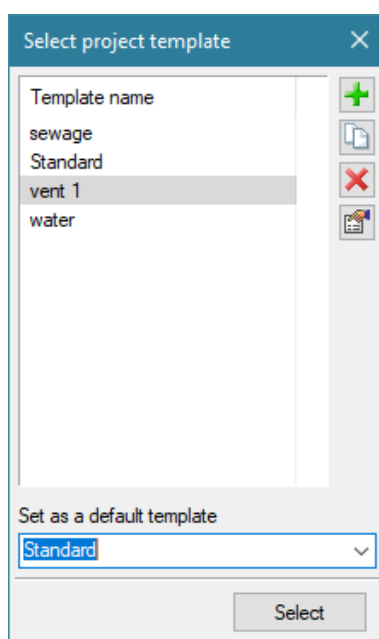






Fig. 29 The project template selection window

	<i>Add template</i>	Adds a new template.
	<i>Create template copy</i>	Copies a template with all parameters.
	<i>Delete template</i>	Deletes a selected template.
	<i>Template properties</i>	Opens the <i>Template properties</i> window.



In the *Template properties* window you can see what elements are included in the template (e.g. changed parameters for pipes, profiles, etc.). You can delete a given element or rename the template.

NOTE! While working in the program, it is possible to change the template, which will cause all new elements to be drawn with new parameters. The drawing and its elements created before changing the template will not be modified.

3.8. The Type library editor

Activation:

ArCADia and ArCADia PLUS

- The *Manage* ribbon ⇒ the *Libraries* logical group ⇒  *Type library*
- The *ArCADia-SYSTEM* toolbar ⇒  *Edit the Type library*

ArCADia LT

- The *Home* ribbon ⇒ the *Libraries* logical group ⇒  *Type library*

The *Type library editor* is used to edit and insert new types of ArCADia objects. It facilitates the access to producer catalogues and allows the selection of only these catalogues that are used most frequently at the design stage. In addition, it divides types into the *Standard library* (included with a given program version), and the *User library*, in which all new or user-modified item types can be found.

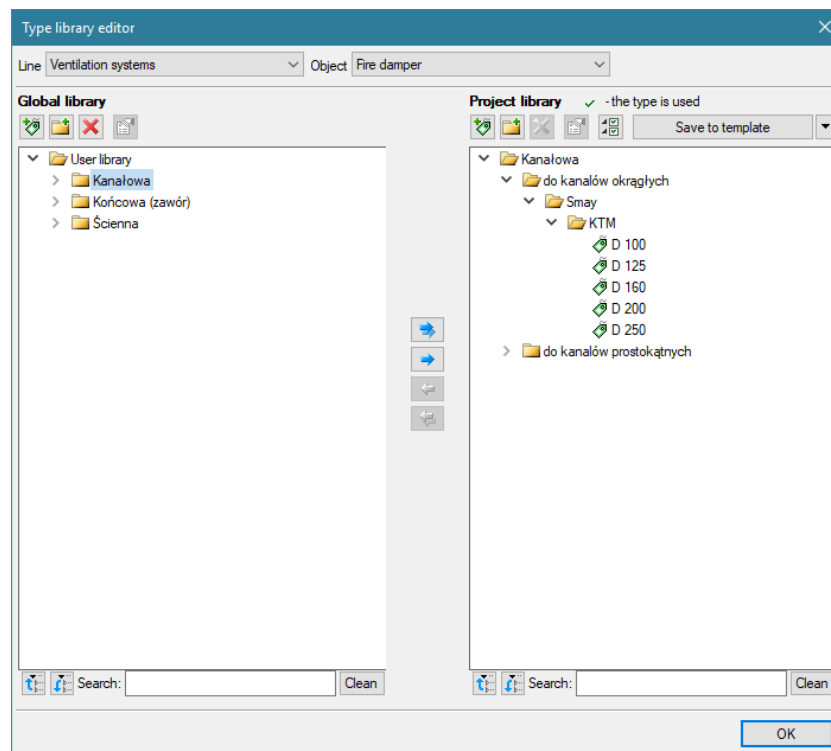


Fig. 30 The Type library editor window

In the upper part of the *Type library editor* window (Fig. 30Fig. 30), the user has the possibility of choosing a line from the drop-down list, which contains all the industries (modules) available in the ArCADia system.

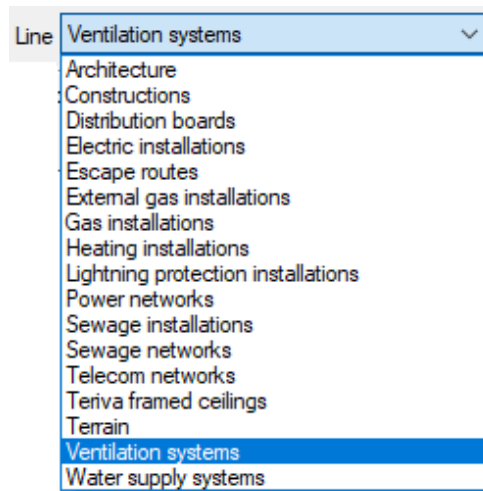


Fig. 31 The view of the expanded list of lines available in the ArCADia system

After selecting a suitable line, a drop-down *Object* list appears on the right, in which the user has all the elements available in the selected industry (module), e.g. *Intake ventilator* after selecting *Ventilation systems*.

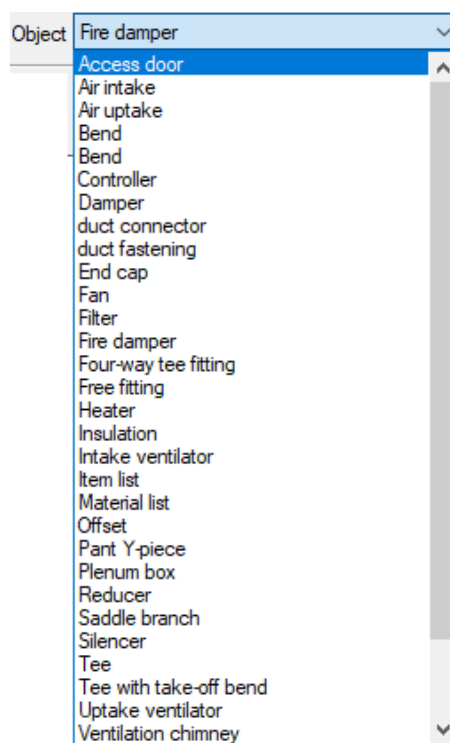


Fig. 32 The view of the expanded list of objects available in ventilation systems

After clicking the selected element, all types of elements will be available in the *Global library*. The first time the *Type library* is used, they will be the *Standard library* types (files included with a given program version).

During the design process, additional types can be added to create the *User library*.

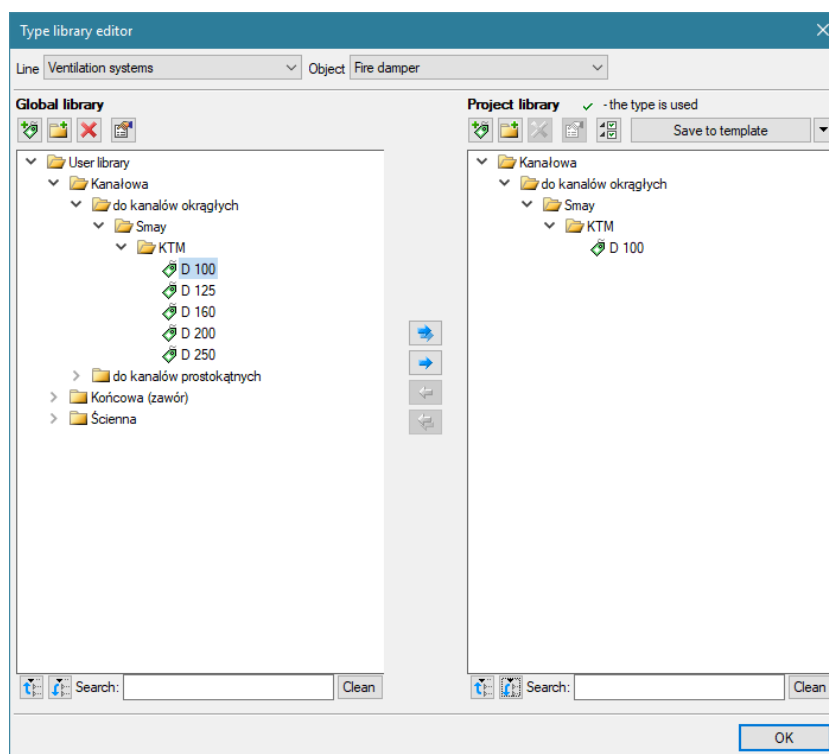


Fig. 33 The Type library editor window after selecting the desirable line and one of its objects

The lower part of the editor window is divided into the *Global library* part (left) and the *Project library* part (right).

The *Global library* contains all types of objects available to the user that have been installed along with the program. As you work, it is divided into the *Standard Library* (attached to a given version of the program and not changed by the user) and the *User Library*, which contains elements (types) added by the user while working with the program.

The *Project library* is a place where all types of objects used or available to use in the project are located. An object can be given a type in the object properties window (Fig. 34, Fig. 60), as well as in modification and insertion windows (Fig. 35).

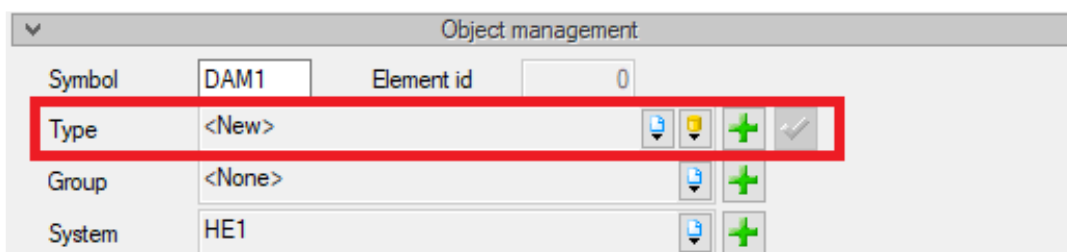


Fig. 34 The place to enter the type on the object properties level

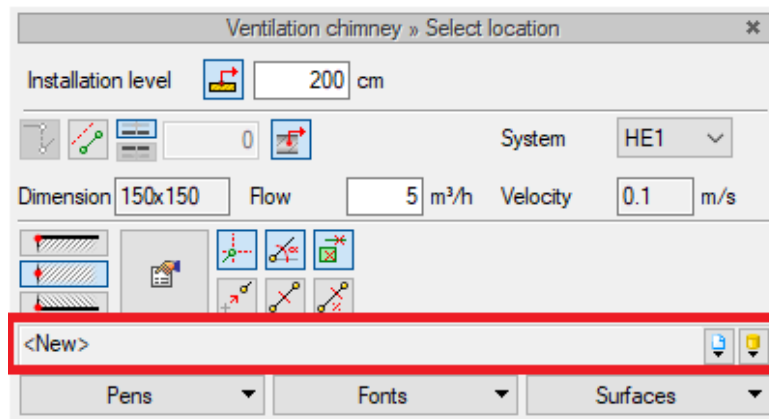




Fig. 35 The place to select the type in the modification and object insertion window

Above the type libraries windows, there are icons which are used respectively:

Add new type  – after clicking this icon the user can add a new type to the *Global library* or to the *Project library* (to the *User library*). It is also possible to edit an object's type properties, and the user can assign the object all the parameters that are characteristic of it, e.g. the type parameters, the view.

NOTE! Clicking on **Add new type** while a type in the library has been previously highlighted will add a new type based on the highlighted one. This makes it easier to enter catalogues of objects (e.g. from one manufacturer) that differ by one parameter, e.g. the diameter, into the library.

Add new folder  – after clicking this icon the user has the option of adding a new folder to which he will then be able to add object types. A window will appear with the option of entering the folder name. After entering the name, press the *OK* button to add the folder to the library, or *Cancel* to abort the command.

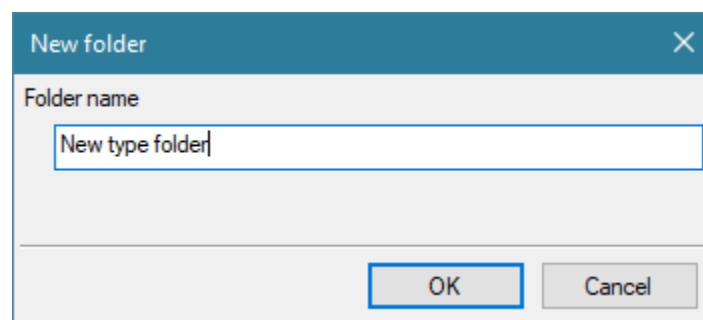

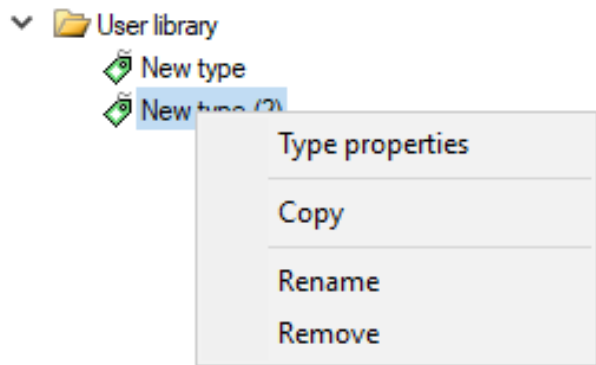



Fig. 36 The window of the entered type folder



Remove  – after clicking this icon the user can delete the selected type or folder.

Leave only the types used in the project  – after clicking this icon, only the types that have been used in the project (in one of the objects) will be left in the *Project library*.

The following menu is available after clicking the type with the right mouse button:



Type properties  – after clicking this icon the user will have access to the properties of the selected type, so he can change and save them here.

Above the **Project library** there is the  button. After clicking it, the **Project library** settings will be saved to a template and they will be available for subsequent projects carried out using this template. Next to it is the  icon. After clicking it, the user has a list of available templates.

Type properties for the element: Fire damper

Appearance

Type name: D 100

Type parameters

Name: Kłapa przeciwpożarowa kanałowa

Standard/Producer: Smay

Type/Series type: KTM

Shape: Cylinder

Diameter: 102 mm Length: 150 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Circular	100			Female	0.0	
Circular	100			Female	0.0	

Active area: 0.01 m² ☐ Actuator


Fire resistance class: EIS 120 Acoustic power

Local pressure loss: 11 Pa

Additional description:

OK Cancel

Fig. 37 An example of a type properties window

In the **Project library** window, you can also check what types of a particular object are currently used in the project. The  symbol appears next to the name of such a type, on its left.

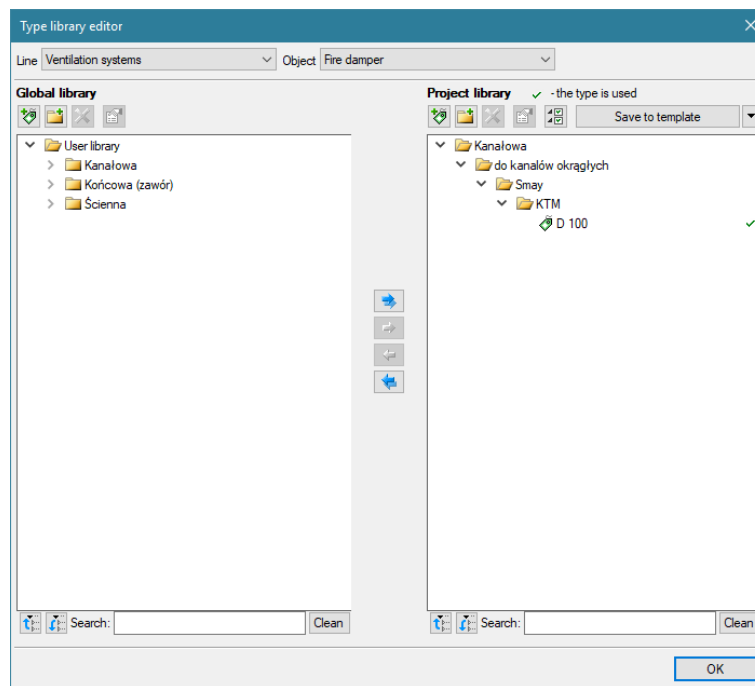




Fig. 38 The Type library editor after inserting a type into the Project library


Below both libraries, there are icons:


Hide everything  – after clicking on such an icon, the type tree in a given library will be collapsed to main catalogues.


Show everything  – after clicking on such an icon, the type tree in a given library will be expanded.


The user can also search for a type in the type library by entering the entire name of the searched type or part of it in the field. Next to it there is the button after clicking on which the *Search* edit box will be cleared.

After selecting types or folders, the transfer buttons placed between the libraries become active.

Copy all to the Project library  – copies the entire contents of the *Global library* to the *Project library*.

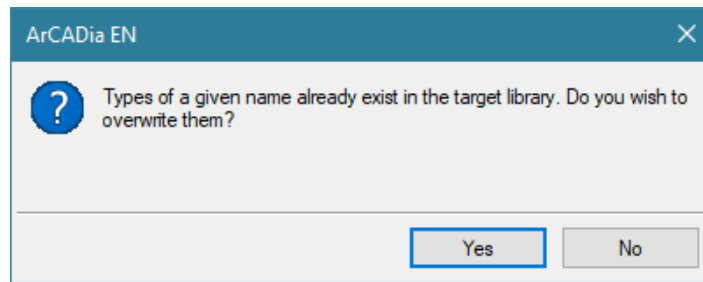
Copy to the Project library  – copies the selected objects to the *Project library*.

Copy to the Global library  – copies the selected objects to the *Global library*.

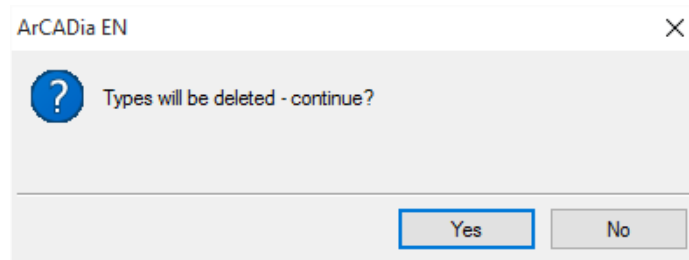
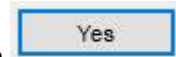
Copy all to the Global library  – copies the entire contents of the *Project library* to the *Global library*.

Messages that appear when working with the *Type library editor*:

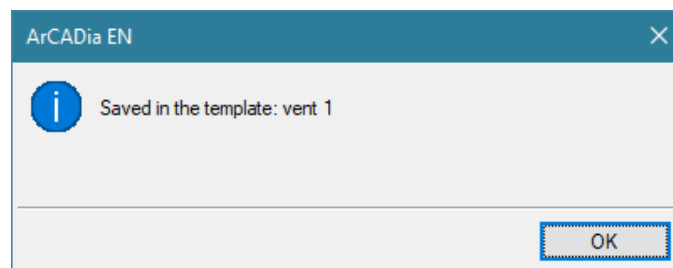
1. The message informs that types of this name already exist. After clicking the button, the information contained in the new type will be saved and it will replace the information in the previously existing type.



2. The message informs that the selected types will be deleted. By pressing the button the user accepts deleting them.



3. The message informs that the layout of the *Project library* has been saved to a project template, e.g. vent 1.



NOTE! If the user has made any changes to the **Project Library** while working on a project, has changed existing types or extended the library with new types, they will all be available for subsequent projects. The user should apply the transfer buttons to add the new types to the **Global library**.



4. CREATING THE STRUCTURE OF THE MODEL

4.1. The Building wizard

The ArCADia BIM system has an option that helps create a multi-level virtual building with one move. The number, names and parameters of subsequent levels as well as the location of the view are defined. You can enter a separate view for each level so that the floors are displayed next to or below each other rather than one above the other.

Activation:

ArCADia and ArCADia PLUS:

- The *Manage* ribbon ⇒ the *Project* logical group ⇒  *Building wizard*
- The *ArCADia-SYSTEM* toolbar ⇒  *Building wizard*

ArCADia LT

- The *View* ribbon ⇒ the *Insert* logical group ⇒  *Building wizard*

After activating the command, the following window will be displayed:

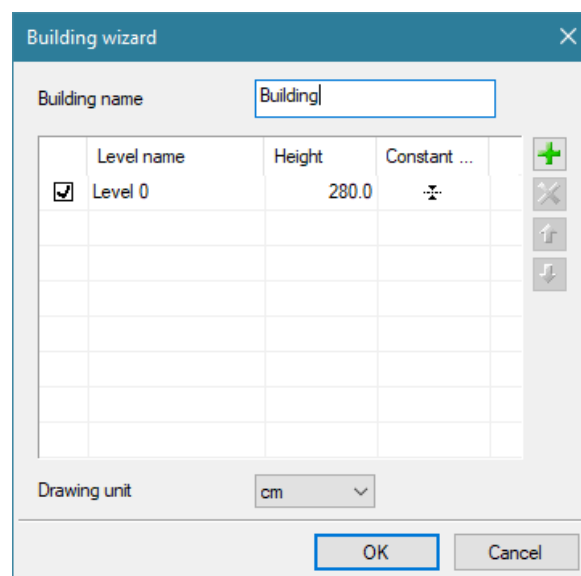


Fig. 39 The window to create a building using defined levels

Building name – the name of the inserted building.

Level name – names of levels (*Level 0*, by default) that can be defined by the user.

Height – a level height calculated from the upper edge of the raw ceiling to the upper edge of the raw ceiling.

Constant point – the view start. The place indicated by the user as an anchor of the level view. Anchors of subsequent levels can be inserted side by side or below each other, leaving space to draw a project plan.

Add (+) – adds a level below the lowest one. If the level is to be above another level, it should be moved using the *Up* ↑ icon.

Remove (X) – deletes the selected level.

Up (↑) – moves the selected level up by one level.

Down (↓) – moves the selected level down by one level.

Drawing unit – selecting the unit in which the projection will be drawn.

NOTE! The column in front of the level name is responsible for the selection of the base level, i.e. one that will be located at the “0” level of the building in the project.

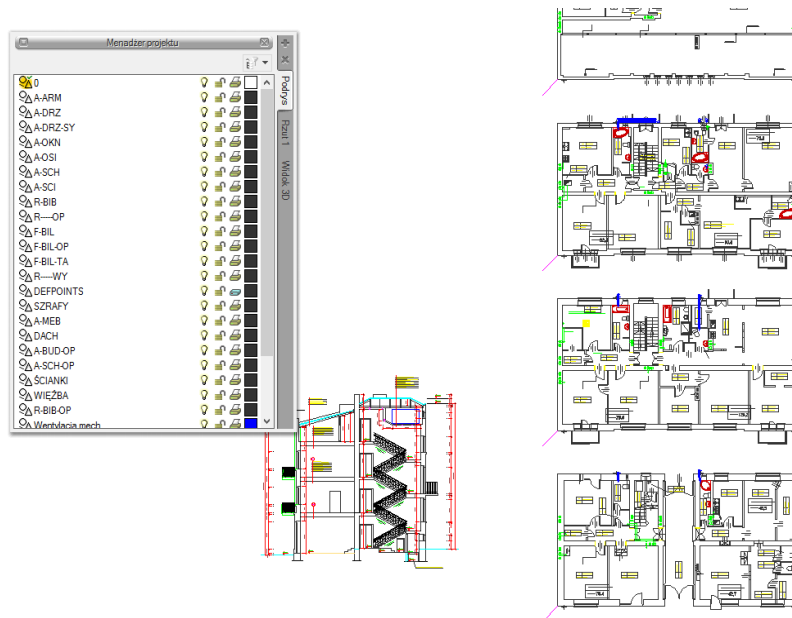
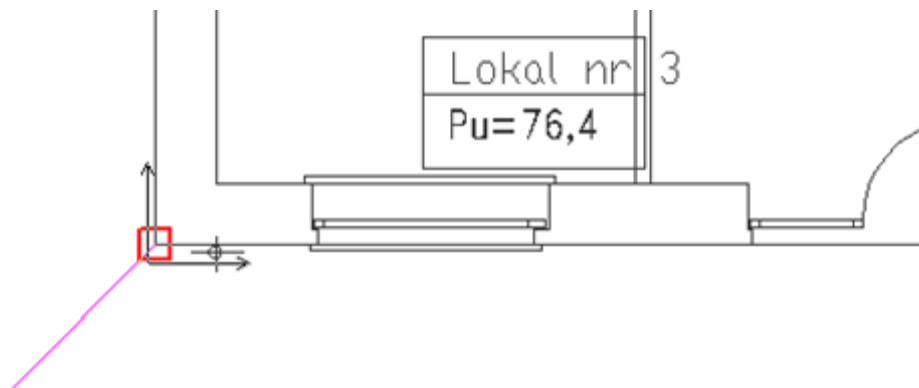


Fig. 40 An example of setting four levels

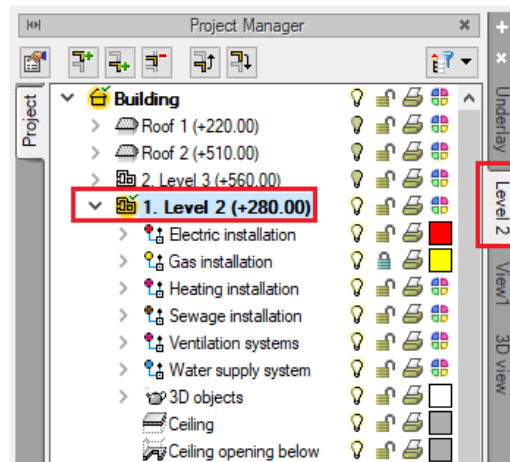
After typing the name of each level and its height, and clicking on its row in the *Constant point* column, we can indicate the constant point.



This point should be an element that is common for all levels of the building.

After indicating all constant points on the levels and clicking *OK* we can work on projections.

In the *Project Manager* window we can see the building tree, i.e. three levels, and on the right side there is a tab showing which names correspond to which floors. An active level has been defined for each view. Therefore, to switch between levels, we switch the views on the tabs.



While working on each view, we can turn off the visibility of other levels, and leave the light bulb of the active level on.

4.2. Room manager

In the ArCADia-VENTILATION SYSTEMS module, the user can create the structure of a building, as well as of each level, without having an architectural underlay (a building model) created in ArCADia-ARCHITECTURE. To be able to take full advantage of the program functionality (e.g. room lists and air exchange rates in rooms), we must define rooms in the *Room manager*. The rooms are automatically loaded from the building model if it is entered in ArCADia-ARCHITECTURE. We can also insert them by pressing the following button:

Activation:

The *Ventilation* ribbon ⇒  *Room manager*

Then, the *Room manager* window will be available:

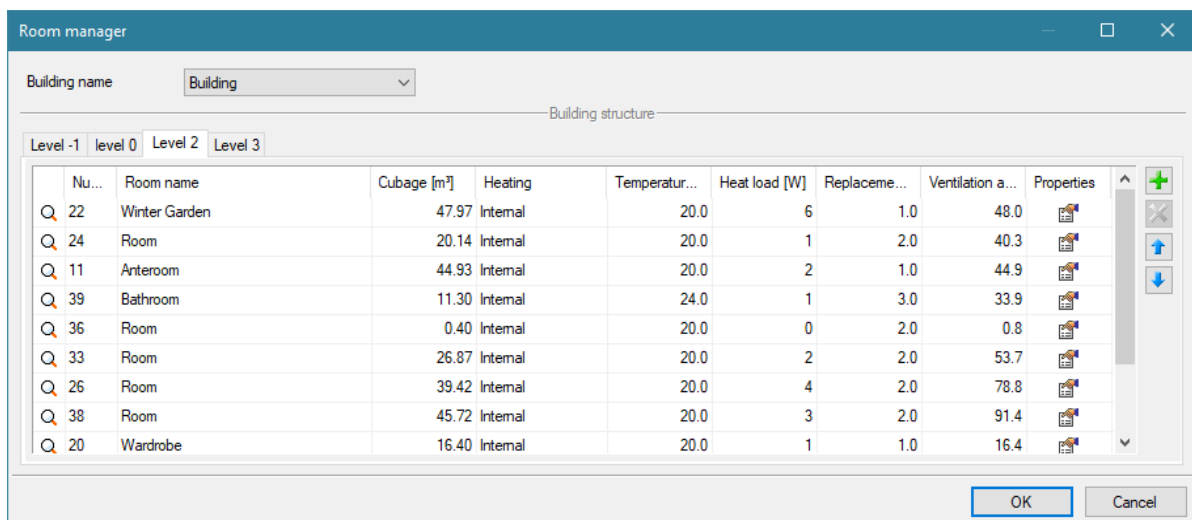






Fig. 41 The Room manager window

The user can choose in which building he will define rooms. The available building names are automatically transferred from the *Project Manager*. Then, in the *Building structure* group, there are tabs of levels entered in the building. On each of them, the user can define rooms using the following icons:

With the  symbol the user has the option of adding another *Virtual room* (4.2.1). The  symbol removes the selected item. The   arrows change the position of the selected item.

In the tab of a given level there are columns in which the user adds, respectively:

- the room number,
- the room name. It can be entered manually independently or selected from the drop-down list of hints (Fig. 42),
- the cubature, [m³],
- the temperature in a given room, [°C],
- the air exchange rate, [1/h]. After selecting a room name from the list, the number of exchanges is proposed. This value can be edited.
- the amount of ventilation air, [m³/h]. It is a value calculated on the basis of cubature and the assumed air exchange rate.

NOTE! *The values of the exchange rate and the amount of air are mutually convertible: after the exchange rate is set in the room, the amount of air will be calculated, while after the amount of ventilation air is set, the resulting exchange rate will be calculated.*

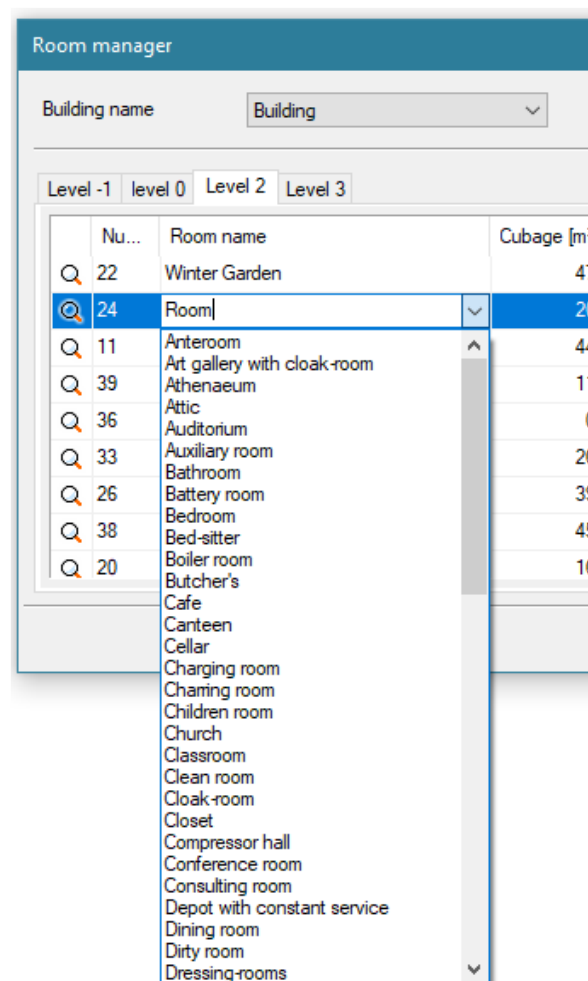


Fig. 42 The Room manager window with the expanded room list

If a building is entered in the ArcADia-ARCHITECTURE program, all columns are automatically filled in with data from the rooms. If the user wants to change data, he must enter the properties of a particular room.

4.2.1. Virtual room

The user can also add a *Virtual room* without having to draw it in the architectural module.

Activation:



The *Ventilation* ribbon ⇒ *Insert virtual rooms*

Then, the *Room manager* window will be available:

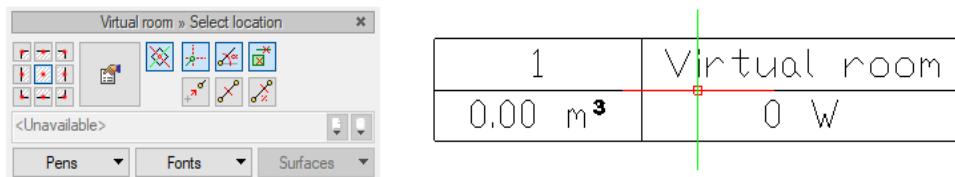


Fig. 43 The Virtual room insertion window and its symbol in the drawing

After clicking the properties button, the *Virtual room* properties window will open (Fig. 44). The user can define the following parameters: *Number*, *Name*, *Heating*, *Temperature*, *Heat load*, *Cubage*, *Replacement rate*, *Ventilation air volume*.

Fig. 44 The Virtual room properties window

Pressing the *Appearance of room desc.* button opens an additional window in which the user defines which elements will be visible in the drawing (Fig. 45).

Fig. 45 The Appearance of room description window

5. DESCRIPTION AND EDITION OF VENTILATION OBJECTS

5.1. Introductory information on editing objects. Inserting objects.

Editing each object consists in entering its symbol in the architectural projection in the drawing model. The object symbol contains information about the object's characteristic parameters, i.e. technical, technological and geometric, that are necessary to make supplementary drawings, calculations and to assess their correctness.

In the Ventilation module, the objects that can be used in a project have been conventionally divided into 3 types grouped on the program ribbon (Fig. 11, Fig. 46): devices (marked in blue), ducts (marked in green) and fittings (marked in orange). The difference between them lies in several functionalities discussed later in this manual.



Fig. 46 The fragment of the Ventilation ribbon regarding object insertion

An object is inserted into the model by selecting the appropriate icon (Tab. 1) from the program toolbars (Fig. 11). Then the object insertion window appears (Fig. 47). For each object, the window allows you to select the object's position by defining a grip on its contour or at a characteristic point, and allows the spatial location (e.g. an axis mounting level).

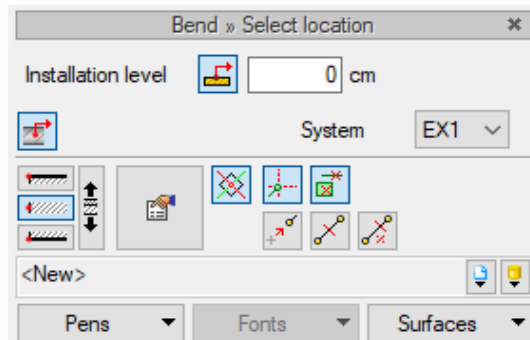


Fig. 47 The object insertion window

After selecting any object, the *3D preview* window is opened (The window can be turned off in the general options (Fig. 9). Unlike the *3D view* window, where an object appears after inserting it in the drawing, in this window the object is visible before insertion (Fig. 48).

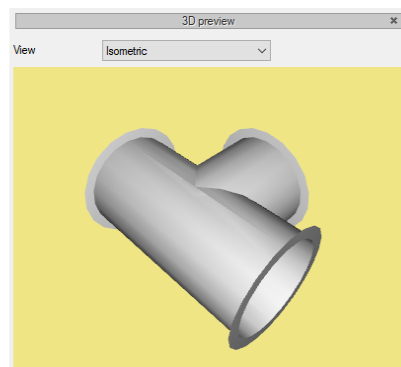
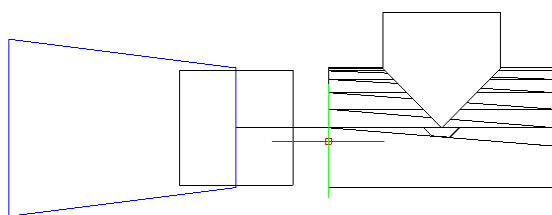


Fig. 48 The 3D preview window – an inserted tee is visible

The user can see any geometry changes he makes in the *Properties* window and can change the view of looking at the object. Additionally, after detecting another object in the drawing, the program shows a possible way of connecting with the object being added (Fig. 49).

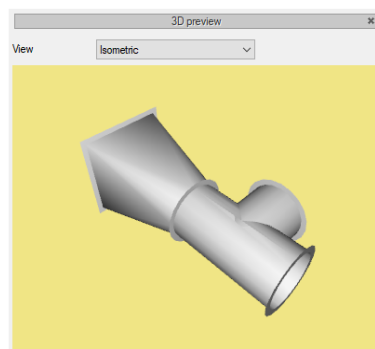
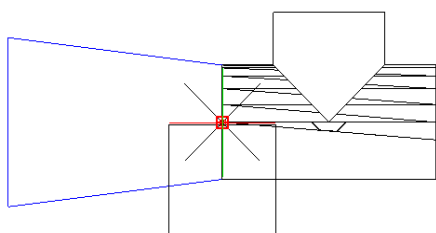


Fig. 49 The 3D preview window – an inserted tee and a connected reducer are visible

If the program does not detect an object, it will not be shown in the *3D Preview* window and the connection will not be made. This can happen when the objects are, for example, on different heights, and the *Installation level – Import from element* option was switched off during insertion, or if the precision value specified in the *Detection* field, in the *Options for inserting elements* window (Fig. 6), is too high.

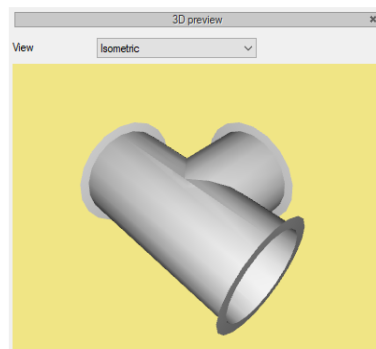
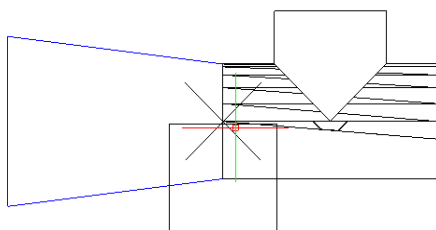





Fig. 50 The 3D preview window – an inserted tee without a reducer detected, is visible


After pressing the  *Import from element* button, the user gets the option of inserting an object, and connecting it at the appropriate height point with the connecting element of another element that has already been inserted in the drawing.


After pressing the  *Import connector parameters from element* button, the user gets the option of inserting an object whose dimensions and a ventilation system match another element that has already been inserted in the drawing.

Inserting objects can be done by “holding” the cursor on the object’s axis or on its edges (seen in a 2D

projection). To change the way in which objects are inserted, use the 3 buttons  defining the top edge, the symmetry axis and the bottom edge, respectively.

When a new object is inserted, the cursor is placed next to one of the connectors. To change the

connector being replaced with the object, click the  symbol. As a result, the connector will “jump” to the next connector. Click the symbol again to make further changes.

The  reference buttons facilitate inserting an object onto a duct in relation to one or two points. Thus:



Reference:

After pressing the button, first indicate the point (question on the command line). The program displays a "ruler", the symbol of the object at the proposed insertion point and the distance of the cursor (in cm) from the indicated reference point. Then we indicate the required insertion point of the object, using the displayed program help and its insertion angle.





Between points (center):

After pressing the button, two points should be indicated in sequence, which the program will use to measure the centre between them and insert an object there. Finally, we indicate its insertion angle.



Between points (percentage):


After pressing the button, first enter the percentage distance from the first indicated point, confirm it by pressing Enter and indicate the first point. The program displays a "ruler" and the symbol of the object at the proposed insertion point and the distance of the cursor (in cm) from the indicated reference point. Then, using the program help displayed, insert a second point at a distance from which the program calculates the percentage position of the object. Finally, we set its insertion angle.

There are also options in the window that help you insert the object precisely. These options are activated by pressing the appropriate buttons of the *tracking function*  or *detecting*  other elements existing in the drawing.

Inserting an object into a drawing can be done in two ways:

5.1.1. Inserting an object into a drawing - the first way

After selecting the appropriate icon from the ArCADia-VENTILATION SYSTEMS toolbar (Fig. 11) and displaying the object insertion window (Fig. 51), you can proceed to editing the object's parameters by

selecting the settings button .

The object insertion window is the same for all objects, with slight differences for insertion handles. Insertion handles are located in relation to the geometry of the inserted object (e.g. centre, top right corner, centre of the left edge, etc.).

Insert window types for objects with insert handles:

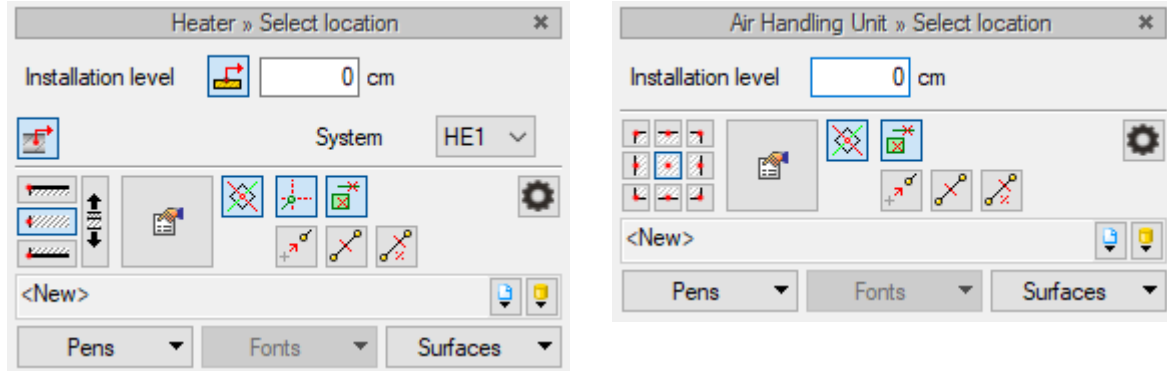



Fig. 51 The insert window types

When the object insertion window is active, its symbol appears in the model drawing area (view). Clicking on a selected place in the drawing area inserts the object.

Elements of the insert window:

Installation level - the user sets the installation level of the characteristic point (e.g. axis, bottom, etc.) of the object relative to the level of the active floor.

Import from element  - if the button is active (highlighted in blue), then clicking on the previously entered element (e.g. vertical duct) will download the installation level of its characteristic points and automatically connecting the inserted element (e.g. tee) at a similar level (e.g. to one end of the vertical duct - below is an example).

Example:

A vertical ventilation duct was inserted, beginning at ordinate 0 and a height of 200cm.

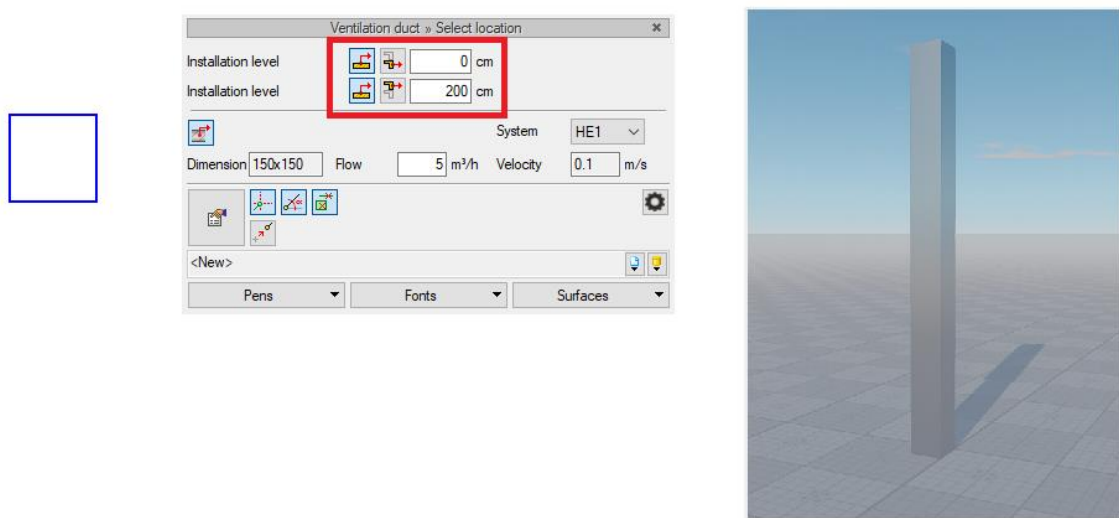


Fig. 52 Sample of inserting a vertical duct

The *Insert Bend* command was selected and 50 cm was entered in the field of the installation level. The *Import connector parameters from element* option was selected. After bringing the bend closer to the duct, there was a change on the window - the installation level field changed to the value taken from the ordinate of the end of the duct, closer to the indicated level 50. If a value in the bend was entered higher than half the height (in this case 100) the bend would be drawn from the upper end of the duct.

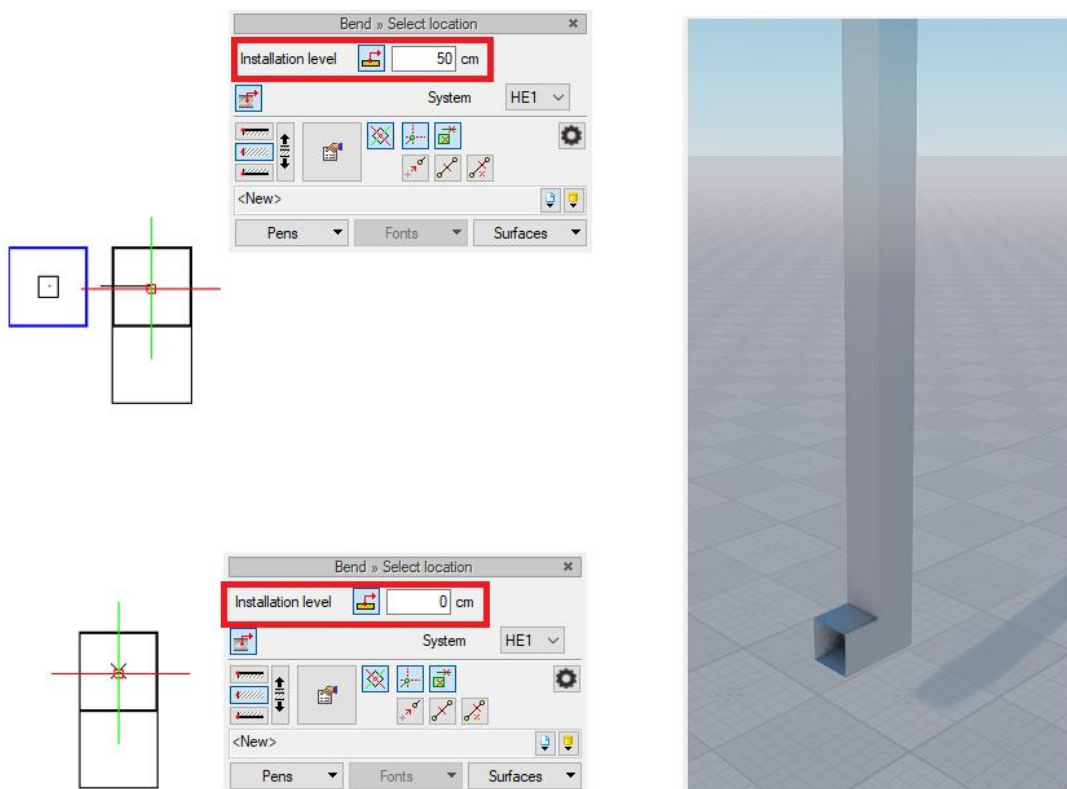



Fig. 53 An example of using the Installation level function, Import from element when inserting the bend to the lower end of the vertical section

[Import connector parameters from element](#)  - if the button is active, then attaching a new element to the inserted one (e.g. we attach the ventilation duct to the tee) will automatically download the ventilation system and characteristic dimensions from the inserted element and assign them to a new element (the ventilation duct will change the dimension and system to adapt to the tee installation - below is an example).

The drawing shows an installation drawn in the HE1 system, with dimensions of 400 x 150. The beginning of a newly designed duct with dimensions of 150x150 in the EX1 system. The drawn ventilation duct has appeared in the 3D view preview window.

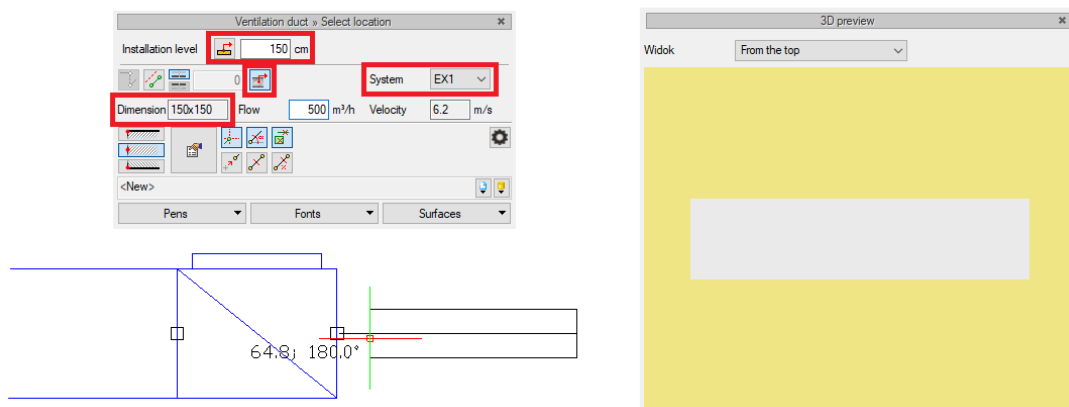


Fig. 54 An example of using the Import connector parameters from element function when connecting a duct to a tee.

With the [Import connector parameters from element](#) function enabled, the duct was brought closer to the tee. The diameter of the duct was automatically changed to fit the tee - 400 x 150 and the ventilation system - HE1. The 3D preview window shows how the connection will be made.

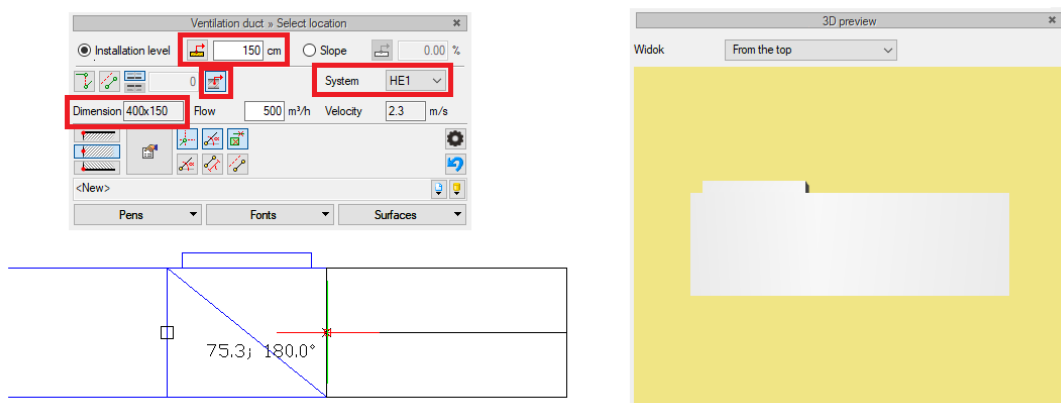


Fig. 55 An example of using the Import connector parameters from element function when connecting a duct to a tee – the effect of the function use.

[Import from element](#) and [Import connector parameters from element](#) should be used with the selected [Element and section detection](#) function.

Tracking (axes or angles) function - allows you to track the ends of a duct sections and objects distant from the path by means of a dashed line appearing on the screen connecting the end of the duct with the detected duct or object.

Element and section Detection function - allows you to precisely and intentionally join an existing element. Detection of an element is signalled by an x-shaped marker appearing on the screen. The detected object will appear in the Preview window of the 3D view.

Object grips - depending on the type of object, allows you to select a point on its outline, which is a grip at the time of insertion.

Go to the Properties dialog box - activates the properties window of the object being inserted.

Reference - inserts the object at a distance from the indicated point, displaying an auxiliary marker - "ruler".

Between points (centre) - inserts the object at the centre of the segment between two indicated points.

Between points (percentage) – inserts the object at a distance given as a percentage of the distance between the two indicated points, calculated from the first point.

Project library / Global library - enables the selection of devices and objects from existing or created type libraries. The following picture shows examples of types of intakes.

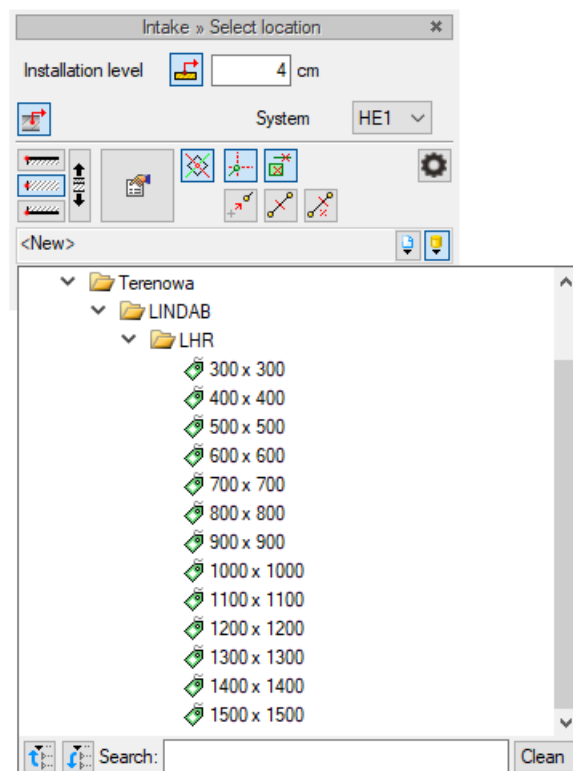



Fig. 56 An example of the intake types available in the program library

Selecting the button  displays the contents of the *Object library* for the current project organised on the basis of successive levels of the type tree.

Selecting the button  rolls up the *Object library* rows to the basic level:

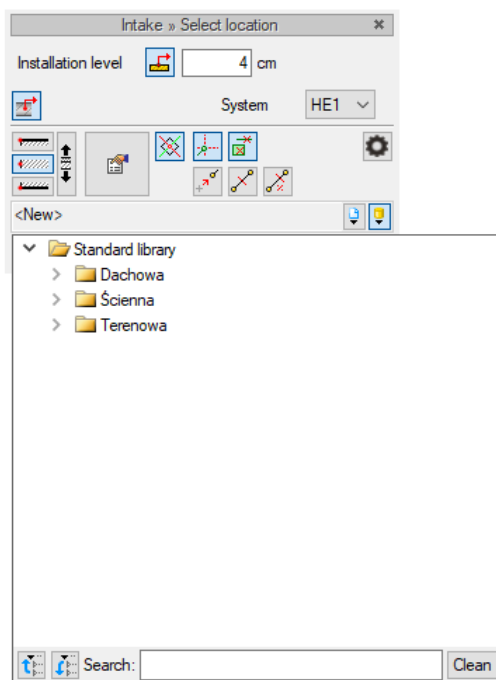



Fig. 57 An example of a rolled-up type tree in the intake library window

5.1.1. Inserting an object into a drawing - the second way

After selecting the appropriate icon from the ArCADia-VENTILATION SYSTEMS toolbar (Fig. 11), insert the object symbol using the object location function and complete the insertion operation. Then, after selecting the inserted object, use the displayed object modification window (Fig. 58). In

the next step, edit the object parameters (as in the first step) by selecting the settings button .

5.2. Object modification

5.2.1. The modification window and the properties window

The object modification window allows you to choose the type of changes in drawing elements and to set parameters for objects after selecting from a given type of object from the libraries included in the program.

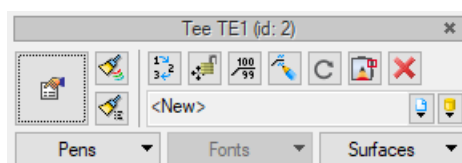














Fig. 58 The object modification window, general view.

Options available in the object modification window

Icon	Description
	Go to Properties dialog box
	Fonts and pen painter
	Type painter
	Insert description
	Connector editor
	Rotation of the object
	Object renumbering (displayed in the object properties)
	Move with connections
	Move without connections
	Delete marked objects
	Global library
	Project library

For each object there may be icons specific to it (the field of additional icons depending on the object), enabling the introduction of appropriate changes intended only for a given group of objects. The number and type of icons may be different for a given group of objects.

5.3. Object properties

Going to editing the object parameters (in the properties window) allows for selecting the button



in the modification window. The object properties dialog box will be displayed to allowing you to set object parameters. Below is the version of the properties window with the control groups rolled up. Expanding them is done by clicking the beam with the group name at the selected point.

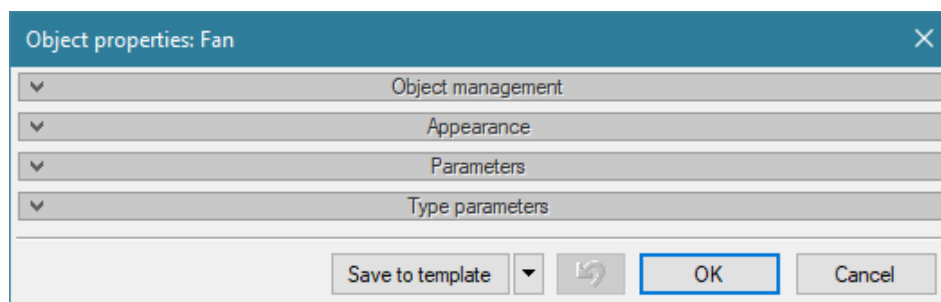
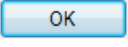


Fig. 59 The properties window with control groups not shown (rolled up)

After making the settings, press the OK button , which will return to the object insertion window and click the object symbol (attached to the cursor) to the selected place in the drawing field. The procedure of such object insertion remembers parameter settings as well as fonts, pens and surfaces for each subsequent object from the same group.

Object properties windows are divided individually for each object into groups of controls:

The screenshot shows the 'Object properties: Fan *' window with the following sections:

- Object management:** Symbol (WENT1), Element ID (1), Type (<New>), Group (<None>), System (HE1).
- Appearance:** Object rotation icon, Order number (0), Show connector colours checkbox, Pens, Fonts, Surfaces dropdowns.
- Parameters:** Installation level (0 cm), Additional equipment dropdown.
- Type parameters:** Name (Duct fan), Standard/Producer, Type/Series type, Shape (Cuboid), Width (200 mm), Depth (150 mm), Height (150 mm), Shape table, Performance (400 m³/h), Static pressure (0 Pa), Acoustic power dropdown.
- Electrical parameters:** Phases (I), Voltage (230 V), Frequency (50 Hz), Power (170 W), Current consumed (1.0 A).
- Additional description:** Text input field.
- Buttons:** Save to template, OK, Cancel.

Fig. 60 The element properties window, general view

5.3.1. Control group - Element management

The set of controls contained in this group is the same (or very similar) for all system objects contained in the program.

Symbol - the default designation and object number displayed on the view are user-changeable. If the user does not make any changes in the active window, the name will be generated from the **Options** window.

Element id - number of the subsequent inserted element of a given type.

Type - allows you to enter objects with common parameters into the project library and then select these objects to use in the project.

Group - common for each of the objects. Allows grouping of selected objects and introduction to the **Project Manager**.

System - the ventilation system defined in the project options to which the element will be assigned. After introducing the element with the assigned ventilation system into the drawing, the given system will appear in the **Project Manager**.

5.3.2. Control group - *Appearance*

The set of controls contained in this group is the same (or very similar) for all the industry objects contained in the program.

Pens - set the thickness of the contour drawing lines of the model and 3D view.

Fonts - set the font format of the name displayed in the drawing views.

Surfaces - sets the colours and patterns of surfaces visible on 3D view.

Object rotation - selecting this command opens a window that allows defining any object rotation in space (Fig. 67).

Order number - after numbering the installation, each element in the system will receive its individual number. The number assigned by the program will be displayed here, and can be edited by the user.

Show connector colours - ticking this box results in the appearance in the drawing and 3D view of connector colours defined in the *Connector Editor*. This will facilitate the identification of individual inlets/outlets at the design stage.

5.3.2.1. The Object view

On the left side of the object view there are buttons that toggle the type of view in the view window:



Fig. 61 The object view in the properties window




Overview Drawing



Projection view



3D view

After selecting the 3D view option, an additional icon  will appear below the buttons (Fig. 63). It is used to *change 3D object appearance* - from the default to any selected by the user from the *3D Object library* (4.5).

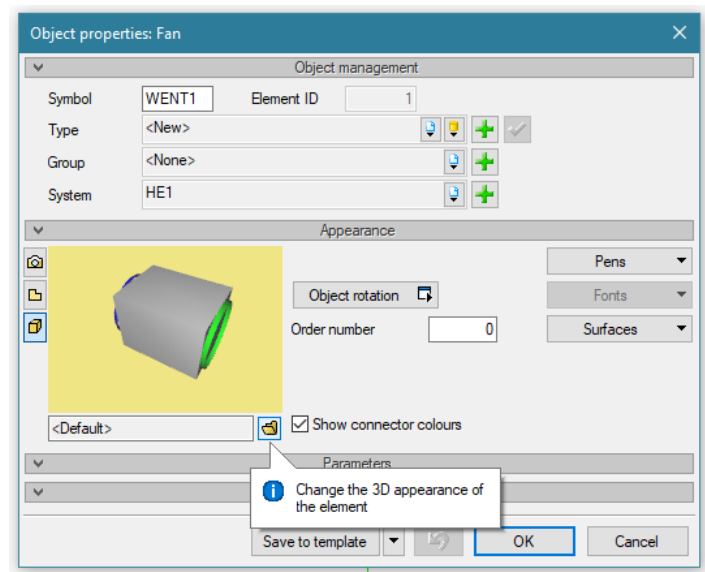



Fig. 62 Changing the appearance of the object in the object's properties window

To change the appearance of an object click the icon . This will open the *3D object library* from which the user can select any object. The objects entered by the user are located in the *User Library* folder. After selecting the appropriate object, confirm your choice with the *OK* button.

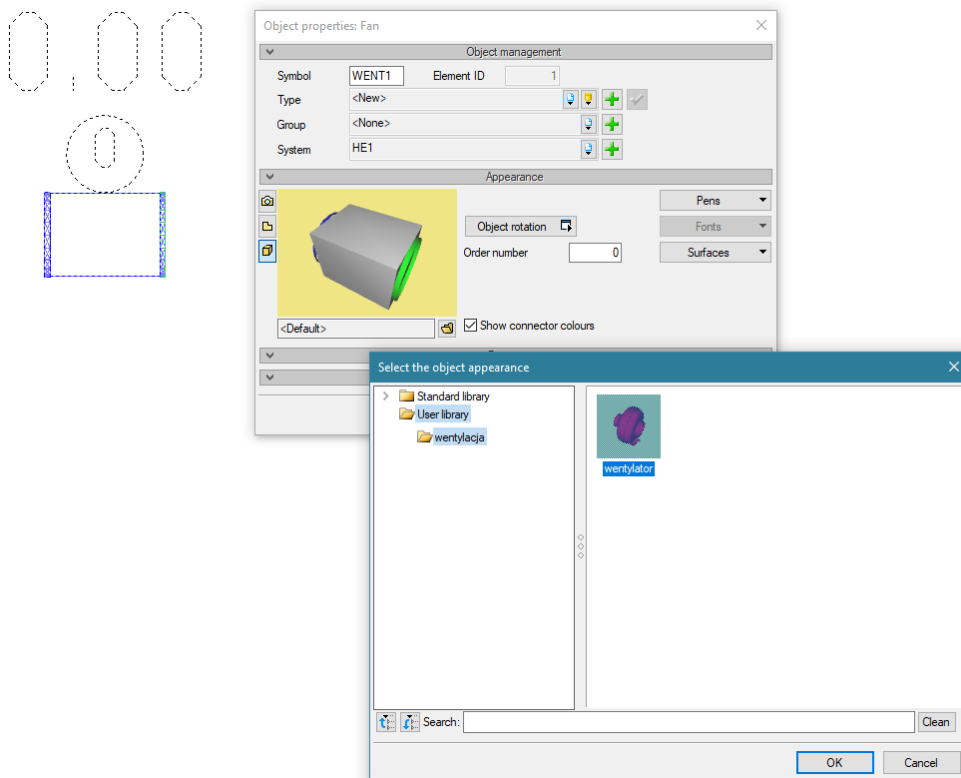


Fig. 63 Window for selecting an element's new appearance

Instead of a default shape, the entered object will appear in the window.

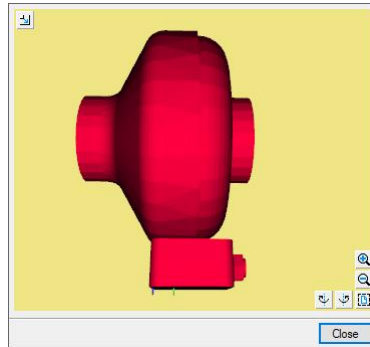


Fig. 64 The enlarged object view window

Hovering over the 3D view, additional icons appear that allow you to change and rotate the view of the element (Fig. 64):

Description of icons changing the 3D view.

Icon	Description
	Zoom in
	Zoom out
	Rotate left
	Rotate right
	Show all in default position
	Enlarge window

If an object has a different shape than the default one, an additional icon appears on the window (Fig. 65). After choosing it, the selected 3D object view is unloaded and the default element view is restored.

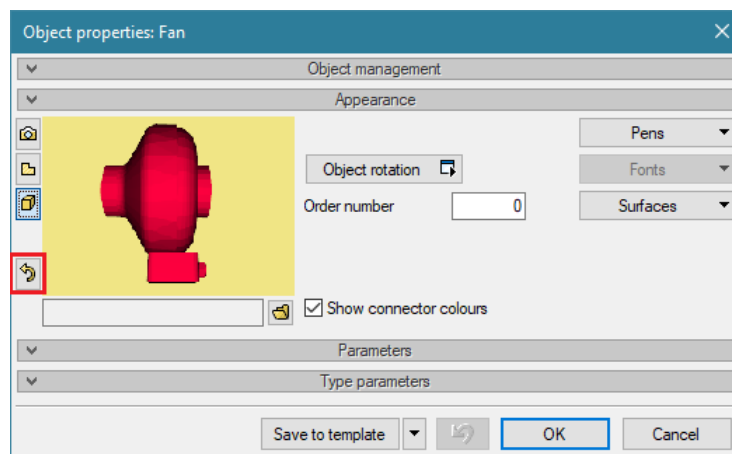


Fig. 65 The element appearance window after changing the appearance of the object

In the view, the 2D appearance of the object (Fig. 66) will be consistent with the view created on the basis of the 3D view (3.5.1).

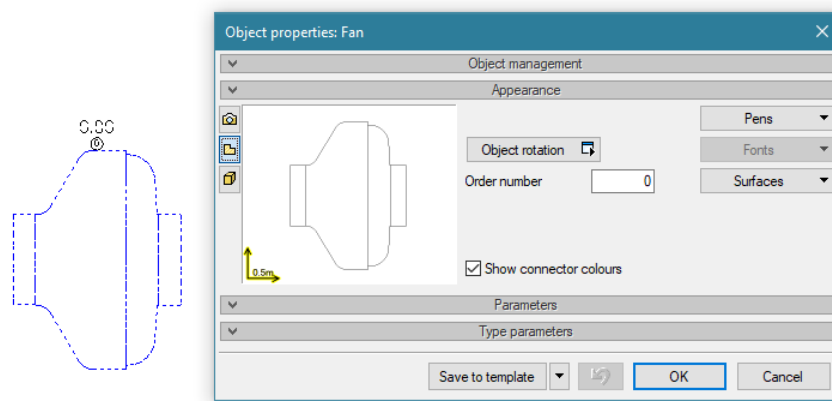


Fig. 66 The appearance of the object and its properties window after changing the appearance of the object – 2D view.

Despite the change in the appearance of the object, the defined connectors remain in the default position. In order to adapt the connectors to the new object, use the [Connector editor 4.6](#) command.

Changes to the appearance of the objects can only be made for the following elements: ventilation devices and free fittings.

5.3.2.2. Object rotation

The [Object rotation](#) command can be invoked from the object properties window (Fig. 67.) or from the object modification window after selecting the element inserted in the drawing.

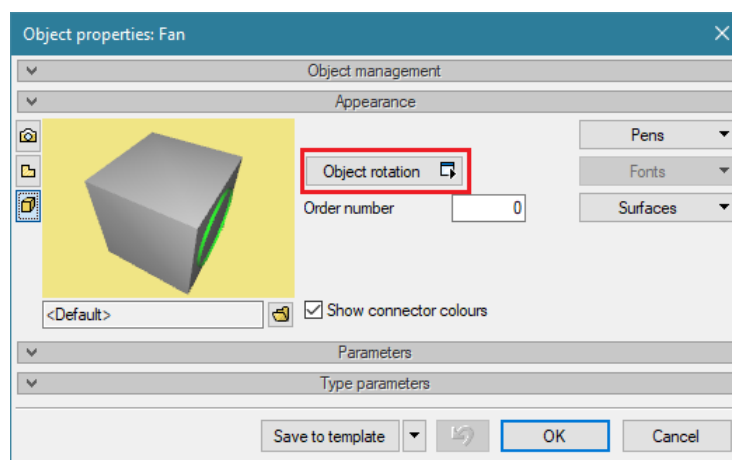


Fig. 67 Properties window with the object rotation button

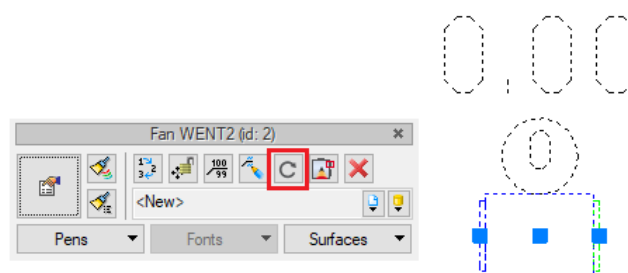


Fig. 68 Modification window with the object rotation button

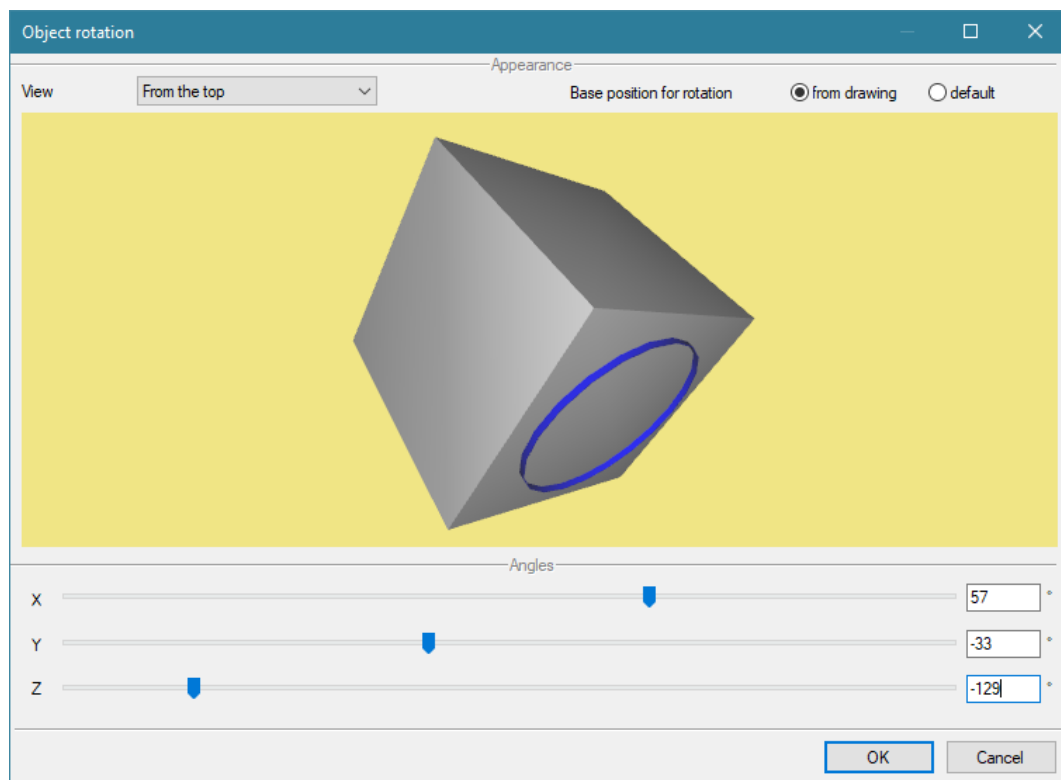


Fig. 69 The object rotation window

Rotation can be defined by moving the sliders rotating the object around the X, Y, Z axis or by entering the exact value of the rotation angle. After defining the required rotation and confirming it with the OK button, you will be returned to the properties window in which the object will be visible in a different position. Inserting an object into the drawing saves the defined rotation. The starting position for defining the next rotation of the object is the current position in the drawing (after reopening the rotation window we will see the object in a position exactly mapped from the drawing, but the sliders will be in the initial position 0.0.0). In the upper right corner it is possible to reset all rotations made on the element by checking the option: *Base position for rotation - default*.

5.3.3. Control group - *Parameters*


A set of controls common to all objects. Allows you to set assembly parameters that define the location of the object and additional equipment. Some objects in this group have an additional field with data only for a given type of object (e.g. fire resistance class for fire damper).




Installation level - the user sets the installation level of the characteristic point of the object relative to the level of the active story.

Additional equipment - for most objects there is a button opening the table that allows you to enter additional equipment whose elements should be included in the List of materials.

The screenshot shows a software interface for configuring equipment parameters. The main 'Parameters' window has several sections: 'Installation level' (55 cm), 'Type parameters' (Name: Duct fan, Standard/Producer, Type/Series type, Shape: Cuboid, Width: 400 mm, Depth: 400 mm), 'Performance' (400 m³/h, Static pressure: 0 Pa, Acoustic power), and 'Electrical parameters' (Phases: I, Voltage: 230 V, Frequency: 50 Hz, Power: 170 W, Current consumed: 1.0 A). An 'Additional equipment' window is overlaid, showing a table with columns 'It...', 'Name', 'Unit', and 'Qua...'. It contains one entry: '1 Gasket' with unit 'pcs' and quantity '1.00'. The window has a '+' icon to add new items, a '-' icon to delete, and up/down arrows to reorder.

Fig. 70 The additional equipment window

With the sign  the user has the option of adding the appropriate element from the drop-down list. At the same time, you can enter your own entry in the table cell, correcting the unit and quantity.

The sign  deletes the selected position. The arrows   change the order of the selected element.

5.3.4. Group of controls - *Type parameters*

A set of controls individual for each of the objects. It enables setting parameters specifying a given object, e.g. technical and geometric parameters (diameter, material, type of connection, manufacturer, etc.).

The common field for every object:

Name - the name of the object taken from the *Type library* or entered by the user to define a new object type.

Standard/Producer - taken from the *Type library* or entered by the user to define a new object type.

Type/Series type - taken from the *Type library* or entered by the user to define a new object type.

Shape - selected by the user from the drop-down window out of 2 available: cuboid, cylinder.

Width/Depth/Height - figures related to dimensions, entered by the user in the units given next to the field.

Connectors' parameters - table with parameters of individual object connectors.

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Circular	200			Zero	10.0	
Rectangular		125	125	Female	10.0	
Rectangular		125	125	Male	10.0	
Circular	200			Flange	10.0	10.0

Fig. 71 The properties window - table with connector parameters

Sound power - after clicking the button a window will open, in which you should enter the sound power generated by the object broken down for medium octave frequencies.

Frequency [Hz]	Acoustic pow...	Silencing [dB]
63	0.00	0.00
125	0.00	0.00
250	0.00	0.00
500	0.00	0.00
1000	0.00	0.00
2000	0.00	0.00
4000	0.00	0.00
8000	0.00	0.00

Close

Fig. 72 Window for defining the sound power in medium octave frequencies

Additional description - the user enters additional data specifying the object and, when selecting the *Description* line in the list components which one will be moved to the list of materials.

Group of controls (saving or cancelling) the entry

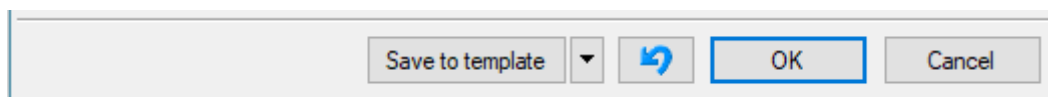



Fig. 73 Save/cancel buttons

Save to template - allows you to save the default object type for a given template . - A button to restore the initial settings.

OK - confirm and make changes.



Cancel - cancel changes and return to the previous window.

5.3.5. Add elements to the type library

The *Standard library* based on manufacturers' catalogues has been attached to the program for most objects. These are locked sets. If the user changes any parameter in the type of a given element from

the *Standard library*, after saving the type it will already be in the *User library*. You can also add new types and type catalogues this way and they will be located in the *User library*.

The program contains a *Global library* and a *Project library* (3.8) in the *Type Library Editor*.

The library contents can be previewed using the *Project library*  (current drawing) button or using the icon .

Adding to the library is done by defining fields in the *Type Parameters* group of controls.

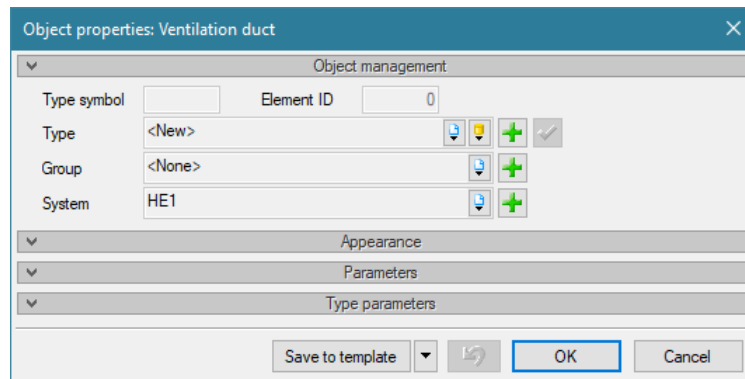

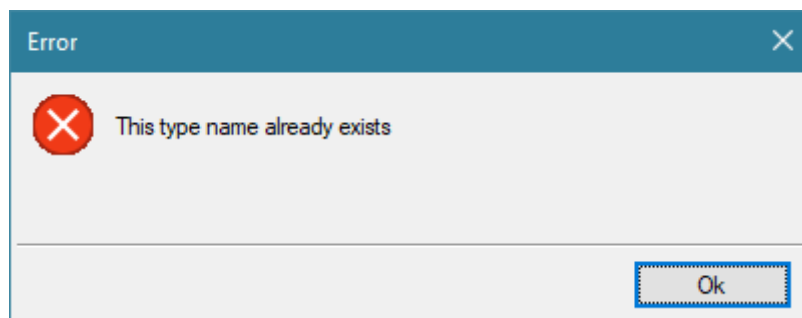


Fig. 74 Adding elements to the library

Then, using the button , we open the window for adding types and enter the name under which the object with the specified parameters will be saved.

After changing any *Type Parameter*, the following entry will appear in the *Type* field (in the *Object management* control group) : '<New based on ...>'. The element type will work under this name until you save it under its own name in any library.

If the user wants to add a file to the *Project library* with the same name as the existing one, the following message will appear:



The name of the newly introduced type should be then changed.

5.3.1. Type tree

A type tree is a way to organize and arrange elements in libraries.

Organization based on the type tree principle consists of defining object names with the use of broadening name segments gradually at subsequent levels in order to easier find the appropriate element and apply it in the project.

Entering an element into the *Project library* from the object level (properties window) consists of defining the name of the type divided into levels of the broadening using the sign "/" (slash), which results in its appropriate location in the tree levels.

Below is an example of the name given to the water meter and how to find an element in the tree:

Type name: **Wall/for circular ducts/D160**

Fig. 75. Shows the location in the tree

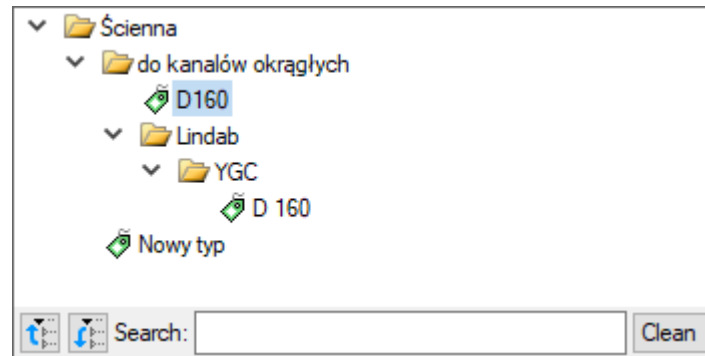






Fig. 75 An expanded type tree.

At the bottom of the window with the type tree, there is the bar which facilitates finding elements   Search:  , and the button  , which allows you to roll-up the list to the elements of the first division, as below:

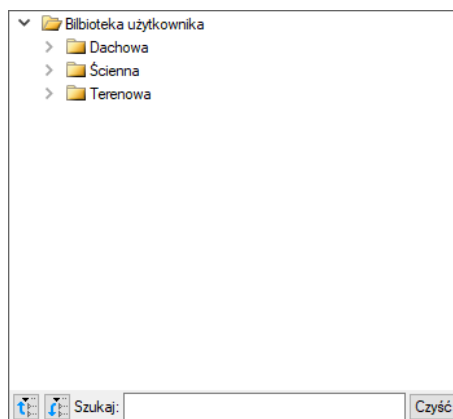






Fig. 76 A rolled-up type tree

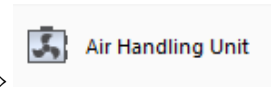
The button  is used to wipe the field   Search: .

6. VENTILATION DEVICES

6.1. The Air Handling Unit

Activation:

- *Ventilation* ribbon ⇒ Logical group *Ventilation systems* ⇒



The object insertion window is activated.

The window also allows the use of the *Project Library* or the *Global Library*. From the drop-down list of a given library, the user can choose a sample type of ventilation unit and apply it to the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (view). Clicking on a selected place in the drawing area inserts the object.



By selecting the button or by a double click on the inserted element, the properties window is activated.

6.1.1. The properties window

Object properties: Air Handling Unit

Object management

Symbol: CW1 Element ID: 0

Type: <New>

Group: <None>

System: <None>

Appearance

Object rotation: [Icon]

Order number: 0

☒ Show connector colours

Parameters

Installation level: 0 cm

Air flow intake: <Unknown> m³/h ☒ Automatically

Air flow exhaust: <Unknown> m³/h ☒ Automatically

Type parameters

Name: Supply/Exhaust AHU

Standard/Producer:

Type/Series type:

Shape: Cuboid

Width: 800 mm Depth: 325 mm Height: 560 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Circular	125			Female	10.0	
Circular	125			Female	10.0	
Circular	125			Female	10.0	
Circular	125			Female	10.0	

Air supply efficiency: 400 m³/h Air exhaust efficiency: 400 m³/h

Air supply available compression: 150 Pa Exhaust available compression: 150 Pa

Acoustic power:

Electrical parameters

Phases: I Voltage: 230 V Frequency: 50 Hz

Power: 170 W Current consumed: 1.0 A

Additional description:

Save to template: [Icon] OK Cancel

Fig. 77 The Air Handling Unit properties window

In the object properties window of the *Air Handling Unit*, the appearance is set in a way that reflects it on the View, as well as installation and technical parameters necessary to perform calculations later on in the project.

Control group: *Appearance* (Błąd! Nie można odnaleźć źródła odwołania.)

Object rotation

Show connector colours
Order number

Control group: *Parameters* (Błąd! Nie można odnaleźć źródła odwołania.)

Installation level

Air flow intake, [m³/h] – the amount of air drawn in by a given air handling unit, supplemented by the user or calculated automatically on the basis of the project after selecting the option *Automatically*

Air flow exhaust, [m³/h] – the amount of air ejected by a given air handling unit, supplemented by the user or calculated automatically on the basis of the design after selecting option *Automatically*

Additional equipment

Control group: *Type parameters* (Błąd! Nie można odnaleźć źródła odwołania.)
(Błąd! Nie można odnaleźć źródła odwołania.)

Name - By default, 3 types of ventilation units are defined - supply/exhaust air handling unit, supply air handling unit, exhaust air handling unit.

Standard/Producer

Type/Series type

Shape

Width/Depth/Height

Air supply efficiency, [m³/h] - the assumed amount of air blown by a given air handling unit, supplemented by the user or downloaded from the *Type library*. At the stage of making calculations, this value is compared by the program with the calculated value resulting from the assumptions made in the drawing.

Air exhaust efficiency [m³/h] – the assumed amount of exhaust air by a given air handling unit, supplemented by the user or downloaded from the *Type library*. At the stage of making calculations, this value is compared by the program with the calculated value resulting from the assumptions made in the drawing.

Air supply available compression [Pa] – the assumed external air supply compression for a given air handling unit, supplemented by the user or downloaded from the *Type library*. At this stage of making calculations, this value is compared by the program with the calculated value resulting from the assumptions made in the drawing.

Exhaust air compression [Pa] – the assumed available exhaust air compression for a given air handling unit, supplemented by the user or downloaded from the *Type library*. At this stage of making calculations, this value is compared by the program with the calculated value resulting from the assumptions made in the drawing.

Connector parameters

Sound power

Electrical parameters - the user has the option of defining the electrical parameters supplying a given device - Phases, Voltage, Frequency, Power, and Current drawn.

6.2. The Fan

Activation:


- *Ventilation* ribbon ⇒ Logical group *Ventilation systems* ⇒



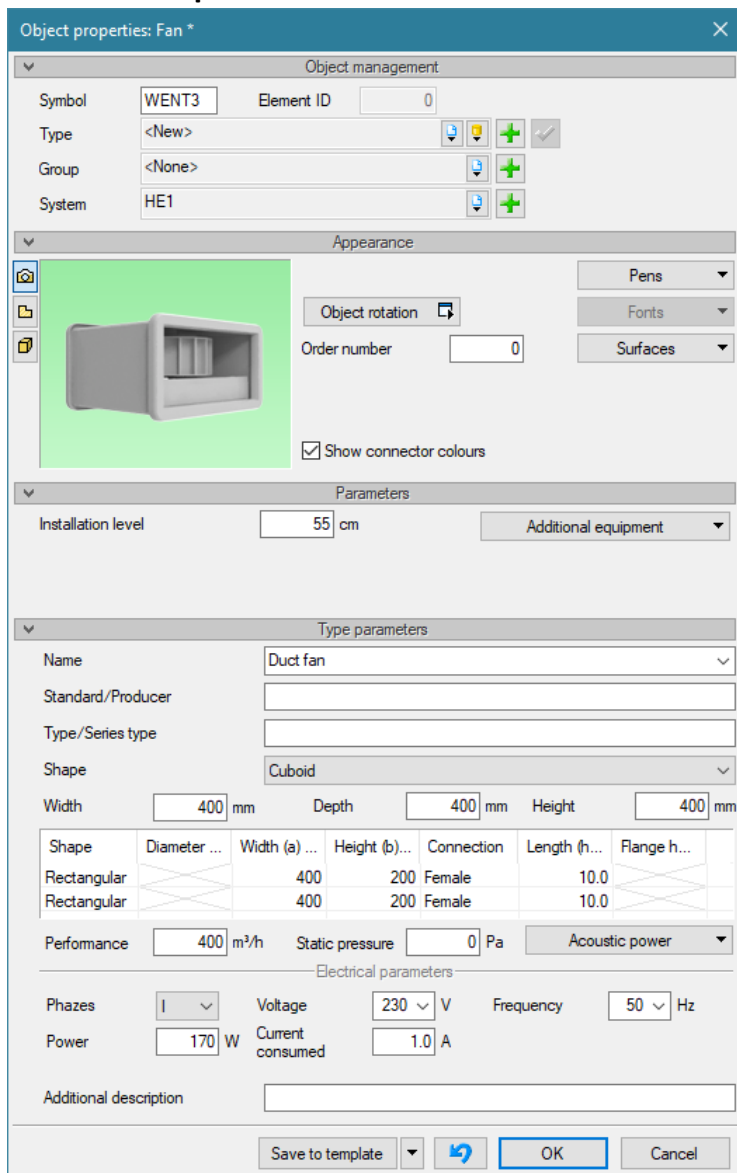
The object insertion window is activated.

The window also allows the use of [Project Library](#) or the [Global Library](#). From the drop-down list of a given library, the user can choose a sample type of ventilation unit and apply it to the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (view). Clicking on a selected place in the drawing area inserts the object.

By selecting the button  or by a double click on the inserted element, the properties window is activated.

6.2.1. The Properties window



Object properties: Fan *

Object management

Symbol: WENT3 Element ID: 0

Type: <New>

Group: <None>

System: HE1

Appearance

Object rotation: [Icon]

Order number: 0

☒ Show connector colours

Parameters

Installation level: 55 cm

Type parameters

Name: Duct fan

Standard/Producer:

Type/Series type:

Shape: Cuboid

Width: 400 mm Depth: 400 mm Height: 400 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Rectangular		400	200	Female	10.0	
Rectangular		400	200	Female	10.0	

Performance: 400 m³/h Static pressure: 0 Pa

Electrical parameters

Phases: I Voltage: 230 V Frequency: 50 Hz

Power: 170 W Current consumed: 1.0 A

Additional description:

Save to template [Icon] OK Cancel

Fig. 78 The Fan properties window

In the object properties window of the [Fan](#), the appearance is set in a way that reflects it on the View, as well as installation and technical parameters necessary to perform calculations later in the project.

Control group: [Appearance](#) (Błąd! Nie można odnaleźć źródła odwołania.)

[Object rotation](#)

[Show connector colours](#)

[Order number](#)

Control group: [Parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.)

[Installation level](#)

[Air flow intake](#), [m³/h] – the amount of air drawn in by a given air handling unit, supplemented by the user or calculated automatically on the basis of the project after selecting option [Automatically](#)

[Air flow exhaust](#), [m³/h] – the amount of air ejected by a given air handling unit, supplemented by the user or calculated automatically on the basis of the design after selecting option [Automatically](#)

[Additional equipment](#)

Control group: [Type parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.)

[Name](#) - by default, 5 types of fans are defined: duct, plate mounted, domestic, roof and radial. The choice of fan type determines the number of connectors that is defined by default for this device. The following are defined:

- 2 connectors for the duct fan;
- 1 connector for the domestic, roof and radial fan
- The plate mounted fan has no connectors.

[Standard/Producer](#)

[Type/Series type](#)

[Shape](#)

[Width/Depth/Height](#)

[Performance](#), [m³/h] - the assumed amount of air forced through a given fan, supplemented by the user or taken from the [Type library](#). At the stage of making calculations, this value is compared by the program with the calculated value resulting from the assumptions made in the drawing.

[Compression](#)- [Pa] – the assumed external static pressure for a given fan, supplemented by the user or taken from the [Type library](#). At the stage of making calculations, this value is compared by the program with the calculated value resulting from the assumptions made in the drawing.

[Connectors' parameters](#)

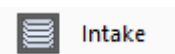
[Sound power](#)

[Electrical parameters](#) - the user has the option of defining the electrical parameters supplying a given device - Phases, Voltage, Frequency, Power, and Current drawn.

6.3. The Intake


Activation:

- [Ventilation](#) ribbon ⇒ Logical group [Ventilation systems](#) ⇒



The object insertion window is activated.

The window also allows the use of the Project [Library](#) or the [Global Library](#). From the drop-down list of a given library, the user can choose a sample type of intake and apply it to the project. When the connection point insertion window is active, its symbol appears in the drawing field of the model (view). Clicking on a selected place in the drawing area inserts the object.

By selecting the button  or by a double click on the inserted element, the properties window is activated.

6.3.1. The properties window

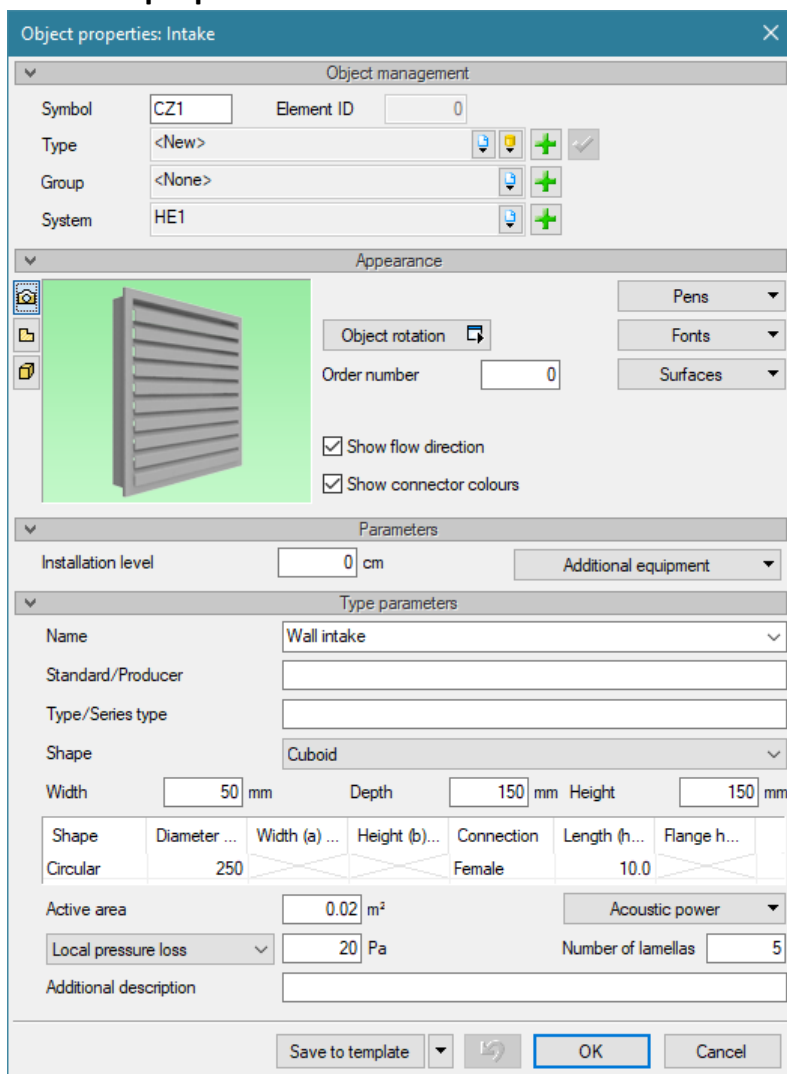


Fig. 79 The Intake properties window

In the object properties window of the [Intake](#), the appearance is set in a way that reflects it on the view, as well as the installation and technical parameters necessary to perform calculations later in the project.

Control group: [Appearance](#) (Błąd! Nie można odnaleźć źródła odwołania.)

Object rotation

Show connector colours

Show flow direction - inserts on the view a drawing of arrows consistent with the air flow direction and the amount of air flow in [m³/h].

Order number

Control group: [Parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.)

Installation level

Additional equipment

Control group: [Type parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.)

Name - By default, 3 types of intakes are defined: roof, external, wall

Standard/Producer

Type/Series type

Shape

Width/Depth/Height

Active area - the real surface of free air flow, supplemented by the user or downloaded from the type library.

Local pressure loss – the pressure loss on an element determined in Pa, completed by the user or downloaded from a type library. This value is included in the calculations.

Number of lamellas - a number specifying the quantity of elements obstructing the inlet.

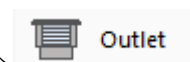
Connectors' parameters

Sound power

6.4. The Outlet

Activation:

- [Ventilation](#) ribbon ⇒ Logical group [Ventilation systems](#) ⇒




The object insertion window is activated.

The window also allows the use of the [Project Library](#) or the [Global Library](#). From the drop-down list of a given library, the user can choose a sample type of outlet and use in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (view). Clicking on a selected place in the drawing area inserts the object.



By selecting the button  or by a double click on the inserted element, the properties window is activated.

6.4.1. The properties window

Object properties: Outlet

Object management

Symbol: WYZ1 Element ID: 0

Type: <New>

Group: <None>

System: HE1

Appearance

Object rotation

Order number: 0

☒ Show flow direction

☒ Show connector colours

Parameters

Installation level: 0 cm Additional equipment

Type parameters

Name: Wall outlet

Standard/Producer

Type/Series type

Shape: Cuboid

Width: 50 mm Depth: 150 mm Height: 150 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Rectangular		300	300	Female	10.0	

Active area: 0.02 m² Acoustic power

Local pressure loss: 20 Pa Number of lamellas: 5

Additional description

Save to template OK Cancel

Fig. 80 The Outlet properties window

Control group: [Appearance](#) (Błąd! Nie można odnaleźć źródła odwołania.)

Object rotation

Show connector colours

Show flow direction - inserts on the view a drawing of arrows consistent with the air flow direction and the amount of air flow in [m³/h].

Order number

Control group: [Parameters](#) (Błąd! Nie można odnaleźć źródła odwołania..)

Installation level

Additional equipment

Control group: [Type parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.)

Name - By default, 3 types of the outlet are defined: roof, external, wall

Standard/Producer
Type/Series type
Shape
Width/Depth/Height

Active area - the real surface of free air flow, supplemented by the user or downloaded from the *Type library*.


Local pressure loss – the pressure loss on an element determined in Pa, completed by the user or downloaded from a *Type library*. This value is included in the calculations.

Connectors' parameters

Sound power

6.5. The Intake ventilator


Activation:

- *Ventilation* ribbon ⇒ Logical group *Ventilation systems* ⇒ 

The object insertion window is activated.

The window also allows the use of the *Project Library* or the *Global Library*. From the drop-down list of a given library, the user can choose a sample type of the intake ventilator and use it in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (view). Clicking on a selected place in the drawing area inserts the object.

By selecting the button  or by a double click on the inserted element, the properties window is activated.

6.5.1. The properties window

Object properties: Intake ventilator

Object management

Symbol: NA1 Element ID: 0

Type: <New>

Group: <None>

System: HE1

Appearance

Object rotation

Order number: 0

☒ Show flow direction

☒ Show connector colours

Parameters

Installation level: 0 cm

Air supply volume: 0 m³/h ☒ From room

Room: <not assigned>

Type parameters

Name: Ventilation grille

Standard/Producer:

Type/Series type:

Shape: Cuboid

Width: 20 mm Depth: 150 mm Height: 150 mm

Shape: Rectangular Diameter ... Width (a) ... Height (b) ... Connection Length (h) ... Flange h ...

170 270 Female 10.0

Local pressure loss: 20 Pa

Acoustic power:

Additional description:

Save to template OK Cancel

Fig. 81 The Intake ventilator properties window

Control group: [Appearance](#) (Błąd! Nie można odnaleźć źródła odwołania.)

[Object rotation](#)

[Show connector colours](#)

[Show flow direction](#) - inserts on the view a drawing of arrows consistent with the air flow direction and the amount of air flow in [m³/h].

[Order number](#)

Control group: [Parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.)

[Installation level](#)

[Air supply volume](#) - the user sets the amount of air flowing through the element. After selecting the [From room](#) option, the amount of air will be assigned based on information from the Room. In the case of more than one element in a room, the amount of air will be evenly distributed between them, rounded to 5 m³ / h.

[Additional equipment](#)

Błąd! Nie można odnaleźć źródła odwołania.Control group: [Type parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.)

Name - By default, 3 types of the intake ventilators are defined: ventilation grille, intake, line intake ventilator, and diffuser

Standard/Producer

Type/Series type

Shape

Width/Depth/Height


Local pressure loss – the pressure loss on an element determined in Pa, completed by the user or downloaded from a *Type library*. This value is included in the calculations.

Connectors' parameters

Sound power


6.6. The Uptake ventilator

Activation:

- *Ventilation* ribbon ⇒ Logical group *Ventilation systems* ⇒ 

The object insertion window is activated.

The window also allows the use of the *Project Library* or the *Global Library*. From the drop-down list of a given library, the user can choose a sample type of the uptake ventilator and use it in the project. When the connection point insertion window is active, its symbol appears in the drawing field of the model (view). Clicking on a selected place in the drawing area inserts the object.

By selecting the button  or by a double click on the inserted element, the properties window is activated.

6.6.1. The properties window

Object properties: Uptake ventilator

Object management

Symbol: WY1 Element ID: 0

Type: <New>

Group: <None>

System: HE1

Appearance

Object rotation

Order number: 0

☒ Show flow direction

☒ Show connector colours

Parameters

Installation level: 0 cm

Air exhaust volume: 5 m³/h ☒ From room

Room: <not assigned>

Type parameters

Name: Diffuser

Standard/Producer:

Type/Series type:

Shape: Cuboid

Width: 20 mm Depth: 150 mm Height: 150 mm

Shape: Circular Diameter: 100 Width (a): Height (b): Connection: Female Length (h): 10.0 Flange h:

Local pressure loss: 20 Pa

Acoustic power:

Additional description:

Save to template OK Cancel

Fig. 82 The Uptake ventilator properties window

Control group: [Appearance](#) (Błąd! Nie można odnaleźć źródła odwołania.)

[Object rotation](#)

[Show connector colors](#)

[Show flow direction](#) - inserts on the view a drawing of arrows consistent with the air flow direction and the amount of air flow in [m³/h].

[Order number](#)

Control group: [Parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.)

[Installation level](#)

[Air exhaust volume](#) - the user sets the amount of air flowing through the element. After selecting the [From room option](#), the amount of air will be assigned based on information from the Room. In the case of more than one element in a room, the amount of air will be evenly distributed between them, rounded to 5 m³/h.

[Additional equipment](#)

Control group: [Type parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.)

Name - By default, 2 types of the uptake ventilators are defined: ventilation grille, diffuser

Standard/Producer

Type/Series type

Shape

Width/Depth/Height


Local pressure loss – the pressure loss on an element determined in Pa, completed by the user or downloaded from a type library. This value is included in the calculations.

Connectors' parameters

Sound power

6.7. The Heater


Activation:

- *Ventilation* ribbon ⇒ Logical group *Ventilation systems* ⇒  **Heater**

The object insertion window is activated.

The window also allows the use of the *Project Library* or the *Global Library*. From the drop-down list of a given library, the user can choose a sample type of the heater and apply it to the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (view). Clicking on a selected place in the drawing area inserts the object.





By selecting the button  or by a double click on the inserted element, the properties window is activated.



6.7.1. The properties window



Object properties: Heater

Object management

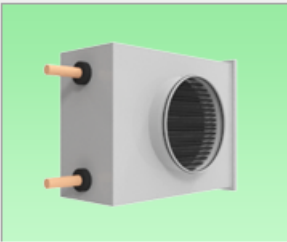
Symbol Element ID


Type    

Group  

System  


Appearance





Object rotation 

Order number

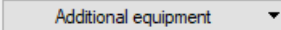
☒ Show connector colours

Pens 

Fonts 

Surfaces 

Parameters

Installation level cm 

Type parameters

Name

Standard/Producer

Type/Series type

Shape



Width mm Depth mm Height mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Circular	125			Female	10.0	
Circular	125			Female	10.0	

Electrical parameters

Phases Voltage V Frequency Hz

Power W Current consumed A

Local pressure loss  Pa 

Additional description



Save to template  

Fig. 83 The Heater properties window

Control group: [Appearance](#) (Błąd! Nie można odnaleźć źródła odwołania.)

[Object rotation](#)

[Show connector colours](#)

[Order number](#)

Control group [Parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.) Control group [Parameters](#)

[Installation level](#)

Additional equipment

Control group [Type parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.Błąd! Nie można odnaleźć źródła odwołania.)

Name - By default, 3 types of the heaters are defined: electric, water, water cooler

Standard/Producer

Type/Series type

Shape

Width/Depth/Height

Local pressure loss – the pressure loss on an element determined in Pa, completed by the user or downloaded from a [Type library](#). This value is included in the calculations.

Connectors' parameters

Sound power

6.8. The filter


Activation:

- [Ventilation](#) ribbon ⇒ Logical group [Ventilation systems](#) ⇒  **Filter**

The object insertion window is activated.

The window also allows the use of the [Project Library](#) or the [Global Library](#). From the drop-down list of a given library, the user can choose a sample type of the filter and apply it to the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (view). Clicking on a selected place in the drawing area inserts the object.

By selecting the button  or by a double click on the inserted element, the properties window is activated.

6.8.1. The properties window

Object properties: Filter

Object management

Symbol: FIL1 Element ID: 0

Type: <New> [Icons]

Group: <None> [Icons]

System: HE1 [Icons]

Appearance

[3D Model of Filter]

Object rotation: [Icon]

Order number: 0

☒ Show connector colours

Pens: [Dropdown] Fonts: [Dropdown] Surfaces: [Dropdown]

Parameters

Installation level: 0 cm Additional equipment: [Dropdown]

Type parameters

Name: Compact filter

Standard/Producer: [Field]

Type/Series type: [Field]

Shape: Cuboid

Width: 200 mm Depth: 150 mm Height: 150 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Circular	125			Female	10.0	
Circular	125			Female	10.0	

Filter class: G5 Local pressure loss: [Dropdown] 20 Pa Acoustic power: [Dropdown]

Additional description: [Field]

Save to template: [Dropdown] [Icon] OK Cancel

Fig. 84 The Filter properties window

Control group: [Appearance](#) (Błąd! Nie można odnaleźć źródła odwołania.)

[Object rotation](#)

[Show connector colours](#)

[Order number](#)

Control group [Parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.)

[Installation level](#)

[Additional equipment](#)

Control group [Type parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.Błąd! Nie można odnaleźć źródła odwołania.)

Name - by default, 3 types of filters are defined: compact, cassette, and pocket.

Standard/Producer

Type/Series type

Shape

Width/Depth/Height

Local pressure loss – the pressure loss on an element determined in Pa, completed by the user or downloaded from a *Type library*. This value is included in the calculations.

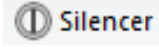
Filter class – the user has the option of defining the filter class - to choose from predefined values or completion.

Connectors' parameters

Sound power

6.9. The Silencer


Activation:

- *Ventilation* ribbon ⇒ Logical group *Ventilation systems* ⇒ 

The object insertion window is activated.

The window also allows the use of the *Project Library* or the *Global Library*. From the drop-down list of a given library, the user can choose a sample type of the silencer and apply it to the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (view). Clicking on a selected place in the drawing area inserts the object.

By selecting the button  or by a double click on the inserted element, the properties window is activated.

6.9.1. The properties window

Object properties: Silencer

Object management

Symbol: SIL1, Element ID: 0

Type: <New>, Group: <None>, System: HE1

Appearance

Object rotation, Order number: 0, Show connector colours: ☒

Parameters

Installation level: 0 cm, Additional equipment:

Type parameters

Name: Straight silencer, Standard/Producer: , Type/Series type: , Shape: Cuboid

Width: 600 mm, Depth: 150 mm, Height: 150 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Circular	125			Female	10.0	
Circular	125			Female	10.0	

Local pressure loss: 20 Pa, Acoustic power:

Additional description:

Save to template, OK, Cancel

Fig. 85 The Silencer properties window

Control group [Appearance](#) (Błąd! Nie można odnaleźć źródła odwołania.)

[Object rotation](#)

[Show connector colours](#)

[Order number](#)

Control group [Parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.)

[Installation level](#)

[Additional equipment](#)

Control group [Type parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.Błąd! Nie można odnaleźć źródła odwołania.)

Name - By default, the straight silencer is defined.

Standard/Producer

Type/Series type

Shape

Width/Depth/Height


Local pressure loss – the pressure loss on an element determined in Pa, completed by the user or downloaded from a type library. This value is included in the calculations.

Connectors' parameters

Sound power

6.10. The Damper


Activation:

- *Ventilation* ribbon ⇒ Logical group *Ventilation systems* ⇒  **Damper**

The object insertion window is activated.

The window also allows the use of the *Project Library* or the *Global Library*. From the drop-down list of a given library, the user can choose a sample type of the damper and apply it in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (view). Clicking on a selected place in the drawing area inserts the object.





By selecting the button  or by a double click on the inserted element, the properties window is activated.



6.10.1. The properties window



Object properties: Damper *

Object management


Symbol Element ID


Type    

Group  

System  


Appearance





Object rotation 

Order number



☒ Show connector colours


Pens 

Fonts 


Surfaces 

Parameters

Installation level cm  Additional equipment 


Adjustments  Pa

Type parameters





Name 



Standard/Producer


Type/Series type


Shape 

Width mm Depth mm Height mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Rectangular		500	500	Female	10.0	
Rectangular		500	500	Female	10.0	

☐  Actuator 

Adjustments 

Acoustic power 

Additional description



Save to template  

Fig. 86 The Damper properties window

Control group: [Appearance](#) (Błąd! Nie można odnaleźć źródła odwołania.)

[Object rotation](#)

[Show connector colours](#)

[Order number](#)

Control group [Parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.)

[Installation level](#)

[Additional equipment](#)

[Adjustment](#) - Pressure loss of air flowing through dampers at 0 (included in calculations)

Control group [Type parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.Błąd! Nie można odnaleźć źródła odwołania.)

Name - by default, 3 names of the dampers are defined: single-leaf, multi-leaf damper, feedback
Standard/Producer
Type/Series type
Shape
Width/Depth/Height

Local pressure loss – the pressure loss on an element determined in Pa, completed by the user or downloaded from a type library. This value is included in the calculations.

Connectors' parameters
Sound power

Actuator - after selecting the option [Actuator](#), a window opens, which enables defining electric parameters of the actuator - number of phases, voltage, frequency, power, current drawn.

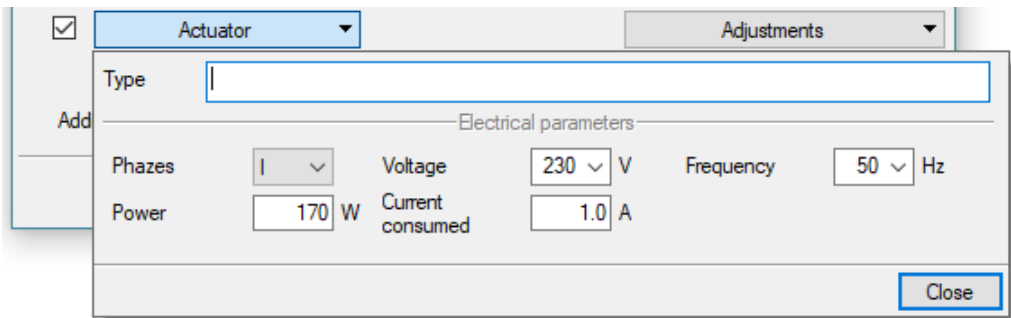


Fig. 87 The Actuator - Adjustments properties window

Adjustments

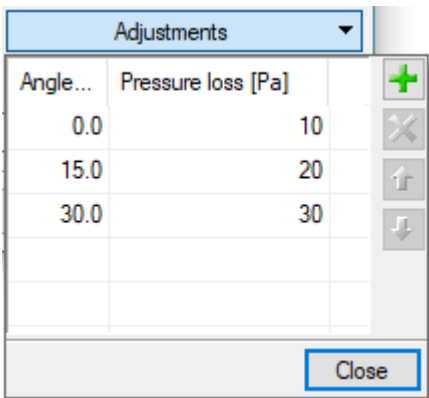


Fig. 88 The Damper – Adjustments properties window

6.11. The Controller


Activation:

- *Ventilation* ribbon ⇒ Logical group *Ventilation systems* ⇒  Controller ▾

The object insertion window is activated.

The window also allows the use of the *Project Library* or the *Global Library*. From the drop-down list of a given library, the user can choose a sample type of the controller and apply it in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (view). Clicking on a selected place in the drawing area inserts the object.

By selecting the button  or by a double click on the inserted element, the properties window is activated.

6.11.1. The properties window

Object properties: Controller *

Object management

Symbol: CON1 Element ID: 0

Type: <New>

Group: <None>

System: HE1

Appearance

Object rotation

Order number: 0

☒ Show connector colours

Parameters

Installation level: 0 cm

Adjustments: 0°

10 Pa

Type parameters

Name: Constant flow regulator CAV

Standard/Producer:

Type/Series type:

Shape: Cuboid

Width: 400 mm Depth: 150 mm Height: 150 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Rectangular		200	100	Female	10.0	
Rectangular		200	100	Female	10.0	

☐ Actuator

Adjustments

Acoustic power

Additional description:

Save to template OK Cancel

Fig. 89 The Controller properties window

Control group [Appearance](#) (Błąd! Nie można odnaleźć źródła odwołania.)

Object rotation

Show connector colours

Order number

Control group [Parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.)

Installation level

Additional equipment

Adjustment - Pressure loss of air flowing through controller at 0 (included in calculations)

Control group [Type parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.Błąd! Nie można odnaleźć źródła odwołania.)

[Name](#) - by default, 2 names are defined: CAV and VAV controller.

[Standard/Producer](#)

[Type/Series type](#)

[Shape](#)

[Width/Depth/Height](#)

[Local pressure loss](#) – the pressure loss on an element determined in Pa, completed by the user or downloaded from a [Type library](#). This value is included in the calculations.

[Connectors' parameters](#)

[Sound power](#)

[Actuator](#) - after selecting the option [Actuator](#), a window opens, which enables defining electric parameters of the actuator - number of phases, voltage, frequency, power, current drawn.

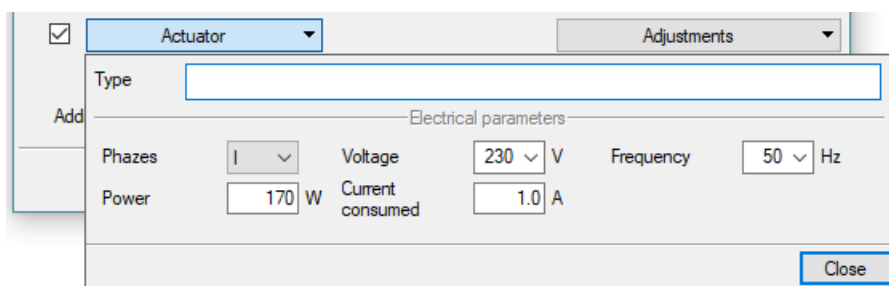
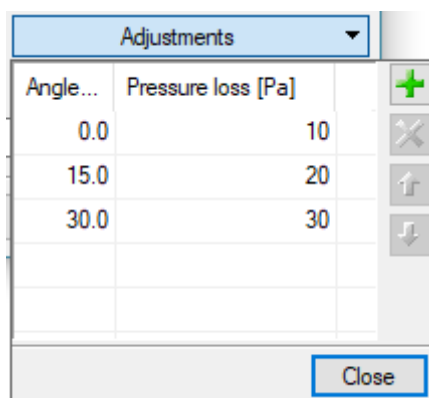


Fig. 90 The Controller - Actuator properties window

[Adjustments](#)



Angle...	Pressure loss [Pa]
0.0	10
15.0	20
30.0	30

Fig. 91 The Controller – Adjustments properties window

6.12. The Plenum box


Activation:

- *Ventilation* ribbon ⇒ Logical group *Ventilation systems* ⇒  **Plenum box**

The object insertion window is activated.

The window also allows the use of the *Project Library* or the *Global Library*. From the drop-down list of a given library, the user can choose a sample type of the plenum box and apply it in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (view). Clicking on a selected place in the drawing area inserts the object.

By selecting the button  or by a double click on the inserted element, the properties window is activated.

6.12.1. The properties window

Object properties: Plenum box

Object management

Symbol: EB1 Element ID: 0

Type: <New>

Group: <None>

System: HE1

Appearance

Object rotation

Order number: 0

☒ Show connector colours

Parameters

Installation level: 0 cm Additional equipment

Type parameters

Name: Plenum box

Standard/Producer:

Type/Series type:

Shape: Cuboid

Width: 200 mm Depth: 150 mm Height: 150 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Circular	125			Female	10.0	
Circular	125			Female	10.0	

Local pressure loss: 20 Pa Acoustic power

Additional description:

Save to template OK Cancel

Fig. 92 The Plenum box properties window

Control group [Appearance](#) (Błąd! Nie można odnaleźć źródła odwołania.)

[Object rotation](#)

[Show connector colours](#)

[Order number](#)

Control group [Parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.)

Installation level

Additional equipment

Control group [Type parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.Błąd! Nie można odnaleźć źródła odwołania.)

Name

Standard/Producer

Type/Series type

Shape

Width/Depth/Height

Local pressure loss – the pressure loss on an element determined in Pa, completed by the user or downloaded from a [Type library](#). This value is included in the calculations.

Connectors' parameters

Sound power


6.13. The Fire damper

Activation:

- [Ventilation](#) ribbon ⇒ Logical group [Ventilation systems](#) ⇒  Fire damper

The object insertion window is activated.

The window also allows the use of the [Project Library](#) or the [Global Library](#). From the drop-down list of a given library, the user can choose a sample type of the fire dumper and apply it in the project. When the connection point insertion window is active, its symbol appears in the drawing field of the model (view). Clicking on a selected place in the drawing area inserts the object.

By selecting the button  or by a double click on the inserted element, the properties window is activated.

6.13.1. The properties window

Object properties: Fire damper

Object management

Symbol: FD1 Element ID: 0

Type: <New>

Group: <None>

System: HE1

Appearance

Firefighting flap 500x500

Object rotation

Order number: 0

Pens

Fonts

Surfaces

Parameters

Installation level: 0 cm

Additional equipment

Type parameters

Name: Duct fire damper

Standard/Producer

Type/Series type

Shape: Cuboid

Width: 200 mm Depth: 150 mm Height: 150 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Rectangu		500	500	Female	10.0	
Rectangular		500	500	Female	10.0	

Active area: 0.02 m²

Fire resistance class: EIS 120

Local pressure loss: 20 Pa

Additional description

Save to template OK Cancel

Fig. 93 The Fire damper properties window

Control group [Appearance](#) (Błąd! Nie można odnaleźć źródła odwołania.)

[Object rotation](#)

[Show connector colours](#)

[Order number](#)

Control group [Parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.)

[Installation level](#)

[Additional equipment](#)

Control group [Type Parameters](#) (Błąd! Nie można odnaleźć źródła odwołania.Błąd! Nie można odnaleźć źródła odwołania.)

Name - By default, 3 types of fire dampers are defined - duct, wall and end damper (fire valve). The choice of the damper type determines the number of connectors that is defined by default for this device. The following are defined:

- 2 connectors for the duct fire damper;
- 1 connector for the end fire damper
- The wall fire damper has no connectors.

[Standard/Producer](#)

[Type/Series type](#)

[Shape](#)

[Width/Depth/Height](#)

[Connectors' parameters](#)

Active area - the real surface of free air flow, filled in by the user or downloaded from the [Type library](#).

Fire resistance class - the user can take the value from the drop-down list or enter his own value.

Local pressure loss - pressure loss on an element determined in Pa, completed by the user or downloaded from a type library. This value is included in the calculations.

Actuator - after selecting the option "Actuator", a window opens, which enables defining electric parameters of the actuator - number of phases, voltage, frequency, power, current drawn.

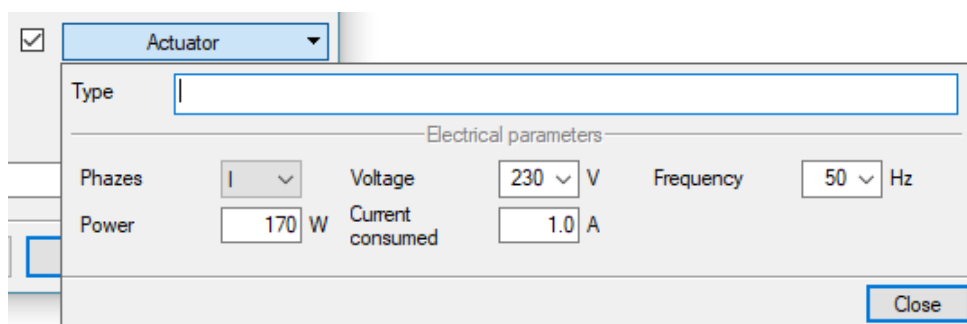


Fig. 94 The Fire damper - Actuator properties window

[Sound power](#)

7. DUCTS

7.1. Introducing and editing horizontal ducts

7.1.1. Introducing horizontal ducts

Activation:

Ventilation ribbon ⇒ logical group *Ventilation system* ⇒



After selecting the *Duct* command, the Ventilation duct insertion window will appear (Fig. 95 **Błąd!** Nie można odnaleźć źródła odwołania.).

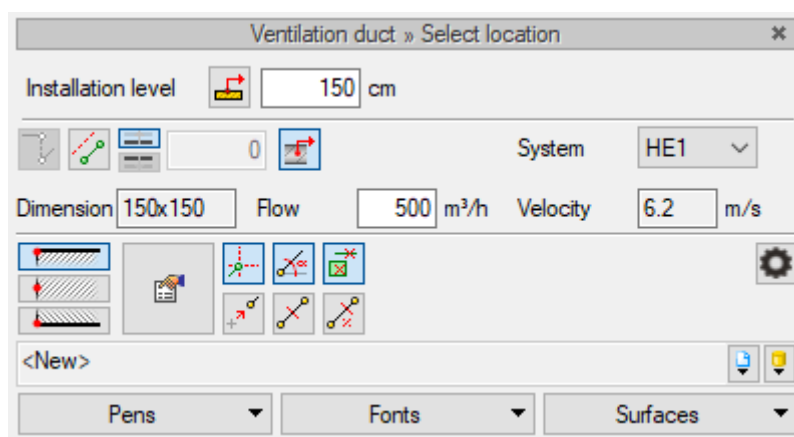


Fig. 95 The Inserting window for the beginning of a horizontal duct.

After indicating in the drawing the point which is the beginning of the duct, a second window will appear - inserting the duct's end (Fig. 96), with additional options concerning the duct's slope and direct possibility to draw the vertical duct without interrupting the command.

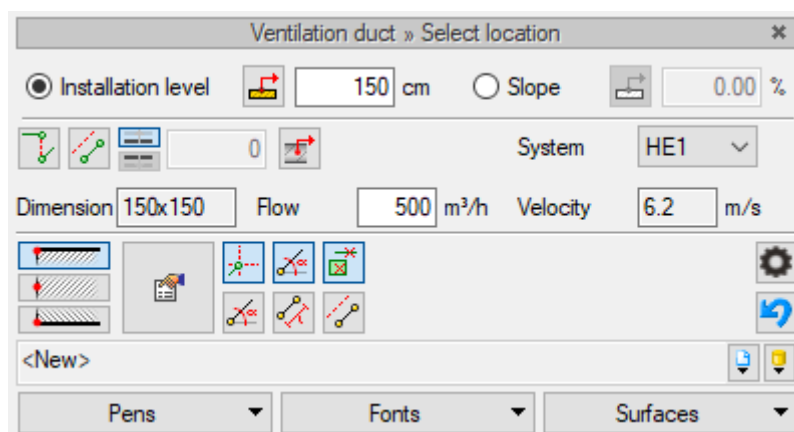





Fig. 96 The Inserting window for the end of a horizontal duct.

For general insertion options, see section 5.1.

An additional function available for horizontal ducts is *Parallel offset*. Pressing the button allows the installation to be drawn parallel to other elements, e.g. walls, offset from them by a given distance. Two buttons are used to select the *Offset direction*:  and . Next to it, there is an edit field in which the offset value must be entered. The field is activated by pressing the *Parallel offset* button.

Pressing the  *Insert vertical section* button allows you to insert horizontal and vertical ducts without interrupting the command. After pressing the Insert button, the insertion window will change to the window of inserting the end of the horizontal duct without giving a slope and the installation level of the vertical end of the duct should be given. Then we draw like other horizontal sections. At any time the user can insert a vertical section by clicking on *Insert vertical section*

Dimension	150x150	Flow	500 m ³ /h	Velocity	6.2 m/s
-----------	---------	------	-----------------------	----------	---------

There is also a place in the ventilation duct window where you can check the air speed in the designed duct. To do so, you need to enter the assumed airflow in the edit field and the program will determine the speed.

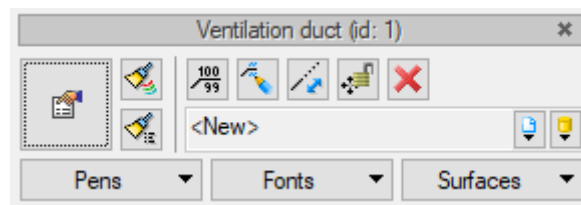





Fig. 97 Horizontal duct modification window

The horizontal duct modification window is opened by selecting one or more horizontal ducts. In addition to the generally available for all objects functions for horizontal ducts, there are also available:

Move with connections/Move without connections -  or . The open padlock means that the ducts will be moved without losing connection with other ducts, the closed padlock allows you to move and disconnect from other ducts.

Lengthen/shorten pipe maintaining slope -  - after clicking on this icon, a marker will appear at the ends of the duct to help lengthen or shorten the duct while maintaining a slope.

7.1.2. The duct element properties

Object properties: Ventilation duct *

Object management

Type symbol Element ID

Type

Group

System

Appearance

Angle °

☐ Visible construction axis

Order number

Parameters

Beginning End

Axis installation level cm cm

Length on the projection m Slope %

Actual length m ☒ Automatically ☐ Insulation

Type parameters

Name

Standard/Producer

Type/Series type

Material

Shape

Internal width mm Wall thickness mm

Internal height mm Coarseness coefficient mm

Additional description

☐ Flexible Segment length m

Connections Beginning End

Type

Flange height mm mm

Fig. 98 The horizontal duct properties window

In the properties window of horizontal ducts, there are typical properties of the element, described in the section **Błąd! Nie można odnaleźć źródła odwołania..**

Control group [Appearance](#)

[Visible construction axis](#) - ticking this box will insert the line axis visible on the view. By default, this field is selected for circular ducts.

Order number - the number assigned to the element by the [Renummer installation objects](#) or by the user. This number is included in the list of elements.

Control group [Parameters](#)

Asis installation level (Beginning, End) - editable beginning and end of duct mounting level, [cm].

Actual length and length in the view - as in the description. The parameters are different if the duct is guided with a slope or if the Automatically checkbox is not checked.

Slope – the value calculated from the difference between the installation levels of the beginning and end of the duct. The slope is given in the window for inserting the segment end (Fig. 96).

Insulation – the checkbox with description Insulation allows insertion of thermal insulation on a given duct. After pressing the [Insulation](#) button the properties window of the [Duct Insulation](#) element opens.

Control group [Type parameters](#)

Name/ Standard/Producer, Type/Series type - the user inserts data as in the edit field in the names of the controls, appropriate for the given type of duct.

Material - the user selects from the drop-down list the appropriate material for a given duct type or enters it manually.

Shape - the user selects the shape of the duct from the drop-down list: round, rectangular or oval.

Depending on the shape selection, items for geometrical dimensions appear below:

Round - inner diameter, [mm].

Rectangular - internal width and height, [mm].

Oval - internal width and height, [mm].

Wall thickness - insert the duct wall thickness, [mm] in the edit field.

Coarseness coefficient - in the edit field the user should specify the coarseness coefficient for the given material. The default value is 0,0015 mm.

Additional description - in this field the user can add any description about the duct.

Flexible - checking this box turns a duct into a flexible duct.

Segment length - in the edit field the user inserts data regarding the maximum length of the straight section of the given duct. After running the [Segment duct in the entire file](#) command in the entire file, the straight ducts will be divided into sections of a given length.

Connections - Type - the user selects the connection type for the initial one from the drop-down list and end duct. There are 4 types to choose from:

- *Zero*,
- *Female*,
- *Male*,
- *Flange* - if this type of connection is selected, the height of the designed flange should also be provided.

7.1.2.1. Insulation element properties

Object properties: Insulation

Object management

Type symbol Element ID

Type <New>

Type parameters

Name

Standard/Producer

Type/Series type

Wall thickness mm

Thermal conductivity coefficient $\frac{\text{W}}{\text{m}\cdot\text{K}}$

Fig. 99 The pipe insulation properties window

Control group [Type parameters](#)

[Name/ Standard/Producer, Type/Series type](#) - the user inserts data as in the edit field in the names of the controls, appropriate for the given insulation type.

[Wall thickness](#) - in the edit field, insert insulation wall thickness, [mm].

[Thermal conductivity coefficient](#) - in the edit field the user should provide the thermal conductivity coefficient of insulation characteristic for a given material. The default value is 0.035W/(m · K).

7.1.3. Introducing and editing vertical ducts

Activation:

[Ventilation](#) ribbon ⇒ logical group [Ventilation system](#) ⇒



7.1.1. Inserting the vertical duct.

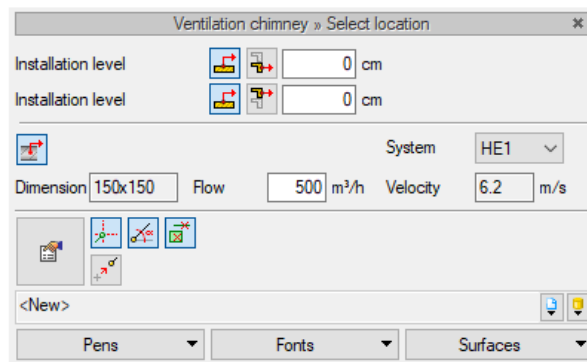


Fig. 100 Inserting window for the vertical duct

When inserting a vertical ducts, the user can choose additional insertion functions, among others [Import from level above](#) / [Import from level below](#). Clicking on [Import from level above](#) will insert the end of the vertical section at the maximum height of the active level (default 280 cm).

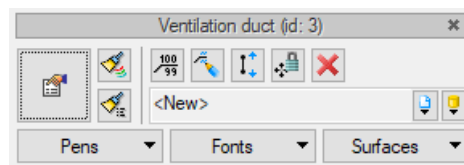


Fig. 101 Vertical duct modification window

After selecting the ventilation duct inserted in the building (visible in the project manager) on the appearing modification window (Fig. 101) there is an additional icon with the command [Stretch pipe](#). After selecting this command the „[Stretching vertical pipe](#)” window will appear (Fig. 102).

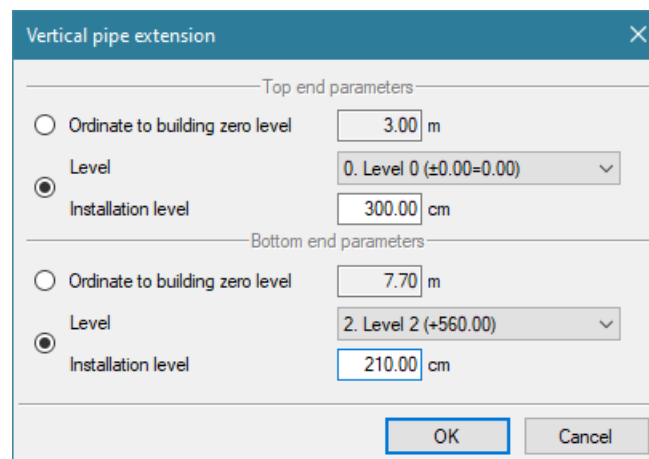


Fig. 102 Vertical duct stretching window

In the window, you can define the position of the lower and upper connector of the duct in absolute terms or in relation to the building's level. After confirming the data, the duct will be stretched between levels

7.2. Introducing and editing flexible ducts

7.2.1. Introducing flexible ducts

Activation:

- *Ventilation* ribbon ⇒ logical group *Ventilation system* ⇒



The general insertion options are the same as for the rigid duct and are presented in section **Błąd!**
Nie można odnaleźć źródła odwołania.. It is recommended to insert the flexible duct by inserting a min. of 3 points.

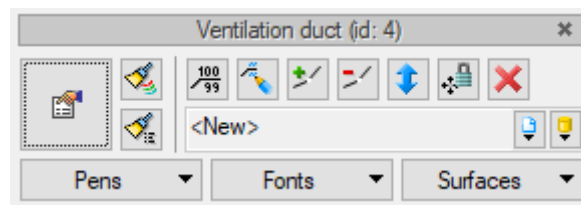




Fig. 103 Flexible ducts modification window

The flexible duct modification window is opened by selecting one or more horizontal ducts. In addition to the generally available for all elements functions for horizontal ducts, there are also available:

Add/Delete point –  or . Another point is added on the duct axis with the plus. After exiting the command, you can grab the created point and move it.

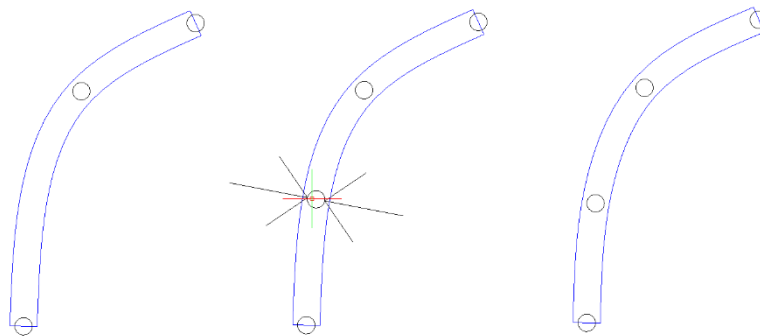


Fig. 104 Adding a point on the flexible duct

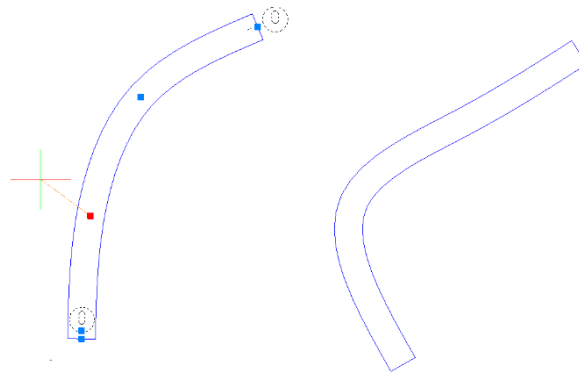


Fig. 105 Modification of the flexible duct

The selected point on the duct axis is subtracted with a minus

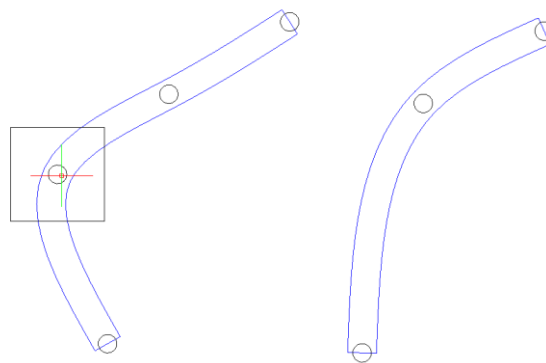



Fig. 106 Deleting a point on the flexible duct

Change the point height –  after clicking this icon, on the flexible duct the point to mark will be highlighted. After selecting a point, the "Change point height" window will appear in which the user will enter a new height. The duct will be bent according to the given value.

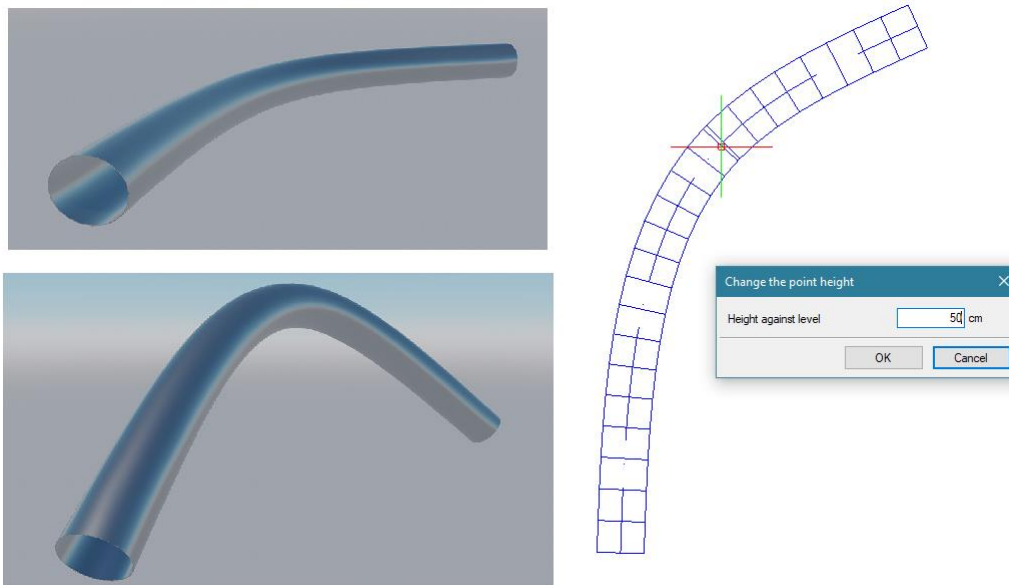


Fig. 107 Changing the point height of the flexible duct

7.2.2. Properties of the element – Flexible duct

Object properties: Ventilation duct *

Object management

Type symbol Element ID

Type

Group

System

Appearance

Angle °

☒ Visible construction axis

Order number

Parameters

Beginning End

Axis installation level cm cm

Length on the projection m Slope %

Actual length m ☒ Automatically

☐ Insulation

Type parameters

Name

Standard/Producer

Type/Series type

Material

Shape

Inner diameter mm Wall thickness mm

Coarseness coefficient mm

Additional description

☒ Flexible Segment length m

Connections Beginning End

Type

Flange height mm mm

Fig. 108 Properties window of the Flexible duct

In the properties window of flexible ducts there are properties similar to ducts, described in section **Błąd! Nie można odnaleźć źródła odwołania.** Checkbox - **Flexible** – is marked by default. Unchecking this box turns the flexible duct into a rigid duct. The connection type selection is also inactive.

Properties of the element Insulation

The insulation properties are the same as described for ducts in section **Błąd! Nie można odnaleźć źródła odwołania.** **Błąd! Nie można odnaleźć źródła odwołania.**

8. FITTINGS

8.1. Fittings – introduction

Ventilation fittings are an essential element of ventilation systems, enabling the creation of duct networks.

In ArCADia, they can be entered into the project in 3 ways:

- by hand
- semi-automatically
- automatically

Regardless of the insertion method, fittings can be edited at any time while working with the program.

8.1.1. Inserting fittings manually

Manually inserting fittings consists of selecting from the Ventilation ribbon (Fig. 11) the command with the fitting that is of interest to the user, defining its properties (type and geometry parameters) and inserting it into the ventilation system. This method gives you full control over the inserted elements, but requires more work.

8.1.2. Inserting fittings semi-automatically

Semi-automatic insertion is also based on the selection of the command with the fitting of interest to the user, however you do not define its parameters, but rather, on the insertion window you select the option "import connector parameters from element" (Fig. 109Fig. 109).

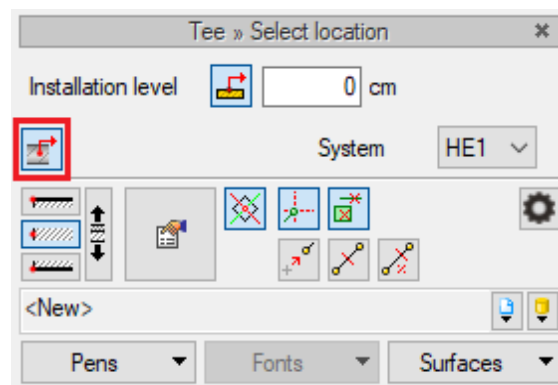




Fig. 109 Insertion window with the selected option - „Import connector parameters from element”.


This function retrieves the connector parameters from the ventilation element detected in the drawing (duct, fitting, object) and assigns them to the newly inserted one. The function imports properties such as shape, dimension and ventilation system...

When adding a fitting to a duct or other element, its shape and dimensions of connectors will be taken from the inserted element. The condition is that the program detects an element already inserted in the drawing. To do this, enable the option "element and section detection" in the insertion window  and "import from element" the installation level . Elements inserted in this way will also be assigned to the ventilation system to which the recognized element belongs.

By matching elements, the program will create fittings with all connectors equal to the imported dimension. For example, if the dimension to which the element is to be fitted is 200x400, this will be created:

- Bend/Elbow - with dimensions 200x400-200x400
- Tee – with dimensions 3 x 200x400
- Four-way – with dimensions 4x 200x400
- Offset – with dimensions 200x400-200x400
- Reduction – with dimensions 200x400-200x400.

After insertion of the element, each dimension can be edited.

In the insertion window (Fig. 109)  – there is an option to change the connector for which the element is inserted into the project. After clicking on the button, the cursor on the inserted fitting will be moved to another connector.

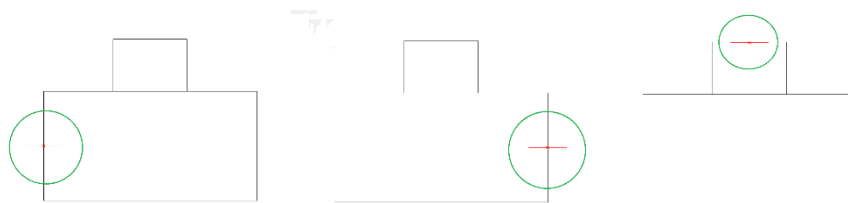


Fig. 110 The function of changing the connector for which the fitting is inserted

8.2. Installation fittings – Project options window

The default symbols of the fittings are set in the Project Options window - Default Symbols tab. These symbols can be freely changed by the user.

Object properties: Project options

Object management

Element id 0

Parameters

Systems General Default symbols

Object	Sy...	Object	Sy...	Object	Sy...
Access door	IF	End cap	EC	Plenum box	EB
Air intake	CZ	Fan	WENT	Reducer	RED
Air uptake	WYRZ	Filter	FIL	Saddle branch	SB
Automatic fitting	AF	Fire damper	FD	Silencer	SIL
Bend	B	Four-way tee fitting	CZ	Tee	TE
Bend	EL	Free fitting	FF	Tee with take-off bend	TWB
Controller	CON	Heater	HE	Uptake ventilator	WY
Damper	DAM	Intake ventilator	NA	Ventilation headquarters	CW
duct connector	C	Offset	OFF	Y-piece	TEE

Operations

☐ Analyse system colour in all views


Save to template

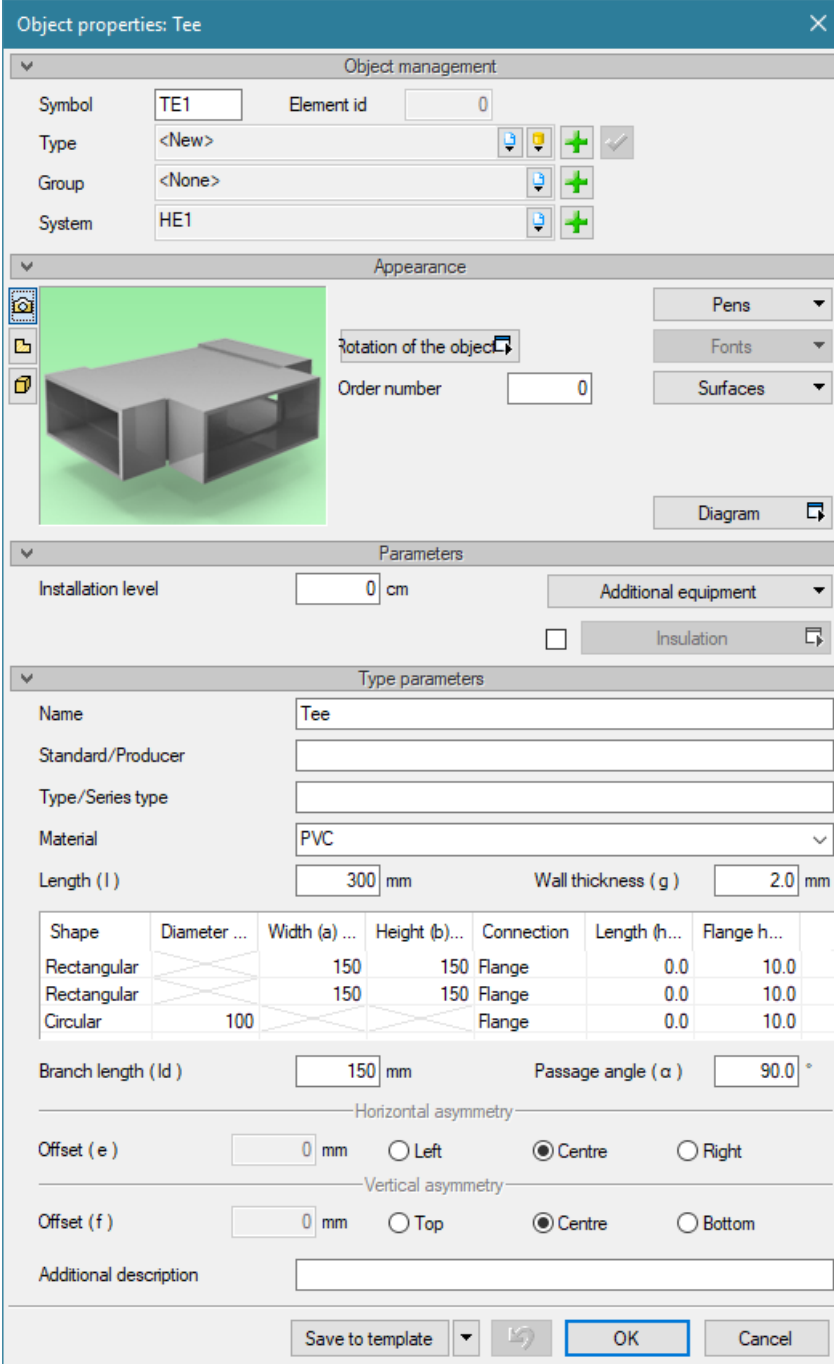
OK

Cancel

Fig. 111 Project Options Window - Default symbols.

8.3. Installation fittings – general properties window

Dialog boxes of fittings properties, activated after clicking  in the insertion window (Fig. 51) or modification (Fig. 58).



Object properties: Tee

Object management

Symbol: TE1 Element id: 0

Type: <New>

Group: <None>

System: HE1

Appearance

Rotation of the object: 0

Order number: 0

Parameters

Installation level: 0 cm

Additional equipment: [Dropdown]

Insulation: [Checkbox]

Type parameters

Name: Tee

Standard/Producer: [Text]

Type/Series type: [Text]

Material: PVC

Length (l): 300 mm Wall thickness (g): 2.0 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Rectangular		150	150	Flange	0.0	10.0
Rectangular		150	150	Flange	0.0	10.0
Circular	100			Flange	0.0	10.0

Branch length (ld): 150 mm Passage angle (α): 90.0°

Horizontal asymmetry

Offset (e): 0 mm ☐ Left ☒ Centre ☐ Right

Vertical asymmetry

Offset (f): 0 mm ☐ Top ☒ Centre ☐ Bottom

Additional description: [Text]

Save to template: [Dropdown] [OK] [Cancel]

Fig. 112 The fitting properties window

In the shape properties window, you set the appearance that reflects it on the plan and the installation and technical parameters necessary to perform calculations later in the project.

Control group **Appearance** (Błąd! Nie można odnaleźć źródła odwołania.)

[Rotation of the object](#)

[Order number](#)

[Diagram](#) – after clicking this button, the fitting drawing will be displayed showing the dimensions defined in the Type parameters section.

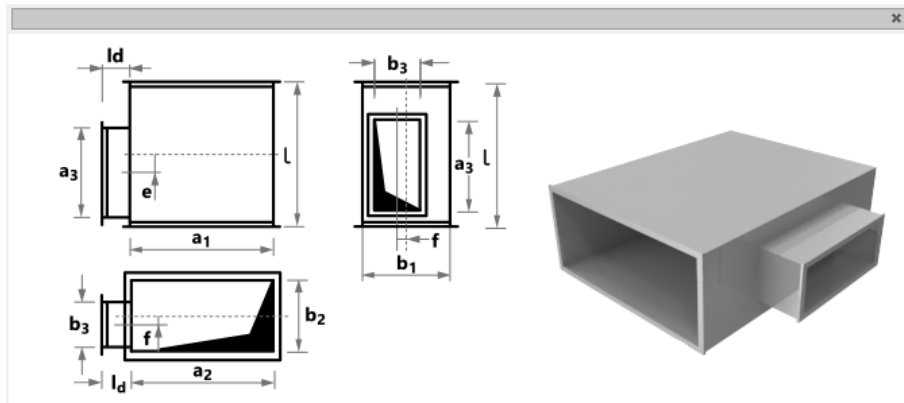


Fig. 113. Diagram of Fitting

Control group **Parameters** (Błąd! Nie można odnaleźć źródła odwołania.)

[Installation level](#)

[Additional equipment](#)

[Insulation](#) (Błąd! Nie można odnaleźć źródła odwołania.)

Control group **Type parameters** (Błąd! Nie można odnaleźć źródła odwołania.Błąd! Nie można odnaleźć źródła odwołania.)

[Name](#)

[Standard/Producer](#)

[Type/Series Type](#)

[Material](#)

[Shape](#)

[Length](#)

[Wall thickness](#)

[Fitting parameters](#)

[Additional fitting parameters – e.g. asymmetrical offset.](#)

8.4. Bend


Command activation:

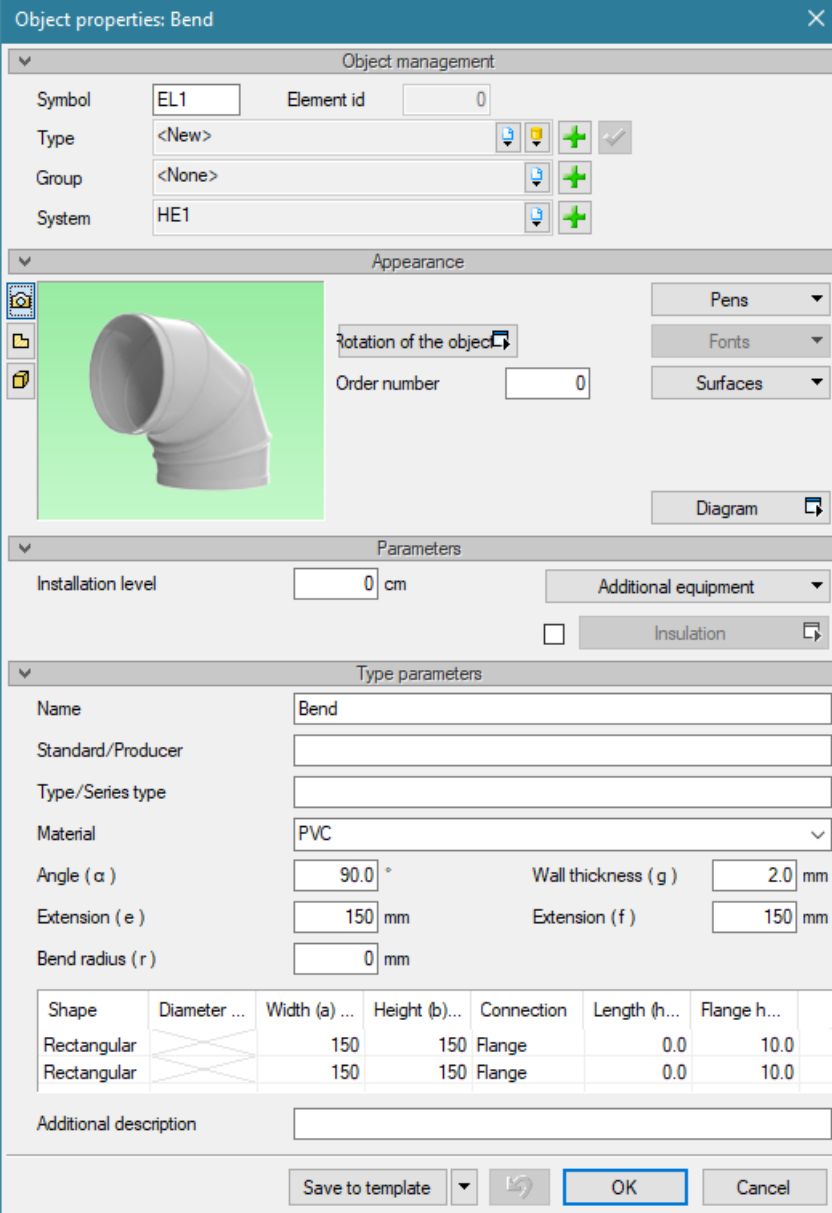
- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒  **Bend**

The object insertion window is activated.

The window also allows you to use the **Project Library** or the **Global Library**. From the drop-down list of a given library, the user can choose a sample type of fitting and use it in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (plan). Clicking on a selected place in the drawing area inserts the object.

By selecting the button  or the double-click on the inserted element, activates the properties window



Object properties: Bend

Object management

Symbol: EL1 Element id: 0

Type: <New> [Icons]

Group: <None> [Icons]

System: HE1 [Icons]

Appearance

[3D Model of Bend] Rotation of the object: [Icon] Order number: 0

[Pens] [Fonts] [Surfaces] [Diagram]

Parameters

Installation level: 0 cm Additional equipment: [Dropdown] Insulation: [Checkbox]

Type parameters

Name: Bend

Standard/Producer: [Field]

Type/Series type: [Field]

Material: PVC

Angle (α): 90.0 ° Wall thickness (g): 2.0 mm

Extension (e): 150 mm Extension (f): 150 mm

Bend radius (r): 0 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Rectangular		150	150	Flange	0.0	10.0
Rectangular		150	150	Flange	0.0	10.0

Additional description: [Field]

[Save to template] [OK] [Cancel]

Fig. 114 Properties window – Bend


8.5. Elbow

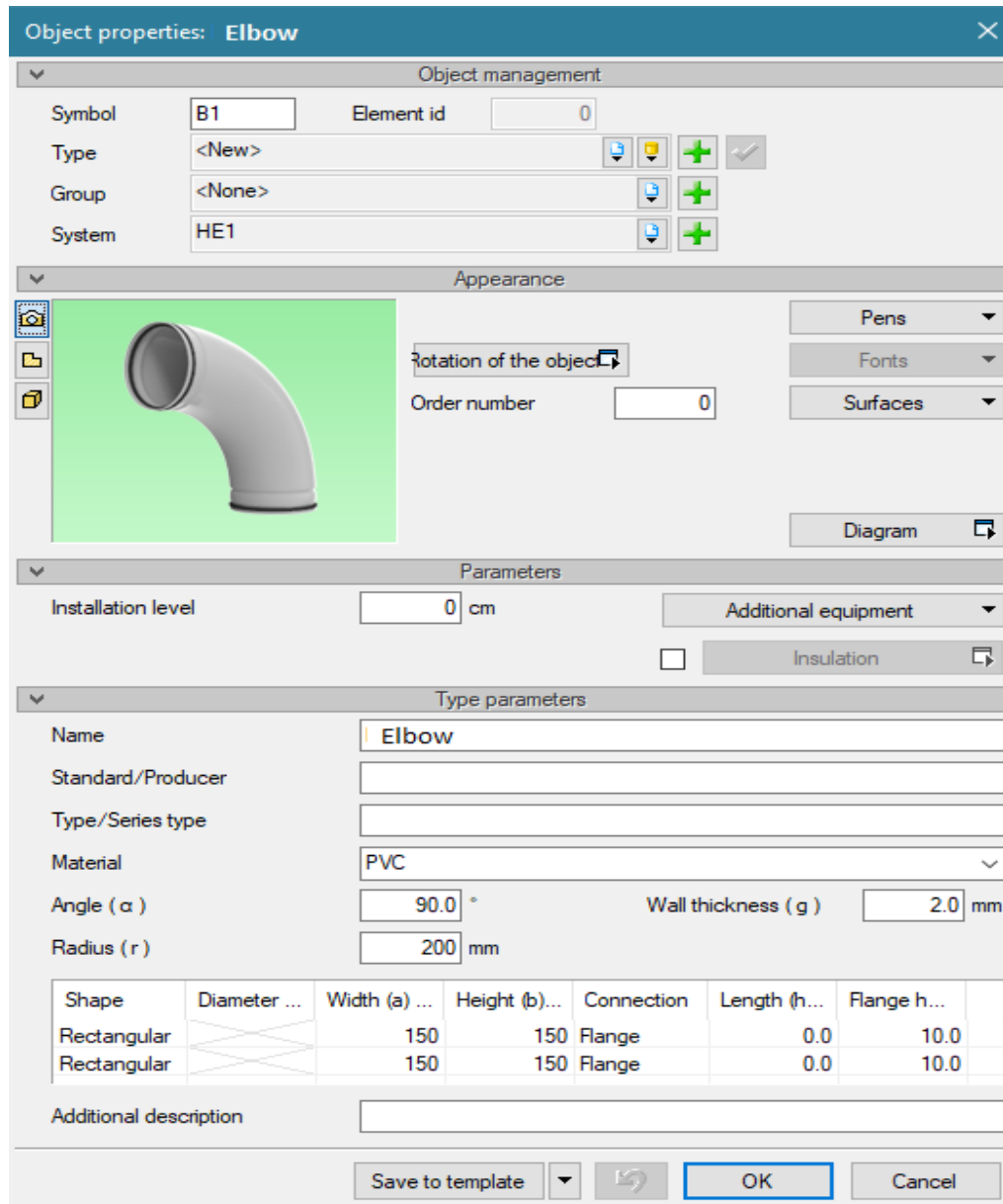
Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒ 

The object insertion window is activated.

The window also allows you to use the **Project Library** or the **Global Library**. From the drop-down list of a given library, the user can choose a sample type of fitting and use it in the project. When the connection point insertion window is active, its symbol appears in the drawing field of the model (plan). Clicking on a selected place in the drawing area inserts the object. By choosing the

button  or the double-click on the inserted element, activates the properties window.



Object properties: Elbow

Object management

Symbol: B1 Element id: 0

Type: <New> [Icons: Import, Export, Add, Check]

Group: <None> [Icons: Import, Add]

System: HE1 [Icons: Import, Add]

Appearance

[Icon: 3D View] [Icon: 2D View] [Icon: Isometric View]

[3D Model of Elbow]

Rotation of the object: [Icon: Rotate] Order number: 0

[Diagram Button]

Parameters

Installation level: 0 cm Additional equipment: [Dropdown]

☐ Insulation [Icon: Insulation]

Type parameters

Name: Elbow

Standard/Producer: [Field]

Type/Series type: [Field]

Material: PVC

Angle (α): 90.0° Wall thickness (g): 2.0 mm

Radius (r): 200 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Rectangular	[Icon: X]	150	150	Flange	0.0	10.0
Rectangular	[Icon: X]	150	150	Flange	0.0	10.0

Additional description: [Field]

[Save to template] [OK] [Cancel]

Fig. 115 Properties window - Elbow

8.6. Reducer


Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒  **Reducer**

The object insertion window is activated.

The window also allows you to use the **Project Library** or the **Global Library**. From the drop-down list of a given library, the user can choose a sample type of fitting and use it in the project.





When the connection point insertion window is active, its symbol appears in the drawing field of the model (plan). Clicking on a selected place in the drawing area inserts the object. By choosing the



button  or the double-click on the inserted element, activates the properties window.



Object properties: Reducer

Object management

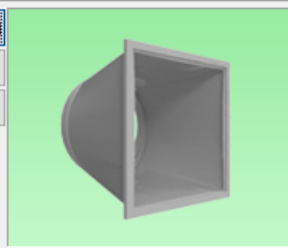

Symbol: RED1 Element id: 0

Type: <New>    

Group: <None>  

System: HE1  

Appearance

 Rotation of the object: 

Order number: 0







Pens:  Fonts:  Surfaces: 

Diagram: 

Parameters

Installation level: 0 cm Additional equipment: 


☐ Insulation: 

Type parameters




Name: Reducer

Standard/Producer:

Type/Series type:

Material: PVC 

Length (l): 200 mm Wall thickness (g): 2.0 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Rectangular		150	150	Flange	0.0	10.0
Circular	100			Flange	0.0	10.0

Horizontal asymmetry

Offset (e): 0 mm ☐ Left ☒ Centre ☐ Right

Vertical asymmetry

Offset (f): 0 mm ☐ Top ☒ Centre ☐ Bottom

Additional description:




Save to template:   OK Cancel

Fig. 116 Properties window - Reducer

8.7. Offset

Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒  **Offset**

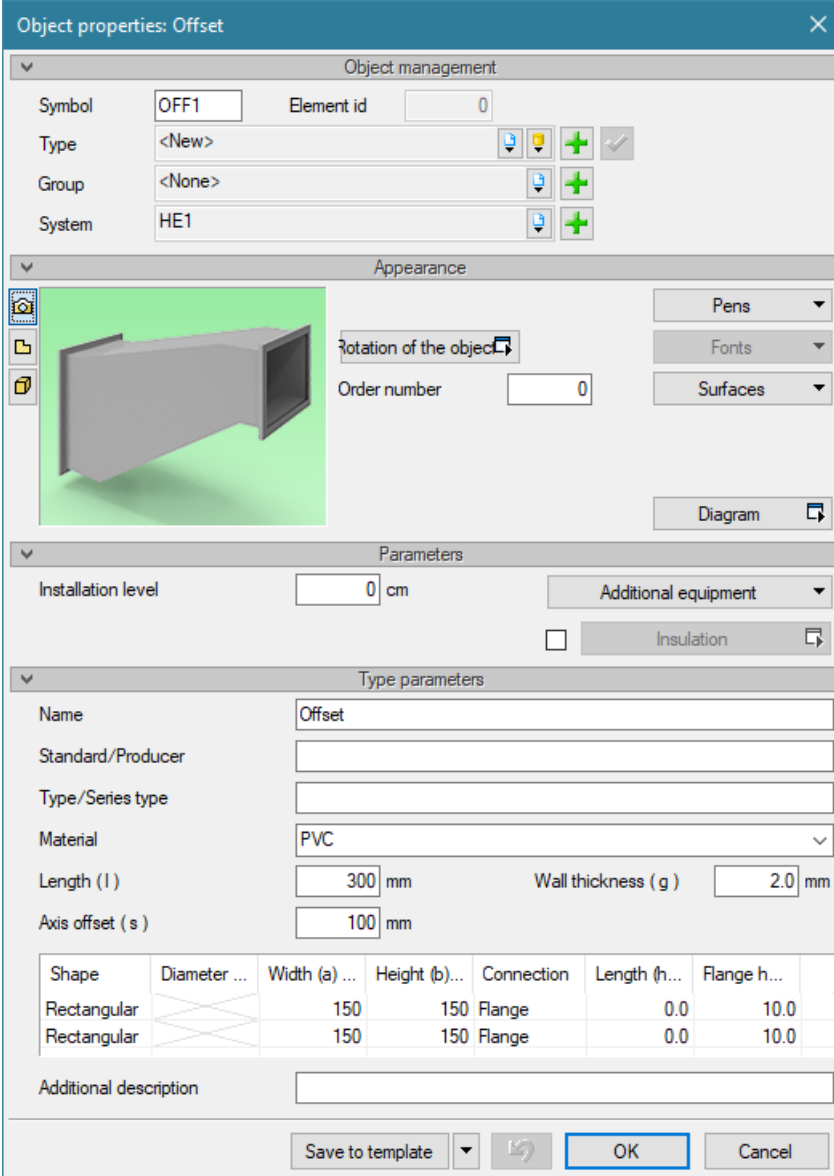
The object insertion window is activated.

The window also allows you to use the **Project Library** or the **Global Library**. From the drop-down list of a given library, the user can choose a sample type of fitting and use it in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (plan). Clicking on a selected place in the drawing area inserts the object. By choosing the button



or the double-click on the inserted element, activates the properties window.






Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Rectangular		150	150	Flange	0.0	10.0
Rectangular		150	150	Flange	0.0	10.0

Fig. 117 Properties window - Offset

8.8. Tee

Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒ 

The object insertion window is activated.

The window also allows you to use the **Project Library** or the **Global Library**. From the drop-down list of a given library, the user can choose a sample type of fitting and use it in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (plan). Clicking on a selected place in the drawing area inserts the object. By choosing the button



or the double-click on the inserted element, activates the properties window.

Object properties: Tee

Object management

Symbol: TE1 Element id: 0

Type: <New>

Group: <None>

System: HE1

Appearance

Rotation of the object: 0

Order number: 0

Parameters

Installation level: 0 cm

Additional equipment: ☐

Insulation: ☐

Type parameters

Name: Tee

Standard/Producer:

Type/Series type:

Material: PVC

Length (l): 300 mm Wall thickness (g): 2.0 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Rectangular		150	150	Flange	0.0	10.0
Rectangular		150	150	Flange	0.0	10.0
Circular	100			Flange	0.0	10.0

Branch length (ld): 150 mm Passage angle (α): 90.0 °

Horizontal asymmetry

Offset (e): 0 mm ☐ Left ☒ Centre ☐ Right

Vertical asymmetry

Offset (f): 0 mm ☐ Top ☒ Centre ☐ Bottom

Additional description:

Save to template:

Fig. 118 Properties window -Tee

8.9. Y-Piece

Command activation:

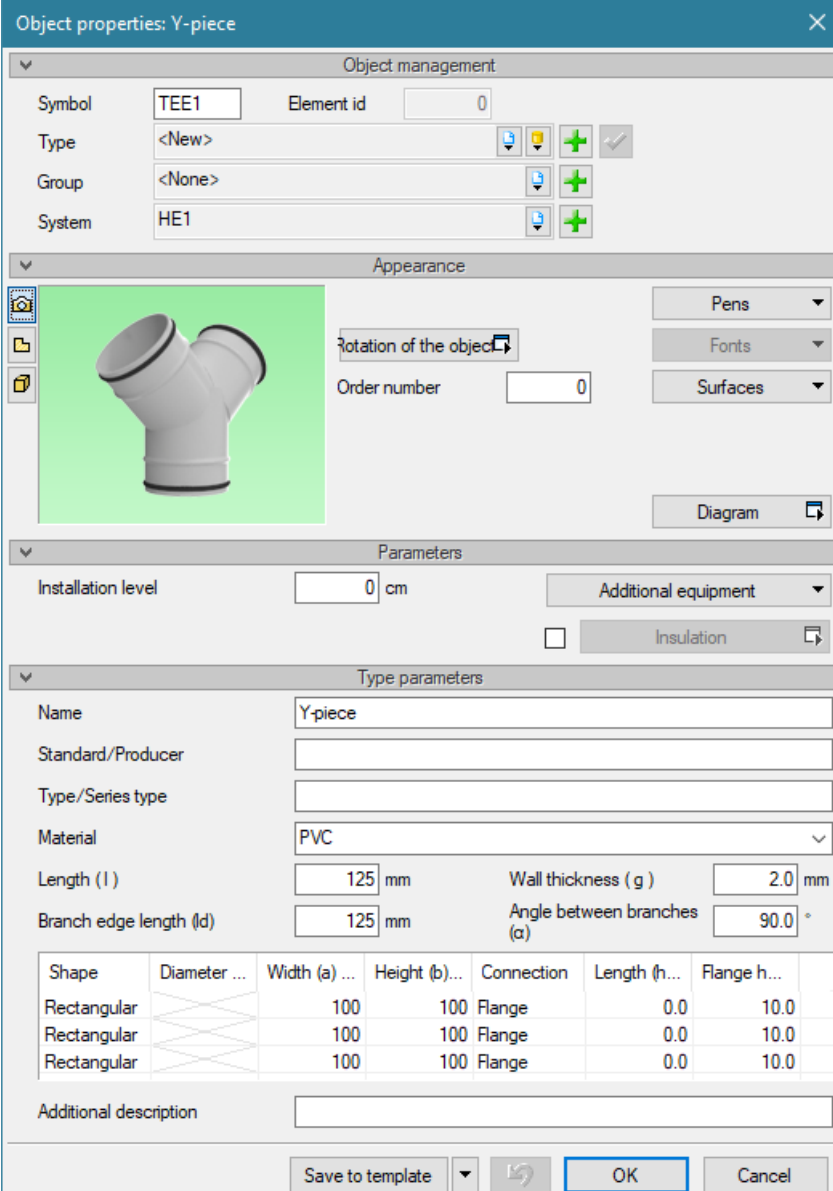
- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒  Y-piece

The object insertion window is activated.

The window also allows you to use the **Project Library** or the **Global Library**. From the drop-down list of a given library, the user can choose a sample type of fitting and use it in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (plan). Clicking on a selected place in the drawing area inserts the object. By choosing the

button  or the double-click on the inserted element, activates the properties window.



Object properties: Y-piece

Object management

Symbol: TEE1 Element id: 0

Type: <New> [Icons: Library, New, Add, Check]

Group: <None> [Icons: Library, Add]

System: HE1 [Icons: Library, Add]

Appearance

[Icons: Home, Folder, Document]

[3D Model of Y-piece]

Rotation of the object: [Icon]

Order number: 0

[Pens] [Fonts] [Surfaces]

[Diagram]

Parameters

Installation level: 0 cm [Additional equipment]

[Insulation]

Type parameters

Name: Y-piece

Standard/Producer: [Field]

Type/Series type: [Field]

Material: PVC

Length (l): 125 mm Wall thickness (g): 2.0 mm

Branch edge length (ld): 125 mm Angle between branches (α): 90.0 °

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Rectangular	[Icon]	100	100	Flange	0.0	10.0
Rectangular	[Icon]	100	100	Flange	0.0	10.0
Rectangular	[Icon]	100	100	Flange	0.0	10.0

Additional description: [Field]

[Save to template] [OK] [Cancel]

Fig. 119 Properties window – Y-piece

8.10. Y-piece with bend

Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒  **Y-pieces with bend**

The object insertion window is activated.

The window also allows you to use the **Project Library** or the **Global Library**. From the drop-down list of a given library, the user can choose a sample type of fitting and use it in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (plan). Clicking on a selected place in the drawing area inserts the object. By choosing the button



or the double-click on the inserted element, activates the properties window.

Object properties: Y-pieces with bend

Object management

Symbol: WT1 Element id: 0

Type: <New>

Group: <None>

System: HE1

Appearance

Rotation of the object: 0

Order number: 0

Pens: [dropdown]

Fonts: [dropdown]

Surfaces: [dropdown]

Diagram: [icon]

Parameters

Installation level: 0 cm

Additional equipment: [dropdown]

Insulation: [checkbox]

Type parameters

Name: Y-pieces with bend

Standard/Producer: [text box]

Type/Series type: [text box]

Material: PVC

Branch radius (ru): 125 mm

Wall thickness (g): 2.0 mm

Branch radius (rd): 125 mm

Passage angle (α): 90.0 °

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Rectangular		125	100	Flange	0.0	10.0
Rectangular		80	100	Flange	0.0	10.0
Rectangular		80	100	Flange	0.0	10.0

Additional description: [text box]

Save to template: [dropdown] [icon] OK Cancel

Fig. 120 Properties window – Y-piece with bend

8.11. Tee with take-off bend

Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒



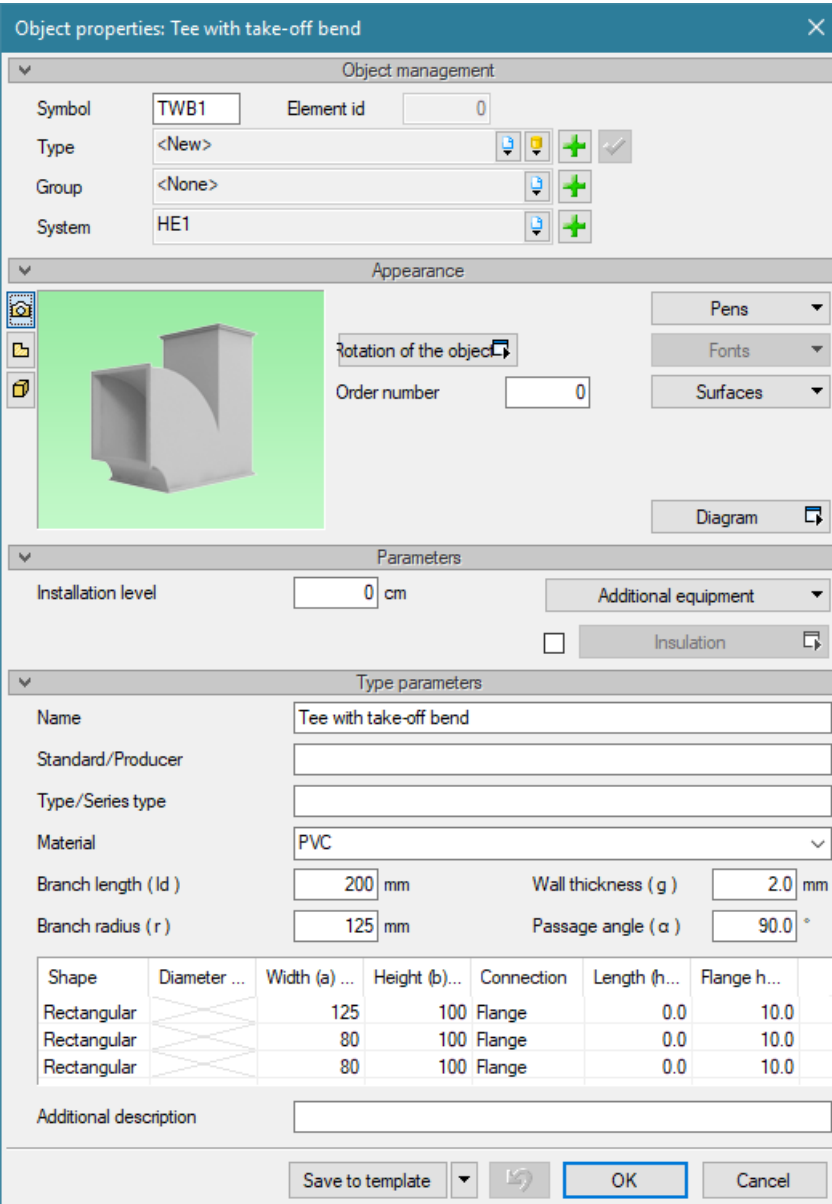
The object insertion window is activated.

The window also allows you to use the **Project Library** or the **Global Library**. From the drop-down list of a given library, the user can choose a sample type of fitting and use it in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (plan). Clicking on a selected place in the drawing area inserts the object. By choosing the button



or the double-click on the inserted element, activates the properties window.



The image shows a software window titled "Object properties: Tee with take-off bend". It is divided into several sections: "Object management" with fields for Symbol (TWB1), Element id (0), Type (<New>), Group (<None>), and System (HE1); "Appearance" with a 3D model of the tee, rotation controls, and a preview button; "Parameters" with installation level (0 cm) and additional equipment options; "Type parameters" with fields for Name, Standard/Producer, Type/Series type, Material (PVC), Branch length (200 mm), Branch radius (125 mm), Wall thickness (2.0 mm), and Passage angle (90.0°); a table of connection options; and an "Additional description" field. At the bottom are buttons for "Save to template", "OK", and "Cancel".

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Rectangular		125	100	Flange	0.0	10.0
Rectangular		80	100	Flange	0.0	10.0
Rectangular		80	100	Flange	0.0	10.0

Fig. 121 Properties window – Tee with take-off bend

8.12. Pant Y-piece

Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒  **Pant Y-piece**

The object insertion window is activated.

The window also allows you to use the **Project Library** or the **Global Library**. From the drop-down list of a given library, the user can choose a sample type of fitting and use it in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (plan). Clicking on a selected place in the drawing area inserts the object. By choosing the button



or the double-click on the inserted element, activates the properties window.

Object properties: Pant Y-piece

Object management

Symbol: PT1 Element id: 0

Type: <New>

Group: <None>

System: HE1

Appearance

Rotation of the object: 0

Order number: 0

Parameters

Installation level: 0 cm

Additional equipment: ☐ Insulation

Type parameters

Name: Pant Y-piece

Standard/Producer:

Type/Series type:

Material: PVC

Length (l): 200 mm Wall thickness (g): 2.0 mm

Distance between branches (p): 50 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Rectangular		125	100	Flange	0.0	10.0
Rectangular		80	100	Flange	0.0	10.0
Rectangular		80	100	Flange	0.0	10.0

Horizontal asymmetry

Offset (e): 0 mm ☐ Left ☒ Centre ☐ Right

Vertical asymmetry

Offset (f): 0 mm ☐ Top ☒ Centre ☐ Bottom

Additional description:

Save to template OK Cancel

Fig. 122 Properties window – Pant Y-piece

8.13. Saddle branch


Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒  **Saddle branch**

The object insertion window is activated.

The window also allows you to use the **Project Library** or the **Global Library**. From the drop-down list of a given library, the user can choose a sample type of fitting and use it in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (plan). Clicking on a selected place in the drawing area inserts the object. By choosing the

button  or the double-click on the inserted element, activates the properties window.

The saddle branch is inserted into the ventilation duct as shown in (Fig. 123)

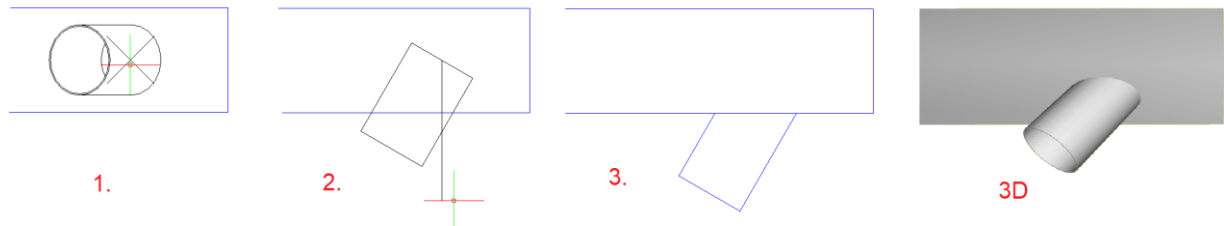


Fig. 123 Step by step insertion of a Saddle branch into the duct.

Object properties: Saddle branch

Object management

Symbol: SB1 Element id: 0

Type: <New> [Icons]

Group: <None> [Icons]

System: HE1 [Icons]

Appearance

[Icons] [3D View] [Rotation of the object] [Pens] [Fonts] [Surfaces]

Order number: 0

Parameters

Installation level: 0 cm [Additional equipment] [Insulation]

Type parameters

Name: Saddle branch for rectangular duct

Standard/Producer:

Type/Series type:

Material: PVC

Wall thickness (g): 2.0 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Circular	100			Zero	0.0	

Branch length (ld): 150 mm Passage angle (α): 90.0 °

Additional description:

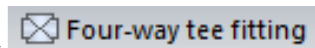
[Save to template] [OK] [Cancel]

Fig. 124 Properties window – Saddle branch

8.14. Four-way tee fitting

Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒



The object insertion window is activated.

The window also allows you to use the **Project Library** or the **Global Library**. From the drop-down list of a given library, the user can choose a sample type of fitting and use it in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (plan). Clicking on a selected place in the drawing area inserts the object. By choosing the button











or the double-click on the inserted element, activates the properties window.





Object properties: Four-way tee fitting

Object management

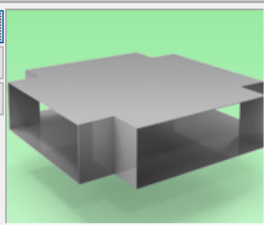
Symbol: CZ1 Element id: 0


Type: <New>    

Group: <None>    

System: HE1    

Appearance



Rotation of the object:  Order number: 0

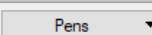
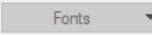
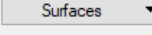
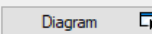
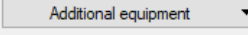
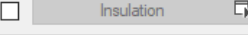
Pens:  Fonts:  Surfaces: 

Diagram: 

Parameters

Installation level: 0 cm Additional equipment: 

☐ Insulation: 

Type parameters







Name: Four-way tee fitting

Standard/Producer:

Type/Series type:

Material: PVC

Length (l): 300 mm Wall thickness (g): 2.0 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Rectangular		150	150	Flange	0.0	10.0
Rectangular		150	150	Flange	0.0	10.0
Circular	100			Flange	0.0	10.0
Circular	100			Flange	0.0	10.0

Branch (3) Branch (4)



Branch length (ld): 150 mm Passage angle (α): 90.0 °

Horizontal asymmetry

Offset (e): 0 mm ☐ Left ☒ Centre ☐ Right

Vertical asymmetry

Offset (f): 0 mm ☐ Top ☒ Centre ☐ Bottom

Additional description:


Save to template:  OK Cancel

Fig. 125 Properties window – Four-way tee fitting

On the window you can choose the branch location of the Four-way tee - through or side



8.15. Duct connector

Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒



The object insertion window is activated.

The window also allows you to use the **Project Library** or the **Global Library**. From the drop-down list of a given library, the user can choose a sample type of fitting and use it in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (plan). Clicking on a selected place in the drawing area inserts the object. By choosing the button



or the double-click on the inserted element, activates the properties window.

*In the case of the ArCADia BIM base license, the duct connector acts as a **ventilation duct**. From the global library you can select predefined ducts and define their length.*

Object properties: duct connector

Object management

Symbol: C1 Element id: 0

Type: <New>

Group: <None>

System: HE1

Appearance

3D model of duct connector

Rotation of the object: [field]

Order number: 0

Pens, Fonts, Surfaces dropdowns

Parameters

Installation level: 0 cm

Additional equipment dropdown

Insulation checkbox

Type parameters

Name: duct connector

Standard/Producer: [field]

Type/Series type: [field]

Material: PVC

Length (l): 100 mm Wall thickness (g): 2.0 mm

Shape	Diameter ...	Width (a) ...	Height (b) ...	Connection	Length (h) ...	Flange h ...
Circular	150			Flange	0.0	10.0

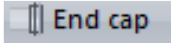
Additional description: [field]

Save to template, OK, Cancel buttons

Fig. 126 Properties window – Duct connector

8.16. End cap

Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒ 

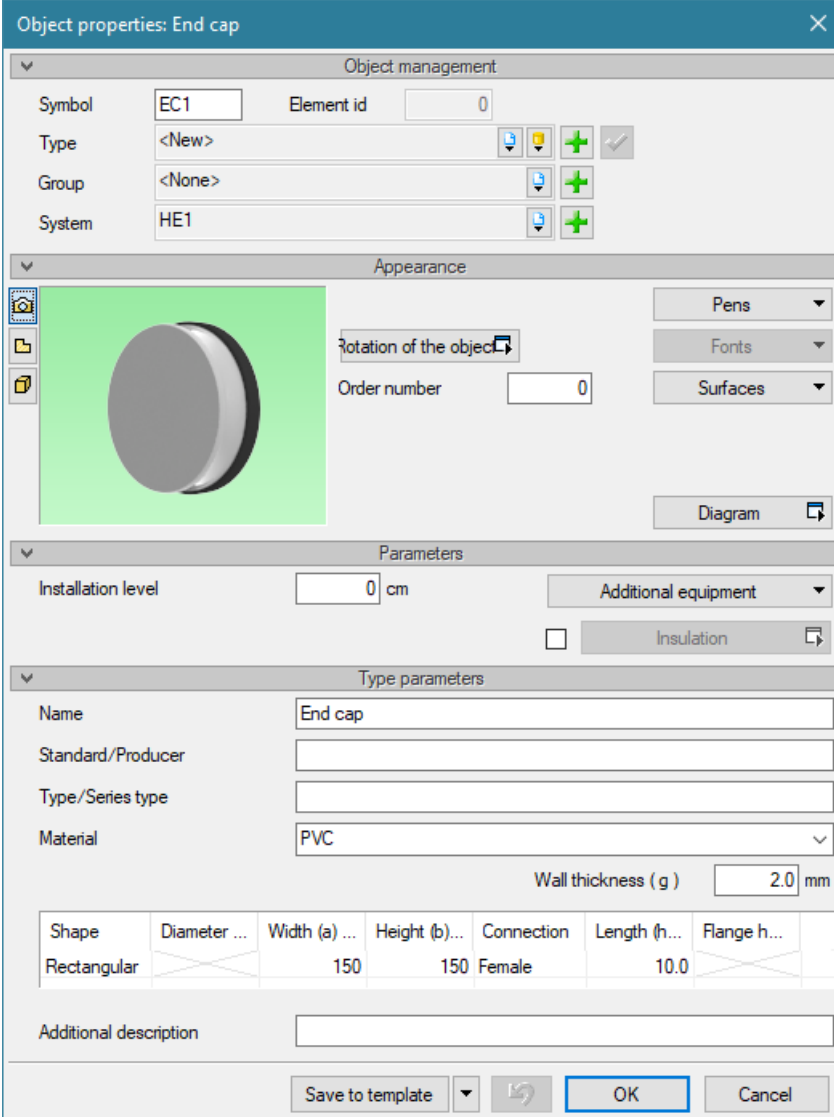
The object insertion window is activated.

The window also allows you to use the **Project Library** or the **Global Library**. From the drop-down list of a given library, the user can choose a sample type of fitting and use it in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (plan). Clicking on a selected place in the drawing area inserts the object. By choosing the button



or the double-click on the inserted element, activates the properties window.



Object properties: End cap

Object management

Symbol: EC1 Element id: 0

Type: <New>

Group: <None>

System: HE1

Appearance

Rotation of the object

Order number: 0

Parameters

Installation level: 0 cm

Additional equipment

Insulation

Type parameters

Name: End cap

Standard/Producer

Type/Series type

Material: PVC

Wall thickness (g): 2.0 mm

Shape	Diameter ...	Width (a) ...	Height (b)...	Connection	Length (h...	Flange h...
Rectangular		150	150	Female	10.0	

Additional description

Save to template OK Cancel

Fig. 127 Properties window – End cap

8.17. Free fitting

Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒  **Free fitting**

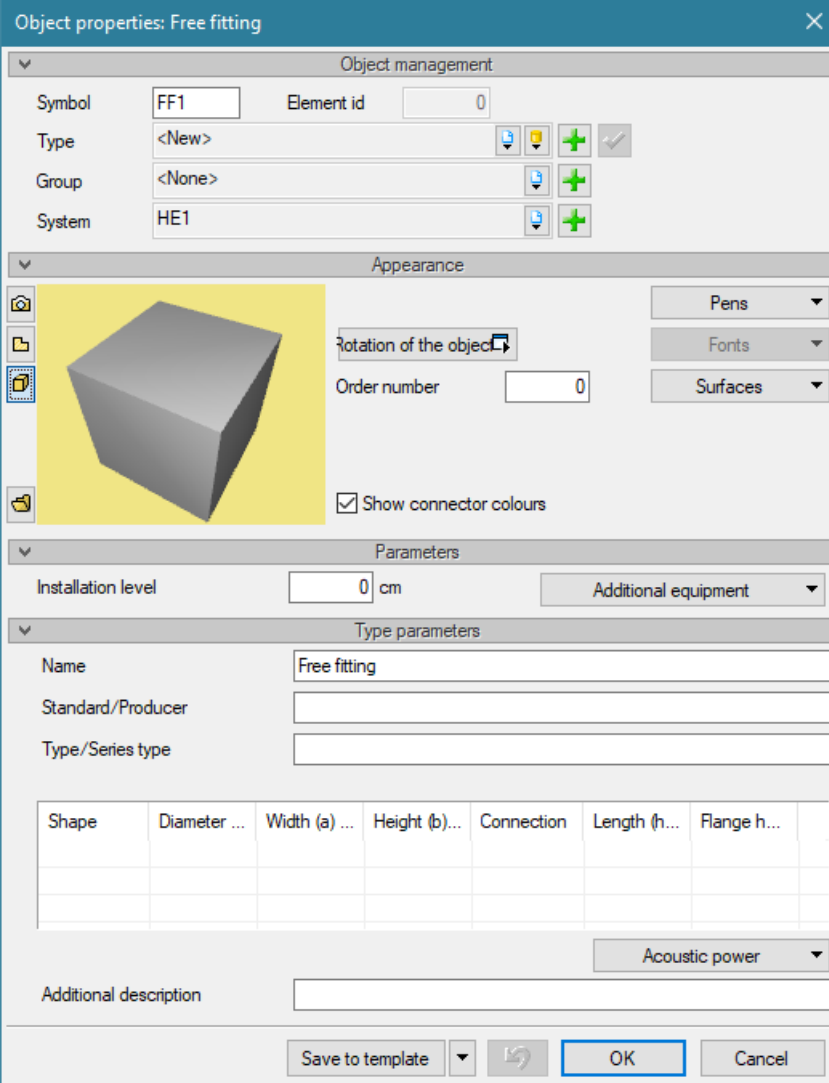
The object insertion window is activated.

The window also allows you to use the **Project Library** or the **Global Library**. From the drop-down list of a given library, the user can choose a sample type of fitting and use it in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (plan). Clicking on a selected place in the drawing area inserts the object. By choosing the button



or the double-click on the inserted element, activates the properties window.



Object properties: Free fitting

Object management

Symbol: FF1 Element id: 0

Type: <New>

Group: <None>

System: HE1

Appearance

Rotation of the object

Order number: 0

Show connector colours

Parameters

Installation level: 0 cm Additional equipment

Type parameters

Name: Free fitting

Standard/Producer

Type/Series type

Shape	Diameter ...	Width (a) ...	Height (b) ...	Connection	Length (h) ...	Flange h ...

Acoustic power

Additional description

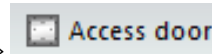
Save to template OK Cancel

Fig. 128 Properties window – Free fitting

8.18. Access door

Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒



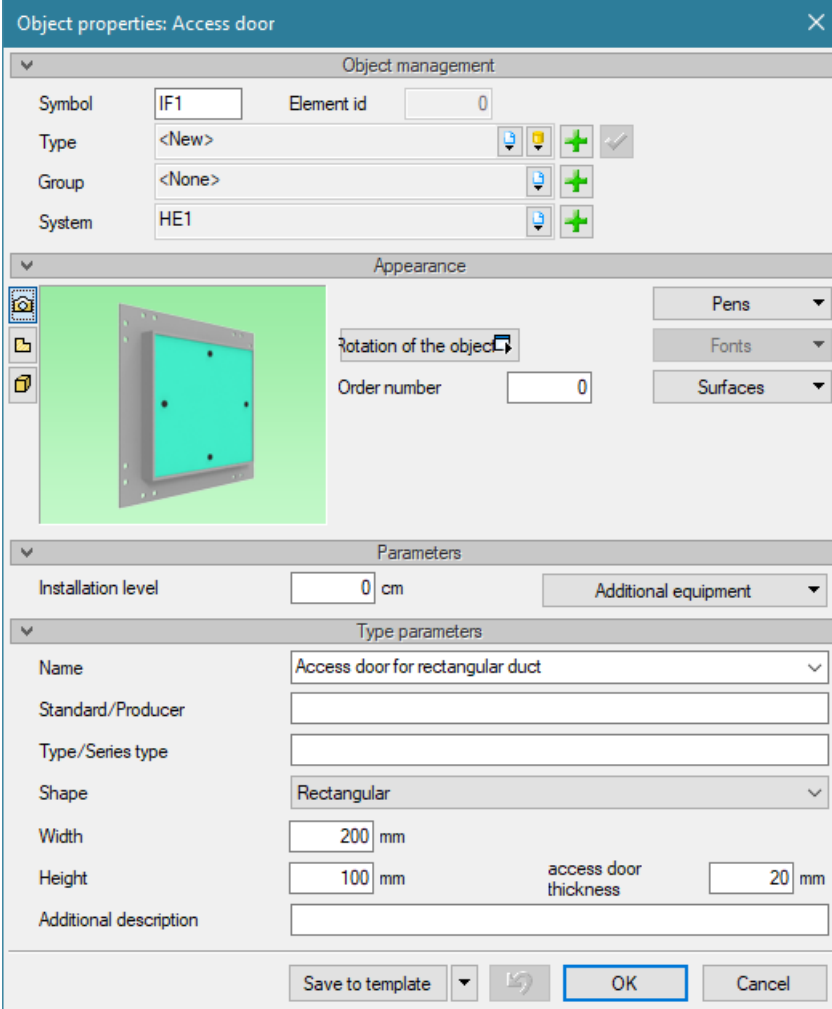
The object insertion window is activated.

The window also allows you to use the Project Library or the Global Library. From the drop-down list of a given library, the user can choose a sample type of fitting and use it in the project.

When the connection point insertion window is active, its symbol appears in the drawing field of the model (plan). Clicking on a selected place in the drawing area inserts the object. By choosing the button



or the double-click on the inserted element, activates the properties window



The image shows a software window titled "Object properties: Access door". It is divided into several sections:

- Object management:** Contains fields for Symbol (IF1), Element id (0), Type (<New>), Group (<None>), and System (HE1). Each field has a small icon to its right.
- Appearance:** Features a 3D preview of a green access door on the left. To the right are controls for "Rotation of the object" (a circular arrow icon), "Order number" (a text box with 0), and three dropdown menus: Pens, Fonts, and Surfaces.
- Parameters:** Includes "Installation level" (a text box with 0 and a unit dropdown set to cm) and "Additional equipment" (a dropdown menu).
- Type parameters:** Contains fields for Name (Access door for rectangular duct), Standard/Producer, Type/Series type, Shape (Rectangular), Width (200 mm), Height (100 mm), and an "access door thickness" section with a text box (20 mm) and a unit dropdown (mm). There is also an "Additional description" text box.
- Footer:** Includes a "Save to template" button, a circular arrow icon, and "OK" and "Cancel" buttons.

Fig. 129 Properties window – Access door

9. CREATOR OF CHANGES AND CONNECTIONS IN THE INSTALLATION

9.1. Changing the height of installation elements

Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒  **Change installation height**

After drawing all or part of the installation, the user can change the installation height by a given value. Click the **Change installation height** icon. Then enter the offset value in the insertion window and in the next step select the objects to be moved.

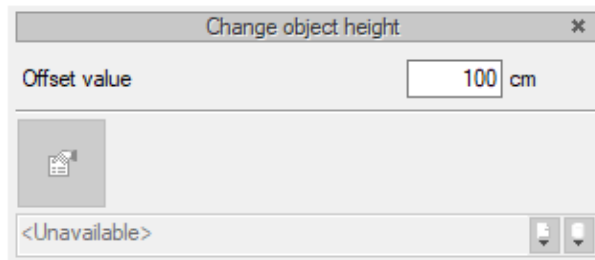



Fig. 130 Change object height window

Then press the Enter button. The mounting height of the marked elements has been changed by the value set.

9.2. Divide ducts into segments

If during the installation drawing the user turned off the "Automatically segment ducts" option (Fig. 11), the ventilation ducts were not divided into sections.

Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒  **Divide ducts into segments**

All ventilation ducts will be divided into segments with a specific length in the duct properties window (Fig. 98) in the field - [segment length](#).

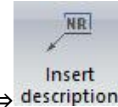
10. DESCRIPTION AND NUMBERING

10.1. Description of installation elements

Each element of the ventilation system can be described in the drawing.

Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒



After selecting the command, the user is asked to indicate the item for which the description should appear. After clicking on the element, a link will appear. By clicking again, the user specifies the location of the description in the drawing. An empty reference appears in the drawing.

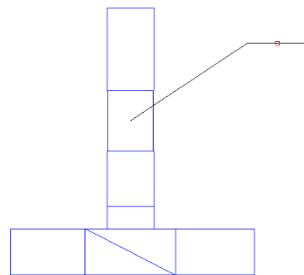


Fig. 131 Inserting the drawing reference.

After selecting the link, the element modification window appears.

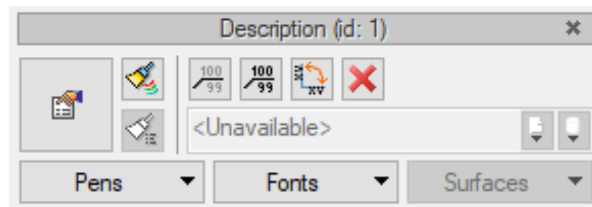


Fig. 132 Description modification window.

10.1.1. Object description properties

After going to the description properties window (Fig. 133) the user can choose what elements will be displayed on the link.

No.	Type	Value	Open	Visi...
1	Text		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Property		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	Address		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	File		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Fig. 133 Description properties window

There are 4 types of description available:

Text – After selecting this type, the user types any text to be displayed in the Value column

Properties - After selecting this type, for data to appear in the Value column, click Open. A window will open with available properties to choose from (Fig.134). The user selects one of them. For example, if he wants the serial number to be displayed - he selects this item. Further fields are completed automatically according to the object's properties. After confirming "OK", the selected values will be copied to the description properties window (Fig. 133).

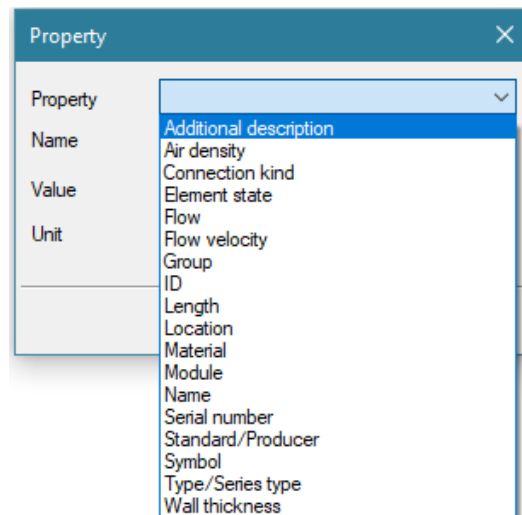


Fig. 134 Select properties window

Address – in the value column, the user can enter the web address or file location path. After clicking on the "Open" column, the website or file location folder will open automatically.

File – here the user can directly assign an external file to an object, e.g. a catalog card. After clicking on the Open column - a new window will open in which we indicate the file location (Fig. 135).

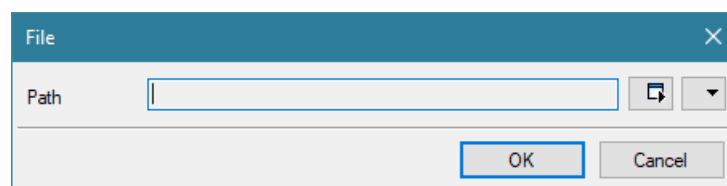


Fig. 135 Selecting file location window

After clicking on the red button, the system explorer window will open - the user will select the file and confirm with "open". The path will be remembered. With the green "Run" button - the file is opened.

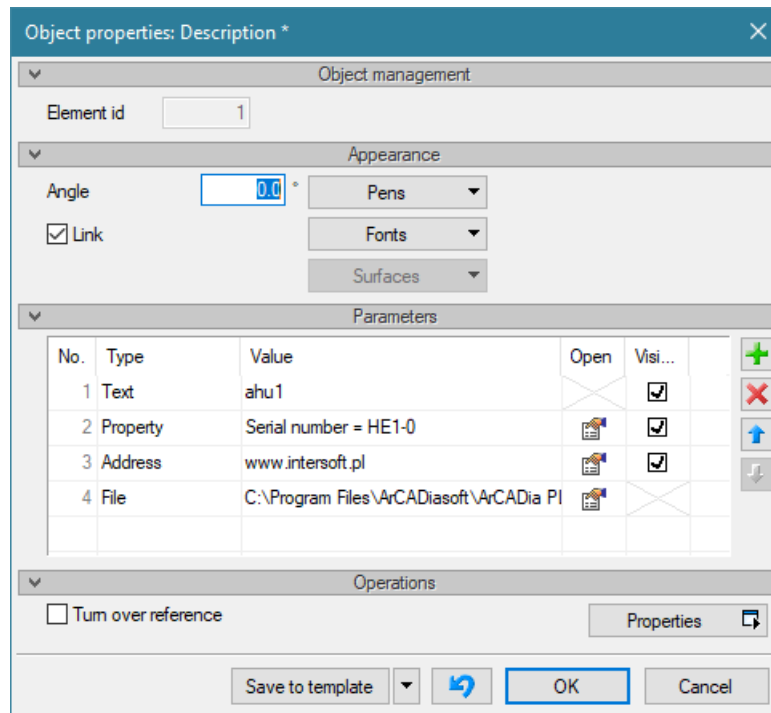


Fig. 136. Sample window with defined description properties.

Further descriptions can be added / removed via the „+” and „-”, while the order of their display is changed by the arrows. Unchecking the check box in the Visibility column will not display the defined description. The window also allows direct access to the properties of the edited element - via the "Properties" button.

heater
HE1-1
www.intersoft.pl




Fig. 137 Example of a defined description according to Fig. 136.

The description font and color can be defined by changing the parameters Appearance - Font and Pens. In addition, several editing options are available in the description modification window (Fig. 132) –



- enable / disable link



- turn over reference



- rotate



- delete marked objects



- fonts and pen painter

To insert a link to a group of elements, first select the elements and then run the "Insert description" command. Description links will appear and will be assigned to individual items. Description properties can be changed in groups, but only for elements of the same type - e.g. ducts or tees.

10.2. Renumber elements

To draw up specifications for ventilation components, you need to number them. By default, each of the elements inserted into the project is assigned the number "0". The number can be changed manually in the properties window (**Błąd! Nie można odnaleźć źródła odwołania.**). However, it is possible to automatically number the installation with the command [Renumber elements](#).

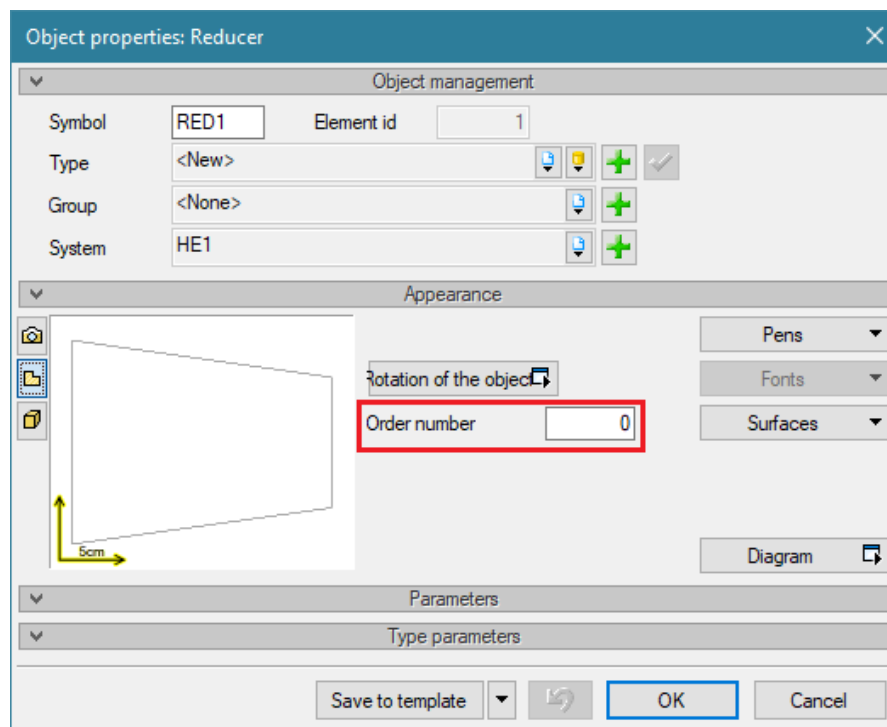


Fig. 138 Element Properties window with the location of the Order number.

In order for the installation components to be numbered, the system must be closed and have a defined air flow path – i.e. all connectors must be connected and there must be an end element (diffuser, exhaust) and a starting element (intake/exhaust) in the installation.

Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒  **Renumber objects**

After starting, the elements in the drawing will be assigned an order number. If the user has numbered the installation and wants to make numbering changes only to a certain extent he can select only certain elements. After running the command only they will be renumbered. If a number is missing as a result of changes, the program will insert the missing number when numbering. In order for the item number to appear in the drawing, its description should be inserted – as in **Błąd! Nie można odnaleźć źródła odwołania.**

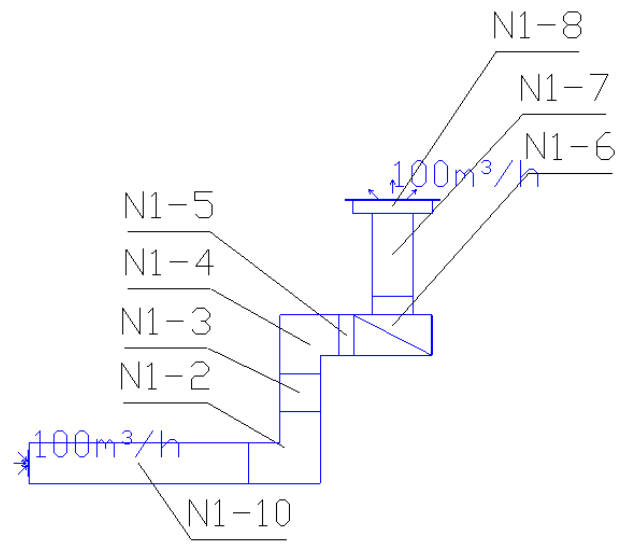


Fig. 139 Example of a numbered installation.

11. CALCULATIONS AND RESULT INTERPRETATION

11.1. General assumptions for performing calculations

The calculations of the program consist of checking the drawn layout of the installation. The designer must complete the introduction of elements and accept their technological parameters.

The program gives the opportunity to check the operating parameters of the installation and its individual elements, and informs the user about errors and incorrectly accepted elements. Parameters are modified by the user, while controlling the results of calculations for selected paths and elements.

Calculation possibilities of the program:

1. Connection correctness diagnostics of ventilation installation objects.
2. Determination of air flows in individual branches and sections.
3. Hydraulic check of the duct diameters selected by the user (checking speed and unit pressure drop).
4. Calculation of linear and local losses on user-selected pathways.
5. Determining the required compression.
6. Comparison of the required compression with the assumed compression for the Air handling unit or fan.
7. Calculation of the sound power level of the installation on the paths selected by the user.
8. Making duct changes from the level of calculation tables.

11.2. Checking the correctness of the drawn installation

After finishing drawing (or during drawing), if the user has connected all the elements of the installation, it is possible to check the project execution in terms of correctness of duct and device connections.

Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒



A window with the table of errors will appear.

Filters		Messages		
Installation		Installati...	Location	Description
All	▼	!	🔍	No intake/exhaust ventilators
Location		!	🔍	Items unconnected to any paths: Reducer
All	▼			
Elements				
All	▼			
Category				
All	▼			
Show selected				
Refresh				

Fig. 140 Table – ventilation installation report with information about the correctness of the constructed installation

The user, after clicking on the error information, will start detecting errors in the drawing. The program will mark on the model the paths and elements where errors occur. The designer can make adjustments in the drawing by connecting elements to ensure the continuity of the installation. After making corrections, the program reports on the correctness of the constructed installation.

On the drop down menu **Installation** the user chooses the point of joining the installation or the set of joining points.

The drop down menu **Elements** gives you the opportunity to choose one of several groups of unconnected items. If there are connection errors in the following groups: ducts, supply, intakes, etc., the user can choose e.g. only the intakes.

After completing the selection from the drop-down lists, the user can select objects in the drawing that are unconnected and which correspond to the given grouping. To do this, press the button **Show selected**. Then the area of the installation view area will be moved to the given fragment of the installation drawing, consisting of the group of connection errors, and marked with dashed lines with a view of grips

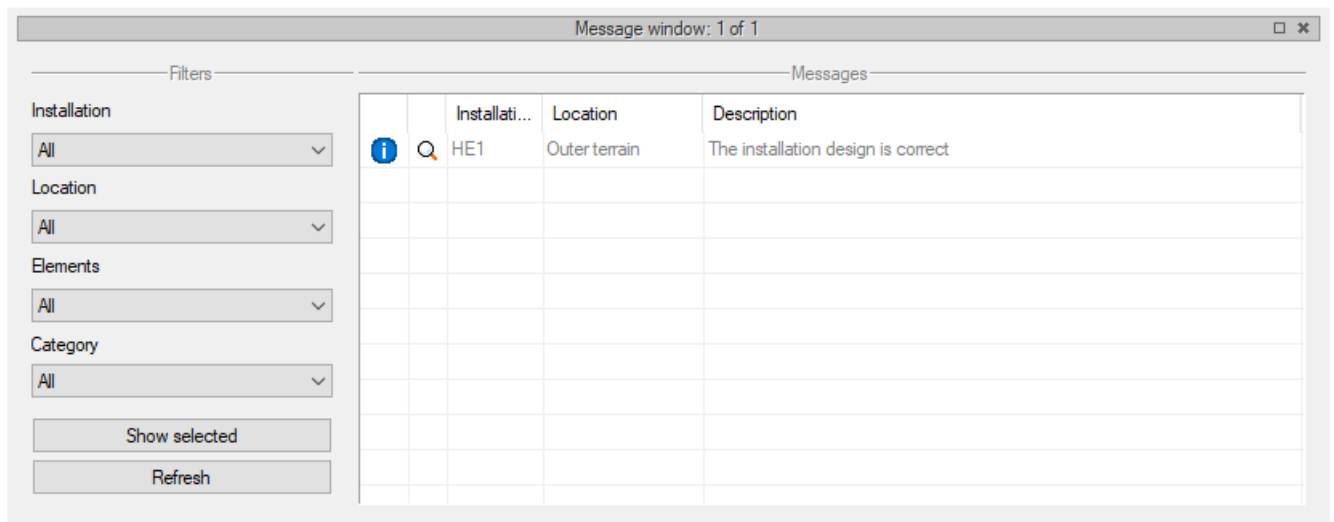










Fig. 141 Table –ventilation installation report with information about the correctness of the constructed installation

Message types (they differ by the icon next to the message):

- Information 
- Warning 

- Error 

Message content – interpretation:

1.  **The installation design is correct**
This message occurs when the installation is built correctly in terms of connections.
2.  **Not connected duct**
This message occurs when there is a duct in the project that is not connected.
3.  **Not connected elements: e.g. Supply**
This message occurs when the object is not connected to any duct.
4.  **Elements not connected to any path, e.g. Ventilation duct**
This message occurs when the object (also the duct) has no direct or indirect connection to the calculation path.
5.  **Incompatibility of coupling connectors**
This message occurs when the object is connected to another, but the connection type is not correct - The program assumes valid connections as: flange-flange, zero-nipple, zero-muff, nipple-muff.
This error does not affect the calculation results.

11.3. Calculation methodology

11.3.1. Computational flows

Flows are determined for calculation sections separated on the basis of the installation geometry. The division into calculation sections results from the change in one of the parameters affecting the determination of flow resistance through the duct: flow, roughness factor (duct material) or duct diameter

The stream flowing through the duct is calculated at each node, i.e. where the next computational section is connected. The air flow is calculated on the basis of the amount of air set in the supply and exhausts.

11.3.2. Hydraulic calculations

Hydraulic calculations consist of determining pressure loss: linear (along the length of the duct) and local (on connecting fittings and devices).

Unit **linear losses** are defined by the Darcy-Weisbach formulas.

$$\Delta h_i = \frac{\lambda}{D} \cdot \frac{V_{obl}^2}{2} \cdot \rho$$

The linear resistance coefficient was determined by determining from the complex formula based on the test results of Colebrook-White'a.

$$\frac{1}{\sqrt{\lambda}} = -2 \lg \left(\frac{2,51}{Re \sqrt{\lambda}} + \frac{k}{3,72 D_w} \right)$$

The total pressure loss over the calculation section is determined by multiplying the unit value of the linear pressure loss.

$$\Delta h_{odc} = \Delta h_i l$$

The total loss of linear pressure on the calculation path consists of the sum of segmental losses.

Local losses are determined on the basis of the Darcy-Weisbach and Colebrook-White formulas and the local resistance coefficient. Additionally, for devices it is possible to specify/enter the local loss value by the user.

Local losses for the object on the calculation section with determination of the resistance coefficient ζ :

$$Z_z = \left(\zeta \frac{V^2}{2} \rho \right)$$

Local resistances for objects on a given calculation section, regardless of which method is used, are then added to each other. Local resistance on the section border is included in the section with a smaller flow. If the design sections are with the same flow (two ducts of different diameters connected to each other), then the local resistances are included in the section with a smaller internal diameter (possibly with a higher speed) at the same flow.

Symbols used in the formulas:

$$\Delta h_c = \Sigma \Delta h_{odc} \text{ [Pa]},$$

Δh_i – unit pressure drop per meter of duct, [Pa],

Z_z – local pressure loss, [Pa],

Z_k – local pressure loss, [bar] – the program converts into appropriate units,

V – air velocity in the duct, [m/s],

P – average density of air, [kg/m³],

k – material roughness coefficient, [mm],

D – duct internal diameter, [mm],

Re – Reynolds number,

L – calculation duct length, [m],

q – calculation flow, [m³/h].

All units are converted by the program to ones displayed in dialog boxes.

The program determines the total pressure loss on the paths selected by the user and determines the geometric active pressure for each receiver. This makes it possible to determine the critical path and compare this with the value of available pressure defined in the **Air Handling Unit or fan**.

11.3.3. Acoustic calculations

Acoustic calculations consist in determining the sound power level of the installation transferred to the room. Calculations are performed for the middle octave band values – 63,125,250,500,1000,2000,4000,8000 Hz.

Procedure:

- from the octave sound power level of the first element which is usually a fan, the natural damping of the next element (n+1) is subtracted. The value obtained is the residual noise in item n+1.
- to the remaining hum in item n+1, the logarithmically generated noise from the air flow through this element is added. This value is the total sound power level at the end of n+1

- from the octave sound power level at the end of pos. n+1 the natural damping of the next element (n+2) is subtracted. This value is the power level in item n+2, etc..

At the end, the octave values obtained are subjected to correction by filter A.

- The sound power of the sound source is the value entered by the user in the properties of the air handling unit (or fan).

Logarithmic summation of sound levels according to the formula:

$$\text{Sum} = 10 \log(10^{0,1 \cdot L_1} + 10^{0,1 \cdot L_2} + \dots + 10^{0,1 \cdot L_n})$$

L – sound power level.

- **Noise caused by the airflow in the system (ducts)**

Total linear sound power level generated by turbulent flow in a straight air duct is calculated in approximation from the equation:

$$L_w = 7 + 50 \cdot \lg v + 10 \cdot \lg S$$

L_w - total sound power level, dB

v – average speed in the cross-section of the flow, m/s

S – cross-sectional area for flow, m²

Linear sound power level in octave bands L_{w okt} results from equation:

$$L_{w \text{ okt}} = L_w + \Delta L_w,$$

ΔL_w – difference in the sound power level in the octave band in relation to the total sound power level, dB

$$\Delta L_w = -2 - 26 \lg(1,14 + 0,02 (f_m/v))$$

f_m – octave frequency

v – speed

- **Noise generated at branch:**

$$L_w = L_w' + 10 \cdot \lg \Delta f + 30 \cdot \lg d_o + 50 \cdot \lg v_a$$

L_w - total sound power level, dB

L_{w'} – standard sound power level

$$L_w' = 12 - 21,5 \cdot (\lg St)^{1,268} + (32 + 13 \cdot \lg St) \cdot \lg (v_h/v_a)$$

St – Strouhal number = (f·d_a)/v_a

d_a - branch conduit diameter, m, (for other than round: d_g = root (4/π) · S)

Δf – octave bandwidth (70,7 % frequency)

V_a – average speed in the cross section of the branch conduit, m/s

V_h – average speed in the cross section of the main conduit, m/s

- **Resulting noise on elements:** intake, outlet, heater, cooler, filter, damper, regulator, plenum box, fire damper (data from element properties).

The program takes into account silencing:

- In straight sections
- Silencing at branching or joining streams

$$\Delta L = 10 \log \left| \frac{A_i}{\sum A_{1,2,3...}} \right| \quad [\text{dB}]$$

A_i - cross-sectional area of the branch in question [m²]

$\sum A_{1,2,3}$ - The sum of the surfaces of all branches

- Silencing when changing direction
- Silencing in sudden narrowing

$$\Delta L = 10 \log \frac{\left(\frac{A_1}{A_2} + 1 \right)^2}{4 \frac{A_1}{A_2}} \quad [\text{dB}]$$

A_1 - cross-sectional area before change [m²]

A_2 - cross-sectional area after change [m²]

- Silencer insertion loss

The program determines the sound power levels on the paths selected by the user. This gives you the opportunity to specify the "loudest" path and select the appropriate damping elements.

11.4. Calculations

After checking the correctness of the constructed model of the installation, calculations can be made.

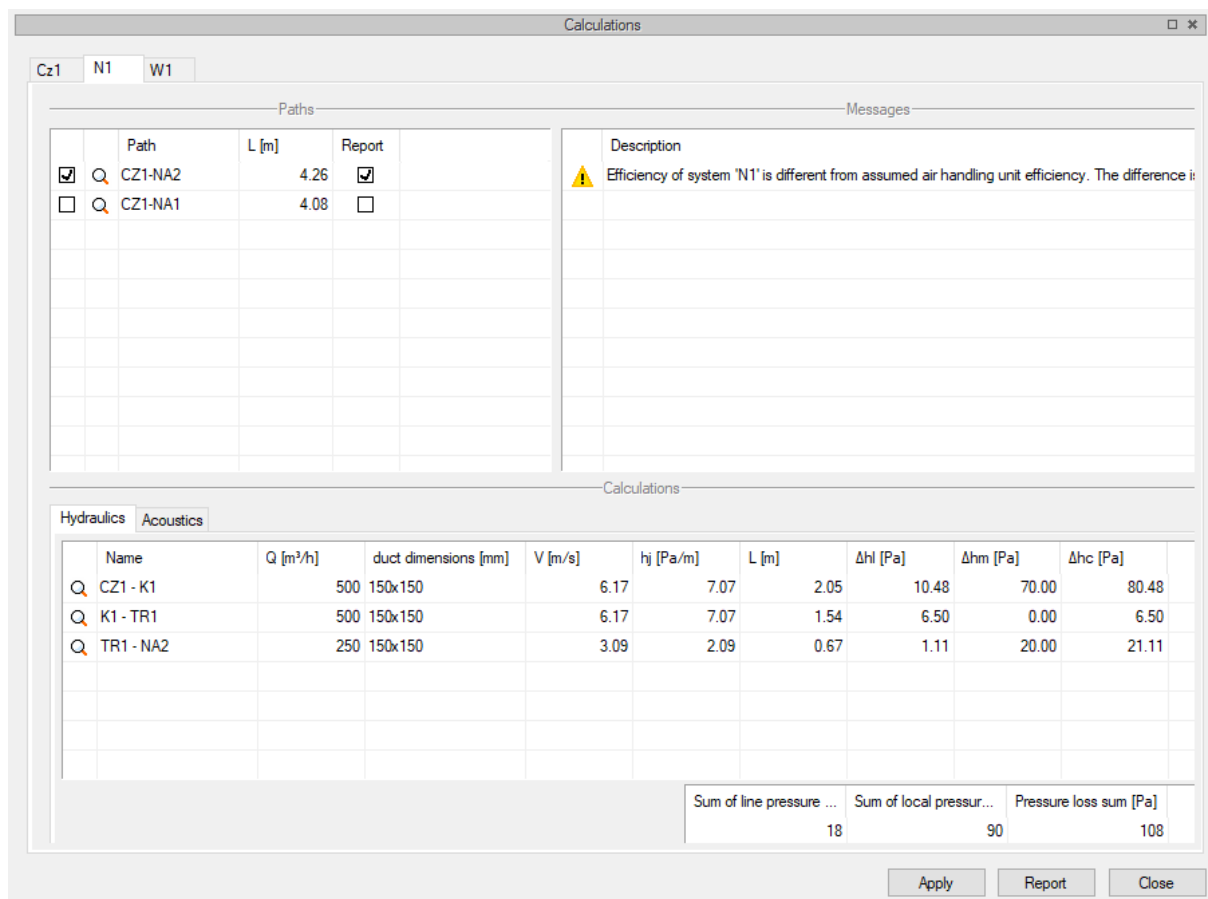
Command activation:

- **Ventilation ribbon** ⇒ **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒



Then a window with calculation tables will be displayed. The calculation window has separate tabs for each system. The content of each tab is a path selection table, calculation table and window with a list of messages.

At the outset the user selects from the tabs the type of system which is to be part of the designed system:



Hydraulics		Acoustics									
Name		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Acoustic ...	Details
CZ1 - TR1		22.51	21.79	21.14	20.60	20.42	20.30	20.30	20.30	30.03	
TR1 - NA1		17.87	18.49	19.25	19.50	19.75	19.75	19.75	19.75	28.34	

Fig. 142 Calculation tables window, N1 system calculations

Duct Table

In the upper left part of the window, the user chooses the duct for calculations. By default, the order is sorted by the duct length. You can change the sorting by clicking on the column name (eg L [m]).

After selecting a given element in the **Duct** table the user can trace the hydraulic or acoustic calculations for the selected circulation in the table **Calculation** as below. In the table with hydraulic calculations, flows and speeds of the heating medium as well as linear and local losses of a given circulation are determined, and their sum is generated below. For acoustic calculations, we have a table with sound power levels in octave bands.

The designer has the opportunity to analyze pressure losses occurring on a given calculation section: unit pressure loss per 1 running meter of the duct, total linear pressure loss on the calculation section, the sum of local pressure losses and the total sum of pressure losses occurring on the calculation section.

The designer can trace the selection of duct parameters on each calculation section and assess the hydraulic and acoustic parameters

If the designer finds it necessary to change the duct diameters due to high air speed or noise, it is possible to do it from the level of table (Fig. 143). To do this, click on the cell with the duct dimension description, which will open the duct properties window in the range of type parameters.

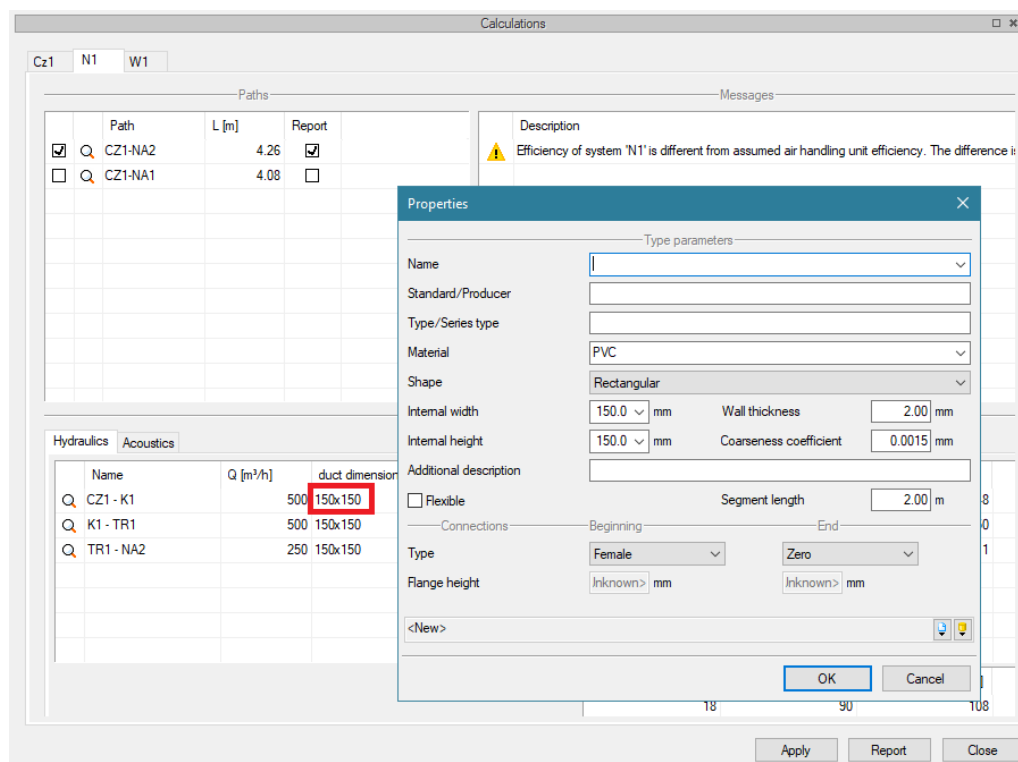



Fig. 143 Changing the duct size from the calculation window.

NOTE! To make the changes in the table reflect in the drawing, press the **Apply** button. Then the change will be applied to the drawing model on the changed calculation sections (the change may apply to several ducts making up one calculation section). After changing the size of the installation fragment, adjust the connections with the unchanged installation - e.g. by applying a reduction.

On the left you can find the table **Messages**.

Message Types (they differ by the icon next to the message):

- Information 
- Warning 
- Error 

11.5. RTF report from calculations

After making adjustments and changes, always click the **Apply** button in the calculation tables, in each tab and at the selected path. To exit from the calculations, you need to press the **Close**, which will close the window and we will go to the drawing model.

In order to receive the set of required reports from individual paths, the user should call up the table with calculations, and then (under each tab) mark the tick in the square in the **Report** column, in the calculation path

selection table. The designer can either select reports only from critical paths, or from others he is interested in as well. After choosing the appropriate reports by selecting them, click the Report button, which will bring up a window enabling you to give a title to the generated text file in the RTF format and locate it in the selected folder.

12. LISTS

12.1. List of installation elements and Materials List

To get the list of elements used in the project, activate the command:

Command activation:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒ 

To get the List of materials, activate the command:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒ 

To get the list of selected items, activate the command:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒ 

To get the list of selected items materials, select the items and activate the command:

- **Ventilation ribbon** ⇒ logical group **Ventilation System** ⇒ 

A corresponding table is then generated in the drawing field. The table is attached to the mouse cursor and clicking in the drawing field places it there in the drawing.

Editing tables can be done by clicking on their frame, which brings up the action windows.

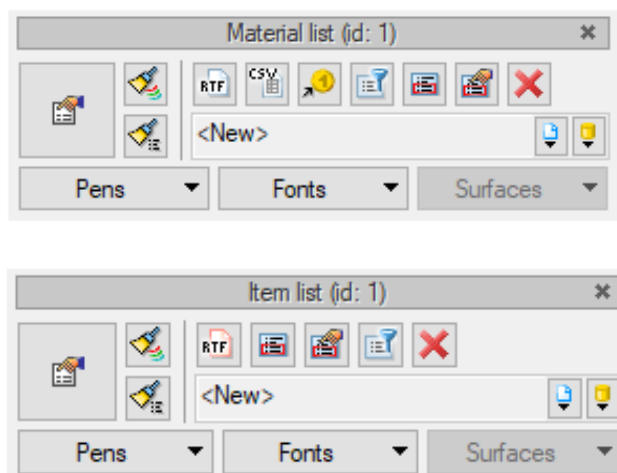




Fig. 144 Transition windows for list of materials and list of elements

In these windows the user is able to send the table in the RTF format by clicking the button  ^{CSV}, a window will appear where you will be able to name the generated file and indicate its location. In the case of the List of Materials, you can export data to the Ceninwest program by pressing the button .

Additionally, you can filter elements or paths for a list of materials. Type filtering allows you to limit the types of objects used in the project to those that interest the designer.

Clicking the big button in the edit transition window or double-clicking the frame will take you to the table properties windows.

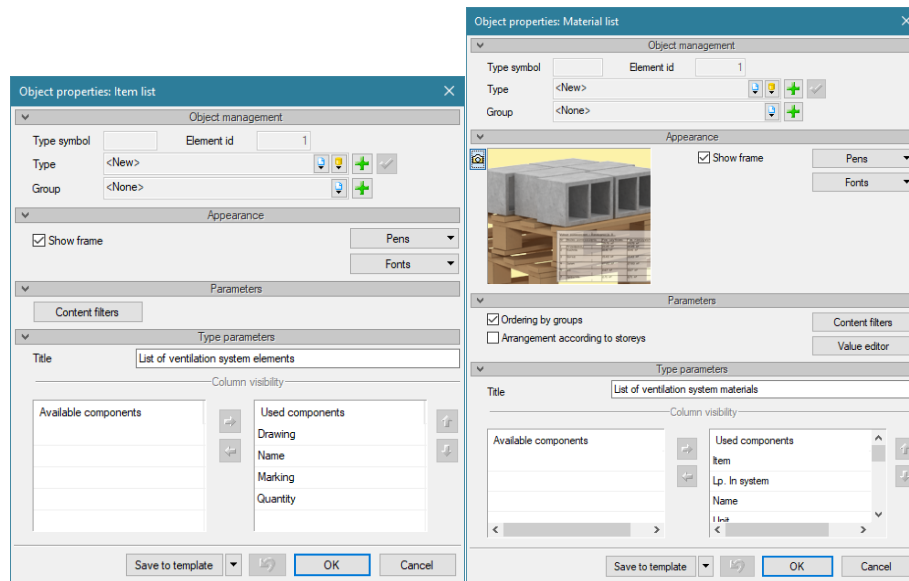




Fig. 145 Property windows for list of materials and list of elements

Editing the number of columns and their order in both cases can be done in the same way. The user selects a component by clicking on it. You can then move the element by clicking the arrow pointing to the table (side arrows). The column order can be set by the up and down arrows. With the component selected, clicking the appropriate vertical direction moves the used component in the table. The order of the rows in the component table corresponds to the order of the columns in the List table.

After inserting the **List of materials** or **List of elements** we have the option of selecting them. Then the modification window with the icon , selecting chosen elements on the plan, is available. After clicking on the icon, the user can select items in the list with the mouse. You can click on the highlighted row in the table and then all the elements of that row will be marked on the plan.

To change properties for all selected objects, e.g. type parameters (diameter, manufacturer, type of connections or other), click the icon  **Change the properties of selected elements**.

List of ventilation system materials



























Item...	Lp. In system	Name
Ungrouped		
1	HE1-1	Tee
2	HE1-2	Ventilation duct
3	HE1-3	Ventilation duct
4	HE1-4	Ventilation grille
5	HE1-5	Wall intake



























Fig. 146 List view with selected elements









13. TABLE OF COMMANDS

Below is a list of commands available in the basic functions of the ArCADia system and the ArCADia industry module - VENTILATION SYSTEMS.

Table of commands available after installing the ArCADia BIM system on AutoCAD or ArCADia

Icon	Command	Option
	isa_tllv	Project manager
	isa_tv3d	3D View
	isa_cmp	Compare documents
	isa_merge	Merge documents
	isa_o	Options
	isa_defaults	Template manager
	isa_etl	Type library
	Isa_extempl	Change type
	isa_fl	Flatten document
	isa_fix	Repair document
	isa_rdp	Restore window position
	isa_help *	Help
	isa_license	Modules and licenses
	isa_ver	About the program
	isa_wizbld	Building creator
	vent_unit	Air Handling Unit
	vent_int	Intake
	vent_exh	Outlet
	vent_int	Intake ventilator
	vent_out	Uptake ventilator
	vent_fan	Fan
	vent_heat	Heater
	vent_fil	Filter
	vent_slr	Silencer
	vent_damp	Damper
	vent_reg	Controller

	vent_pb	Plenum box
	vent_fdamp	Fire damper
	vent_ad	Access door
	vent_cs	Saddle branch
	vent_vrd	Duct
	vent_vvrd	Vertical duct
	vent_vfd	Flexible duct
	vent_red	Reducer
	vent_bend	Bend
	vent_arc	Elbow
	vent_of	Offset
	vent_tee	Tee
	vent_ypiece	Y-piece
	vent_sgull	Y-piece with bend
	vent_swept	Tee with take-off bend
	vent_pants	Pant Y-piece
	vent_four	Four-way tee
	vent_coup	Duct connector
	vent_end	End cap
	vent_ff	Free fitting
	vent_hgtwiz	Change installation height
	vent_sd wiz	Divide ducts into segments
	iu_vr	Insert virtual rooms
	iu_rm	Room manager
	iu_pos	Insert description
	vent_rnwiz	Renumber elements

	vent_sl	Material list
	vent_ssl	Selected elements material list
	vent_il	List of elements
	vent_sil	Selected elements list
	vent_calc	Calculations and Report
	vent_ver	Checks ventilation system
	vent_popt	Options
	Isa_help	Help