CADvent 6.x

Manual

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CADvent: A tool for the 21st century

CADvent is a design and drafting program that increases workplace efficiency. By looking at the history of CADvent, we can understand how the program evolved into its current form.

The predecessor to CADvent was V–CAD, a program that started in 1992 as an academic thesis. Sheet metal contractors, mechanical contractors and design engineers needed a tool that would enable them to design in 3 dimensions, calculate sound and pressure drop, and create a Bill of Materials to calculate price and material quantities. When V–CAD was exhibited at a large industry trade show in Europe in March 1994, design and organization expectations were raised to new heights.

Through an initial cooperation with Lindab, the program designers used measured values instead of formulae for specific engineering data required by the program. These calculations have proven to be consistent with measurements in other facilities.

Today's CADvent is the result of the use of worldwide Beta testers and continual program upgrades to improve user–friendliness and functionality.

CADvent uses the following criteria as a product development guideline:

It must be easy to learn
It must be quick to design a project in 3D
It must be possible to add parts to a system
It must be possible to radically change a duct system easily and quickly
No programs other than CADvent should be required to design a duct system
System components in CADvent must have the same properties as real–world components
Data for calculation must be based on tested and measured values
If a system can be drawn in CADvent, it can be built
System information must be updated automatically when components are changed
Functions such as advanced calculation methods and reports should be fully integrated

CADvent provides several possibilities in designing a duct system, enabling the user to work within CADvent based on his or her existing knowledge of CAD drawing and HVAC duct systems. For example, if the user is unsure of which air device is most appropriate for a given space, the user can choose one and then later change to another and recalculate in a matter of minutes.

Installation and Registration

Installation of CADvent

System requirements

Hardware: We recommend the same hardware features for minimum and recommended performance as the AutoCAD platform.

Software: AutoCAD® 2007 to 2010
AutoCAD® Architecture 2007 to 2010
AutoCAD® MEP 2007 to 2010
CADvent is also running on AutoCAD 2004 to 2006 but with reduced functionality

CADvent supports Windows XP 32-bit and Windows Vista in 32- and 64-bit as OS.

Installation of CADvent on a single PC

CADvent is installed using an MSI installation package using Windows installer.

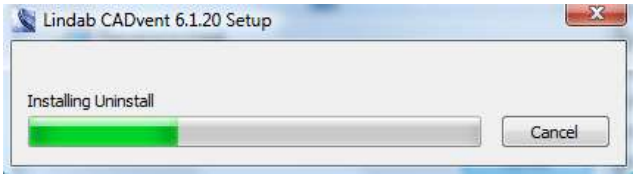
To install CADvent you must have local administrator privileges on your computer.

CADvent supports side-by-side installation, will say you can install separate versions of CADvent, but always just one MINOR version. You can install CADvent 5.6and 6.0 side-by-side, but not 2 versions of 6.0.

NOTE: Close all other programmes before you start installing CADvent.

Download the CADvent software from the internet or the download link that was sent to you.
The CADventSetup32.exe is for 32-bit systems, the CADventSetup64.exe is for 64-bit systems.
Double-click on the EXE-file to start the installation.
If you install CADvent for the first time you the installation software will check for support software and download and install these if necessary:

- .NET Framework 3.5 SP1
- Crystal Reports 2008 Runtime SP1



Installation Startup

NOTE:
You must have local administrator rights to run the installation, the installation program will check whether you have these rights, the UAC in Vista and Windows 7 may invoke you to confirm the action. We recommend uninstalling existing CADvent 6 versions before installing a new one. CADvent 5.6 does NOT need to be uninstalled, they can run parallel.

Installation Progress

CADvent checks if there are versions that needs to be uninstalled before installing a new version and ask you to uninstall the existing version first.

The dialog to the left will be shown, press the “Uninstall” button to remove the exisinting CADvent version.
After the removal is completed CADvent will continue with the new installation.

An installation Wizard will guide you through the installation.

The steps are similar as before and will come in the following order:

- Installation startup page
- License agreement
- List of possible AutoCAD versions to install on
- Country
- Installation directory (**NOTE:** CADvent always into C:\Program Files (C:\Program Files(x86) for 64-bit) by default, we recommend not to change the folder)
- Installation succeeded

A Desktop Icon is now created with your CADvent version and referring AutoCAD version. To run CADvent you have to double-click on the shortcut or through the Windows START menu.

NOTE: CADvent will make a copy and rename your templates and databases in the User Directory to keep your personal changes.

Installation of CADvent in a computer network

CADvent can be installed with a network license. The network license is an own installation file with manual. For further information please contact ITCenter@lindab.com

Use CADvent

Due to the version of AutoCAD that you are running you can start CADvent using one of the following procedures:

Run on a standard AutoCAD version

Option 1: Double-click on the CADvent shortcut on the Windows® Desktop

Option 2: Activate the Windows® Start-menu -> Programme -> Lindab -> CADvent

Option 3: Launch AutoCAD and activate CADvent by clicking on one of the CADvent toolbars.

Option 4: Double-click on a drawing with CADvent objects.

NOTE: If you launch CADvent with the 3rd option, the translation program will not be started and all CADvent texts will be in English.

The translation program can be started manually. You can find the U2000.exe in the folder: C:\Users*yourUserName*\AppData\Roaming\Lindab\CADvent\6.*X*\Translation
When the program is running, the icon to the right will be shown in the message board of the Windows task bar. You can shut off the translator by left-clicking on the icon. Then a pop-up window will appear. Now push the button “Close Software Translator”.

Registration of software keys

The registration has been changed. Every user must be registered now. Therefore you need a licence number from Lindab. This licence contains several software keys. If you need more software keys than you have in the current configuration, please contact: itcenter@lindab.com

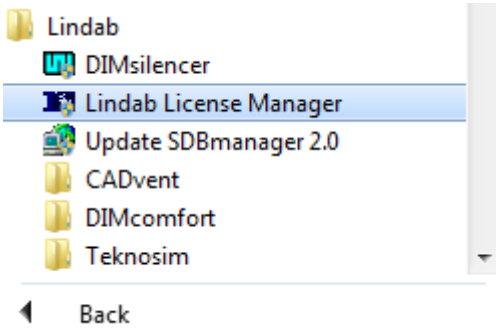
When you start CADvent after the installation it will be shown a message, if you are running in trial mode. You can run the program for 14 days in trial mode. Most of the CADvent functions are available in trial mode, but be aware that you cannot create or edit own components

When the trial mode is not valid anymore this screen will show up.

This indicates that you must register CADvent now. You can continue using the program, but you can not Open or Save drawings any longer until you have registered the product.

Therefore we advice to register in time. The license will not be enabled before the product is paid.

To register the product, please open in the **Lindab Licence Manager** in the Windows® Start-menu.

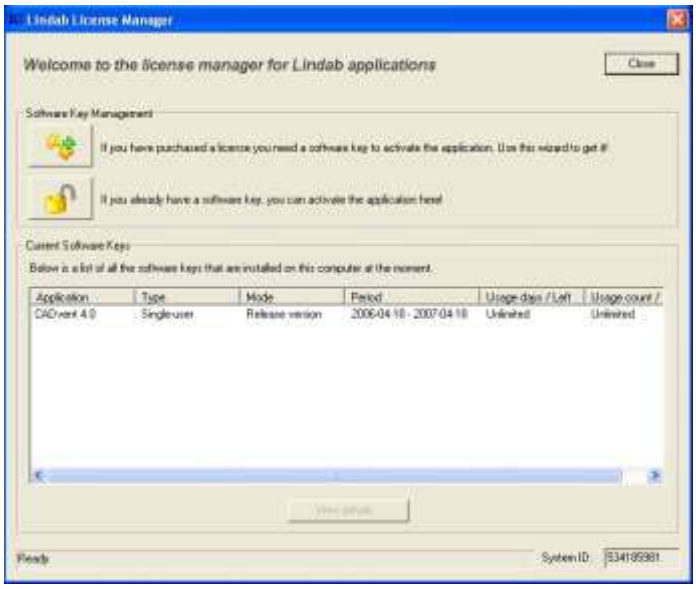


This opens the License Manager.

Note:
You can not use the Software Keys from earlier versions of CADvent

Now you need to have the license number provided to you by Lindab, to request the Software Key.
The license contains a default number of Software Keys. If you need more Software Keys please contact: *itcenter@lindab.com*

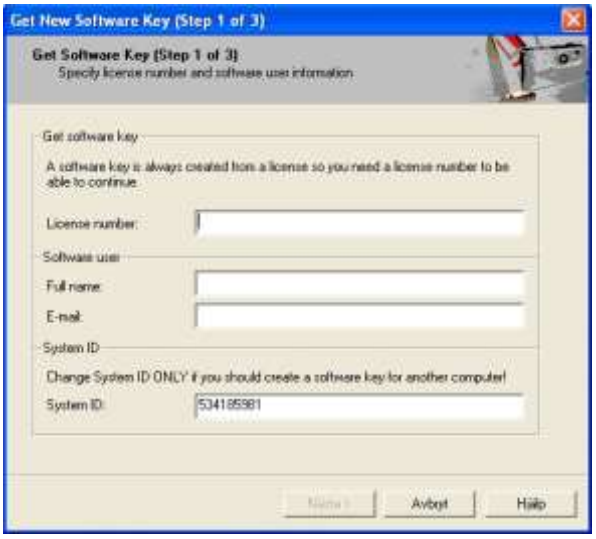
Click now on the upper button (the key) to activate the license.



Now a new pop-up window will come up which will lead you through the activation in 3 steps.

Please enter your license number, name and e-mail address

The System ID will be put in automatically. If you want to register for another computer you have to put in the System ID manually.



In the 2nd window you should select how you want to get the software key.

You have 3 possibilities:

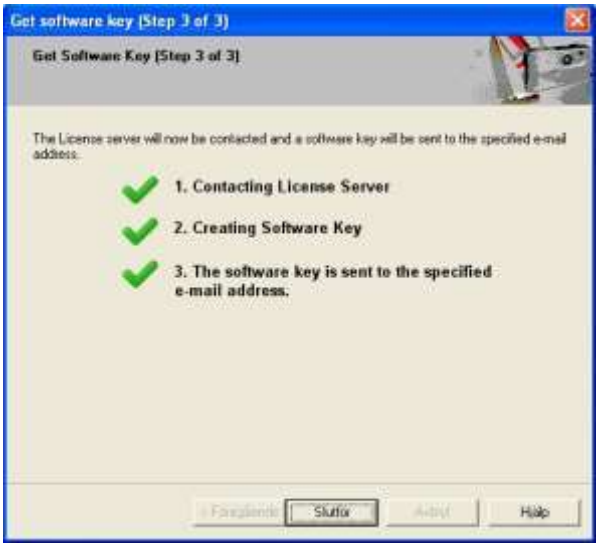
- Automatically with connection over the internet
- Contact Lindab over another internet connection and receive the Software Key via e-mail
- Contact Lindab by e-mail, fax or phone

If you choose the automatic activation you must have an online connection to the internet. The program calls the Lindab License Manager and inserts the Software Key automatically (provided that you have a Software Key left on the license).

We recommend this way if you want to activate CADvent on your computer.

If you choose to contact Lindab via internet and receive the Software Key as an e-mail the picture to the right will show up.

The Software Key will be sent to the e-mail address that you have inserted in step 1.



After you received your Software Key by mail you must open the register dialog again and click on the lower button „if you already have a Lindab Software Key…“!

You can enter the key manually into the text field or push the button „Get key from file…“ and open the e-mail to insert the key straight from there.

We recommend this way of activation if you want to install the Software Key on another computer.

The 3rd possibility to get the Software Key is to contact Lindab by e-mail, fax or phone.

If you choose the 3rd possibility, a pop-up window will open that contains the necessary information for the registration. You can copy this file to attach it to an e-mail or print it to send it via fax.

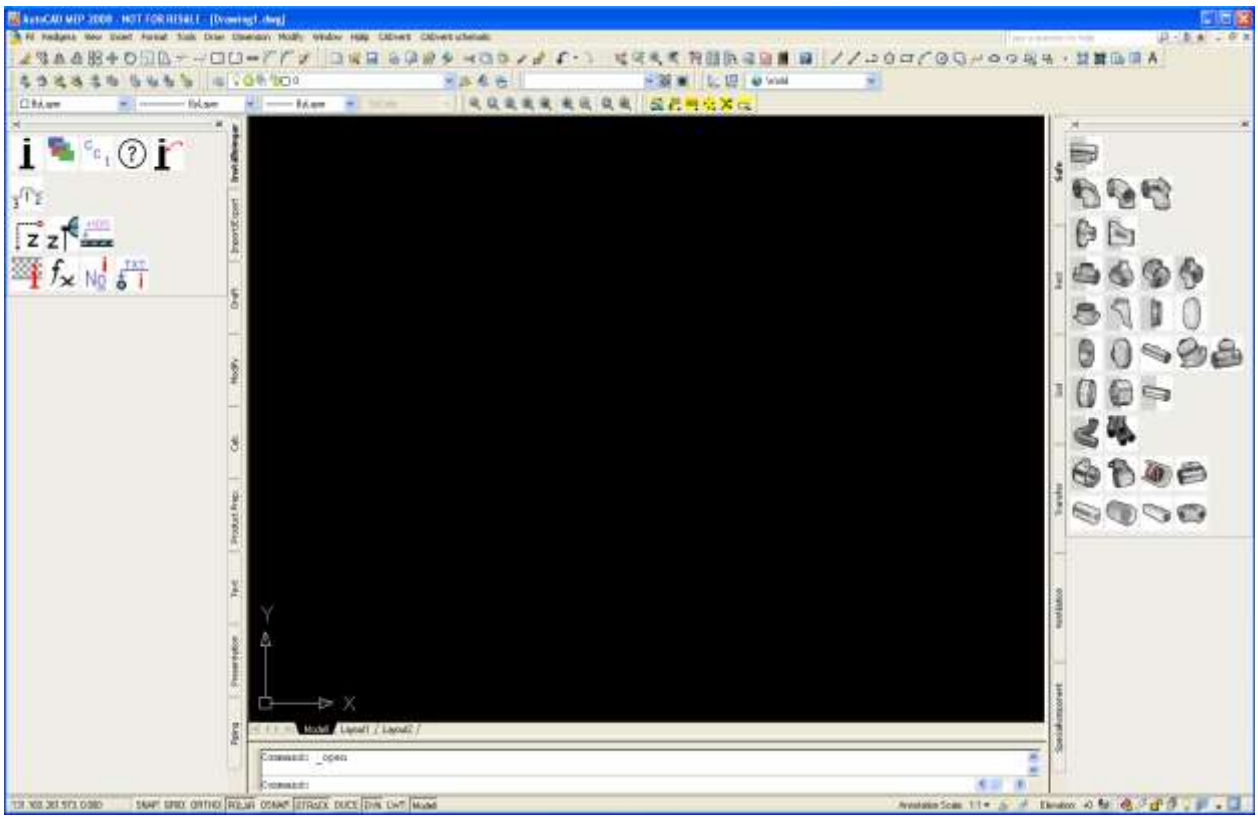
If you wish to send it by mail, please send it to: itcenter@lindab.com
If you want to send it by fax, please send it to: +46 431 853 95
Please make sure that your e-mail address is on the fax!

You will then receive the Software Key by e-mail. You can then activate CADvent as mentioned above.

Introduction into CADvent

CADvent Toolbars

CADvent's appearance within the AutoCAD screen



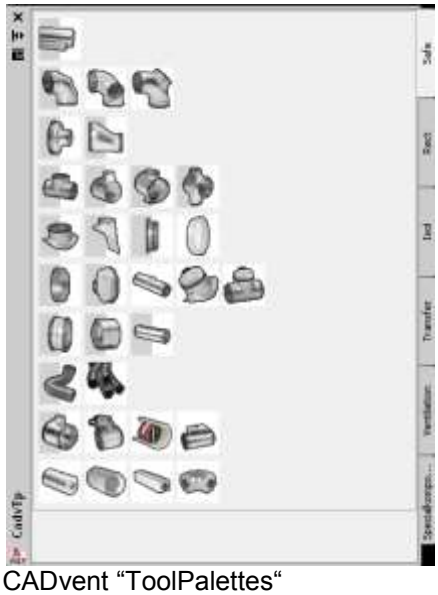
Select toolbars

When you start CADvent the CADvent Dashboard and CADvent Tool Palettes will show up on the screen.

The Dashboard and the Tool Palettes in CADvent are cut into a specific structure. It is divided into several tabs which includes all drafting commands. You can move and arrange the Dashboard and the Tool Palettes on the screen with the cursor and if you right-click on the left side of the Dashboard or the Tool Palettes you can choose to view them in auto hide mode to make more free working space on the screen or allow docking to the right or left side of the screen.
In CADvent Dashboard (CADVDB) that you see on the right side you have all the tools for drafting and calculation.

CADvent "Dashboard"

In CADvent Tool Palettes (CADVTP) that you see on the right side you have all the tools for drafting duct components.

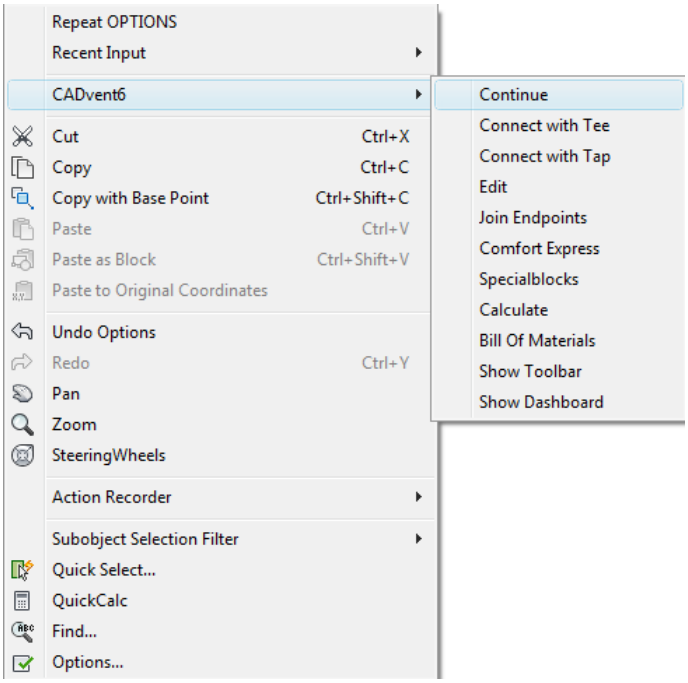


CADvent “ToolPalettes“

CADvent Quick commands

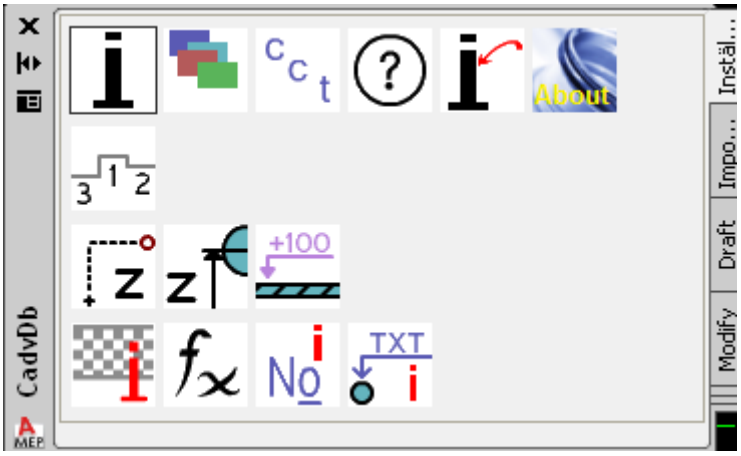
In CADvent 6 we introduced quick commands generally used CADvent functions. If you right-click on your mouse, the dialog to the right will appear, move your pointer to the CADvent 6 command, then the drop-down menu with CADvent commands will appear.
Click on the commands to use them without the usual Toolbars or Dashboards.
Quick commands contain:

- Continue From ...
- Connect with Tee
- Connect with Tap
- Edit
- Join Endpoints
- Comfort Express
- Specialblocks (Special component library)
- Bill of Materials
- Show Toolbar
- Show Dashboard



Dashboard

CADvent under the tab “Settings”



‘Settings’ Toolbar (Templates and systems variables)

Updating colours according to the layer template - Changing colour template file

CADvent Layer Properties (Defines the colours to the colour structure and linetypes and lineweights in 2D representation)

‘Lindab System Settings‘: Here you can set default values for the system settings

Project Settings by object: Takes over the CADvent settings from an object as default

About CADvent: Tells you which CADvent version you are running on

Product Default Settings: Default list for choosing products automatically

Set Elevation: Sets the drafting elevation

Set Elevation by object: Takes over the elevation from an object

Floor Set up

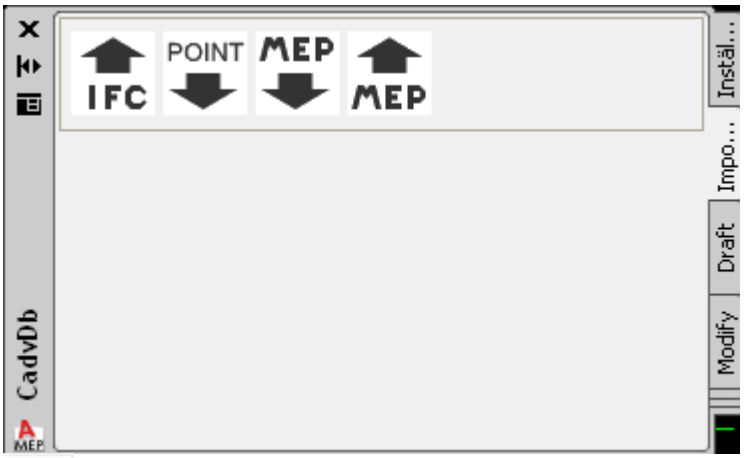
Insulation Type Settings: Select the insulation type to apply to circular and rectangular ducts among the available ones

Settings for designing, converting from rectangular duct to round duct and VAV calculations.

Piece Label Settings: Template to choose default or design piece label settings

Text Settings

CADvent under the tab “Import and Export”



Export of CADvent 3D components to IFC 2x3 format

Import of 3D components from POINT-Software

Export of CADvent 3D components to Autodesk MEP format

Import of 3D components from Autodesk MEP format to CADvent

CADvent under the tab “Draft”

Air device (Product Manager – Comfort Express): Library of Lindabs and user-defined air outlets

Roof hoods: Library with Lindabs or self-defined roof hoods and transitions

Roof transitions: Library with Lindabs or self-defined roof hoods and transitions

Chilled Beams (Product Manager – Comfort Express): Library of Lindabs and user-defined chilled beams

DIMcomfort: Link to open the DIMcomfort dialog (If installed and you are running on an standard AutoCAD version)

Surplus Air: Library for Lindabs and self created surplus air components

Dummy/Flowpoint: Simulates an air device with airflow and pressure loss

DIMsilencer: Link to open DIMsilencer AFTER calculation in CADvent to search for the best suitable silencer

DIMsilencer: Link to open DIMsilencer and search for any silencer (DIMsilencer 5.0 must be installed on your computer)

Silencer Express: Automatic selection of silencers according to the calculated required sound attenuation

Silencer (Product manager): Library of user- defined circular silencers

Silencer with net airflow for supply and exhaust air

Product manager rect silencer: Library of user- defined rectangular silencers

Product manager rect bend silencer: Library of user-defined rectangular bend silencers

Circular silencer (manual Selection)

Lindab elbow silencer (manual Selection)

Rectangular silencers with round connection (manual Selection)

Balancing Dampers: toolbar for automatic or manual selection of balancing dampers from Lindab

Balancing Dampers: toolbar for automatic or manual selection of balancing dampers from Lindab

Balancing Dampers (Product manager): Library of user-defined balancing dampers

Manual selection for constant airflow dampers from Lindab

Shutoff dampers – manual selection

Shutoff dampers (Product manager): Library with user-defined shutoff dampers

Circ Fire Dampers (Product manager): Library of user-defined circular fire dampers

Rect Fire Dampers (Product manager): Library of user-defined rectangular fire dampers

Flexible duct – automatic selection

Flex: product manager for flexible duct

Settings for flex duct connection

Special terminal (Air devices) defined from AutoCAD objects

VAV–boxes (Product Manager): Library of user-defined VAV-boxes

Air handling units created as CADvent component from AutoCAD blocks

Air handling units inserted as CADvent component from XML files

Add Insulation on a CADvent object

Add Partial Insulation on a duct

Remove Insulation

Remove Partial Insulation

Insulation Type Settings: Select the insulation type to apply to circular and rectangular ducts among the available ones

'Continue from…' command

Connect to duct with a Tee

Join two endpoints

Connect to duct with a Tap

'Mounting' Toolbar

Break in: Easy way to split up a duct

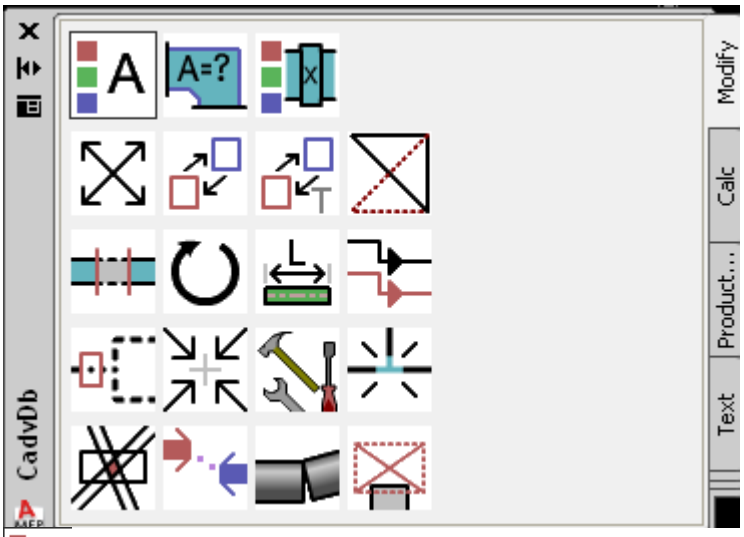
Copy and Draw

'Draw Space' command

'Connect to a duct run' command

Selection dialog for duct accessories

CADvent under the tab 'Modify'



CADvent Object Properties: Properties of CADvent objects are listed and can be edited

Rotate Around Connection: Rotation of CADvent components around one of the endpoints

Flip: Change connected components, such as an eccentric tee from flat on the top to flat on the bottom

Smart Move: Intelligent moving of CADvent components and all the ones that are connected to them

Break Duct: Breaking a straight duct between two selected points

Set Length: Give a specific length to a piece of duct

Offset Copy: Copy a selected part of a ductwork from one system/system type to a different one.

Command replace Products: Exchanges one or more components against another without breaking the connections

Upstream/Downstream Selection: Select the upstream/downstream objects connected to the marked one

CADvent Special Component Properties: Properties of special components can be edited

Edit Rectangular Component: Dimensions of rectangular components can be changed

Command replace Products Matching Product Code: Exchanges all components who have the same product code against another without breaking the connections

Smart Adjust: Intelligence adjustment of distant connections

Repair Connections: Connect components that are positioned a certain distance from each other

Connected Objects: Show objects that are connected to the one selected

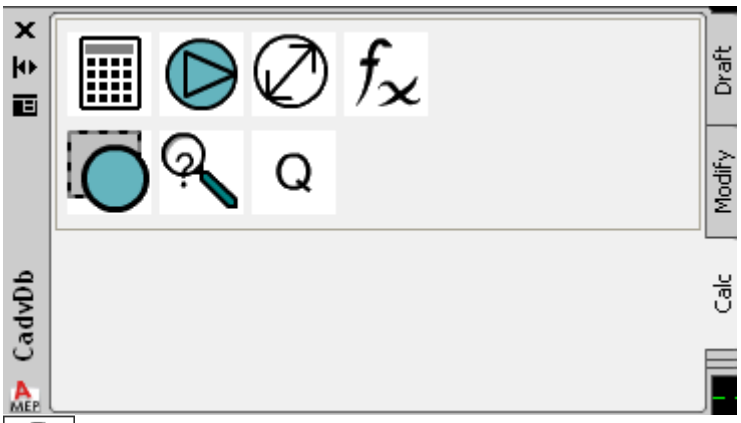
Clash Detection: Collision check (for CADvent objects only) throughout the drawing

Show Distant Connections: Show objects that are positioned a short distance from each other but still considered connected by CADvent

Show not fitting objects: Checks upstream/downstream objects for improperly aligned connections

Show Unconnected Products: Highlight all products having unconnected edges

CADvent under the tab ‘Calc‘



Start symbol for system calculations

Analysis of the duct systems pressure, flow and sound data on the screen

Settings for designing, converting from rectangular duct to round duct and VAV calculations

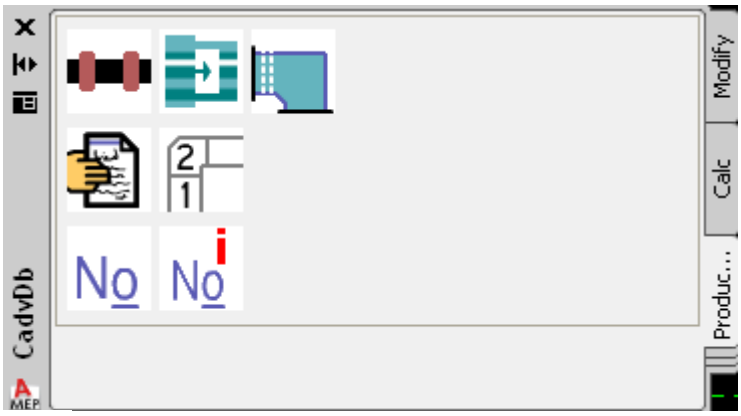
Automatic conversion of rectangular to round duct system

Automatic duct sizing after default settings

Calculation of the flow, pressure drop and insertion of balancing dampers in the system if necessary.

Q Total airflow through a terminal object (diffuser, hood, etc.)

CADvent under the tab ‘Product Prep‘



Connectors – Inserts duct/fitting couplings

Slide in coupling

Optimize rectangular fittings

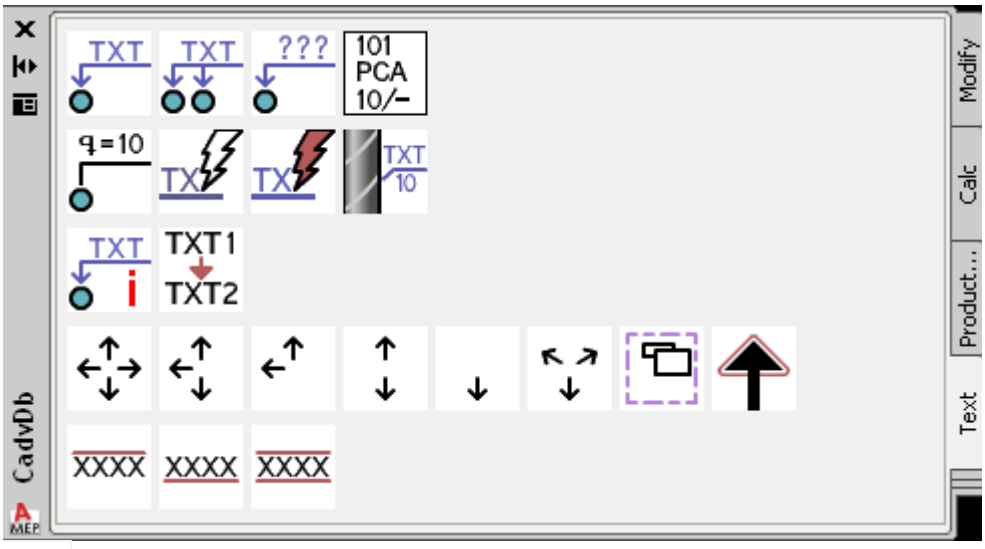
Create Bill of Materials, show report incl. piece labeling if necessary and in some countries offer and order functions

Create Material Specification listed after product number or object

Update Piece Label: Creates or updates the piece-labelling

Piece Label Settings: Template to choose default or design piece label settings

CADvent under the tab ‘Text‘



Text Product: Label product according to current text template

Text Multiple Products: Label multiple products with one text flag according to current text template

Text Flow: Label product with the value of the airflow through it

Room Text: Label grouped objects according to current room text and text template

Free Text: Label product with a free text

Auto text selected objects according to current text and auto text template

Auto text System according to current text and auto text template

Text Vertical

Text Settings

Update Code Marking: Update objects tags

Arrows for air outlets with 4–way throw

Arrows for air outlets with 3–way throw

Arrows for air outlets with 2–way 90°angle throw

Arrows for air outlets with 2–way 180° straight throw

Arrows for air outlets with 1–way throw

Arrows for air outlets with 3–way 120 degree throw

Object grouping ON/OFF

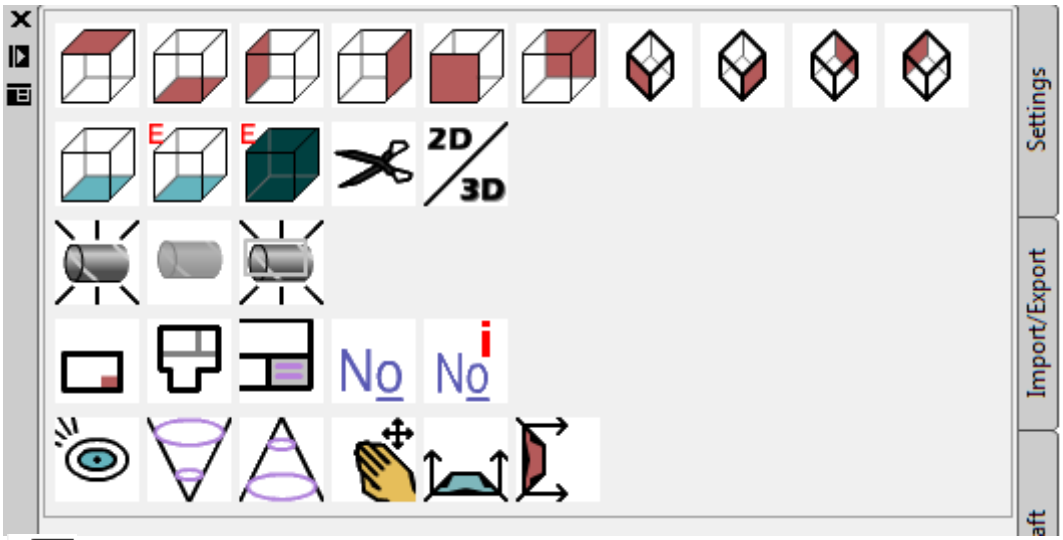
Setting of dispersal arrow size

Adding line above – Adding line above existing text

Adding line below – Adding line below existing text

Adding line above – Adding line below - Adding line above and below existing text

CADvent under the tab ‘Presentation’



Plan View

Plan View Underneath

View from left

View from right

View from front

View from back

Isometric view from the southwest

Isometric view from the southeast

Isometric view from the northeast

Isometric view from the northwest

Create a perspective view of the drawing

Zoom in within the perspective view

Zoom out within the perspective view

Panning within the perspective view

Define Your View

Define Your Elevation View

3D Visible: Show the 3D system

3D Invisible: Hide the 3D system

3D Isolate: Show only selected parts of the 3D system

Create 2D drawing

2D Express–show

2D Express–hide

Create a Cut: Create a cross-section view of the duct system

Enables / Disables the 2D Preview in Shademode “2D Wireframe”

Drawing Frames

Model Drawing scale

Drawing Accessories

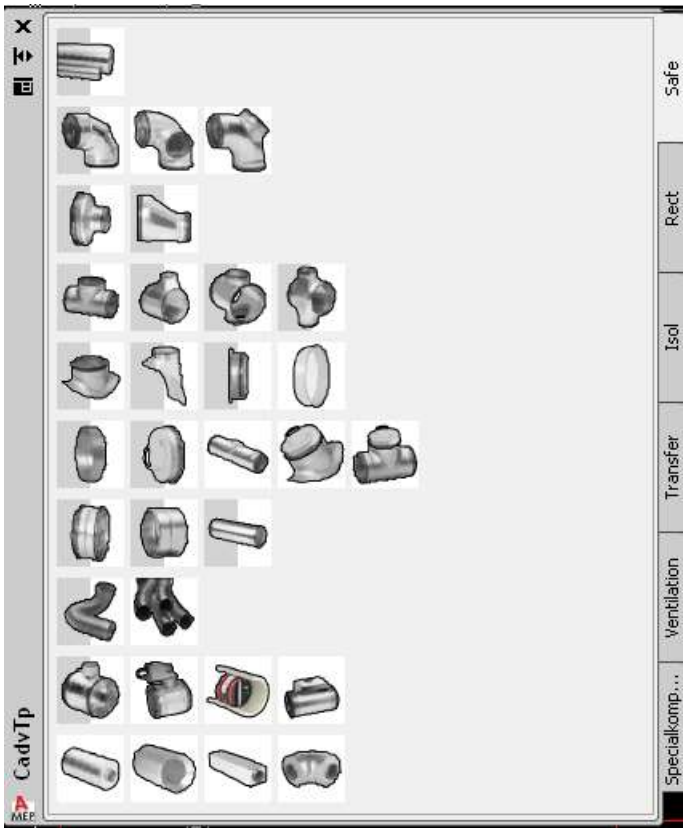
Update Piece Label: Creates or updates the piece-labelling

Piece Label Settings: Template to choose default or design piece label settings

ToolPalettes

The number of tabs and the products in each tab may differ regarding your country specific localization of products. The below shown products and functions represent only the common products. Tabs or toolbars for Flatoval and Marine products are not part of this description.

CADvent under the tab ‘Safe’



Round duct automatic selection on the left side of the toolbar

Round duct manual selection on the right side of the toolbar

Elbow automatic selection on the left side of the toolbar

Elbow manual selection on the right side of the toolbar

Cleaning bend

Cleaning Y-bend

Reducer - symmetric automatic selection on the left side of the toolbar

Reducer - symmetric manual selection on the right side of the toolbar

Reducer – eccentric automatic selection on the left side of the toolbar

Reducer – eccentric manual selection on the right side of the toolbar

Tee automatic selection on the left side of the toolbar

Cleaning Y-bend manual selection on the right side of the toolbar

Round duct automatic selection on the left side of the toolbar

Round duct manual selection on the right side of the toolbar

Crossing Tee automatic selection on the left side of the toolbar

Crossing Tee manual selection on the right side of the toolbar

Eccentric Crossing Tee automatic selection on the left side of the toolbar

Eccentric Crossing Tee manual selection on the right side of the toolbar

Reducer - symmetric automatic selection on the left side of the toolbar

Reducer - symmetric manual selection on the right side of the toolbar

Saddle Tap automatic selection on the left side of the toolbar

Saddle Tap manual selection on the right side of the toolbar

Eccentric Saddle Tap automatic selection on the left side of the toolbar

Eccentric Saddle Tap manual selection on the right side of the toolbar

Start round collar from rectangular duct automatic selection on the left side of the toolbar

Start round collar from rectangular duct manual selection on the right side of the toolbar

Take off with mesh and cone

Duct to duct coupling automatic selection on the left side of the toolbar

Duct to duct coupling manual selection on the right side of the toolbar

Fitting to fitting coupling automatic selection on the left side of the toolbar

Fitting to fitting coupling manual selection on the right side of the toolbar

Sliding connectors automatic selection on the left side of the toolbar

Sliding connectors manual selection on the right side of the toolbar

Flexible duct – automatic selection on the left side of the toolbar

Flex: product manager for flexible duct on the right side of the toolbar

Settings for flex duct connection

Balancing dampers automatic selection on the left side of the toolbar

Balancing dampers manual selection on the right side of the toolbar

Shutoff dampers – manual selection

Circ Fire Dampers manual selection

CAV-Damper manual selection

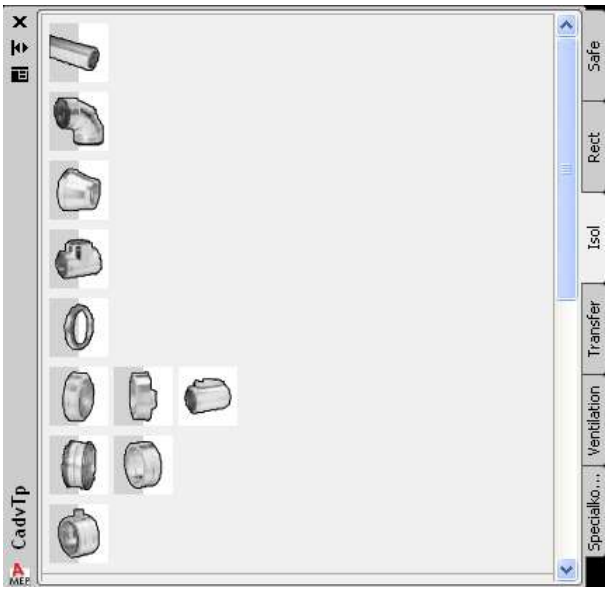
Silencer (manual selection)

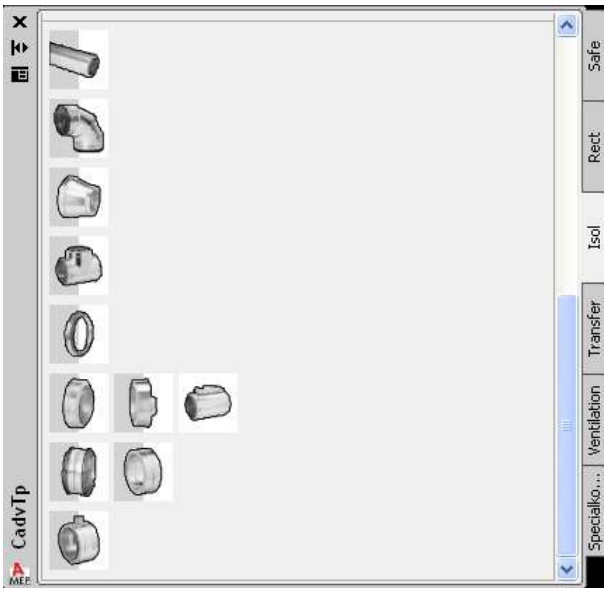
Silencer with net airflow for supply and exhaust air

Rectangular silencer with round connection (manual selection)

Round Elbow silencer (manual selection)

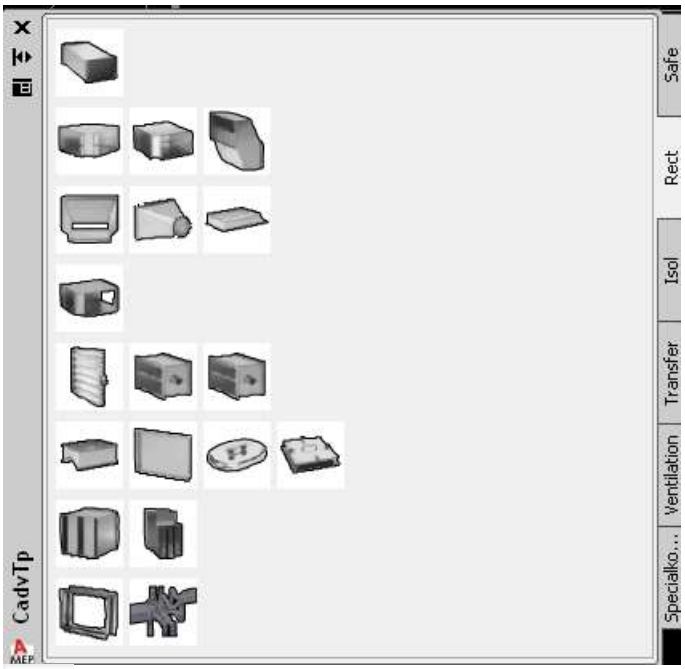
CADvent under the tab ‘Lindab Isol’





The symbols of the systems Isol25 and Isol50 have the same meaning like under the tab ‘**Safe**‘.

CADvent under the tab ‘Rect.’



Straight duct

Elbow

Elbow

Offset

Reducer

Transition Rect – Circ

Rectangular branch

Tee

Multiblade Damper

Damper

Manual Damper VAV

Manual Rect Tap on Circ. duct

End Cap

Oval cleaning and inspection hatches

Rectangular cleaning and inspection hatches

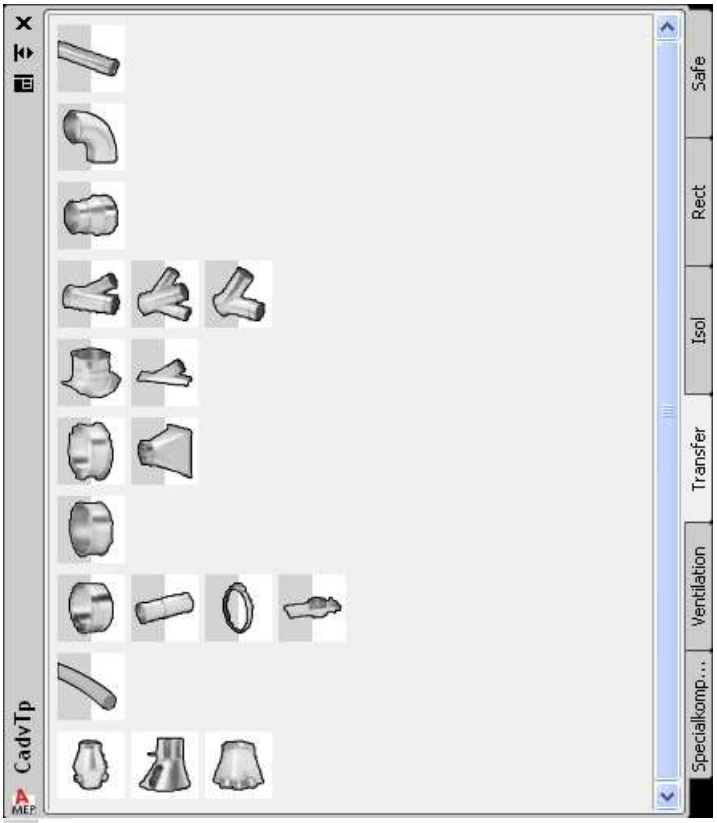
Rectangular Silencer

Rectangular Bend Silencer

Rectangular Flex Connection

Plenum Chamber

CADvent under the tab ‘Transfer’



Round duct, Transfer automatic selection on the left side of the toolbar

Round duct, Transfer manual selection on the right side of the toolbar

Elbow, Transfer automatic selection on the left side of the toolbar

Elbow, Transfer manual selection on the right side of the toolbar

Reducer, Transfer automatic selection on the left side of the toolbar

Reducer, Transfer manual selection on the right side of the toolbar

Lateral Tee 30°, Transfer automatic selection on the left side of the toolbar

Lateral Tee 30°, Transfer manual selection on the right side of the toolbar

X-Tee, Transfer automatic selection on the left side of the toolbar

X-Tee, Transfer manual selection on the right side of the toolbar

Y-Branch, Transfer automatic selection on the left side of the toolbar

Y-Branch, Transfer manual selection on the right side of the toolbar

Saddle, Transfer automatic selection on the left side of the toolbar

Saddle, Transfer manual selection on the right side of the toolbar

Saddle Tap Lateral 30°, Transfer automatic selection on the left side of the toolbar

Saddle Tap Lateral 30°, Transfer manual selection on the right side of the toolbar

Start round collar from rectangular duct, Transfer automatic selection on the left side of the toolbar

Start round collar from rectangular duct, Transfer manual selection on the right side of the toolbar

Transition Rect toTransfer automatic selection on the left side of the toolbar

Transition Rect toTransfer manual selection on the right side of the toolbar

End Cap, Transfer automatic selection on the left side of the toolbar

End Cap, Transfer manual selection on the right side of the toolbar

Socket Connector, Transfer automatic selection on the left side of the toolbar

Socket Connector, Transfer manual selection on the right side of the toolbar

Sliding Connector, Transfer automatic selection on the left side of the toolbar

Sliding Connector, Transfer manual selection on the right side of the toolbar

Clips, Transfer automatic selection on the left side of the toolbar

Clips, Transfer manual selection on the right side of the toolbar

Sliding Gate, Transfer automatic selection on the left side of the toolbar

Sliding Gate, Transfer manual selection on the right side of the toolbar

Flexible Duct, Transfer automatic selection on the left side of the toolbar

Flexible Duct, Transfer manual selection on the right side of the toolbar

Round Suction Head, Transfer

Suction Head Eccentrically, Transfer

Suction Head Vertically, Transfer

Starting a CADvent Drawing

An architectural drawing is usually needed as a reference for drawing a ventilation system. It is possible to work directly in the architectural drawing file or to use the architectural drawing as an external reference file in the CADvent drawing.

Architectural Drawing as External Reference File

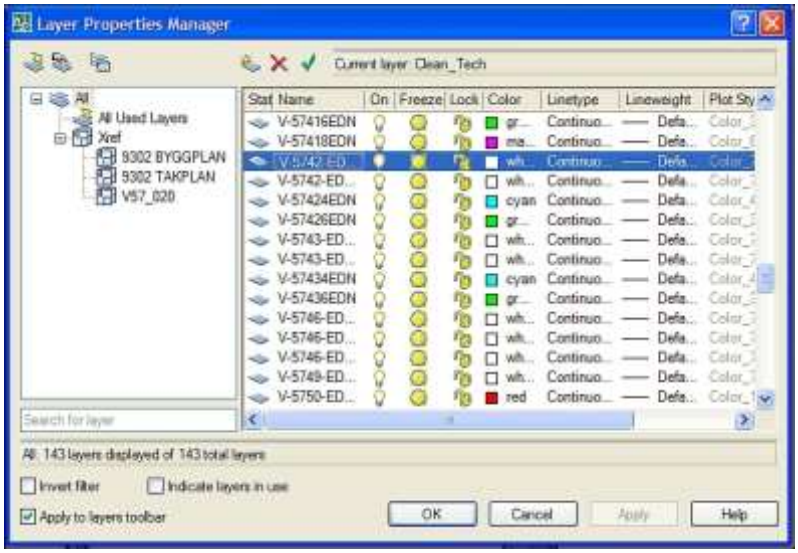
Before inserting the architectural drawing, it is suggested to create a layer that the drawing will be inserted on:

1. Open a new AutoCAD drawing.
2. Open the AutoCAD "Layer Properties Manager" dialog box.
3. Create a new layer.

Note: If you want the XREF layer to be identified with the name of the floor, name it "A---XREF---name of floor" or any combination of letters and numbers that is 11 digits before the name of the floor! This way, anytime the correspondent floor is made invisible, the architectural drawing will be frozen too. (See also ***CADvent Settings – Floor Set Up***)

4. Make this new layer current.
5. Click *OK* in the "Layer Properties Manager" dialog box.

Top Portion of Layer Properties Manager Dialog Box



To insert the architectural drawing as a XREF:

1. In the AutoCAD menu INSERT select *External Reference*.
2. Left-click on **Attach DWG**
3. Select the architectural drawing file you wish to insert and specify Reference Type (Attachment or Overlay), Insertion Point, Scale Factor and Rotation Angle.
4. Click *OK* to close the External Reference dialog box and have the architectural drawing inserted in the active file.

XRef Manager in AutoCAD 2007

Settings for the CADvent Drawing

Before you begin drawing ductwork, it is recommended to decide the settings to use.

Floor Setup

(See CADvent Settings – *Floor Setup*)

Project Settings

Click on the **Project Settings** icon in the 'Settings' toolbar.
Select a Layer Template (for editing/creating a Layer Template see *Advanced Project Settings – Creating a Layer Template*).
Select a System Name to be current in the drawing among the available ones or create a new one (click "New" button) and then make it current.
Select a System Type and a Floor to be current in the drawing among the available ones.
Set a value for the Object Resolution (12 is a recommended value).
Note: Small Object Resolution values are recommended because the resolution effects CPU performance, regeneration time, reduces load on math co-processor, etc.
Check the Show Unconnected Edges box to have arrows showing out of unconnected endpoints.
Click *OK* to close the Project Settings dialog box. (See also *CADvent Settings – Project Settings*)

Product Default Settings

(See CADvent Settings - Product Default Settings)

Drawing a ductwork

The product selection functions and the drafting capabilities of CADvent make it a very powerful and flexible tool for drawing a duct system.
The following operations are suggested in an order that doesn't necessarily have to be sequential but that is, very frequently, the most obvious one.

Insert Diffusers

(See CADvent Ventilation – Component File (Product Manager) and Air Outlet Selection From the Product Manager Library)

Set Elevation

Set the drawing's current working elevation by:
1. Clicking on the Set Elevation button in the 'Settings' toolbar and typing the elevation in the command prompt
- or -
2. Using the Set Elevation by Object button in the 'Settings' toolbar to take the elevation's new value from an existing object selected on the drawing.

Select Duct Components

1. Manually select products from the Lindab toolbars (See Drawing Method 1 and Drawing Method 2)
- and/or -
2. Use CADvent assembling and modifying commands to complete the drawing (See Continue From…, CADvent Assemble and CADvent Modify).

Duct Design & Calculation

Insert System Starting Point

Set the logical starting point of the system by:
Inserting a Start Symbol (See CADvent Calc & Estimate – *Inserting a Start Symbol*)
- or -
Inserting an Air Handling Unit (See CADvent Ventilation – *Air Handling Units*)

Sizing Settings

(*See CADvent Calc & Estimate – Duct Size Settings*)

Size Ducts

(*See CADvent Calc & Estimate – Sizing*)

Calculate Duct System

(See CADvent Calc & Estimate – *Pressure and Sound Calculation*)

Drawing Presentation

Text Drawing

According to the type of drawing you want to produce choose how to text your CADvent drawing.
Note: You may need to adjust the current value of AutoCAD “text size” variable in order to adequately view the resulting auto text.

From Text Template

1. Click on the **Project Settings** icon in the ‘Settings’ toolbar.
2. Select a Text Template (for editing/creating a Text Template see *Advanced Project Settings – Creating a Text Template*) and click *OK* to close the **Project Settings** dialog box
3. Insert text on the drawing using the desired texting functions included in the ‘Text’ Toolbar (See *CADvent Text and 2D - Text)*.

Text with Product No. & Calculation No.

1. Click on the Project Settings icon in the ‘Settings’ toolbar.
2. Select the "ProductNo.ctt" or "CalculationNo.ctt" Text Template file and click OK to close the Project Settings dialog box
Insert text on the drawing using the Text Product commands or the Autotext functions from the ‘Text’ toolbar. (See also Advanced Project Settings - Writing Product Numbers).

Create 2D Drawing

Create a 2D image of the drawn three-dimensional duct system by:
1. Using the **2D Express – Show** function from the ‘Plane Drawing’ toolbar.
2. Using the **Create 2D Drawing** function from the ‘Plane Drawing’ toolbar.
(See CADvent Text & 2D – *Plane Drawing)*

Material Lists

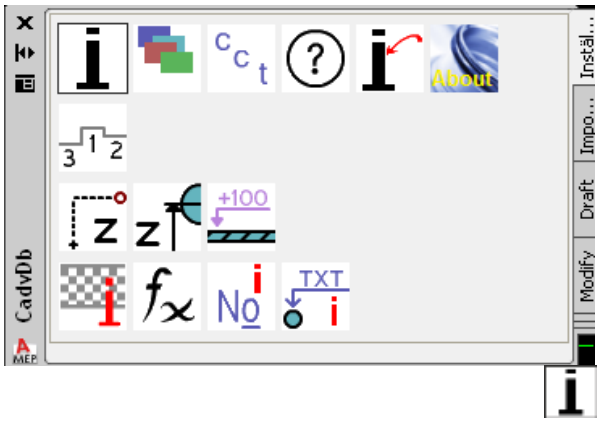
Bill of Materials

(See CADvent Calc & Estimate – *Bill of Materials*)

Material Specification

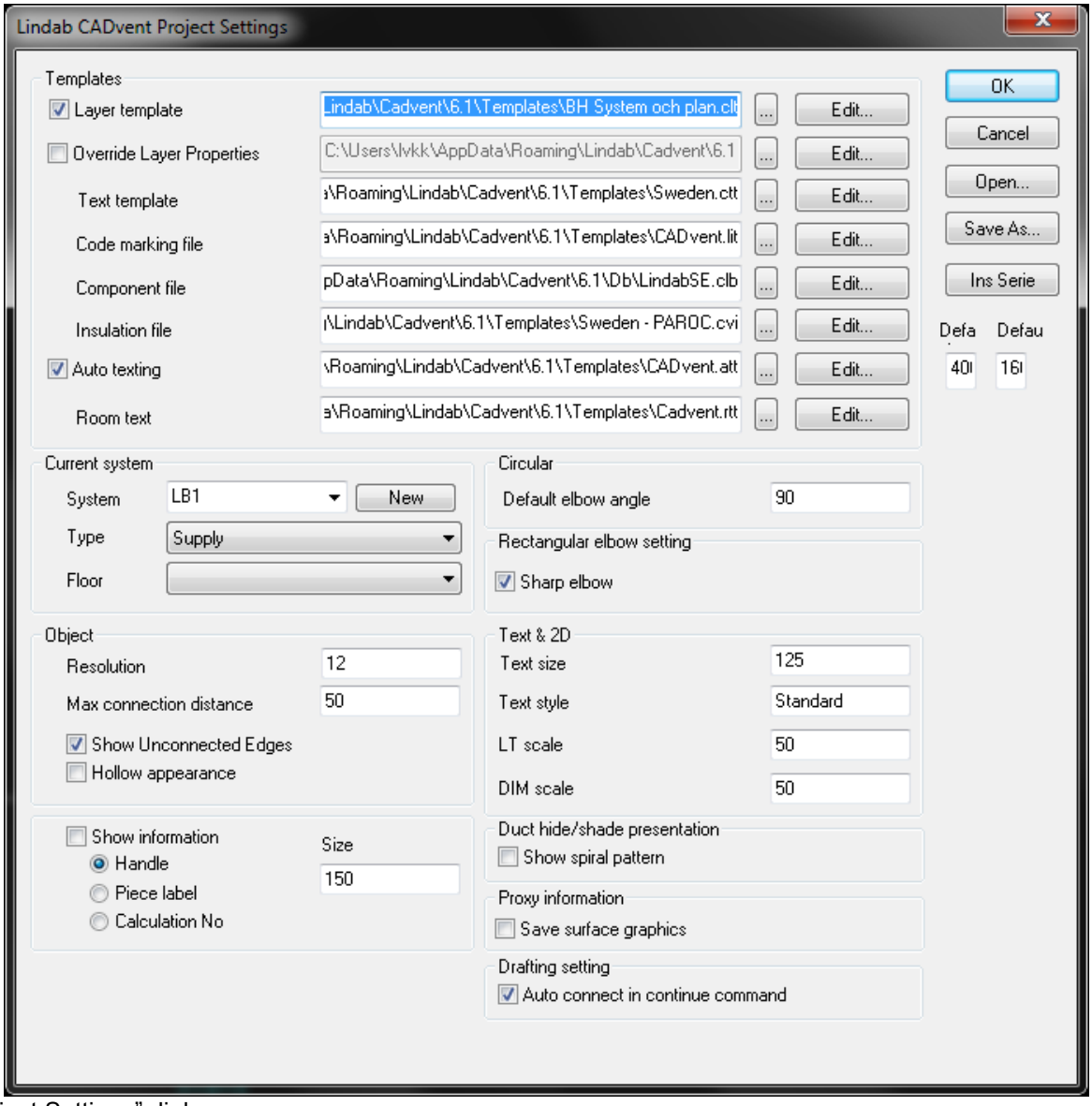
(See CADvent Calc & Estimate – *Material Specification*)

CADvent Settings



Project Settings

The settings for CADvent-drawings are configured in the project settings dialog. You have to save the drawing before you can change the project settings.



"Project Settings" dialog

Open:

When you make an adjustment in the Project Settings, it will be saved in the temporary file: <...Lindab\CADvent\Db\cadvent.cpf>. If you save the drawing, all implemented changes in the Project Settings will be saved in the CADvent.CPF-file. They will be saved in the same sub file like the drawing.

When you open the drawing the next time CADvent looks for a file CPF-file in the same directory where the drawing is in. If there is a file available it will be copied into <...Lindab\CADvent\DB\CADvent.cpf>. All templates for the layers in the Project Settings will be updated with the data found CPF-file belonging to the drawing. If there is no CPF-file available, CADvent uses the default settings.

Save As:

This option allows you to save a CPF-file to a certain location and with a certain name. This is useful if you several users are working on the same project in order to have the same settings for CADvent.

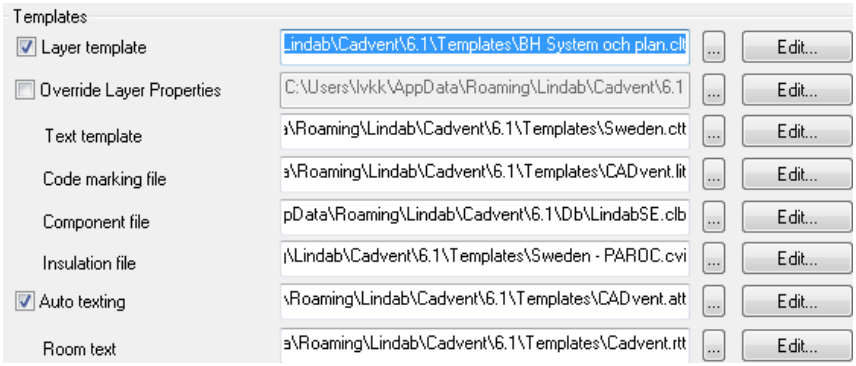
NOTE: The name of the CPF-file is dependent on the network name of the computer. For example, if your computer has the network name SE85047, the file will have the name: *CADventSE85047.cpf*.

Templates – Special files for the setup of the default settings

Layer template: Places components on different layers. Changes will automatically be updated.

Override Layer Properties: By default the layer template always loads a colour template with the same name. You can load other colour templates instead by marking the check button and selecting a .CCT file on your computer

Text template: Contains the default settings for the texts shown in the drawings.



Domain “Templates” in the “Project Settings” dialog

Code Marking file: The text for special chosen products will be shown as characteristic value.

Component file: (is used by the CADvent product manager) Components defined by the user will be included into this database.

Insulation file: Contains the database for insulation and lining products. Self-defined insulations and linings will also be included there.

Auto texting: Indicates if and with what a product gets labelled automatically.

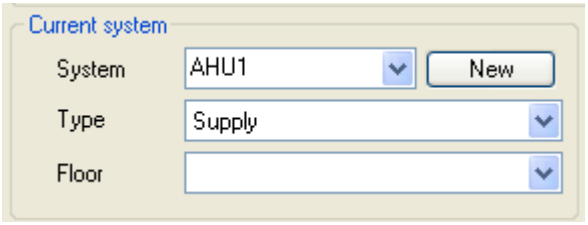
Room text: Marks the text structure for grouped objects.

Default Settings Current system

System: Sets the default system for new drafted objects. The system for objects can be changed at any time in the *Project Settings* or the *Properties.*

Type: Sets the air type for new drafted objects.

Floor: Sets the floor name for new drafted objects (See *Settings – Floor Setup*).

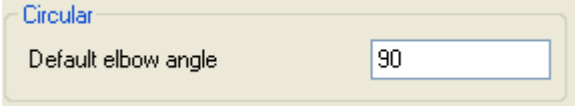


Domain “Current System” in the “Project Settings” dialog

NOTE: The system, type and floor settings for objects can be changed at any time in the *Project Settings* or the *Properties.*

Default Settings Circular

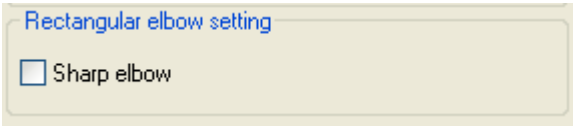
Angle: Sets the default angle for Elbows. You can also change the default angle in the Continue From command.



Domain “Circular” in the “Project Settings” dialog

Default Settings Rectangular Elbow Setting

Sharp Elbow: If this button is marked, CADvent will use sharp elbows for all automatic functions (Continue, Connect open ends…) instead of normal elbows.



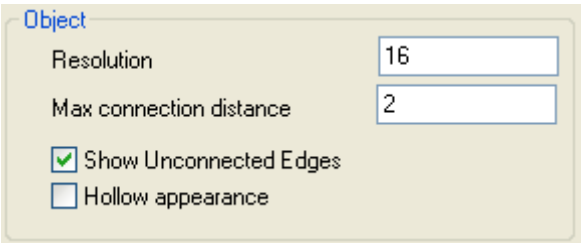
Domain “Rectangular Elbow Setting” in the “Project Settings” dialog

Default Settings Object

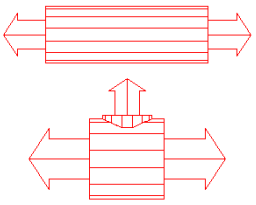
Resolution: Shows the resolution for on-screen objects. If e. g. the resolution is 60, then a circle will be divided in to 60 pieces. The smaller this setting I, the lower and more irregular (jagged) the object will look like. The higher the resolution, the more detailed the object will look like. But on the other hand grows the calculation demand for the computer with the resolution. We recommend the value 16.

Max. conn. distance: Shows the max. distance between two objects that can be connected with the command *Repair connections* . (See also *Connection assistance - Repair connections*).

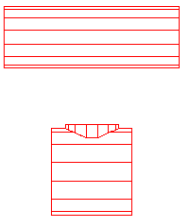
Show unconnected edges: If this button is marked, all open ends in the drawing will be marked with an arrow.



Domain “Object” in the “Project Settings” dialog

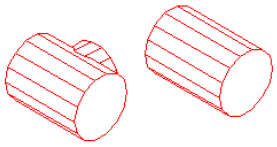


Show unconnected edges - marked

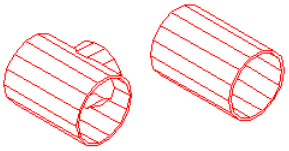


Show unconnected edges – not marked

Hollow appearance: If this button is marked, all drafted objects will appear hollow



Hollow appearance hidden



Hollow appearance shown

Information Domain

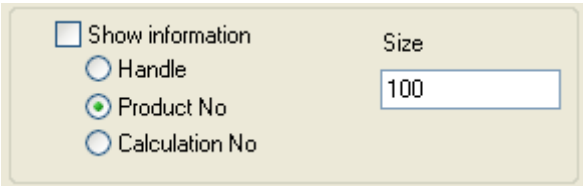
Show Information: If this button is marked, Information to all CADvent objects in the drawing will be shown. The following options can be chosen:

Handle: The AutoCAD number ill be shown.

Product No: The piece-labelling number will be shown (see also *Piece labelling – piece label settings)*

Calculation No: Shows the number for an object used in the calculation (is also shown in the calculation report).

Size: Shows the text size within a drawing



Domain “Information” in the “Project Settings” dialog

Duct display with Hide/Shade

Shows the spiral rebate if AutoCAD functions Hide or Shade are used.

Text & 2D

This dialog allows the user to set-up the scale settings for the 2D-drawings.

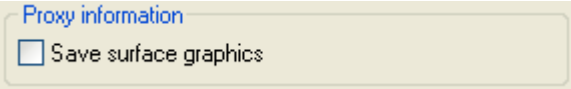
Note:
These scale settings are global AutoCAD text settings and therefore may also affect the standard textures.

Domain “Text & 2D” in the “Project Settings” dialog

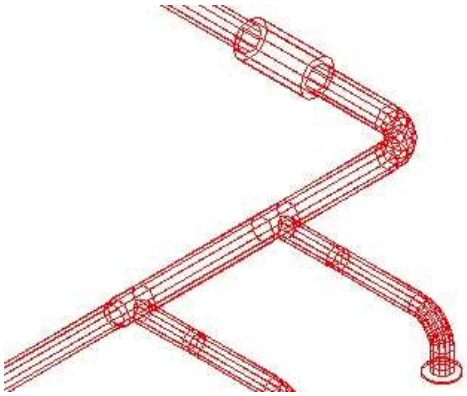
Proxy Information

Drawings that contain CADvent objects are saved as AutoCAD DWG- or DXF-files. If you want to be able to open these files in other programs, e. g. AutoCAD, was it just possible to open them as Proxy graphics. Therefore it was just possible to present these objects as 3D-wireframe. With a new function they can also be shown with a surface structure.

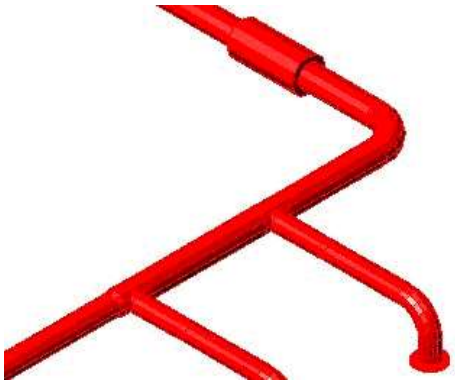
Save surface graphics: If this function is marked, the details for the surface structure will be saved in the drawing.



This gives you the possibility to render or shade these objects by programs that can open DWG- or DXF-files and use the AutoCAD functions shade and/or render.



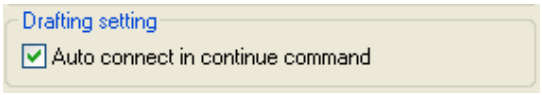
Shade command
– Surface structure not saved



Shade command
– Surface structure saved

Drafting Setting

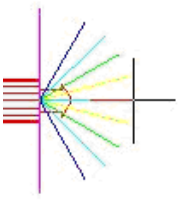
Auto connect in continue command: If this option is marked, is it possible with the **Continue** command to couple a duct with a Tee or a Saddle Tap/Take Off to an orthogonal duct system.



Domain “Drafting setting”

Example:

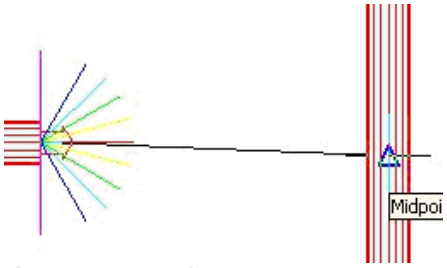
The **Continue** command is used on the endpoint of a duct. The usual sign for the **Continue** command appears. Without entering another command you select the orthogonal duct system. Dependant from the default settings will now a tee or a saddle tap be inserted.



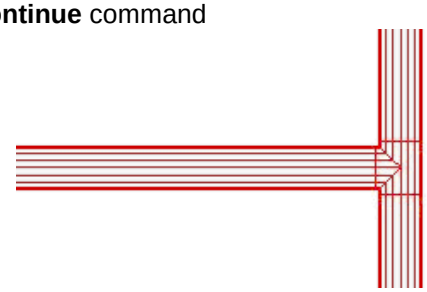
Continue command

NOTE:
The **Continue** command works with 90º and 45º tees and saddle taps/take-offs.

NOTE:
If the **Continue** command is not activated, you can achieve the same solution by using the option ‘Connect’ (C) in the AutoCAD command line.



Continue command



Continue command
– Auto connect function

Floor setup

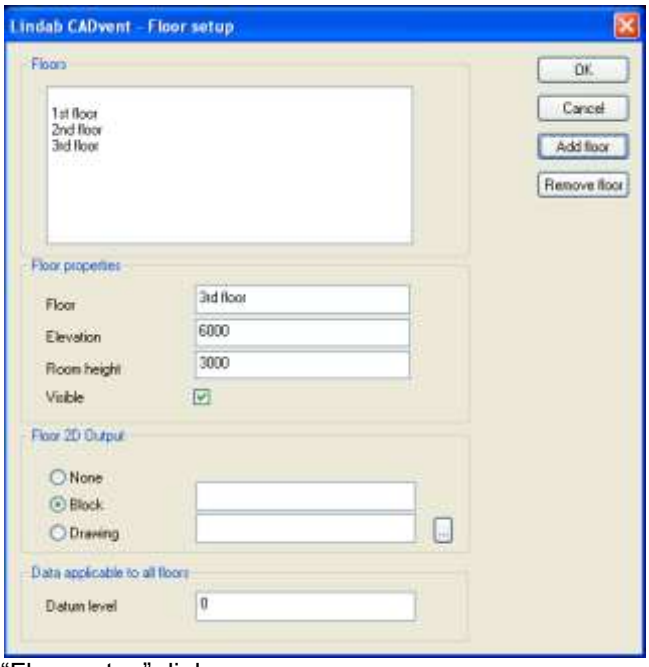
The command Floor setup sets the floor and room height for every floor in the drawing. To make it easier to set-up a 2D-drawing 'after floor', you can enter a block name (if the 2D-drawing is created as block), or give a file name (if the 2D-drawing is created as a file). (See also *Presentation – Set-up 2D-Zeichnung*)

Please proceed as followed to setup a floor in CADvent:

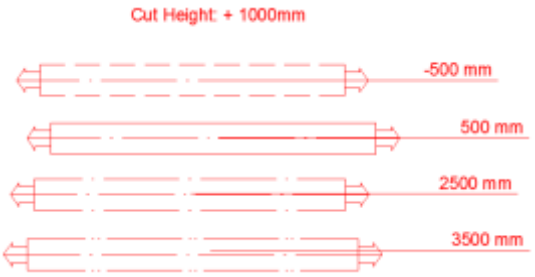
Open the dialog Floor Setup .
Enter in the floor properties values for the floor: The name (Floor name), height of floor E and Storey height (Distance from one floor to the other).
If the control button **visible** is marked, all CADvent objects chosen to this floor will be shown.
If you wish you can enter a name for the 2D-drawing that shall be drawn as a block or as a file
Push the button "Add floor" if you wish to add another floor to the current drawing.

NOTE:
In the domain "Data applicable to all floors" is it possible to set datum level that can be used as a reference height.

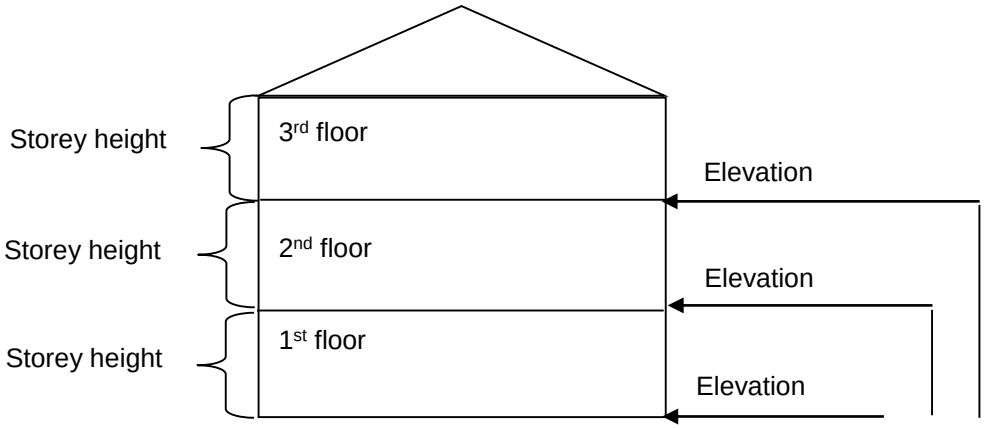
NOTE:
The **Floor Setup** function does not have influence on the elevation in the 3D-drawings. In 3D-darwings, the objects have to be drafted with the total elevation (Floor elevation + Draft elevation, see also *Settings – Set & Info*).
If you check the button for "Use linetype by height" in 2D settings in the **Presentation tab** the 2D line types will be shown differently after: Above cut, below cut, above floor and below floor.



"Floor setup" dialog



Line type by height

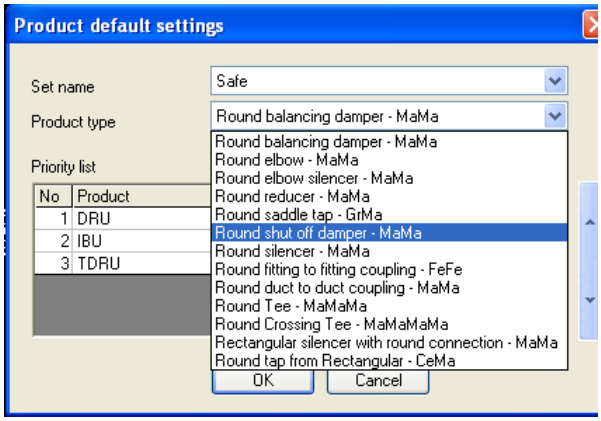


Product default setting

The **Priority list** defines, which components CADvent uses when drafting with the automatic drawing tools (Continue…, Connect open ends...) or by drafting circular duct system in auto function,

In the Priority list all products for a component type are shown.

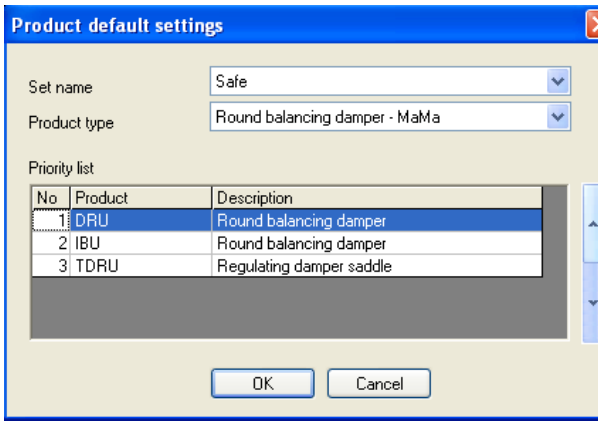
You can choose a product type to insert it into the priority list. Choose a product name that refers to a component.



"Priority list" dialog

With the arrows on the right hand you can now switch the priority of the products.

Repeat this procedure to put forward all the products you work with the most.

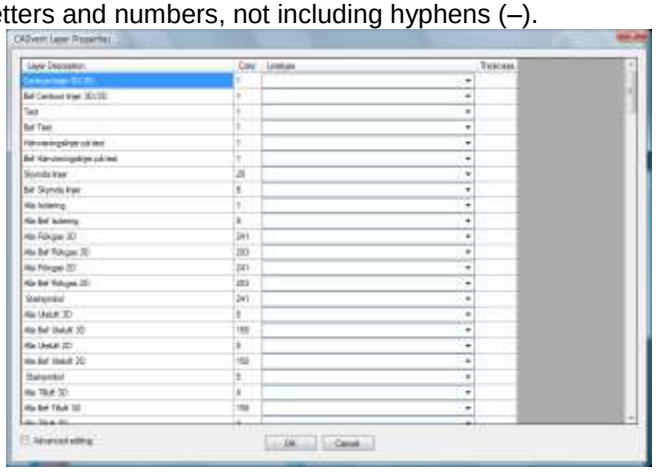


"Product default settings" dialog

CADvent Layer Properties

The color management has been changed in CADvent 6.0.
Instead of selecting a color file to a layer template looks CADvent automatically for color file that has the same name as the layer template and loads it automatically.
The interface for the color template has been changed completely and supports now settings for lineweight and linetype.
When pushing the CCT-button in the Settings tab you open the automatically selected CCT-file. The file structure has not changed; you have the Layer description on the left, the layer key is hidden by default, then the color selection, the linetype selection and the lineweight (thickness).
If you want to view, add or edit the layer key you must check the button “Advanced editing” in the lower left corner of the dialog.
The advanced editing function should only be used by advanced CADvent users.

NOTE:
There are a number of “wild cards” that can be used to simplify the creation of the Color Template file:
= Any number
? = Any number or letter
* = Any combination of letters and numbers, not including hyphens (–).



“CADvent Colour Template” dialog

Update Layer colours

If the active Layer template gets changed CADvent does not update the colours by itself. To refresh the colours in the open drawing, please proceed as followed:

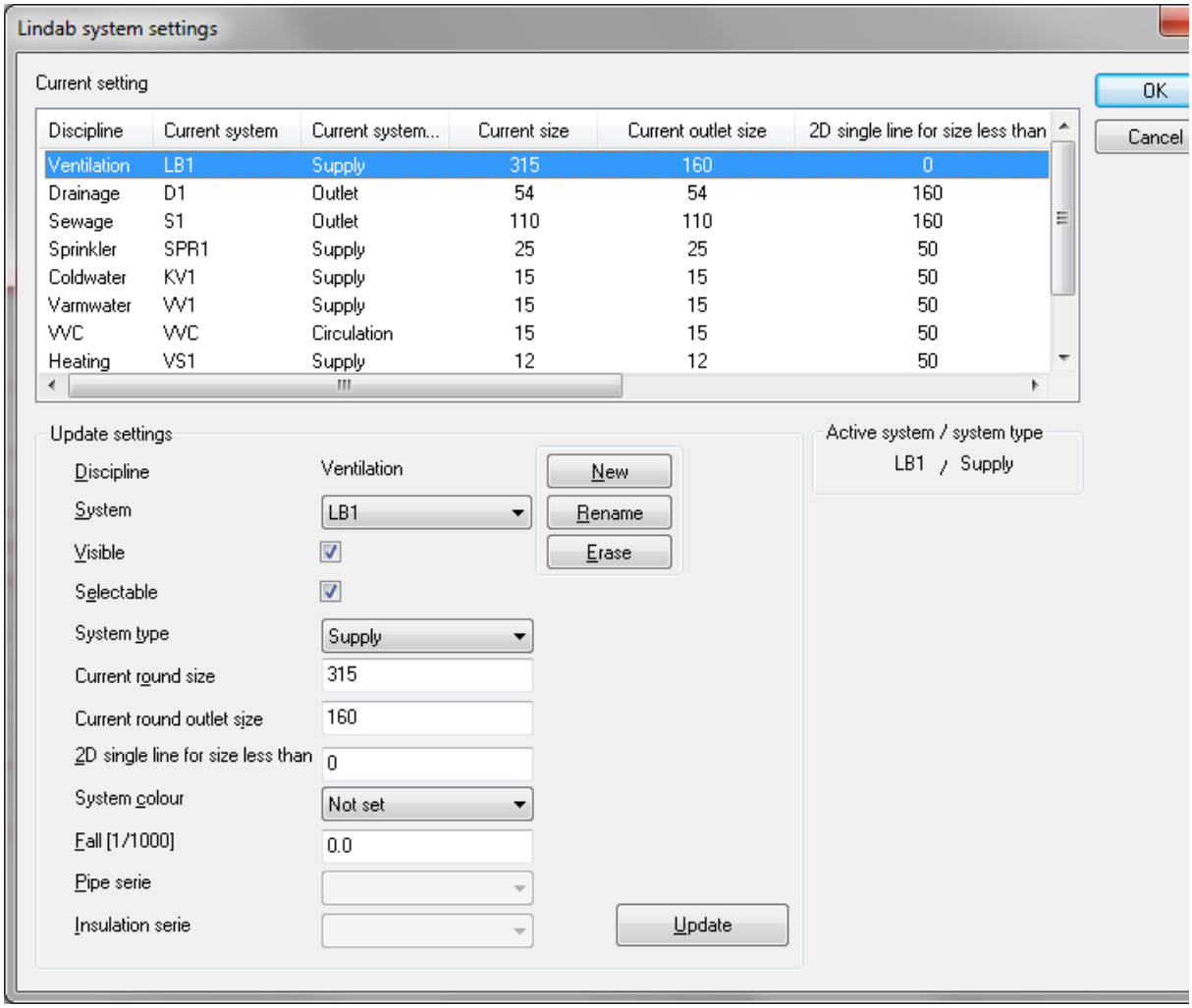
Push the button Update Layer colours . CADvent does now update the colours according to the current colours in the template

(See also *Advanced Project Settings – Colour template*)

Lindab System settings

As described can the current CADvent system settings be shown and changed in the Project Settings.

All components belong to a system and get a special system type, floor, colours, and so on.
Further settings for combinations of systems and system types can be configured in System settings dialog.
These adjustments should only be changed if necessary!



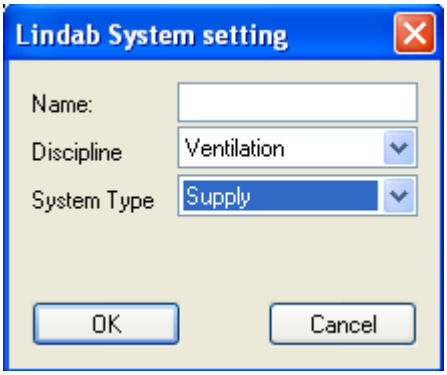
"Lindab System settings" dialog

Update settings

System: Choose one of your created systems.

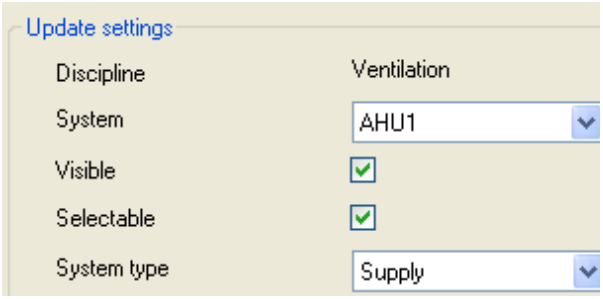
NOTE: New system names can be defined in the System settings or the Project settings with the control button "New".
Then the dialog to the right will show up.

System Type: Choose one of the available system types according to its function!



Create New System" dialog

Visibility and Selection of systems:

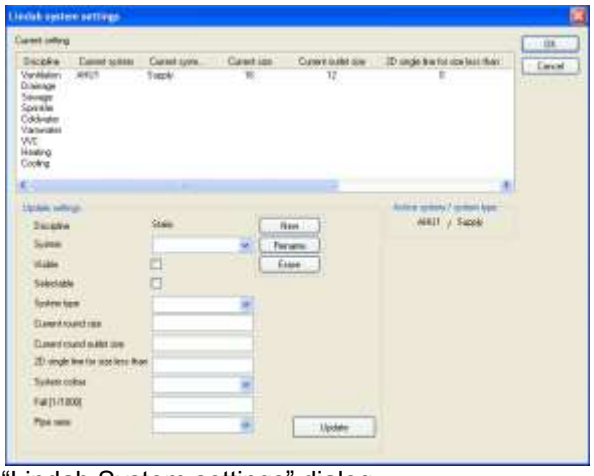


Lindab System settings – domain “Update settings”

Visible: If this function is deactivated the selected system will not be shown in the current drawing.

Selectability: If you deactivate this function, the selected system will lose a lot of their functions (Continue, Connect Open ends, Cut Duct System, Move, Smart Move, Calculate, Text, Insulation,…).
Just a few commands (Properties, Insert Connectors, Piece—Labelling and the AutoCAD commands) can be used on these systems.

Current size (round): Sets the standard size for all round components for the automatic functions.



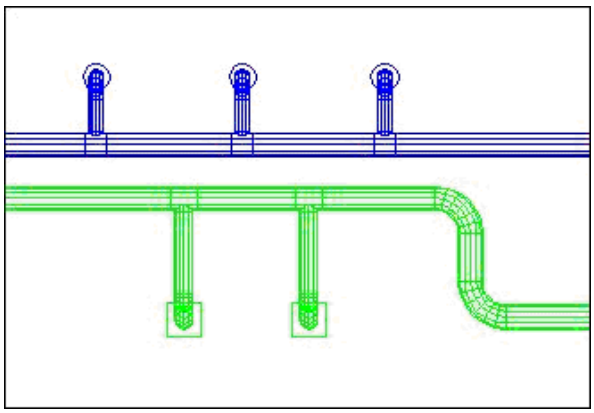
“Lindab System settings” dialog

NOTE: If you continue or connect duct systems, CADvent will automatically switch to the size your related duct is drafted in. It does not matter if this is the automatic or a manual size.

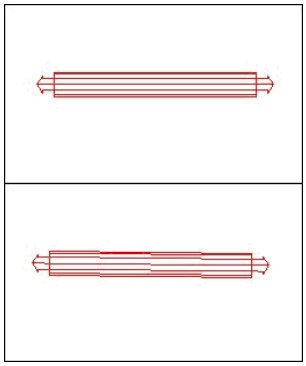
Current outlet size (round): Sets the standard size or Tees and Saddle taps/Take-offs (for the automatic functions).

2D single line for size less than: Defines to which size a duct is shown as a single line. If the size is 0, all ducts will be drafted with two lines.

Colour: This is not applicable anymore for ventilation since the development of the CADvent Layer Properties.



Fall (1/1000): Sets the hydraulic gradient of an object in the top view. The standard setting for the fall is 0.0.



Fall (set on1%) – Top view and Side view

Set & Info

Set elevation

This command can also be used within another command (shown in the AutoCAD command line) to set the current drafting elevation. You must first choose the component you want to draw and then click on the command **Set elevation** . Then you write the elevation (in mm), e. g. 2700. The component will now be drafted in an elevation of 2700mm.

NOTE:

All objects have to be drafted with their total elevation, even if they have a floor setup!

Set elevation by object

The function of this command is basically the same like the **Set elevation** command. But in this command you don't write an elevation, but you choose the elevation from another object. This command is very useful, if you have to draw a duct system in different sizes but don't want them to go over or under a specific elevation like in a suspended ceiling.

Settings by object

This command changes the elevation set in the **Project Settings** dialog by clicking on an object. The default setting for the elevation will be taken over from this object as new default elevation.

Drawing

Construction method 1 – Drawing a duct system manually

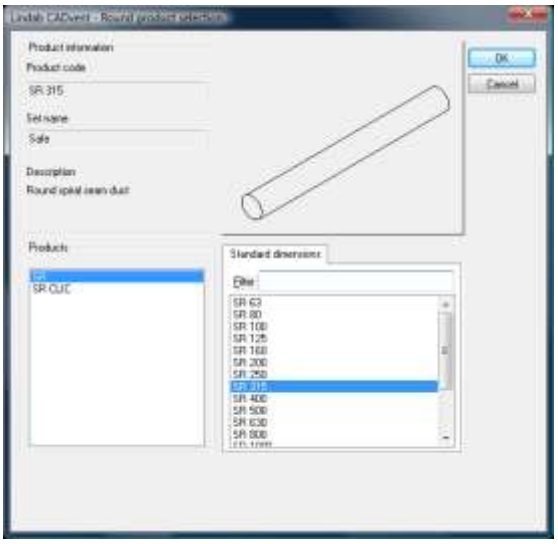
With this method we will show how to draw a duct system with the manual commands (yellow buttons). It is very manageable, because the steps are very detailed and you can check every step. On the other side it takes a little bit longer, because you don't take automatically the default settings to draw, but choose every component detailed by type, product and sizes.

Draw round ducts and fittings with fixed sizes

It is a good method, if you are not yet so familiar with the automatic and advanced settings functions.
Select the wished duct components by clicking on the yellow command button (Manual selection) in one of CADvent's toolbars.
Insert the component to the duct system by clicking on the insertion point in the drawing

Draw a round duct

Open the **Safe manual duct** dialog.
Choose the designated type of duct and size and click on OK.
Mark the start- and endpoint for the duct by clicking into the drawing.



"Safe manual duct" dialog

NOTE:

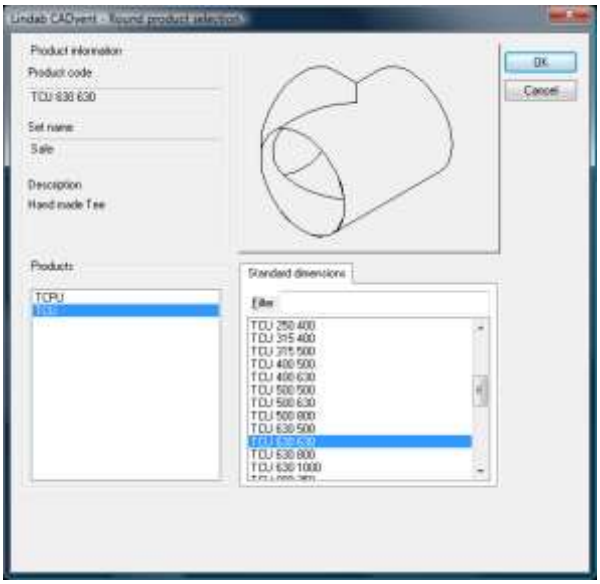
The **Continue** command is automatically activated on the endpoint, if you don't end the Safe manual duct command by pressing the <ENTER> key.

Insert a Tee

Open the **manual tee** dialog
Choose the designated type of duct and size and click on OK.
Mark the start- and endpoint for the duct by clicking into the drawing.

Mark the connection point in the drawing.

Enter the rotation angle by moving the pointer into the wished direction or entering the angle value in the command line. Confirm the angle with a click or pressing <ENTER>.

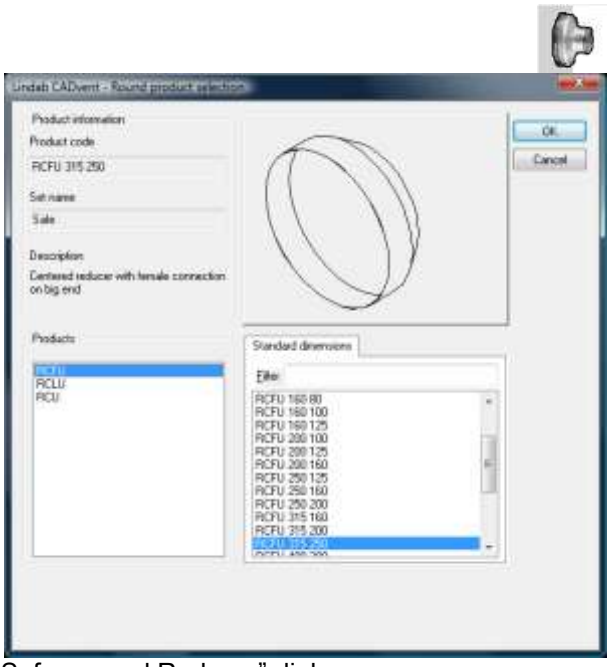


"Safe manual Tee" dialog

Insert a reducer

Open the **Safe manual reducer** dialog. Choose the designated type of duct and size and click on OK.
Mark the start- and endpoint for the duct by clicking into the drawing.

Mark the connection point in the drawing.



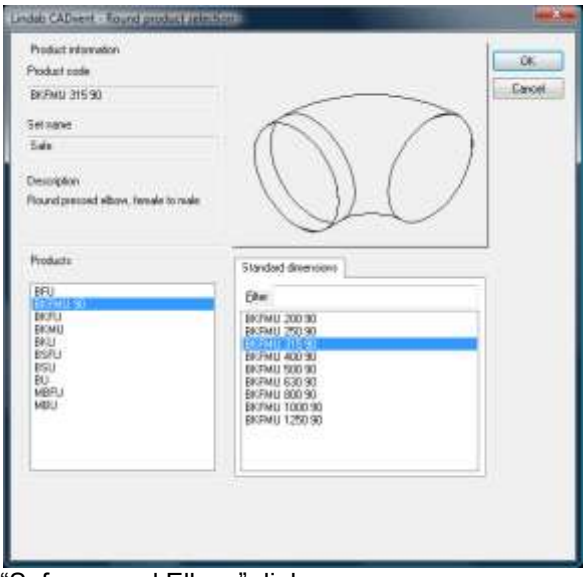
Safe manual Reducer" dialog

Insert Elbow

Open the **Safe manual elbow** dialog.
Choose the designated type of duct and size and click on OK.
Mark the start- and endpoint for the duct by clicking into the drawing.

Mark the connection point in the drawing.

Enter the rotation angle by moving the pointer into the wished direction or entering the angle value in the command line. Confirm the angle with a click or pressing <ENTER>.

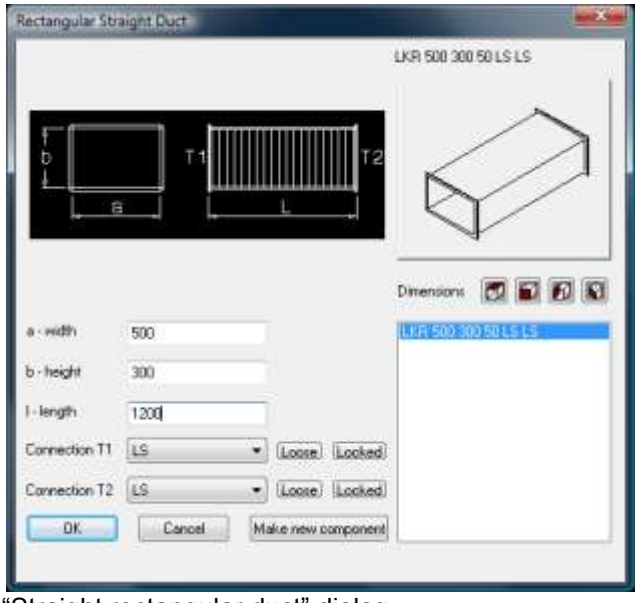


"Safe manual Elbow" dialog

Rectangular ducts and fittings with fixed sizes

Insert rectangular duct

Open the **Straight rectangular duct** dialog.
Enter the sizes for the duct "a-width" and "b-height" into the text fields. In the **Connection** line you can choose what flanges you want to have on the duct. You can insert or switch the flanges later in the **Properties** if you want to.
Click on the button **Make New Component** to create the duct and click on OK to insert it in the drawing.
Mark the start- and endpoint for the duct by clicking into the drawing.



"Straight rectangular duct" dialog

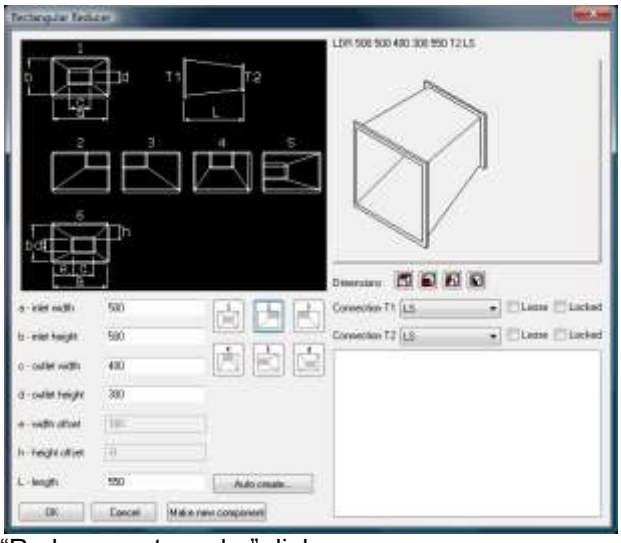
NOTE:

Several countries have the possibility to use the order function in CADvent to order Lindab rectangular duct. If you don't set in flanges or use the "Other" flange it can cause problems with the automatic ordering!

NOTE: You can set the length too if you want too, but the length will be adjusted from you by marking the start- and endpoint or by marking the start point and then entering the length in the AutoCAD command line and confirming with the <ENTER> key.

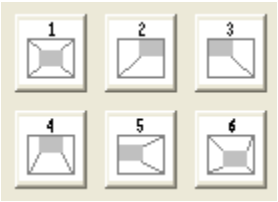
Insert Rectangular Reducer

Open the **Reducer rectangular** dialog. Enter the sizes for the reducer into the fields “a –inlet width”, “b-inlet height”, “c – outlet width”, “d –outlet height” and if necessary “e – width offset”, “h –height offset” (concentric reducer) and “l – length”.



“Reducer rectangular” dialog

NOTE:
By choosing one of the six possible default offset possibilities you can jump the manual offset sizing. The sixth example is totally manual like described before.



Click on the button **Make New Component** to create the reducer and click on OK to insert it in the drawing.
Mark the start- and endpoint for the duct by clicking into the drawing if you want to set the length to another value than the one you entered in the dialog.

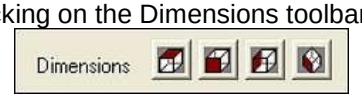
NOTE:
To use the **Auto create** function you must draw the two different sized rectangular ducts first. Then open the Reducer rect dialog and use the ‘**Auto create…’** command. Click on the two duct edges (as connection points for the reducer) to let CADvent calculate all sizes for the reducer. Instead you can also use the **Connect Open ends** function of the two ducts if you want to.

Insert rectangular Elbow

Open the dialog for **Rectangular elbow / sharp elbow** .

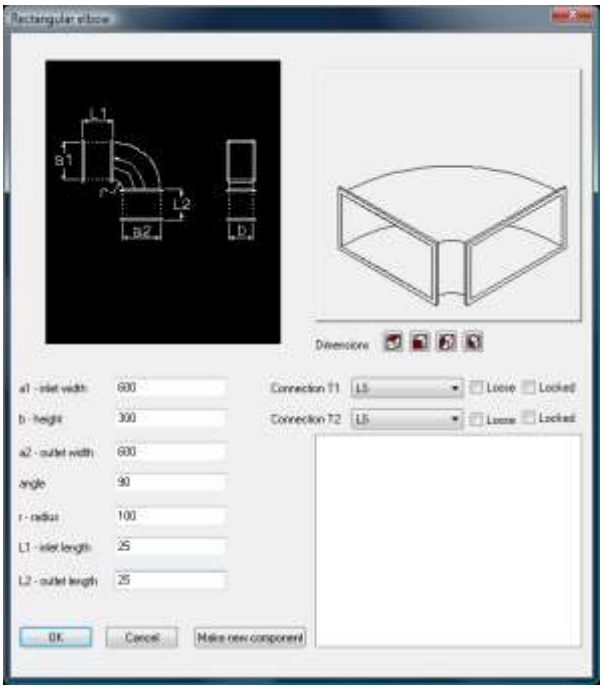
Enter the sizes for the reducer into the fields “a1 –inlet width”, “b- height”, “a2 – outlet width”, angle” and “r – radius” (inner diameter). If you want to attach extensions on the elbow please enter this in the fields L1 and/or L2.

NOTE:
By clicking on the Dimensions toolbar



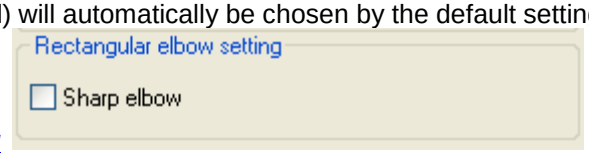
You can change the point of view on the component to make sure it has the requested design.

Click on the button **Make New Component** to create the duct and click on OK to insert it in the drawing.
Mark the start- and endpoint for the duct by clicking into the drawing.



“Rectangular elbow” dialog

NOTE:
Just like with the rectangular reducer you have also the possibility to insert an automatically created elbow with the function **Connect Open ends**. This function is linked to the project settings. The form of the elbow (sharp/normal) will automatically be chosen by the default setting in the

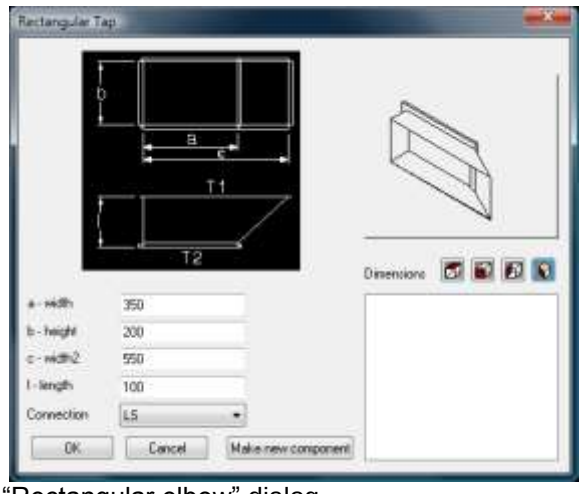


Rectangular Elbow Setting

Insert rectangular branch to a rectangular straight duct

Open the dialog for **Rectangular branch** .
Enter the sizes for the rectangular branch in the text fields “a – width”, “b – height” and choose a connection if you want.

Click on the button **Make New Component** to create the duct and click on OK to insert it in the drawing.
Mark the start- and endpoint for the duct by clicking into the drawing.
Choose the rectangular straight in the drawing the tap shall be put on and click on the designated insertion point.



“Rectangular elbow” dialog

NOTE:
After drawing the main system and the branch duct you can automatically connect the branch duct to the main duct with the command **Connect with Saddle Tap** .

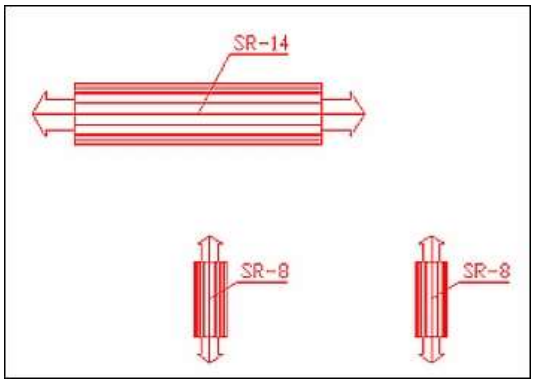
Construction method 2 – Drawing a duct system automatically

We recommend this drawing method for users who work with CADvent frequently It is a simple and very quick drawing method which uses the intelligent functions embedded into the program to solve construction problems. Changes if necessary can be done after the construction. If you use the sizing and calculation functions of CADvent the sizing will be adjusted anyway.

Drawing a round duct with connections and automatic sizing

Exercise 1:

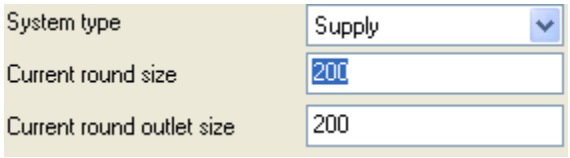
Start drawing a circular duct with fixed sizing by using the known **Safe manual duct** function or with the automatic drawing, shown consecutively.



Start-up Exercise 1

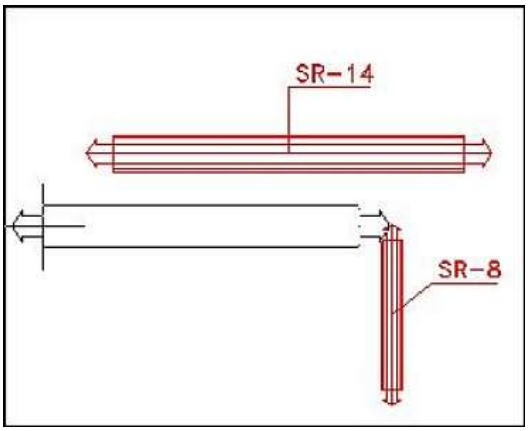
Drawing a Safe duct automatically

Check the default size for the circular ducts in the Lindab System settings:
Write in the designated size and update the System settings (See also *Settings- Current size*)
You can also change the size by clicking on the Auto duct command and then write "s" for size in the AutoCAD command line and confirming with <ENTER>. Then write your size and confirm again.



Domain "Update settings" in the "Lindab System settings" dialog

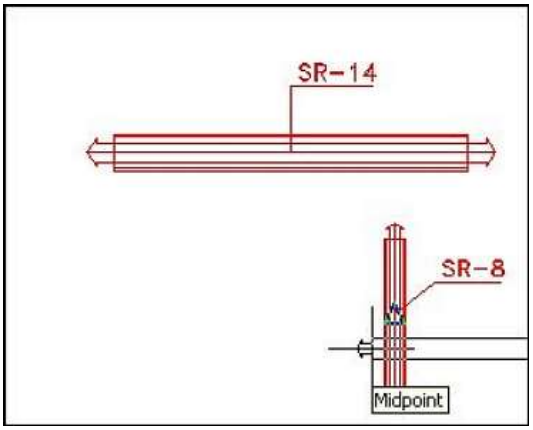
When you changed your default duct size, click on the **Auto duct** **command insert the duct with the pointer.**



Automatic drawing – default duct size

If the AutoCAD object snap (OSNAP) command is activated, you draw the duct over the existing duct the current size will of the drafted duct will be copied to the duct you want to draw.

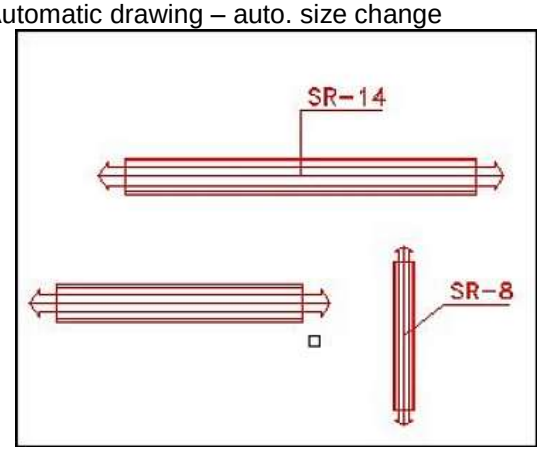
If the object snap tracking (OTRACK) command is also activated, the elevation will also be copied to the new duct.



Automatic drawing – auto. size change

Mark the start- and endpoint for the duct by clicking into the drawing.

NOTE:
The **Continue** command is automatically activated after you set the endpoint. CADvent shows now the possible commands in the AutoCAD command line.



Automatic drawing – adapted size

Choose now the point from which to continue with the duct or choose another option from the command line. Press <ESC> to abort the continue command.

Continue command – command line

NOTE:

You cannot just continue from the endpoints but also from any point on the duct in between. The branch duct will be set in with a Tee or a Saddle tap, according to your preferences (see also – *Connecting ducts with Tees or Saddle Taps*)

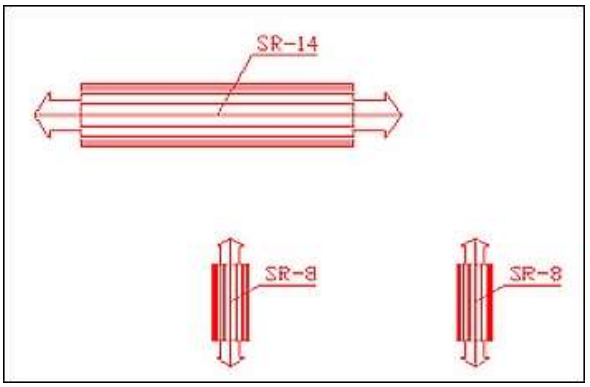
Connecting two ducts with the same elevation

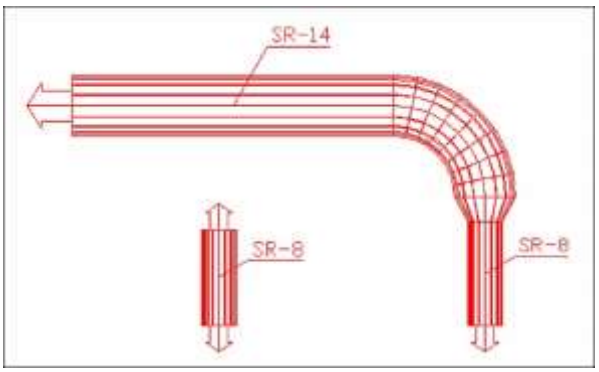
Exercise 2:

With the **Connect open ends** command can you connect two open ends in a duct system, even if they have different sizes or are apart from another. CADvent connects the open ends automatically with standard components.

Activate the **Connect open ends** command.
Click on the two endpoints you wish to be connected. CADvent connects them with standard components.

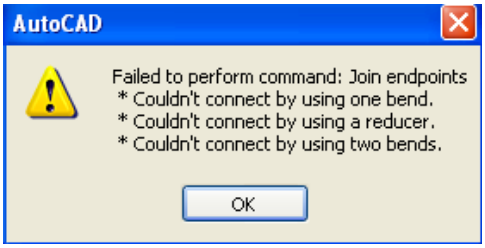
NOTE:
If the two components have different sizes, CADvent takes the size from the first component and continues with that dimension to the connection point of the second component and inserts a reducer automatically.





Exercise 2

NOTE:
If CADvent cannot connect the two components with it's standard products it will pop-up an error message. This can happen if e. g. the angle between two components does not match the angle of standard elbows.



Changing the elevation of an object

Exercise 3:

Activate the CADvent *Properties* command or change CADvents properties in the AutoCAD Property dialog.
Select the component you want to edit.
You can activate the field "Elevation" and enter a new elevation for your object. Confirm the new value by pressing <ENTER>.
Click on OK. To place the component on a new elevation.

NOTE:
You can also select several components, even with different elevations. The changed value will be taken over to all selected components.

"Properties" dialog

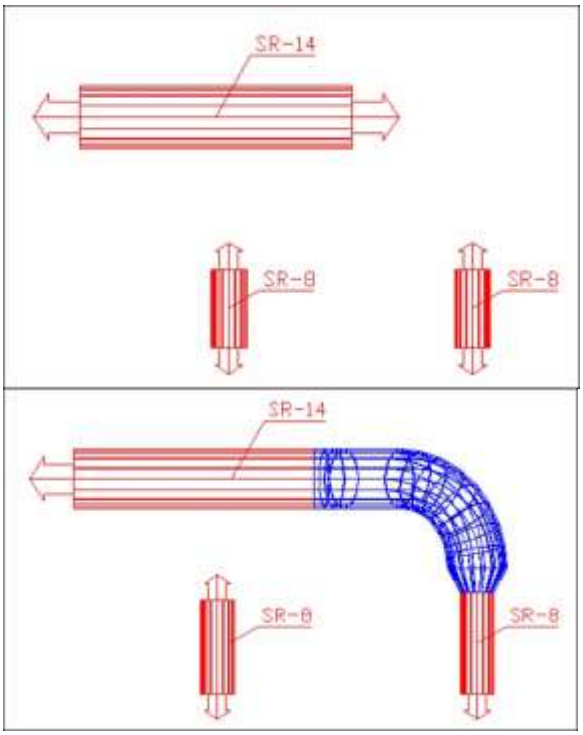
Exercise 3

Connecting two ducts with the different elevations

Exercise 4:

The command **Connect open ends** connects also two components on different heights by connecting them with standard components.

Activate the **Connect open ends** command
and choose the two open ends you wish to be connected. CADvent If there several combinations of elbows possible, CADvent can show all by switching with the <ENTER> key or the right mouse button. To confirm your choice you have to push the <Y> key and <ENTER>. If there is just one solution possible, CADvent will automatically use this one without further confirmation.



Exercise 4

Connect ducts with a Tee or a Saddle Tap

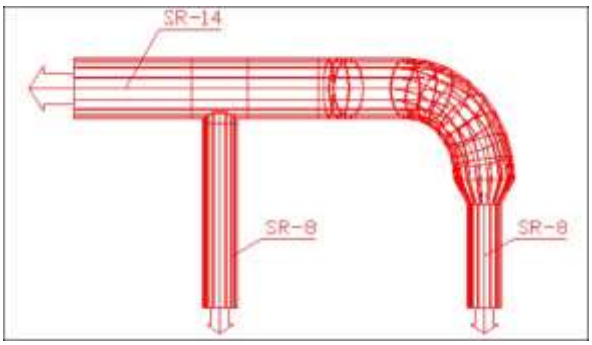
Single object

Exercise 5:

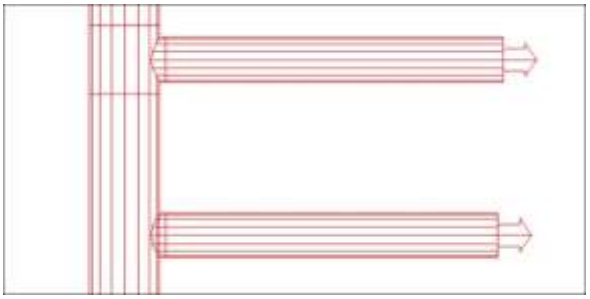
This command is basically similar the one explained before.
Please choose in the *Assemble toolbar* if you want to connect your ducts with a Tee or with a Saddle Tap .
Choose the branch duct that shall be connected to the main duct and then on the main duct. CADvent connects the two duct swith the component that you have selected before.

In the picture to the right you see the difference between the connection with a Tee and a Saddle Tap:

- Connection with **Tee**
- Connection with **Saddle Tap**



Connected with a Tee
Exercise 5

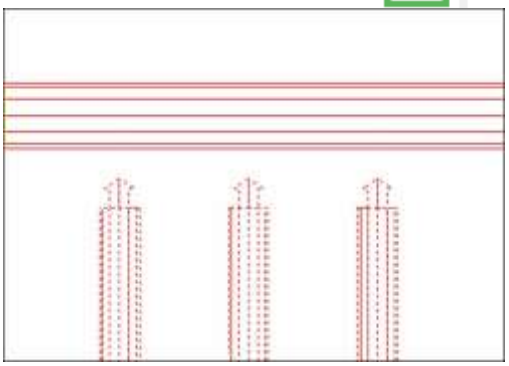

Connections with Tee and Saddle Tap

Multiple objects

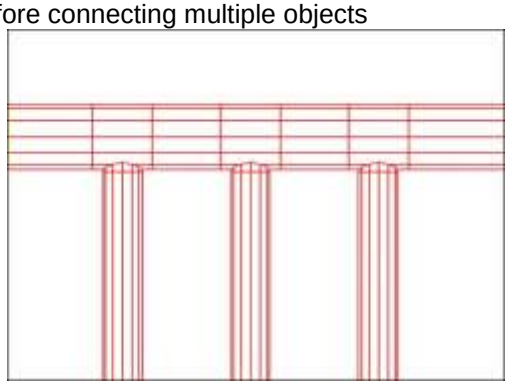
Exercise 6:

Please choose in the **Assemble toolbar** if you want to connect your ducts with a Tee or with a Saddle Tap .

Right click on the mouse one time to activate the function for connecting multiple objects.
Select all the branch ducts you want to connect to the main duct first and then the duct you want to have them connected to. CADvent connects all the chosen ducts with Tees o Saddle Taps, dependant on which connection you selected before.



Before connecting multiple objects



Multiple objects connected with Tees
Exercise 6

Connect all open ends with straight duct

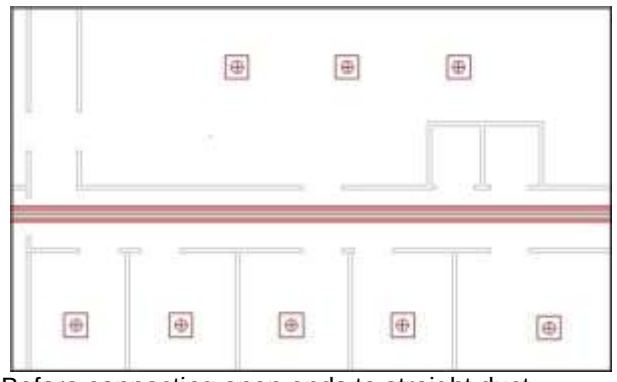
Exercise 7:

Please choose in the **Assemble toolbar** if you want to connect your ducts with a Tee or with a Saddle Tap .

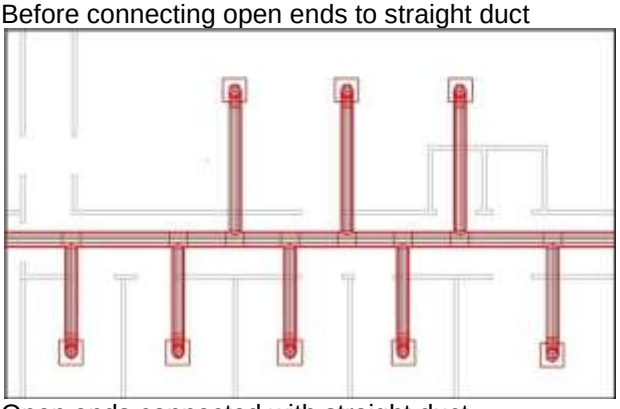
Right click *twice* on the mouse to activate the function for connecting multiple objects to a straight duct. Between the two mouse clicks you maybe have to confirm your choice by pressing the <ENTER>key.

Select the straight duct. CADvent connects all ducts with open ends to the straight duct with Tees respectively with Saddle Taps.

NOTE:
This auto-connect function contains many different calculation methods. The more complex the system is, the more problems can occur during the calculation. Therefore it is likely to be easier to connect open ends with the single connect command if you have a highly complex system.



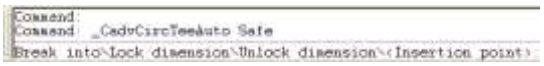
Before connecting open ends to straight duct



Open ends connected with straight duct
Exercise 7

Drawing a Safe Tee-piece automatically

Activate the **Auto-Tee** command. A Tee-piece with the default sizes from the project settings is now assigned to your pointer in the drawing. CADvent shows the following options in the AutoCAD command line for this function: ‘Break into’, ‘Lock dimension’, ‘Unlock dimension’ and as default value ‘Insertion point’. Make sure that the Tee-piece has the right dimensions before you select the command.

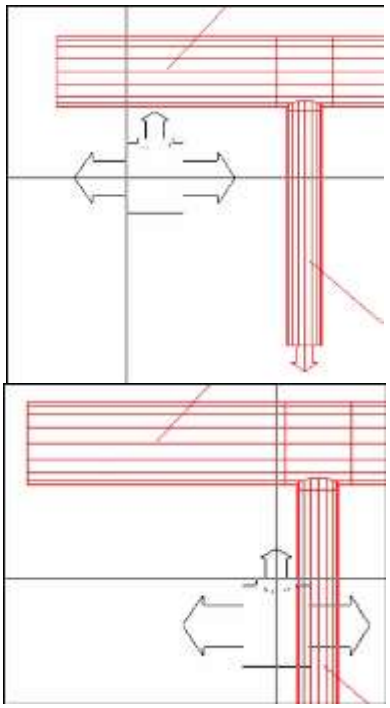


Command line “Auto-Tee”

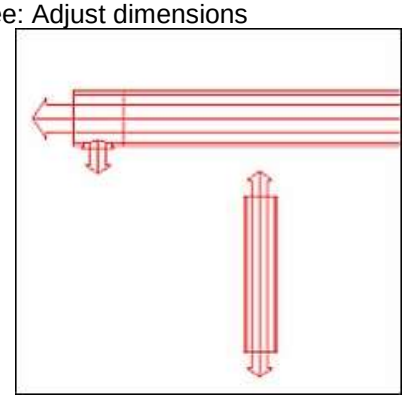
To make sure to get the correct dimensions for the Tee-piece, make sure that the OSNAP function is activated.

Right click on your mouse to switch between the three connection points. Switch to the connection point that you want to adjust.

Draw the mouse pan onto the object with the designated size. The OSNAP functions transfers the size from the object to the connection of the Tee-piece. Repeat this function to size the main connections and the branch connection.

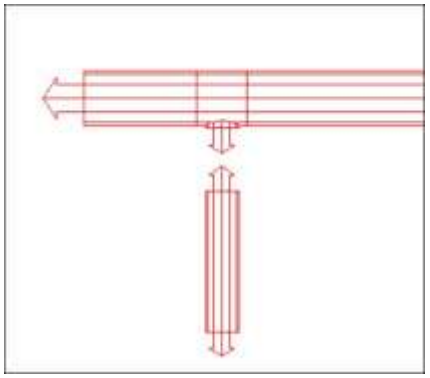

Auto-Tee: Adjust dimensions

Select the ‘Lock Dimension’ command from the command line to make sure the dimensions on your connection point do not take over other object dimensions when moving the mouse pan over the drawing.
Then you can choose your mounting command: ‘Insertion Point’ to connect your Tee to an open end or ‘Break Into’ to mount it into a duct. After inserting the product you must enter the rotation angle by pointing with the pan or entering an angle in the command line.


Auto-Tee: Insertion point

NOTE:
If you used the ‘Lock Dimension’ command you should unlock it now with the ‘Unlock Dimension’ command to make sure that the CADvent calculation functions can change the size when necessary, e. g. with the “Size ducts” function.

NOTE:
If you use the 'Break Into' command you can combine with the regular AutoCAD commands to hit the correct position. In the example to the right, the branch connection was positioned by using the OSNAP function taking connection endpoint of the branch duct as a 'Temporary Track Point'.



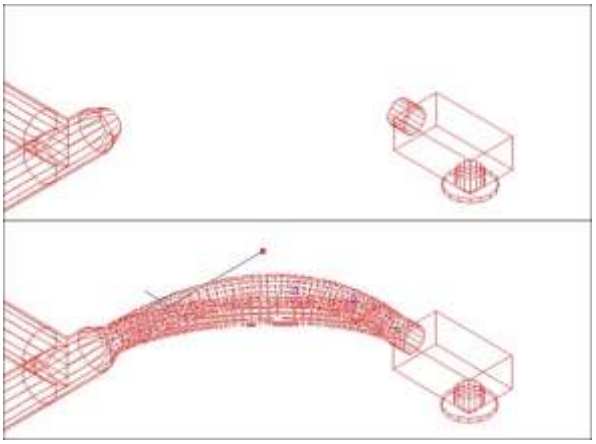
Auto-Tee: 'Break Into' function

Connect with flexible duct

Please proceed as followed to insert a flexible duct between two connections:

Activate the **Flex** command and select The two endpoints you want to connect.

NOTE:
If the two components have different sizes, CADvent takes the size from the first component and continues with that dimension to the connection point of the second component and inserts a reducer automatically. The design of the Flex duct is based on the Bezier-curve. By dragging the second and the fourth breakpoint you can alter the form.



Flex – Curve design

Insert a circular damper

Insert a damper manually

Open the dialog:

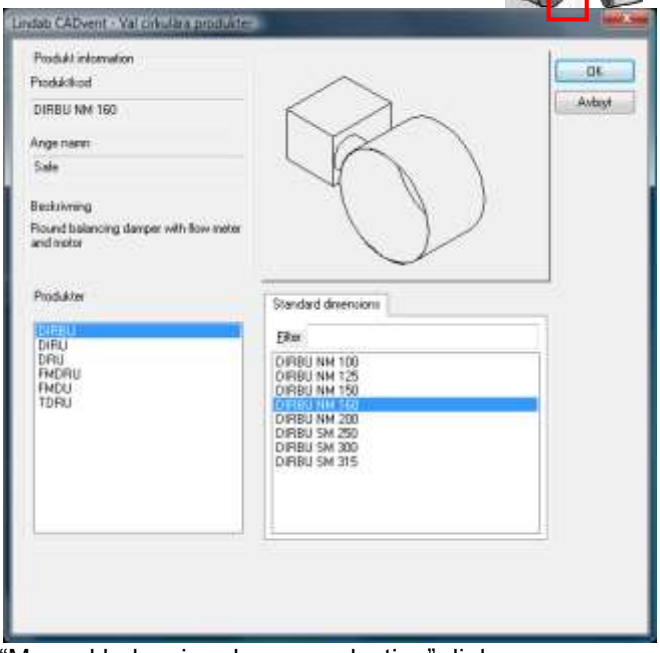
Manual - Balancing damper,

manual – shutoff damper or

manual – constant flow damper .

Choose the designated product and the dimension and click on.

CADvent switches automatically into the "Break Into" command. The user must now select the duct the damper should be mounted in. To change to the "Insertion Point" command you must right click on the mouse and the damper is added to the mouse pan. You can switch between the two connection points with the right mouse button.



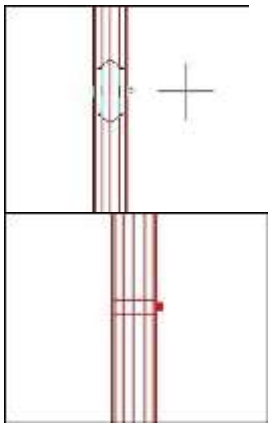
"Manual balancing damper selection" dialog

After inserting the damper you must enter the rotation angle as before.

Insert a damper automatically

Activate the **Auto – balancing damper** command. CADvent takes now the balancing damper that is set on default value in your *Product Default Settings*.

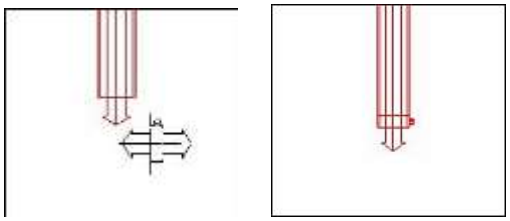
Then select the duct and the 'Break Into' position or the 'Insertion Point' and enter the rotation angle as described above.



Auto balancing damper – Break Into

NOTE:
If the OSNAP function is activated you can adapt the size of the damper by dragging the pan (with the damper) over the duct.

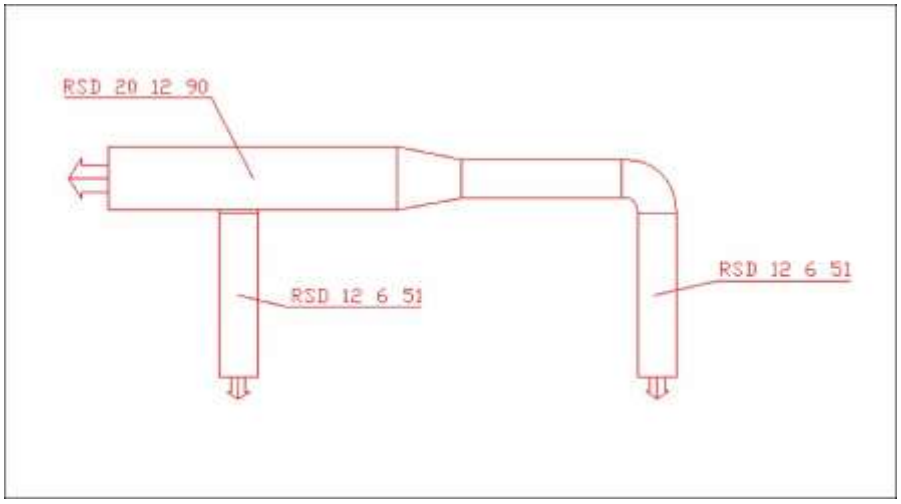
Mark the insertion point on the duct and enter the rotation angle.



Auto balancing damper – Insertion point

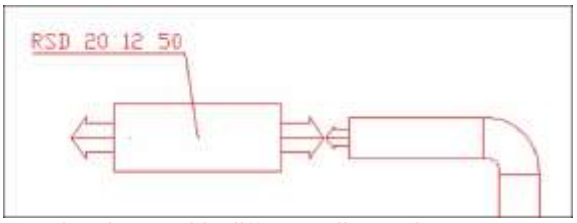
Draw rectangular straight duct and fittings with automatic sizing

Construction method for two rectangular ducts



Connect two rectangular ducts with different dimensions

To connect two rectangular ducts which are aligned (but not necessarily centred) you can choose between two methods dependant on the elevation and the dimensioning of the ducts.



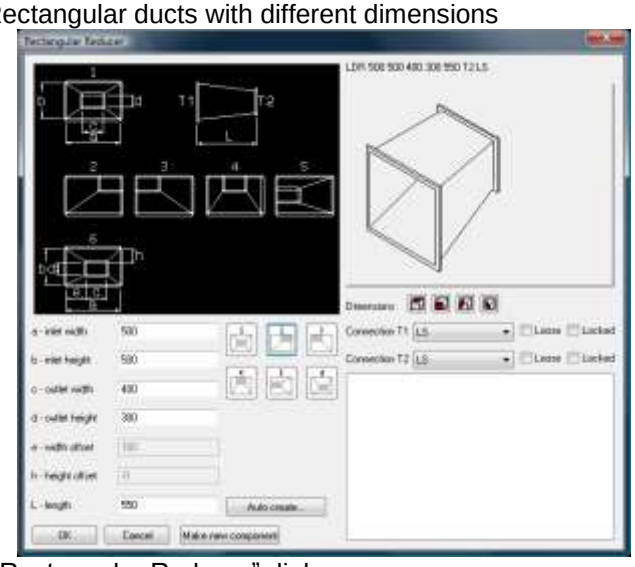
Rectangular ducts with different dimensions

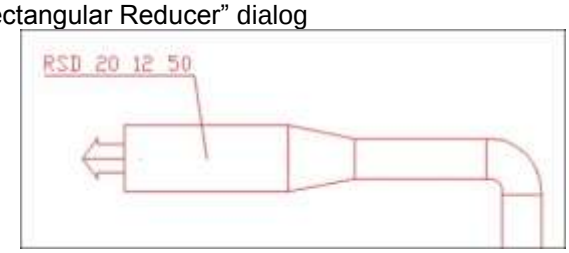
Method 1:

Open the **Reducer** dialog in the Rect toolbar and press the button **'Auto create…'.**

Click on the two duct edges (as connection points for the reducer) to let CADvent calculate all sizes for the reducer.

NOTE:
If you need to change or attach dimensions to the reducer you can use the command **Edit rectangular component**. Mark the reducer you want to check and use the command to open the Reducer dialog again and you can alter or attach dimensions. Click OK when you are finished.
You can use this function for all rectangular components.


"Rectangular Reducer" dialog

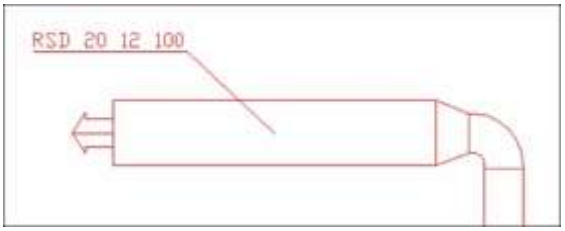


Connect two ducts with different dimensions – method 1

Method 2:
Activate the already known **Connect Open Ends** function.

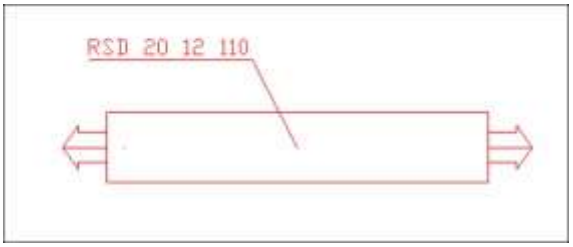
Click on the two endpoints you wish to be connected. CADvent takes over the dimensions from the first point and reduces or extends them to the second.

Like before you can adjust the auto created product if necessary with the **Edit rectangular component** command, described in method 1.



Connect two ducts with different dimensions – method 2

NOTE:
If the second duct is not connected to any other component, CADvent does not set in a reducer, but extends the firs duct (with its dimensions) over the length of the two product endpoints.

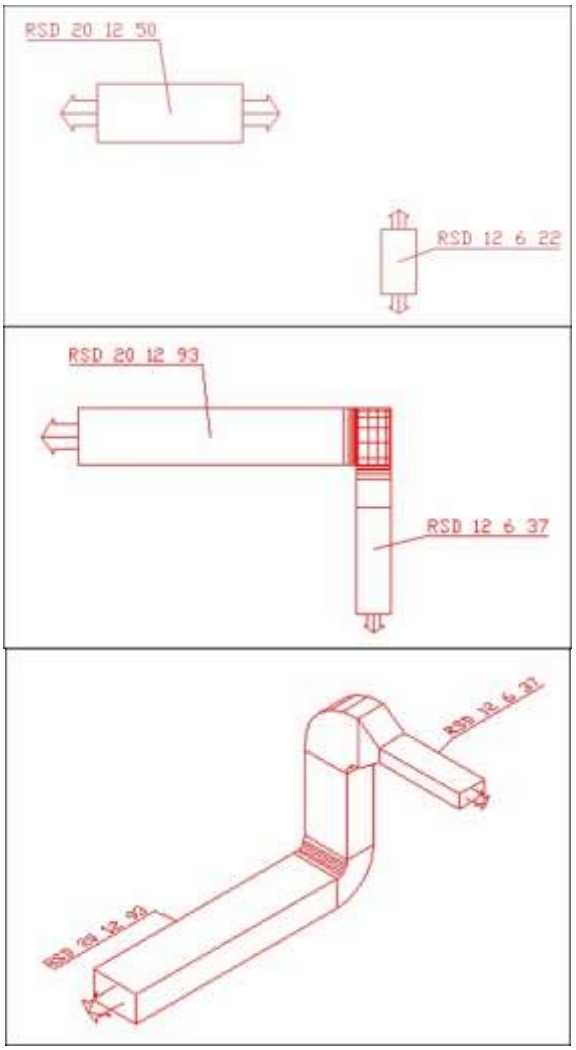


Method 2 (See NOTE)

Connect two rectangular ducts with different elevations

The function **Connect Open Ends** allows the possibility to connect two ducts with different elevations. CADvent connects them automatically with standard components if possible.

Activate the function **Connect Open Ends** **.** Click now on the two endpoints you want to connect. Like with the circular components, CADvent shows the possible solutions. You can switch between them by clicking on the right mouse button. Do select an option you have to type a <Y> in the AutoCAD command line and confirm with the <ENTER> key.
If there is only one solution possible, CADvent will apply it automatically without confirmation.



Connect two rectangular ducts with different elevations

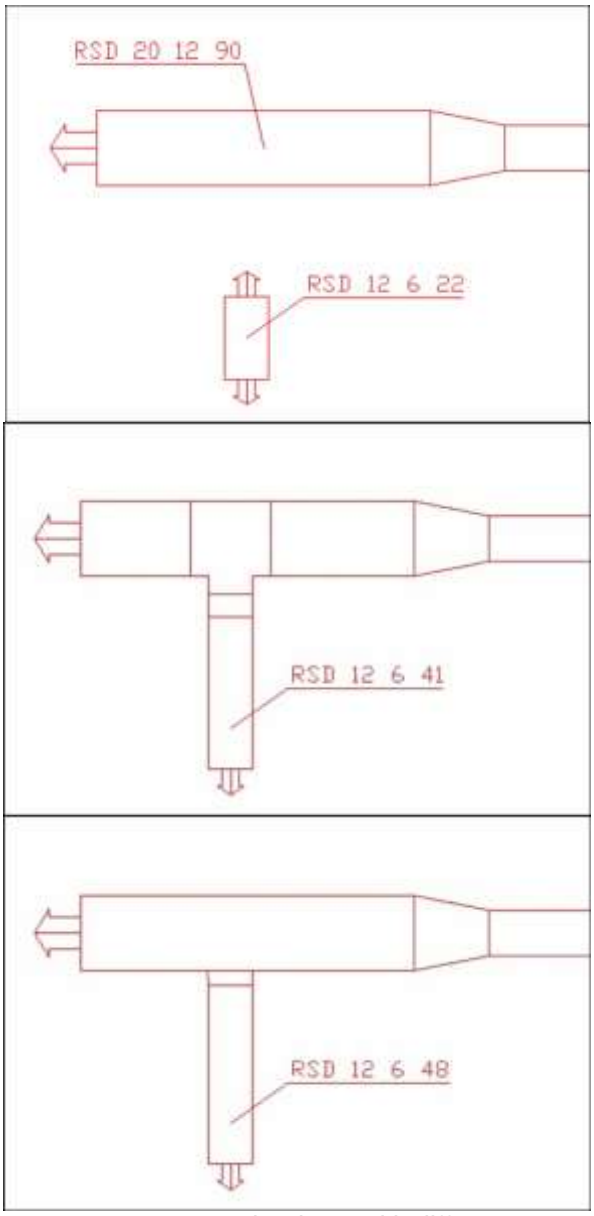
NOTE:
When connecting ducts with different dimensions, CADvent refers to the dimensions of the first duct and inserts automatically a reducer before the second duct to adjust the dimensions.

Connect to vertical arranged rectangular ducts

Activate the **Draft** Tab. Select **Connect with Tee** or **Connect with Saddle**, then click on the branch duct that shall be connected and then on the main duct.

CADvent creates automatically an appropriate component and connects the two ducts.

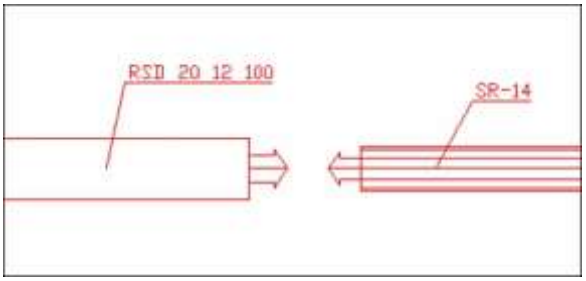
NOTE:
To check and/or adjust the sizes of your Tee piece/Saddle Tap select the command **Edit rectangular component**. The dialog for Tee pieces/Saddle Taps opens. Enter the changes (if you need) and confirm them with the OK button.



Connect two rectangular ducts with different elevations

Connect a rectangular and a circular component

To connect a rectangular and a circular duct which are aligned (but not necessarily centred), you can choose between two methods dependant on the elevation and the dimensioning of the ducts.



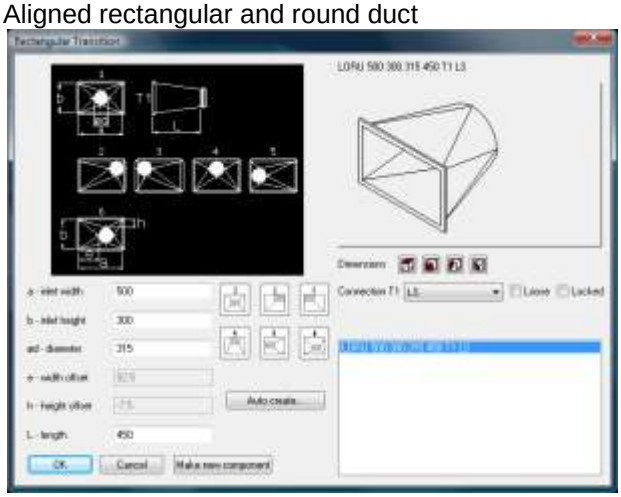
Aligned rectangular and round duct

Method 1:

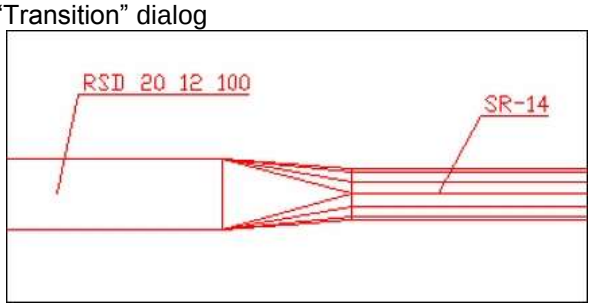
Open the command **Transition** and press the ‘Auto create…’ key.

Select now the open ends of the rect duct and the round duct that you want to be connected.

You can also enter all the sizes by yourself. You have basically the same functions like in the Reducer dialog. But we recommend that you take the **Auto create** command, especially when the ducts are not centrically it can save you a lot of time.


“Transition” dialog

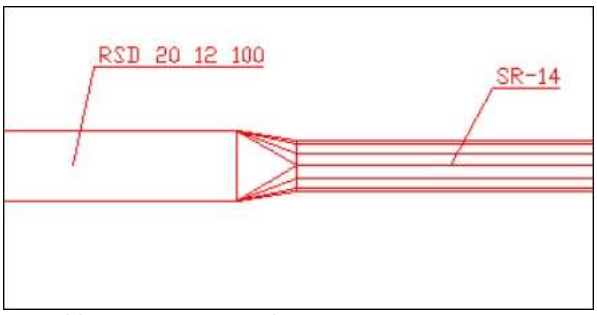
NOTE:
To check and/or adjust the dimensions of your transition select the command **Edit rectangular component**. The dialog for Transition opens. Enter the changes (if you need) and confirm them with the OK button.



Rechteckiges Kanal mit rundem Rohr verbinden

Method 2:

Activate the **Connect Open Ends** function and click on the two ends you want to connect.
CADvent keeps the position of the first connection point (in this case the rectangular duct) and adjusts the position of the second connection (in this case the round duct) to ensure a standard length for the transition according to the norms.



Transition Rect - Round

NOTE:
To check and/or adjust the dimensions of your transition select the command **Edit rectangular component**. The dialog for Transition opens. Enter the changes (if you need) and confirm them with the OK button.

Connect a round duct on the side of a circular duct

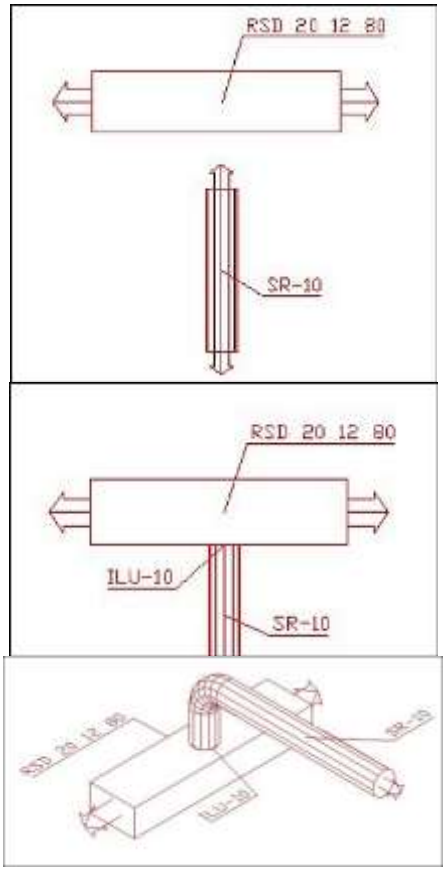
To connect a round duct on the side of a rectangular duct you can choose between two methods dependant on the elevation and the dimensioning of the ducts.

Method 1:

Activate the **Draft** tab, then click on “Connect with Saddle” . First select the round duct that shall be connected to the rectangular duct. Select then the rectangular duct

If both objects have the same elevation (or just a small deviation) a round Take-off (Type ILU or ILRU) will be mounted to the rectangular duct.

If the two objects have different elevations, The Take-off will be mounted on the top or bottom side (depends on the elevation of the round duct) of the rectangular duct.

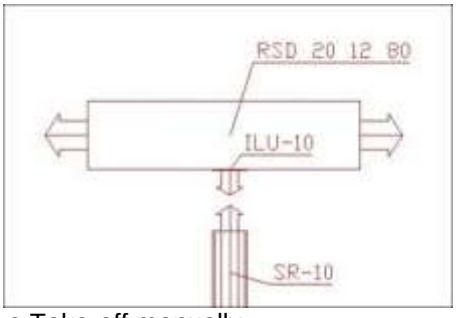


Connect round duct to rectangular duct- Method 1

Method 2:

Activate the command for:

Auto – or Manuel Tap **.**Select the rectangular duct. You can now move the cursor along the rectangular duct; if you use the OSNAP function it is easier to find the correct insertion point to connect the Take-off to an existing duct. Confirm the insertion point with a mouse click.



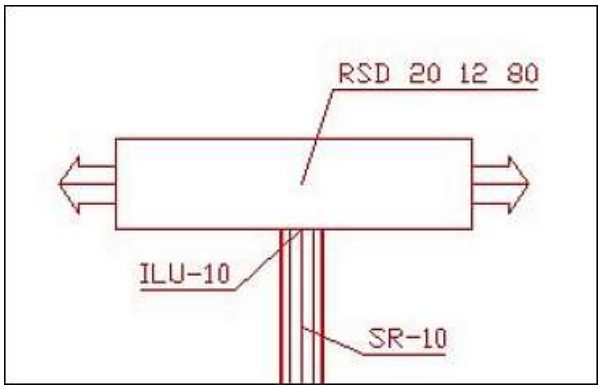
Insert a Take-off manually

NOTE:

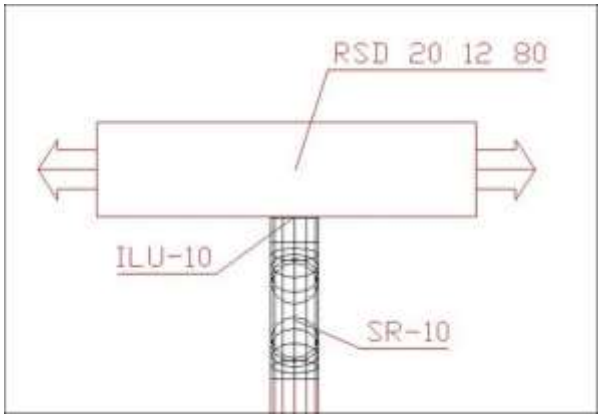
If the current drafting elevation is different to the duct elevation, you maybe have to adjust the drafting height by typing <h>- the elevation and confirm it with the <ENTER> key to be able to insert the Take-off on the side, the top or the bottom of the rectangular duct.

To connect the round duct to the Take-off you can use the **Join Endpoints** command.

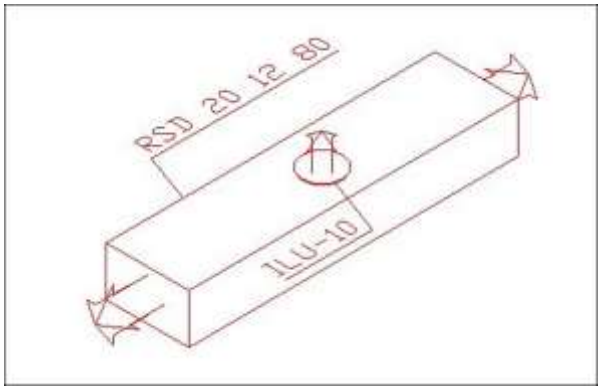
If the round duct and the take off are centred to each other, the round duct will just be extended and connected to the Take-off.



If the duct and the Take-off have different elevations they will be connected with elbows. If CADvent allows more than one possibility to connect the two ducts you can choose between them with a right-click on the mouse. To accept a combination type <y> into the AutoCAD command line and confirm it with the <ENTER< key. If there is just one possibility CADvent will use it without further confirmation.



If you want to insert the Take-off on the top or bottom side of the duct you must activate the **Auto – or Manuel Tap** command. You must then enter <h>, enter the elevation (of the top or bottom side of the duct) and confirm with <ENTER>. After that you can go on as described before.



Connect round duct vertical/horizontal with a Take-off to a rectangular duct

Continue from…

Continue from… - Default settings

Continue from an endpoint

Activate the **Continue** command.
Select the endpoint from which you like to continue to draw.

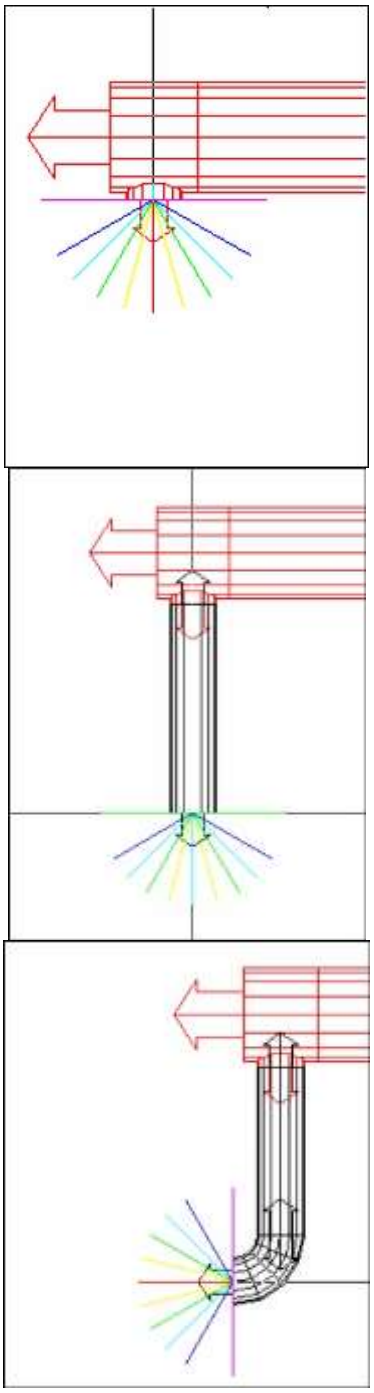
NOTE:

Open ends are shown with arrows if the control button *Show unconnected edges* is activated (default value is activated).

A fan-shaped formation occurs from the endpoint. Every of these lines represent the angle for a standard elbow. You can select one of the lines with the cursor. CADvent calculates which elbow suits best to this specific angle.

NOTE:

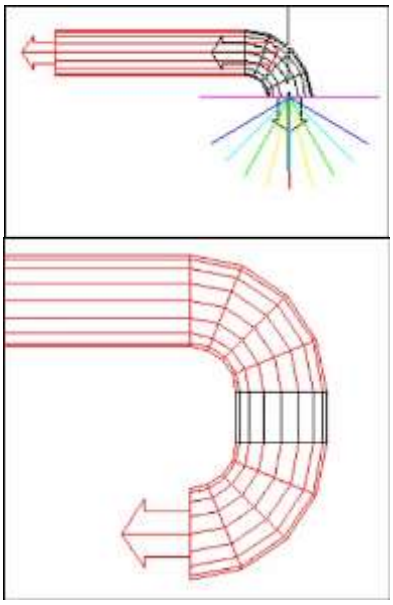
Continuing from an endpoint can be done forward and backwards. This means that you can also shorten an existing duct. To set the length you can use the mouse cursor or just type the designated length into the AutoCAD command line and confirm it with <ENTER>.



Continue from … an endpoint

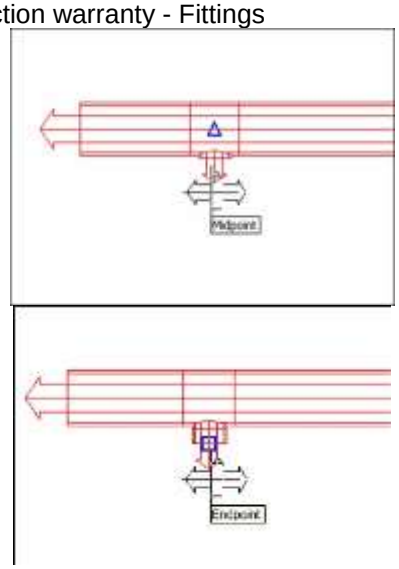
CADvent control routines – Connection warranty

1. When continuing from an endpoint CADvent checks, if the products can be mounted this way or if you need a fitting.



Connection warranty - Fittings

2. When you insert multiple objects CADvent controls the connections. CADvent does not allow e. g. that you connect a damper directly to a tee. Like shown in the picture on the right you cannot snap the connection point, but instead the middle point is shown. But if you mount a connector (in this example a coupling because both products have male fittings), then CADvent allows to mount the damper to the coupling of the tee.



Connection warranty - Products

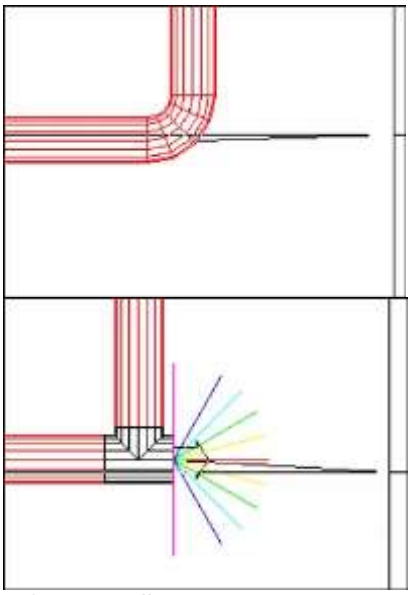
Continue from an elbow

Activate the **Continue** command.

Mark the elbow. You can continue from a tee in two directions (in this case X-axis and Y-axis). Drag the pointer from the centre of the elbow to the direction you want to continue your duct system and click to confirm. The elbow switches into a tee and you can continue your duct system.

If you drag the pointer away from the elbow and click to confirm, CADvent will automatically insert a duct between the tee and your position.

NOTE:
This functions works with 90°-elbows (regular tee) and 45°-elbows (lateral tee).



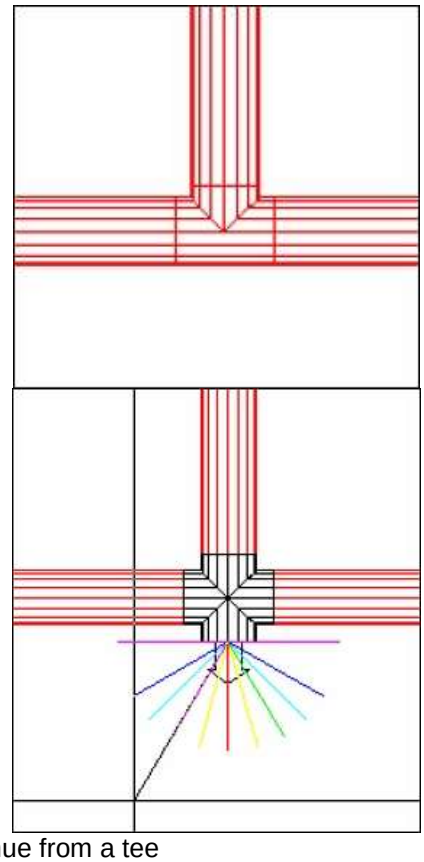
Continue from an elbow

Continue from a Tee

Activate the **Continue** command.
Mark the tee piece that you want to switch into crossing tee. Drag the pointer to the side you want to continue and confirm with a click. The Tee switches into a crossing tee.

If you drag the pointer away from the tee and click to confirm, CADvent will automatically insert a duct between the crossing tee and your position.

NOTE:
This functions works with 90°-tees (regular crossing tee) and 45°-tees (Crossing tee 45°).



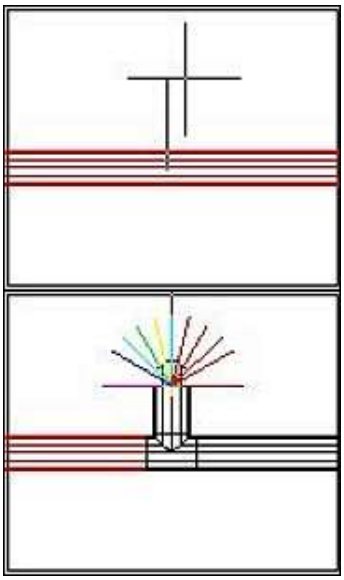
Continue from a tee

Continue from a duct

Activate the **Continue** command.

Select the duct and the position you want to continue from. Mark the position with a click. Go now with the mouse pan in the direction you want to continue the duct and click with the mouse on the point your new inserted duct should end. CADvent will now insert a a Tee or a Saddle Tap (referring to your default product) and insert the duct. Continue now from the fan-shaped connection point.

NOTE:
You can also continue from a rectangular duct, both, rectangular with same or changed sizes and circular. You can also continue with a rectangular duct from a circular duct. Use the *Size* command.



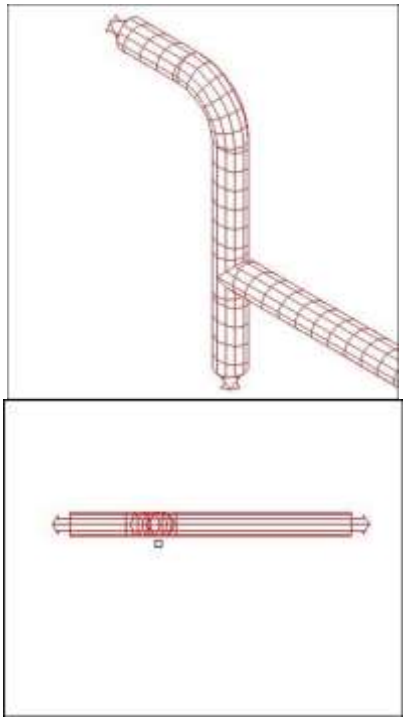
Continue from a duct

Continue from duct - vertical objects in the plan view

Please proceed as followed to continue from an ascending duct without changing into the isometric view:

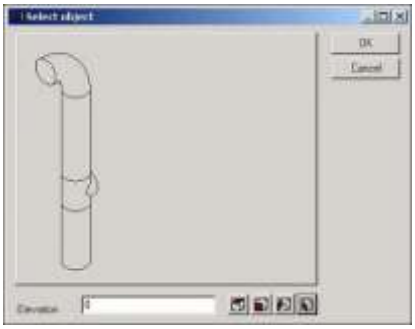
Activate the **Continue** command.

Click in the plan view on the position where the ascending duct is laying.



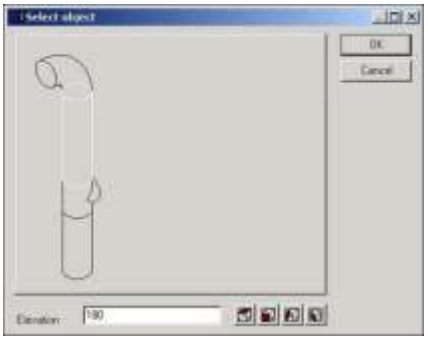
Continue vertically from a duct in plan view

As there are several components inserted on this point, CADvent opens up a window showing all components inserted in the area you marked.



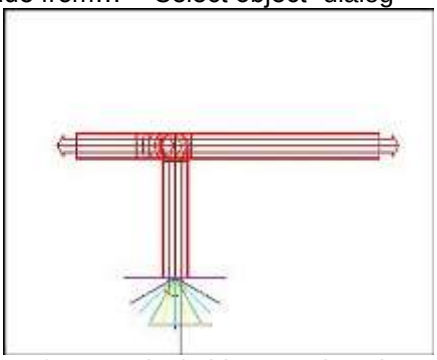
Select the object that you want to continue from (in this case the vertical duct) and if necessary, enter the elevation that you want to continue from.

Click on OK.



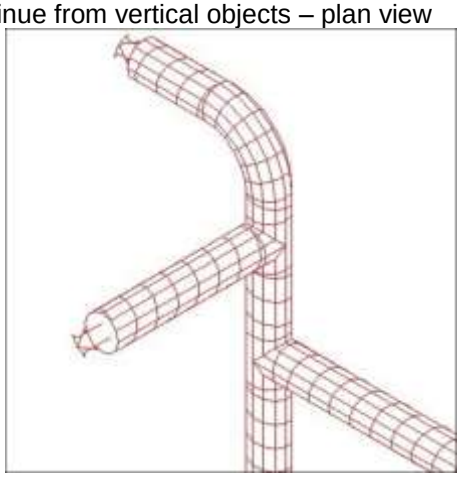
Continue from… - “Select object” dialog

CADvent changes into the plan view and continues the duct from the insertion point chosen before. CADvent inserts a Tee or Saddle Tap if necessary and draws automatically a duct ending at the last marked position.



Continue from vertical objects – plan view

Continue drawing your duct system as usual from the fan-shaped connection point.

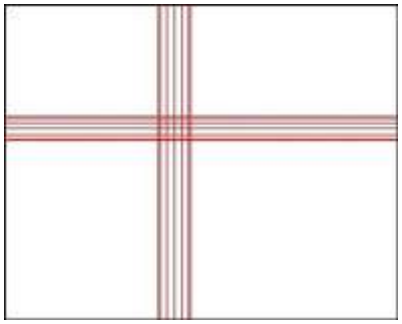


Continue from vertical objects – isometric view

Objects with different elevations crossover

The same situation occurs when several objects are positioned in the same place but with different elevations.

Click on the point you want to continue from in the plan view. As there are multiple objects in this area, CADvent opens up a window to select the object you want to continue from.

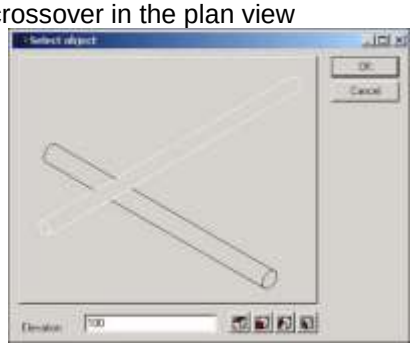


Object crossover in the plan view

Select the object that you want to continue to draw from. The elevation can be entered in a separate text filed at the bottom of the dialog.

Click on OK.

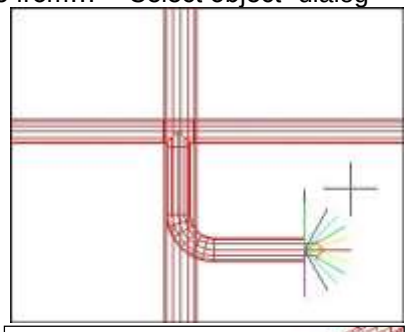
NOTE:
This dialog is also active when you wnat to connect an object to ducts which have similar X,Y coordinates, but lay on different levels.

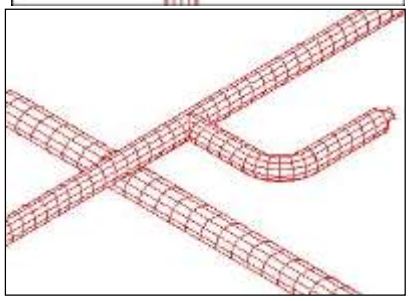


Continue from… - “Select object” dialog

CADvent switches back into the plan view and continues the drawing from the position marked before. CADvent inserts a Tee or Saddle Tap if necessary and draws automatically a duct ending at the last marked position.

Continue drawing your duct system as usual from the fan-shaped connection point.





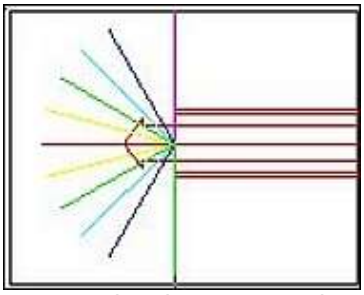
Continue from duct crossover - solution

Continue from… - Advanced

Activate the **Continue** command.

Select a position from which you want to continue to draw. To continue in any direction is just one of the features the **Continue** command contains.

If you look at the AutoCAD command line; you can see many other features you can choose from.



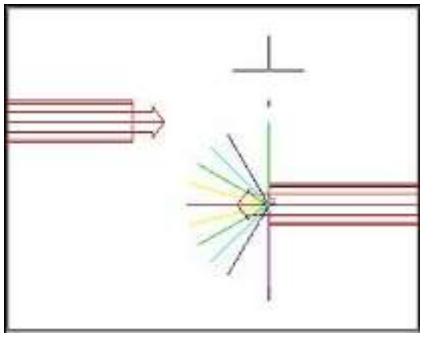
Continue from… - Direction command

Continue from… - Command line:

```
[Selection dialog settings.]/Select object...
[Connect./Height./Multi./Size./DUct set./Justify./Preferences./T/X/Next port./POrt Resize./PLane./3Cramble tap./Endcap.]<Direction>...
```

Connect command

If you want to connect two ducts instead of switching to the **Connect Open Ends** commands, please proceed as followed:



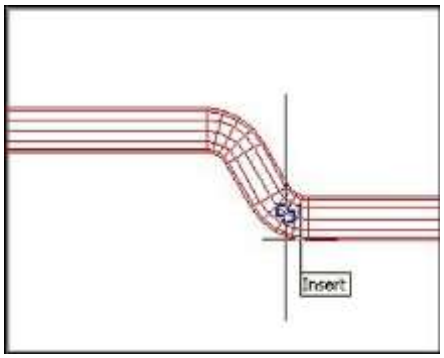
Continue from… - Connect command

Select now the **Connect** function by typing “c” and confirm it with the <ENTER> key.

```
[Connect./Height./Multi./Size./DUct set./Justify./Preferences./T/X/Next
port./POrt Resize./Endcap.]<Direction>...c
[Selection dialog settings.]/Select object
```

Connect command to connect your duct to another connection point

You can now choose the connection point from the object you want to connect your duct to.
Like in the **Connect open ends** command, CADvent connects the two ends with standard components.

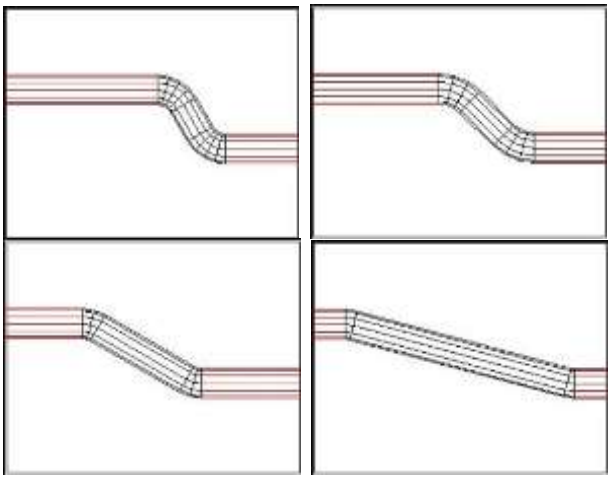


Continue from… - Connect command

NOTE:

If you connect two different sizes, the size from the first connection point will be continued to the second. CADvent will insert a reducer automatically to switch size to the second connection point.

NOTE:
Just like in the **Connect open ends** command, CADvent will show you multiple combinations to connect the two ends if possible. You can switch between them with the right mouse button. Type <y> and <ENTER> to confirm your selection.

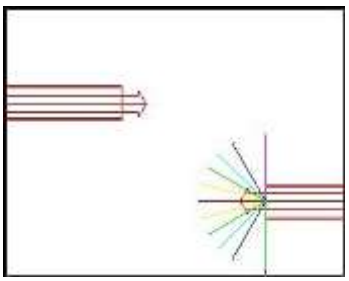


Connect command – elbow combinations

Height command

Please proceed as followed to change from your continue point to another height:

1. Select your continue point type <h> for the height command. Confirm your selection with the <ENTER> key. CADvent shows the options **From object**, Select **elevation, Rotate, Angle** and in brackets the current elevation.



Height command

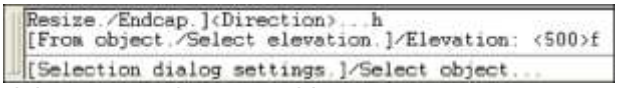
2. Enter the new elevation that you want continue from after, OR:

```
connect./Endcap.]<Direction>...h
[From object./Select elevation./Rotate./Angle.]/Elevation: <2000>
```

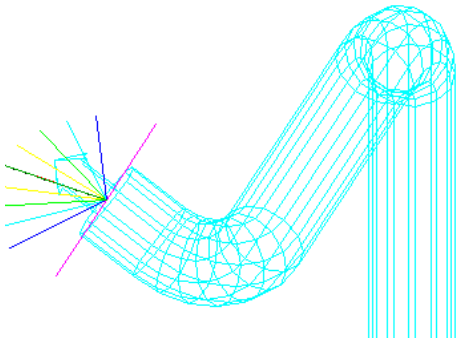
Height command – command line options

3. Select the option **From object** by typing <f>, confirm with <ENTER>.

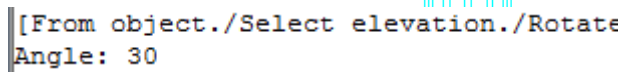
4. Choose the object in the drawing from which you want to copy the elevation to continue.



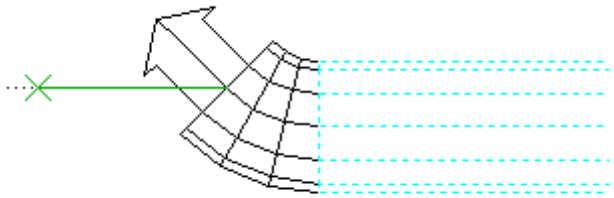
Height command – From object



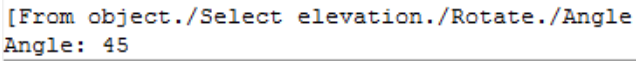
With **Rotate** you can rotate an already drafted circular Tee, Saddle tap or elbow up or downwards by entering a positive or negative angle.



Rotate function



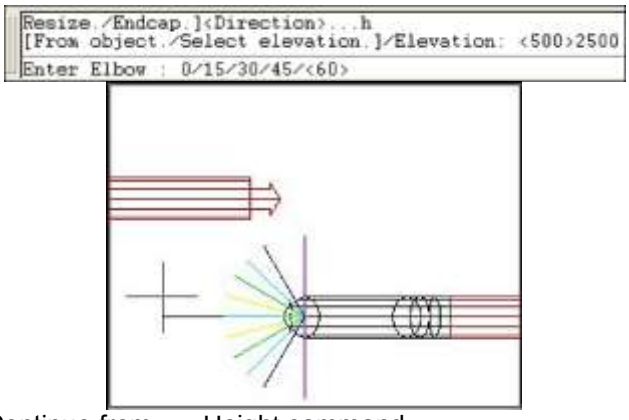
The **Angle** functions allows the user to go upwards or downwards from a straight duct directly with a standard elbow angle for circular ducts and with a free angle for rectangular ducts



Angle function

CADvent calculates the possible elbow angle that the user can select from.

Type your decision and confirm it with the <ENTER> key or abort the command with <ESC>.

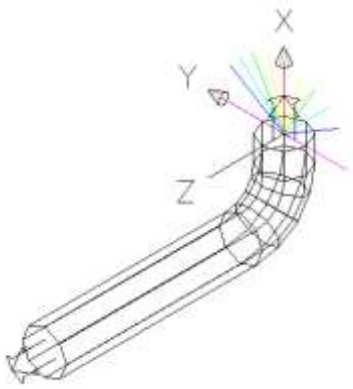


Continue from… - Height command

PLane flip command

Instead of using the height command you can also use the **PLane** command.
This function switches the UCS system in AutoCAD automatically. The Z-Axis becomes the X-Axis so that you can draft vertically. The command is very useful, when you are drawing in a side or isometric view.

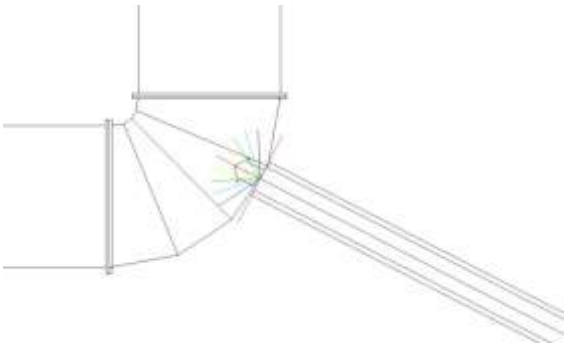
Left-click on the **Continue From** command, select the open connection point from which you want to continue and type <pl>. Confirm your command with <ENTER>.
Select now which direction and length you want to continue.



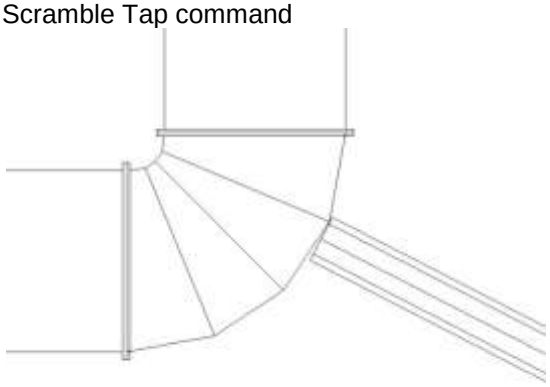
PLane command

Scramble Connect command

CADvent supports Lindab's production model. What is designed in CADvent after the production model can also be built in reality. Though under certain circumstances non-standard solutions are to be made in the design or on the building site. Therefore we improved the "SCramble connect" connection which allows the user to connect straight duct to any type duct or fitting.
CADvent will insert connection types that can be used in a modified way to connect and they are also shown in the Bill-of-materials, like saddle-tap, tee or take-off.
Select the Continue From command, mark the duct you want to connect, type SC in the command line or select "SCramble connect" from the right-click menu and mark the duct you want to connect to.



Scramble Tap command



NOTE:
Although this connection is possible, please keep in mind that the product needs to be modified and that the calculations in CADvent can differ from the real results.

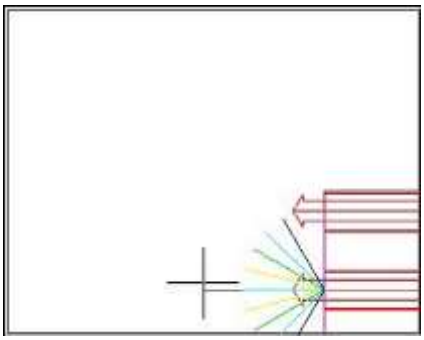
NOTE:

In the **Project Settings** is a text field that shows *the maximum connection distance* between two CADvent products. The open end and the surface of the two components you want to connect must be closer to each other than this maximum distance, otherwise CADvent cannot connect them.
.

Multi command

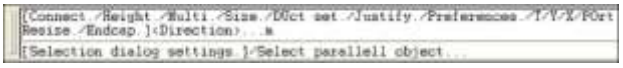
If your drawing contains two or more parallel ducts, you can multiply your **Continue from…** command:

- Select your connection point to continue from and type <m> in the command line. Confirm with the <ENTER> key.

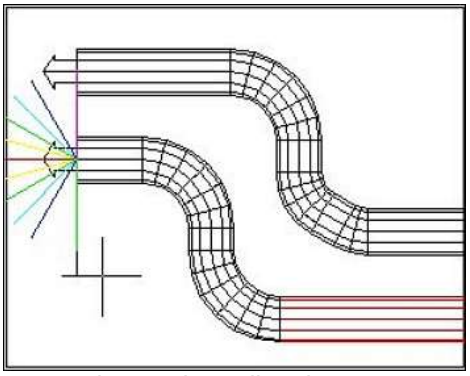


Multi command

- CADvent requests you now to select all parallel ducts to follow this command.



- Mark the direction to continue your ducts or select further options if you want to change height e. g.!



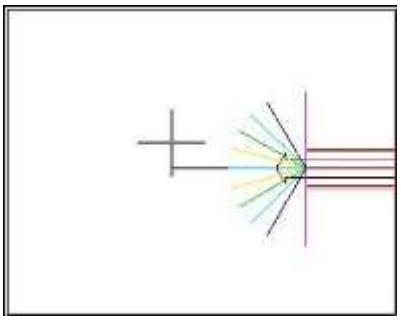
Multi command – continue direction

Multi command – choose further options

Size command

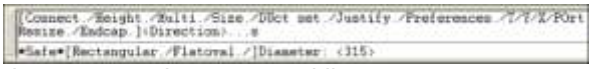
To change size from the connection point with the **Continue from…** command, please proceed as followed:

1. Type <s> in the command line to choose the option ‘Size’. CADvent shows you in the command line that you are working with *SAFE* components right now, the value in brackets shows your current diameter.



Size command

2. You can also switch to another design. CADvent offers the possibility for ‘Rectangular’ duct, ‘Flatoval’ ducts and ‘Diameter’ for round components. Enter type of duct and the dimensions to go on.

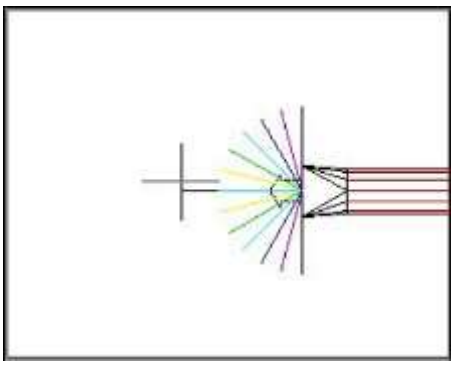


Size command – command line

3. CADvent inserts a reducer or a transition to rectangular or flat oval ducts. If you switch to rectangular or flat oval ducts, you will be asked after ‘Height’ and ‘Width’ for the new dimensions to set in the transition.

Size command – Switch product

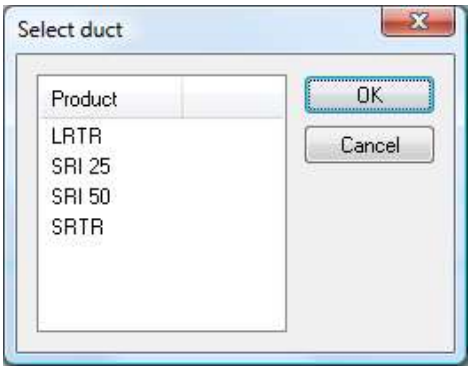
4. CADvent inserts the transition with the entered dimensions and the shortest length allowed by the norms.



Size command – Round to Rect Transition

Duct set command

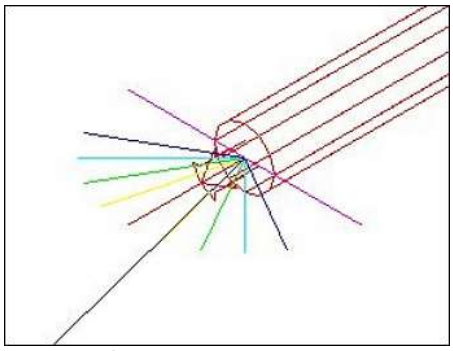
This command inherits the selection of all round product groups. You can select another product group (e. g. Transfer) to continue in your drawing. This is a relevant function if you swap between product groups. The different groups may have different connectors. If you change product groups with this function, CADvent inserts automatically an adapter.



Justify command

The **Continue From…** command and its subcommands can also be used when you change the adjustment on your duct:

Choose the function Justify by typing the letter <j> and confirm it with the <ENTER> key.



Justify command

CADvent shows the possible options:

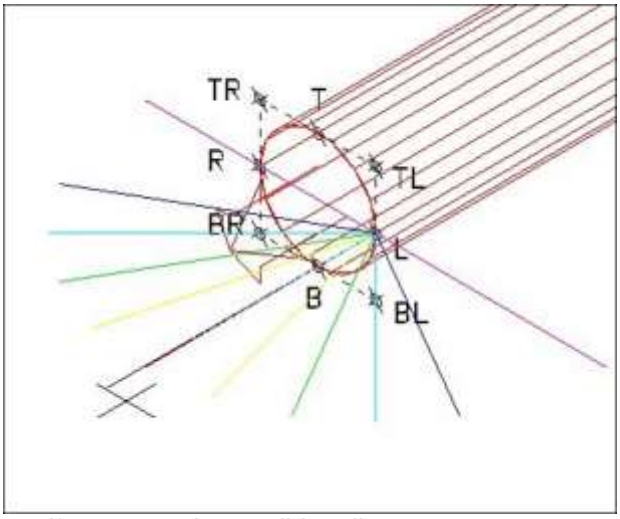
- Center
- Left
- Right
- Top
- Bottom
- TL – Top Left
- TR – Top Right
- BL – Bottom Left
- BR – Bottom Right

Justify command – possible adjustments

Make your selection by typing the letter and confirming with <ENTER>.

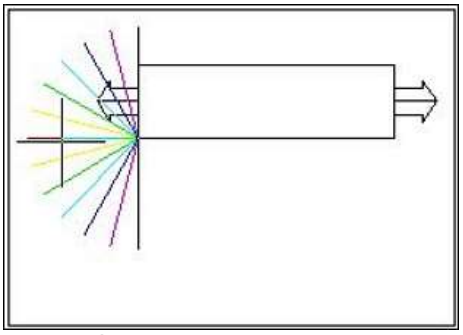
The connection point switches to your new standard adjustment (in this case the left side). All lengths, elevations and dimensions you enter now refer to this base point.

You can continue drawing or choosing other functions. Abort the command with <ESC>.



Justify command - possible adjustments

NOTE:
This adjustment will be the base point, until you enter another. If you continue with rectangular components for example, the insertion point will be on the left side. Always seen in the direction you draw.

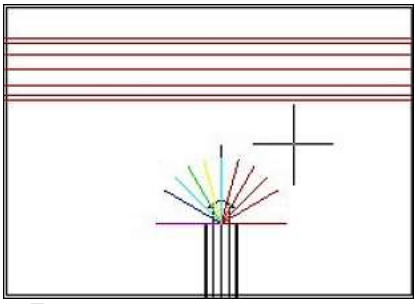


Insert rectangular component

Preferences command

While executing the **Continue From…** command you may want to switch some default settings. You can do this with the **Preferences** function.

When you open the function by typing the letter <p> the sub commands for this function will be shown:

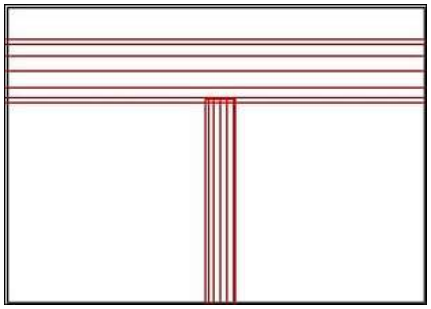


Continue From…

In the Preferences command you have multiple sub commands to draw easier, quicker and more accurate! The sub commands include the following functions:

Preferences command – Sub commands

Tee, Saddle tap or direct:
When you connect ducts outside of the connection points, you have to insert a fitting to create this connection point. We have shown you how do this manually or automatically with Tees or Saddle Taps. You can switch inside the Preferences from Saddle Tap connection to Tee. Type <s> for connection with Saddle Tap , <t> for the Tee and <d> for the Direct connection. Confirm your selection with <ENTER>. Next time you use the Connect function the connection will be executed with the component of your choice.

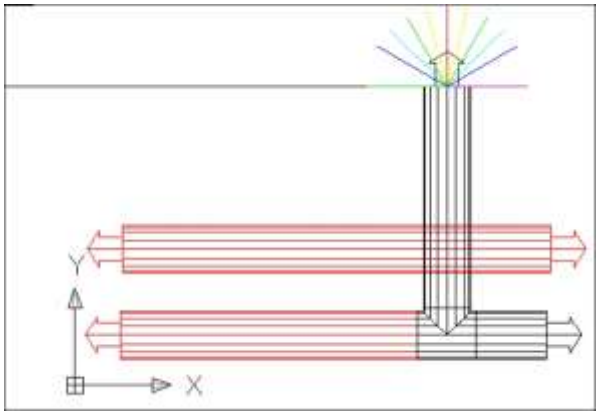


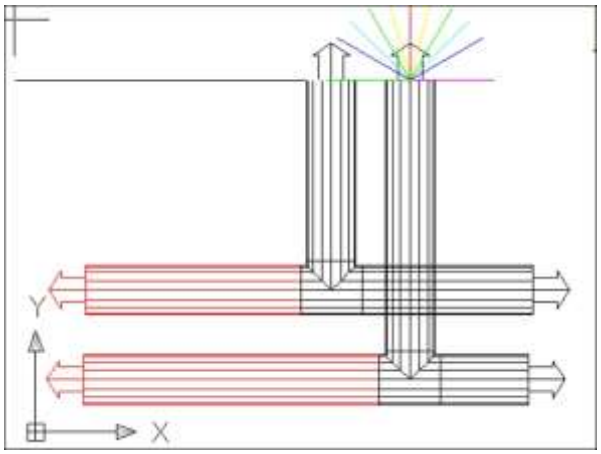
Preferences – Connection type

Multi distance:

The **Continue From…** command can be applied to two parallel ducts simultaneously.

1. Select the **Continue From…** button.
2. Select the point of the first duct from which to continue drawing and indicate the direction to go to. CADvent will insert a tee (or a tap) and a duct ending in the last point marked on the screen.
3. While still within the **Continue From…** command, select the option ‘Preferences’, then the option ‘Multi distance’ by typing <m> on the command line. CADvent will present the default distance between multiple objects.
4. Enter the distance desired for the parallel ducts.
5. Now select the option ‘Multi’ by typing <m> on the command line. CADvent will instruct the user to select the parallel object to run together with the newly created duct.
6. Select the second duct from which to continue drawing. Again, CADvent will insert a tee (or a tap) on the second duct selected and will draw a duct ending in the same position previously marked on the screen.

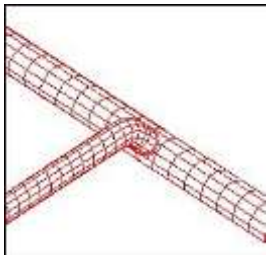




Preferences command – Elbow angle default setting

Angle:

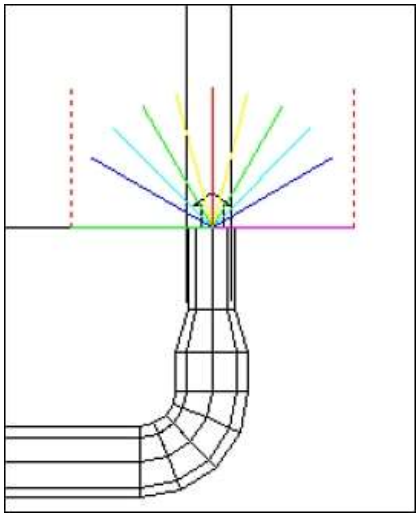
For connections with different elevations you need an elbow to connect the two ducts. Press <a> to open the Angle sub command. Here you can enter a default elbow angle that CADvent should use for connecting ducts with different elevations.



Track size command:

The Track size option is conceptually designed to follow the duct drawing from a 2D-drawing. It allows to follow lines or polylines in their middle-axis (does not work with grid patterns) and redraw them with CADvent's 3D-functions. Please proceed ass followed:

1. Activate the Track size function in the Preferences of the **Continue From…** command by typing <ON>. Confirm with <ENTER>.
2. To parallel perforated lines will be shown at the connection point.
3. The 2D duct system you want to redraw must lie in between these lines. CADvent will automatically change the duct size according to the 2D-drawing.

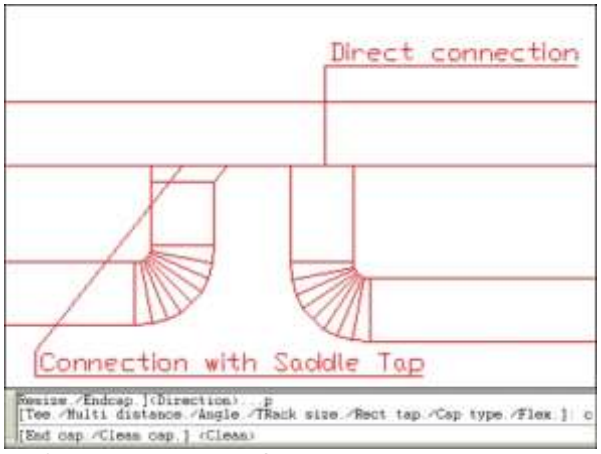


Track size command – Automatic sizing from 2D-drawings

NOTE:

The function only works on circular duct.

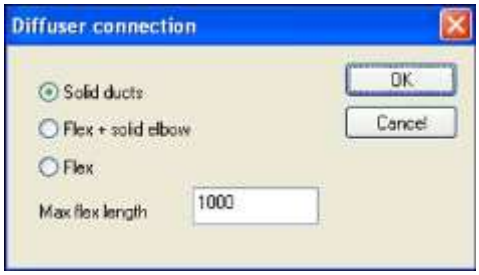
Rect Tap:
For this function you must have the saddle tap set as default in the Preferences. By typing the letter <r> you can enter a submenu which allows you to choose between a Saddle Tap <s> and a Direct <d> connection when connect two rectangular ducts. As you can see on the right picture, the direct connection uses a flange, while the Saddle Tap inserts a branch pipe with a minor pressure loss.



Preferences command – Cap Type

Cap Type:
You can open this sub command by typing <c> and confirming with <ENTER>. This function allows you to set your default value for the **End Cap** function in the **Continue From…** command. You can choose, if you want to have an End Cap or a Clean Cap (cleaning hatch) when inserting this component.

Flex:
Opens the "Diffuser connection" dialog. In this dialog you can set the standard type of connection when you connect ducts with the **Connect Open Ends** command to any kind of diffuser. In the text field you enter the maximum length a flexible duct should not exceed.



T/X/Y/POrt/End cap commands

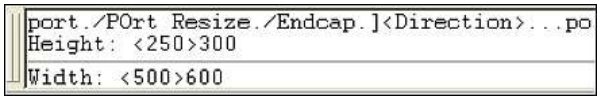
T/X/Y/POrt/End cap commands contain a quick selection of products. Usually you have to open the **Product Default Settings** or draw a product manually if you want to change a product. This function allows to swap quickly between the most common products.

- T: Selection of Tees
- X: Selection of Crossing Tees
- Y: Selection of Y-branches
- O: Change of dimensions for rectangular duct and diameter for circular duct
- End cap: Inserts End Cap (See also *Cap Type* command)

Tee selection

Y-branch selection

X-Tee selection



POrt: resize ducts

If you use the function R90 or R180, you can switch the angle of the component by 90 or 180°.

Next Port command

The Next Port command switches between the open ends of one component. It's useful if you have for example a tee with two open ends. You can switch between them while executing the **Continue From…** command.

Port Resize command

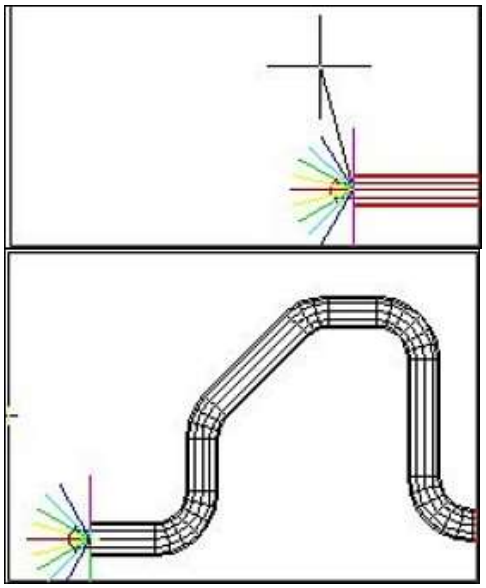
This function allows you to change the sizes of Tees, X-Tees and Y-branches while executing the **Continue From…** command. If you insert a tee e. g. and want to change the size of the branch duct, you can open the Next Port function with typing <PO> and entering a new dimension for the connection.

Undo command

While working with the **Continue From…** command you can Undo your steps when you want to change something you already executed.

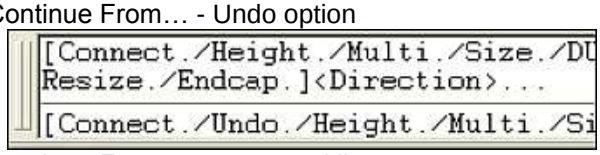
Example:
Continue drawing a complex duct system from a connection point like in the example shown to the right.

While the command **Continue From…** is still active, select the option ‘Undo’ shown in the AutoCAD command line with typing <u>.



Continue From… - Undo option

Confirm with the <ENTER< key.

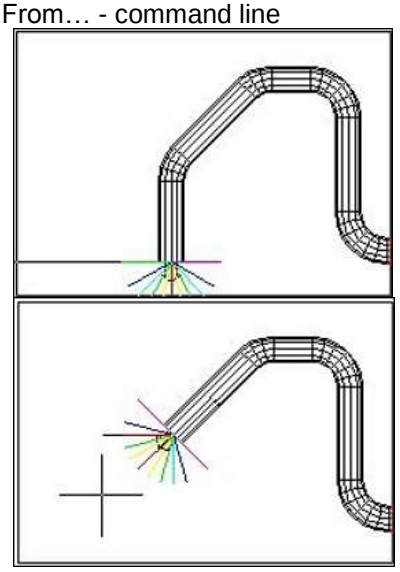


Continue From… - command line

CADvent calls off the last step in the drawing.

Select the ‘Undo’ option and press the <ENTER> key, to call of further steps in the drawing until you reached the point from where you want to continue again.

Select another function or press <ESC> to abort the command.



Continue From… - Undo option

Draw a vertical duct

Draw or insert a vertical duct

Please proceed as followed to draw a vertical duct.

Start by changing the Viewport into any isometric view. You can of course also draw in plan or side view, but the isometric view offers the possibility to see the drawing in 3D which makes easier to design a complex system.

Choose a rectangular or round duct system to draw:

NOTE:
Due to AutoCAD functions, CADvent can only draw in two dimensions. Therefore CADvent has special commands to change the elevation (see also *Continue From … - Height command*)

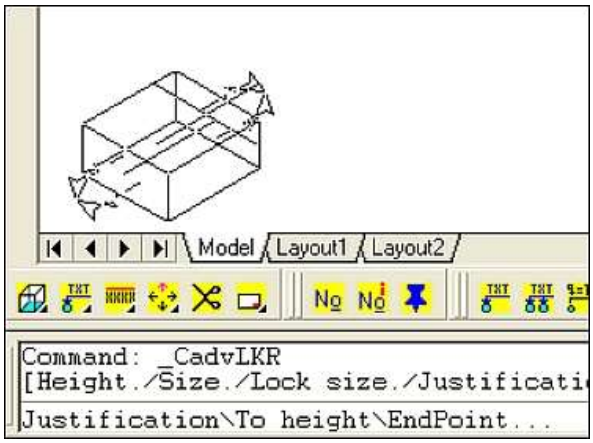
Please proceed as followed:

Enter the Insertion point of your duct on the screen. You have now the options to draw a horizontal duct or to use the command **To height** in the AutoCAD command line by typing <h>.

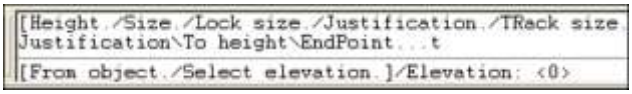
You have now the possibility to copy a height from another object with the command **From object** or to enter the designated elevation (Default command). The value shown in brackets is you current elevation!

In the example set the elevation for our rectangular from 0 to 500! You can now go on with the **Continue From…** command or abort by pushing <ESC>.

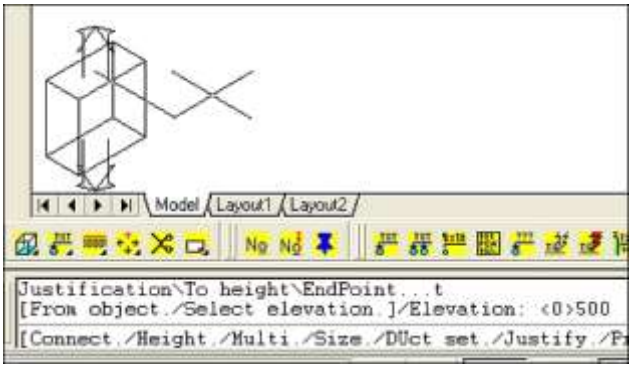
NOTE:
When you are working within the **Continue From…** command the subcommand to change to another elevation is **Height**. Therefore you have to type <h> to open the options in the command line as shown to the right.



Insert a vertical duct



Command line – To height option

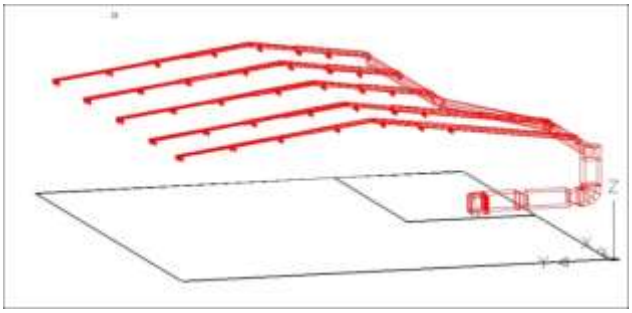


Vertical duct inserted

Draw duct systems with angles other than 90°

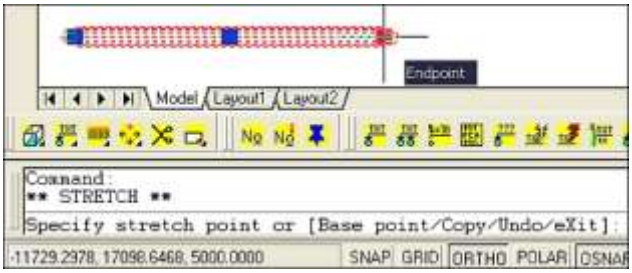
Change elevation with one fixed endpoint

In technical drawings it can be very helpful to angle a duct or two set different elevations for the two endpoints of a duct, e. g. if you must draw in an angular roof like in our example to the right.



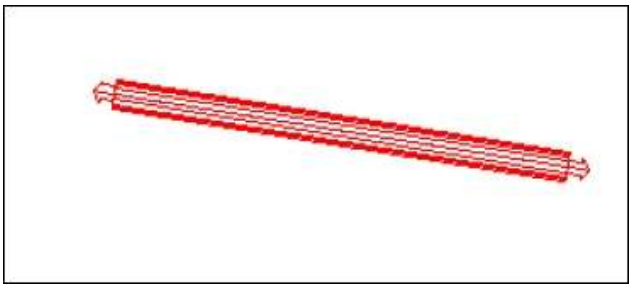
Drawing with angular roof

Example:
Open up a drawing and draw a rectangular duct with an elevation of 5000 and a length of 5000. Click on the duct. You see now three base blue points; one at each end and one in the middle. Click now on the end you want to change the elevation. By dragging the mouse pan you can stretch the duct now while the base point on the other side is fixed. To stretch our duct in z-axis you have to use the **Base point** command in the AutoCAD command line by typing <b< and confirming with <ENTER>.



Stretch point command line

You are now asked to enter the base point coordinates. As we are working in an AutoCAD function now, you must enter the x-, y- and z-coordinates like this: 0,0,5000 <ENTER>
The first two coordinates are for the x- and y-coordinate. The third is the z-coordinate. To make it easier to change this, you should enter the current elevation, so you don't have to calculate '+' or '-'!



Side view

Now the command line shows the same functions again like before and you can enter the stretch point!

We want to go down with our duct to an elevation of 4200. Enter: 0,0,4200 <ENTER>. When you change into the side view you see that the duct is angled.

Now we want to connect our branch duct to a main duct that lies underneath the roof structure at an elevation of 3500.

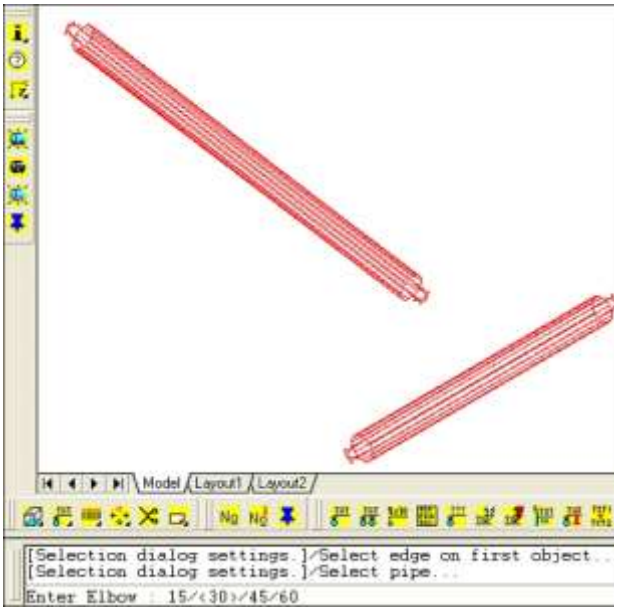
Isometric view – angled connection

Activate the command auto connection with:

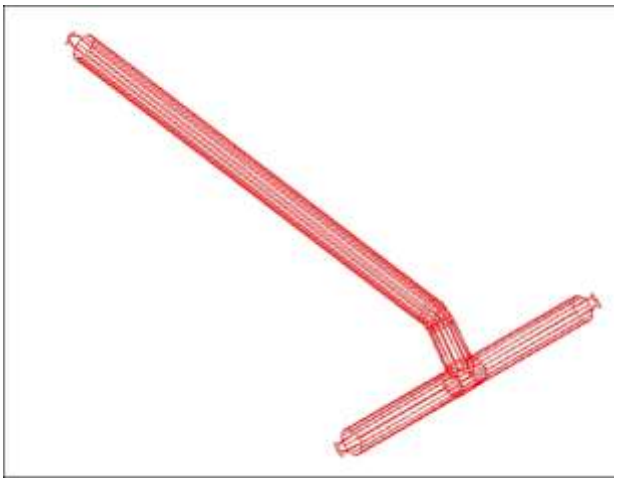
Tee or with **Saddle Tap** and click first on the connection point and then on the duct.

To execute the command CADvent has to insert an elbow, because the main duct is not lying straight in the line of the branch duct. CADvent Asks you to enter the angle of the elbow and then executes the command.

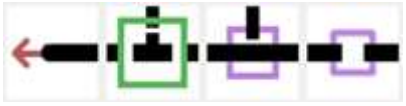
The duct is now designed according to our virtual roof.



Command line – Elbow settings


Accomplished roof design

CADvent Assemble



Continue from… command

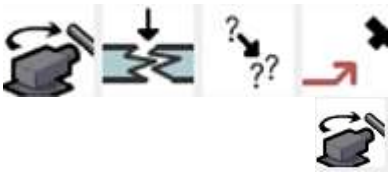
Connect ducts with Tees or with Saddle Taps

(See *Construction method 2 – Connect ducts with tees or with Saddle Taps*)

Connect Open Ends command

(See *Construction method 2 – Connect Open Ends*)

Mounting toolbar



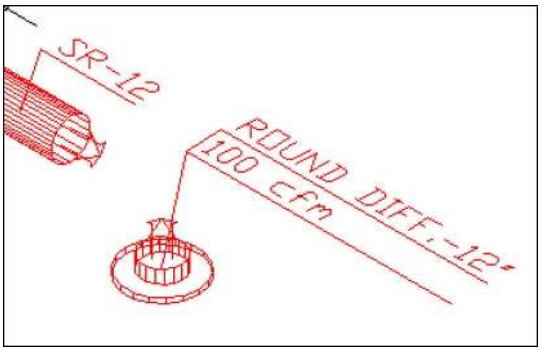
Mount command

The **Mount** command is very useful to join connect a component to another by moving it straight to the endpoint instead of creating a duct system between the two components like with **Connect Open Ends** command.

Activate the **Mount** command. Select the component that you want to mount to second without changing its changing position (in this example mounting a diffuser to a duct). The component you select first will be moved and mounted to the second, which keeps the position.

1. After activating the Mount command, click on the diffuser.

2. Now click on the duct you want to connect the diffuser too. If necessary you can enter an angle now in the AutoCAD command line. Confirm with <ENTER>.

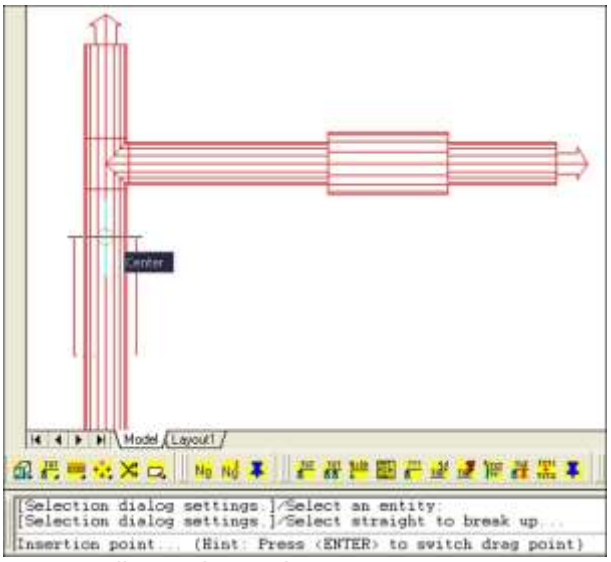


Mount a diffuser to a duct

Break in command

The command **Break In** offers the possibility to insert components into a duct (e. g. Silencers, dampers, fittings…).

1. Activate the **Break In** command.
2. Select the product that you want to insert (in the example a silencer).
3. Select the duct the component should be inserted in (in the example the vertical duct).
4. Mark the position you want to break in to and enter the rotation angle if necessary. Confirm your command with the <ENTER> key.



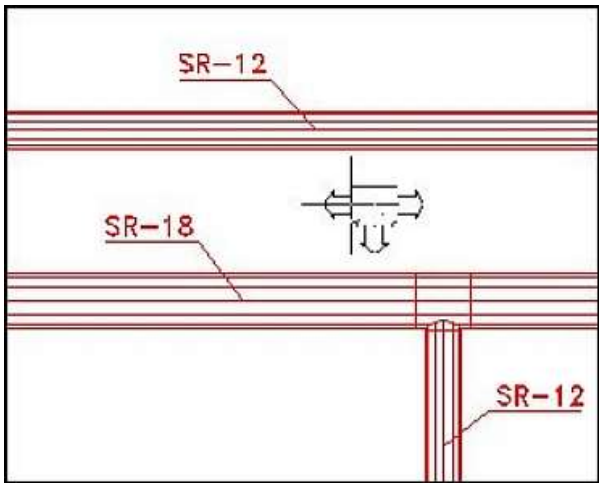
Mount a silencer into a duct.

NOTE:
It is possible if you insert the component to close to a fitting, CADvent has to move the objects away from each other to insert a female coupling or a duct (see also *Modify – Show distant connections*)

Copy and Draw command

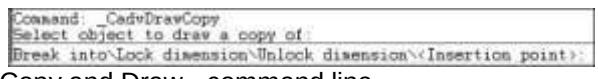
The command **Copy and Draw** allows copying any object and using it without any connections or settings, just like it was selected from a CADvent toolbar.

1. Activate the **Copy and Draw** command.
2. Select the object that you want to copy (in the example a tee).

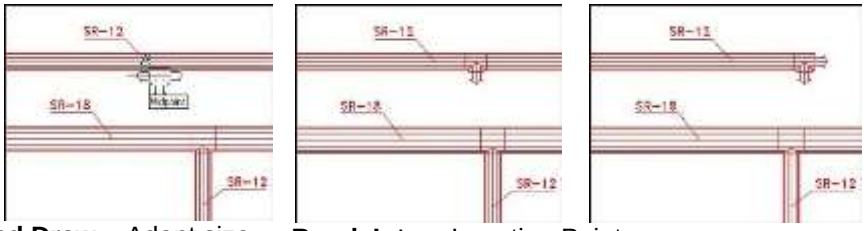


"Copy and Draw" command

3. CADvent displays the possible options 'Break into', 'Lock Dimension', 'Unlock Dimension' and 'Insertion Point' in the command line (see also *Construction Method 2 – Drawing a Tee automatically*).



Copy and Draw - command line



Copy and Draw – Adapt size – **Break Into** – Insertion Point

CADvent Draft tab

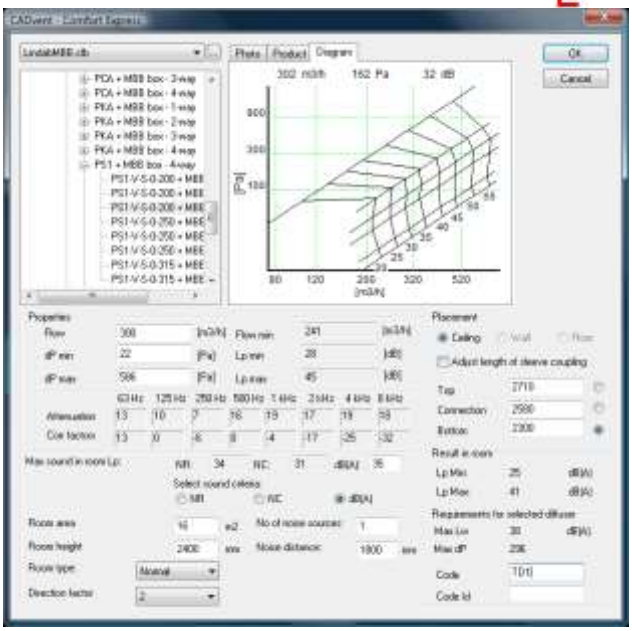
Air device Selection

Comfort Express

The ComfortExpress dialog box is one of the important features in CADvent. It is used to insert all kinds of supply and exhaust outlets into the drawing. Besides offers ComfortExpress detailed calculation methods for the sound generation in the comfort zone of the room. You can choose grilles, diffusers, displacement ventilation and create own products and databases if necessary (see also *Create Own Air Device*).

1. Start **Comfort Express**

2. Select the air type for the diffuser (supply or exhaust)
3. Choose an outlet and the size
4. Enter the airfow



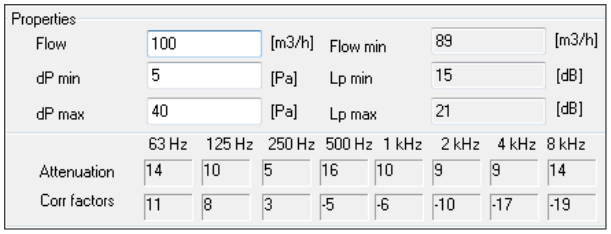
"ComfortExpress" dialog box

NOTE:
Please make sure that you choose the right air type (supply or exhaust) because this affects the CADvent calculations for pressure drop and sound.

The following functions and data are available:

Properties:

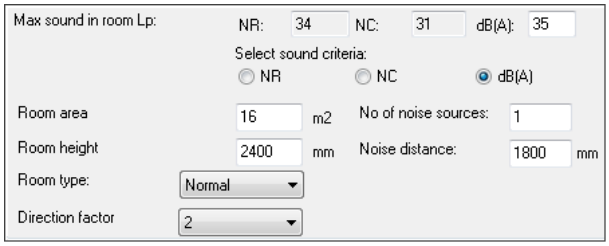
- Flow: Your current airflow
- Flow min: The minimum flow of the product you should not fall below
- dPmin: Pressure drop with open damper
- dPmax: Pressure drop with closed damper
- Lpmin: Sound power generation in the outlet with open damper
- Lpmax: Sound power generation in the outlet with closed damper
- Attenuation: Sound attenuation of the outlet for incoming sound from the duct system
- Corr Factors: Correction factors for the sound level to the centre frequencies



Properties dialog in “ComfortExpress”

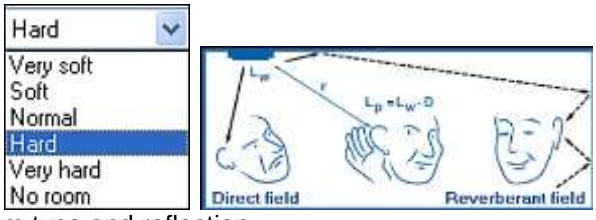
NOTE:
dPmax and Lpmax are just different when the selected product has an integrated regulating damper, otherwise the numbers for min and max will be the same.

Sound data:
The user can decide which sound criteria he wants to use. ComfortExpress the NR-curve, NC-curve and dB(A) level. Select the sound criteria and the sound level (in the example NR 40). The number of noise sources defines how many diffusers you use in this room. ComfortExpress needs it to calculate the sound addition.
The noise distance shows the distance between the outlet and the comfort zone, to calculate the sound pressure level in the comfort zone.



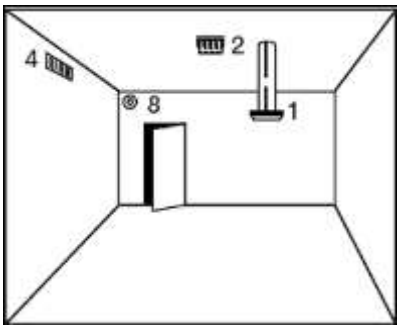
Sound data options for the room in“ComfortExpress”

Room data:
To make correct calculation, the user must enter the room area and height for the calculations of sound absorption and reflection. Therefore you have to select a room type. The harder the room is, the bigger is the reflection. The softer the room is, the bigger the sound absorption is.



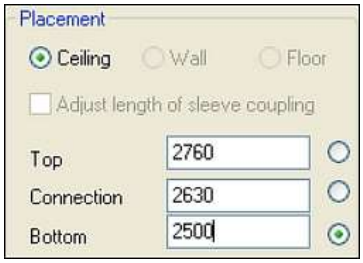
Room type and reflection

Direction factor:
The direction factor is a factor that expresses the reflection in addition to the position of the outlet:
1 – free in the room
2 – on the ceiling or the floor
4 – on the wall or ceiling, close to another wall
8 – in the corner



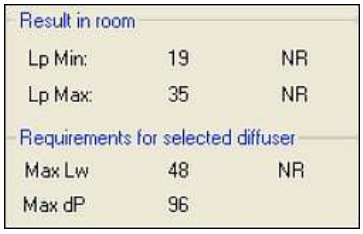
Sound data – direction factor

To get a correct sound calculation for the room you should insert this data carefully.
In the placement area in the ComfortExpress dialog the user selects the insertion height of the component and the placement. In the example we chose a diffuser, so we can place it just on the ceiling. The placement is relevant for the rotation around the y-axis. A grille placed on the wall is inserted with another angle than a grille placed on the ceiling.



Placement area in the “ComfortExpress” dialog

The ‘Result in room’ is copied from the properties area of ComfortExpress. The ‘Requirements for the selected diffuser’ are based on our selections for the sound data, incl. reflections and absorption.

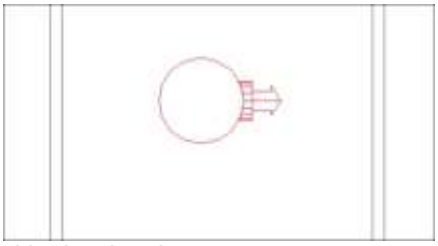


Sound calculation for the room

If the maximum sound power level (Lp Max) of the diffuser is bigger than the calculated requirements for the room (Max Lw) allow, an erroe message will appear on the screen when trying to insert the outlet into the drawing.
The Code and Code Id text fields have basically the same function like the *Custom String* function in the properties dialog. The user can insert own properties. They can be shown with the **Text product** command if they are inserted in the **Text Template** in the Project Settings (see also *Advanced Project Settings – Text Template*)

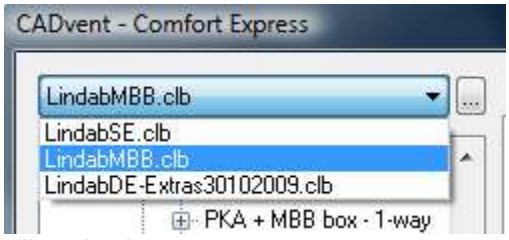
Text field for descriptions

After configuring the outlet you must push the <OK> button to insert the diffuser into the drawing. Position the outlet in the drawing and enter the angle if necessary.


Diffuser inserted in the drawing

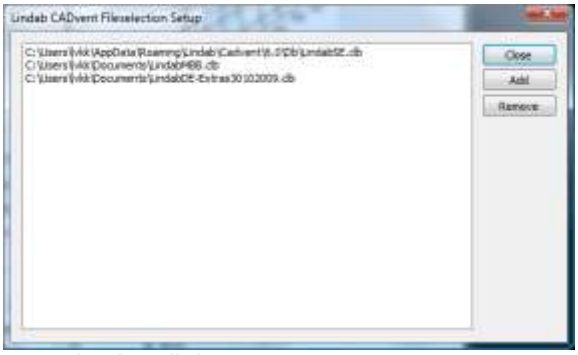
Database Selection dialog

In CADvent 6.0 we introduced a function where you can load several diffuser databases at the same time and switch between them.
As shown in the picture to the right you have a list box on the top left side of the Comfort Express dialog.



CLB file selection

With the button to the left of it you can open a dialog where you can Add and remove other database files of type .CLB to you user library.



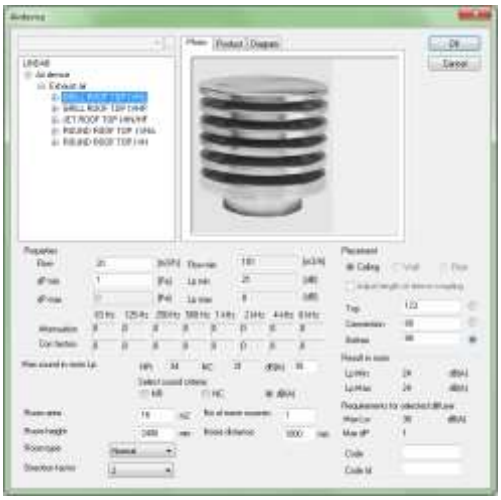
CLB selection dialog

Roof hoods and roof transitions

Roof Hoods

In the Roof Hoods dialog you can select Hood devices from Lindab.

The dialog is the same as when selecting an air device. In this case the sound calculation for the room is of course not necessary. Nevertheless it can be useful to check the sound power level if the roof hood is mounted in a residential area.

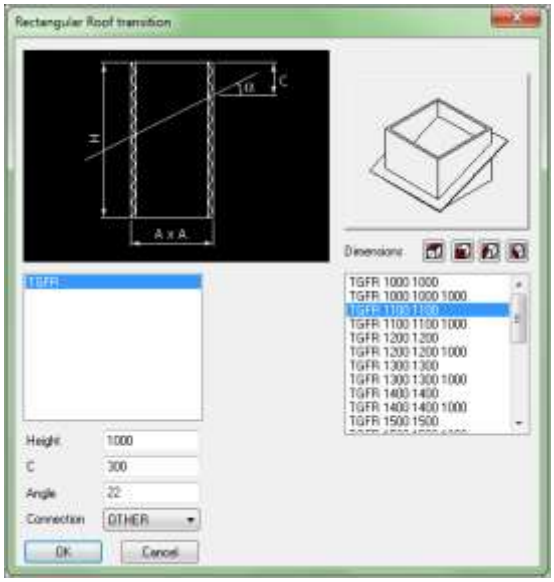


“Roof hood” dialog

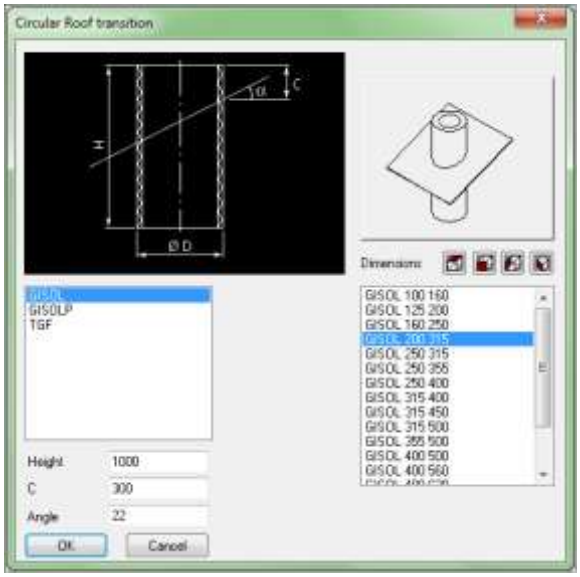
Roof Transitions

In this dialog the user can select circular and rectangular roof transitions. The roof transitions are inserted by manual setup of sizes and connections and an insertion method as below.

1. Select either the rectangular or the circular type.
2. Select size.
3. Set heights, angle and connections
4. Insert the roof transition in the drawing



"Rectangular roof transition" dialog

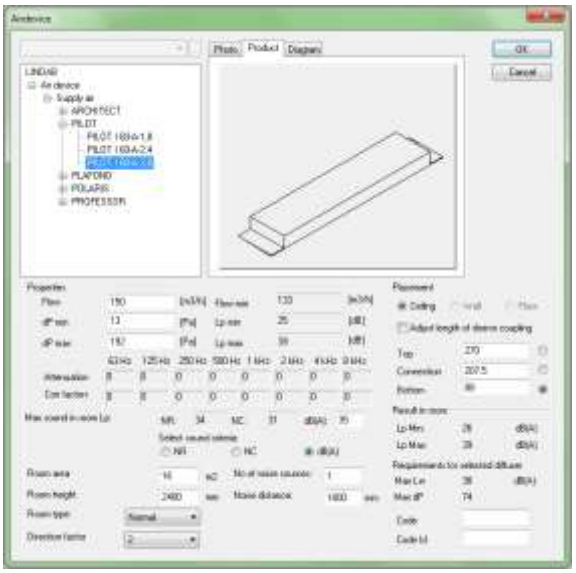


"Circular roof transition" dialog

Chilled beams

In this dialog you can calculate and insert chilled beams. It is the same *Comfort Express* dialog as for the supply and exhaust air devices.

You have the same possibilities and demands like you have when designing and inserting air devices.

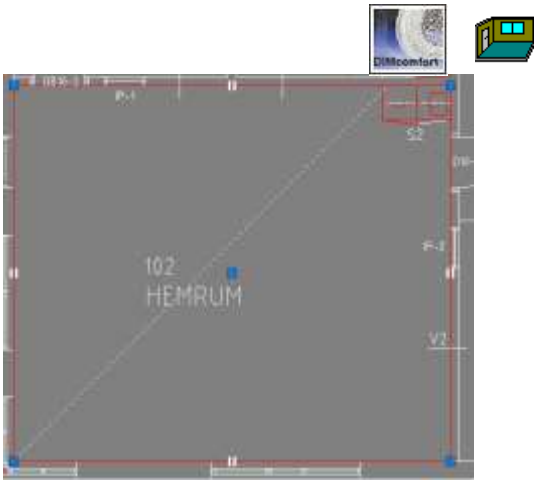


"Comfort Express" dialog for chilled beams

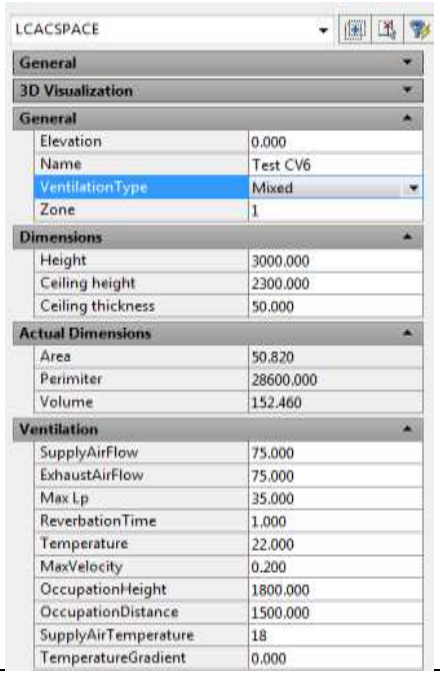
DIMcomfort and SPACE object

If you have installed DIMcomfort 5.0 on your computer system, you're able to use the advanced particle simulation and airflow velocity in the comfort zone.
You can now create a 3D room object on a 2D XRef or free. The Space object can contain airflow and sound data and has a connection to DIMcomfort.

Click on the button to create a SPACE.
Mark the start and endpoint to create a rectangular SPACE or press "P" for Poly to make Polyline for your SAPCE, use then "C" to close it.
The Space object contains default values for elevation, height of false ceiling, thickness of false ceiling and height of ceiling as well as sound and airflow data.
These values are also shown in the Properties.
Before you export the SPACE to DIMcomfort you must select a ventilation type (Mixed, Displacement or Chill beams).
The button to call the export files from DIMcomfort has been changed and starts DIMcomfort now directly.
You can select your diffusers and edit your room setup, when you close DIMcomfort the diffusers will be transferred and inserted in CADvent



Create SPACE in CADvent



NOTE:
You need DIMcomfort 5.0 to use this import/export function!
The function exports only the SPACE, not already inserted diffusers. If you want to be able to reopen your selection in DIMcomfort we recommend saving the DIMcomfort file and opening it when you run the export function the next time.

Ventiduct

The Lindab Ventiduct® is a special duct with small nozzles on the surface and is usually used in rooms where you have big cooling loads. It is designed for big airflows with moderate cooling temperature and high rooms. It can just be used as a supply outlet.
Typical usages are production areas, shopping malls, gyms and bowling tracks.

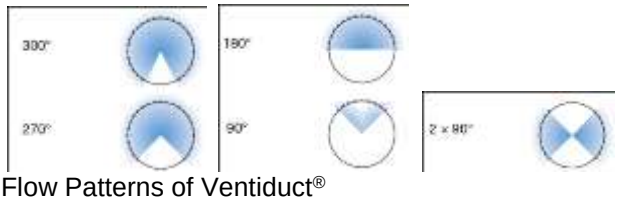
NOTE:
This product is only available in the Ventilation tab in the CADvent Tool Palette.

"Ventiduct®" dialog

To select the Ventiduct® , please proceed as followed after activating the dialog with the

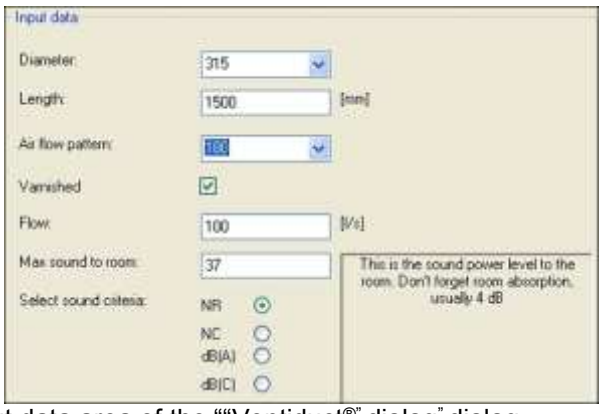
Ventiduct command:

1. Select the diameter of your Ventiduct® (ø200 to ø500)
2. Select the total length! The standard length is 3000mm, but you can order also cut-to-length ducts.
3. Select the Air flow pattern.
4. Click on the control button 'varnished' if you want the duct to be painted.
5. Enter the designated total airflow.
6. Push the <OK> button to insert duct into the drawing, position it and enter if necessary an angle.



Air Flow Patterns of Ventiduct®

NOTE:
As the sound calculation is very detailed the dialog was made easier and customer-friendly. This is supported by the fact that the Ventiduct® is a low-impulse outlet and has therefore o very low sound generation.

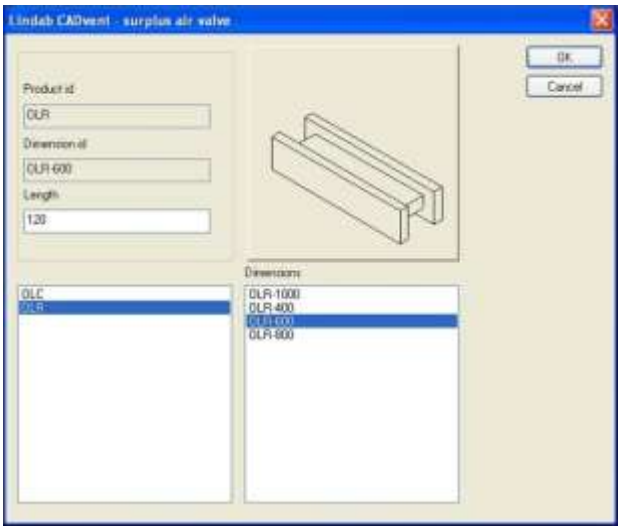


Input data area of the ""Ventiduct®" dialog" dialog

Surplus Air Valve

The Surplus air valves are inserted in the walls between two rooms. Their function is to transfer air from one roome to anther by the pressure difference without complicated ductwork.

1. Activate the **Surplus Air Valve** command.
2. Select design and size the valve.
3. Press the <OK> button and position the valve in the drawing.



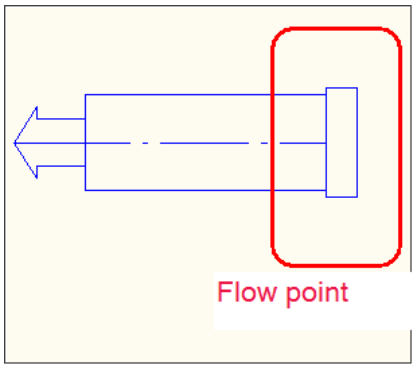
"Surplus Air" dialog

Flow point

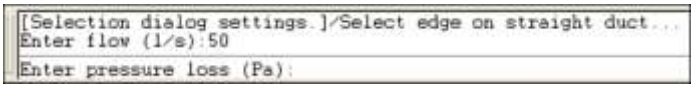
With the pushbutton **Flow Point** can you insert an airflow and a pressure drop instead of an outlet. It is a fictive component Without sound data.

1. Select the open connection point of a straight duct.
2. Enter the airflow and the pressure drop for the Flow Point

The Flow Point gets inserted at the specified connection point.



Flow Point inserted at connection point



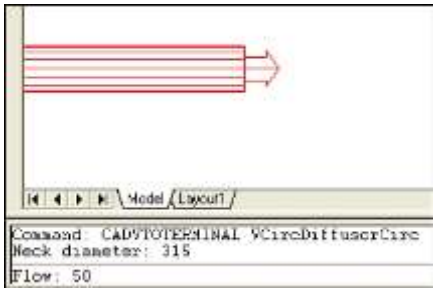
Flow point command line

NOTE:

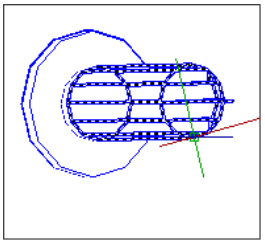
The Flow Point function can only be inserted at the end of straight rectangular, flat oval or round ducts. It cannot be inserted when you are drawing with Transfer products or on fittings.

Round diffuser – Round neck generic component

Based on the fact that ComfortExpress is a very sophisticated and detailed dialog, CADvent has some generic diffusers that you can use when less detailed solutions are required. The names of the generic components are according to their design of plate and connection.
The generic components are similar to the **Flow Point** command. The generic components have no sound data and no pressure drop but the design of real diffusers.

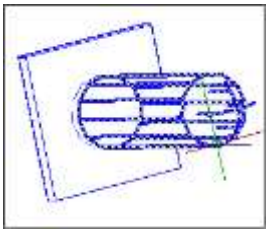


1. Activate the **Round Diffuser – Round Neck** command
2. Insert the size, the airflow
3. Insert the component in the drawing by entering an elevation into the command line and positioning it in the drawing or by pushing the <ENTER> key to connect the diffuser to an open connection point.



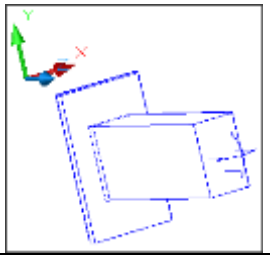
Rectangular diffuser – Round neck generic component

1. Activate the **Rectangular Diffuser – Round Neck** command
2. Insert the size, the airflow for the diffuser
3. Insert the component in the drawing



Rectangular diffuser – Rectangular neck generic component

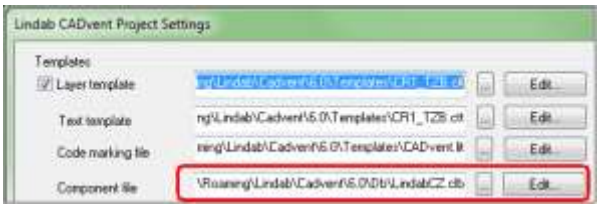
1. Activate the **Rectangular Diffuser – Rectangular Neck** command
2. Insert the size, the airflow for the diffuser
3. Insert the component in the drawing



NOTE:
The 3 above named features are available in the Ventilation tab of the of the CADvent Tool Palettes

Create Own Air Device

CADvent has an own database that contains the air devices distributed in your country. The technical data in this database comes from Lindab's laboratories and is very accurate. The products are updated regularly to make sure that our customers always have the newest and most accurate products.
But nevertheless there is of course the possibility to create your own air devices and insert the technical data.
To create own databases for air devices, dampers, silencers and other products, you have to open the **Project Settings** dialog.

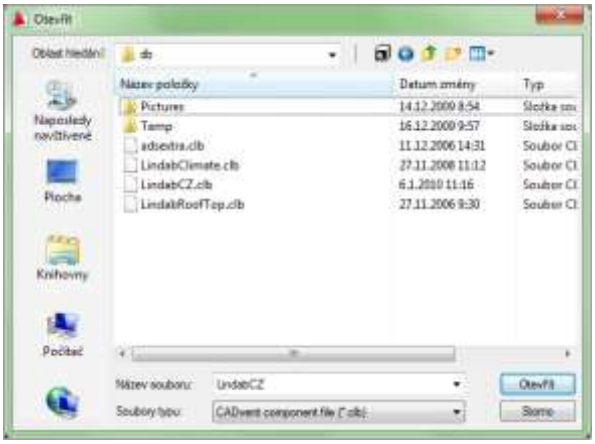


Area "Templates" in the Project Settings dialog

The template that deals with components is the **Component file**, liked marked on the right hand side. You have two possibilities, open a file that already exists or edit an existing file and save it as a new file.

Open an already existing file:

Click on the button to browse in your system and open an existing .clb file shown on the right hand side. You find the clb-files usually in the path …/Lindab/CADvent/Db.
You can easily create new empty CLB files by right-clicking in the selection Window -> New -> Text file and rename the file including its file type to for example User.clb.



Browse function to open an existing clb-file

Edit a file:

Click on

button to edit the loaded file and open the Product Manager

CADvent Product Manager

Product Manager

To make sure that none of the original data gets lost we recommend that you create an own clb-file, e. g. “user.clb” before editing components.

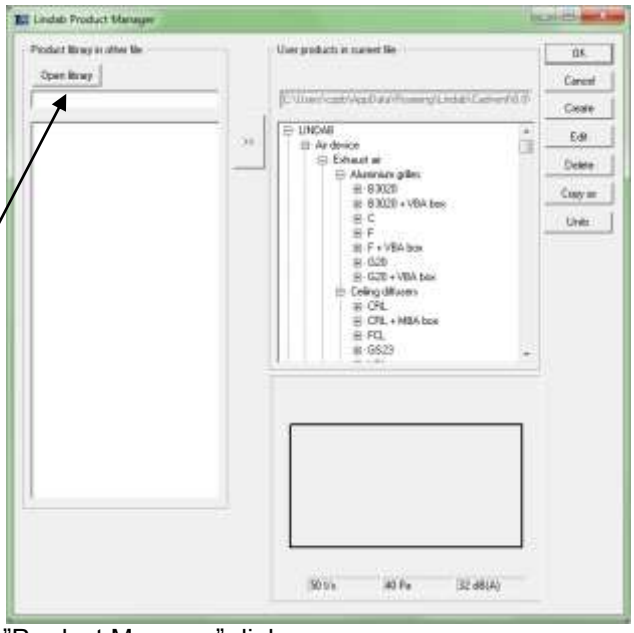
You have two options to open the Product Manager. You can open it in the **Project Settings** by clicking on the ‘Edit’ button or open the Product Manager direct under Start – Programs – Lindab – Product Manager. Click on the button Open library in the ‘User products in current file’ text field to open an existing library that you want to edit.

You can choose if you want to create a new product or edit an already existing product.

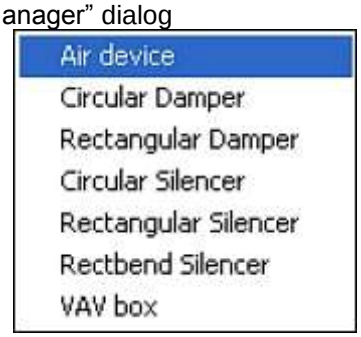
To create a new component please proceed as followed:

Click on the Create button. A new dialog will open as shown on the right hand side. The user must select what kind of product he wants to create from the shown list.
We will proceed and select an air device as component we want to create.

NOTE:
In the circular and rectangular damper selection you can also create fire dampers!



”Product Manager” dialog



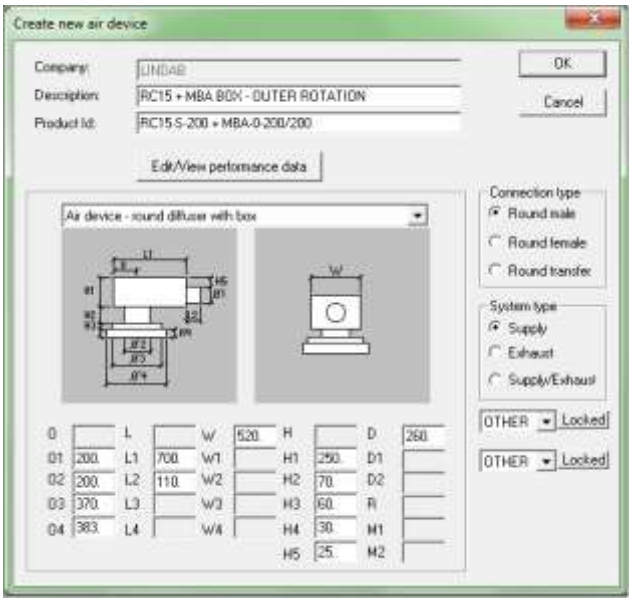
List of components the user can create

Create Air Device

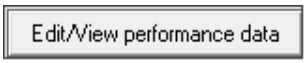
After selecting the air device a new dialog box opens up.
Select a product from list in the pull down menu that you want to create.
Enter now a description and a Product ID (The manufacturer is predetermined with SPECIAL).
Select the requested connection and system type on the right hand side of the dialog.

NOTE:
The system type is relevant for the possible application of the air device. An air device with system type supply cannot be chosen as an exhaust air device in the component list of ComfortExpress.

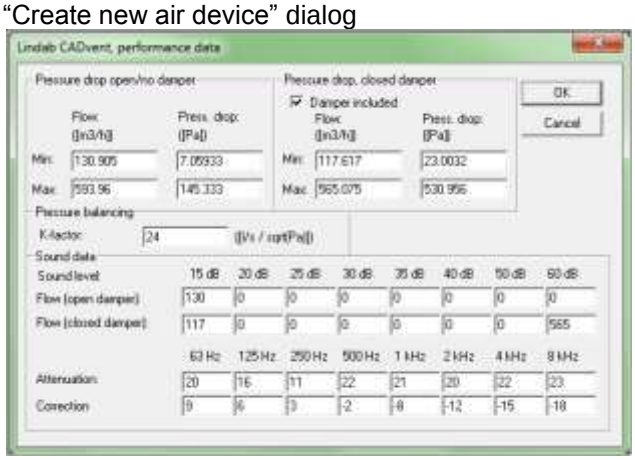
Insert the measures for your component. If your created product does not have all the measures enter a '0' or leave the text field open.



"Create new air device" dialog

Click on the button 

to enter the performance data.
The performance data includes the definition between the airflow, the pressure loss and the sound generation and attenuation. If your component has a regulating damper the user can insert the data for open and for closed damper by clicking on the control button.



"Performance data" dialog

NOTE:
The Min and Max values for the airflow and the pressure drop mark the basic data from which the airflow diagram will be created.

NOTE:
The attenuation and correction factors are not essential, but all missing data will affect the correct sound calculation for the room and the sound calculation report (example on the right hand side)!

Explanation, sound levels:

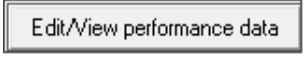
First row - actual sound level
Second row - noise
Third row - attenuation
Fourth row - required attenuation

Sound levels

63	125	250	500	1k	2k	4k	8k
27	27	23	21	15	10	10	4
27	27	23	21	15	10	10	4
16	10	6	15	11	11	12	14
0	0	0	0	0	0	0	0

Insert all available data and click on <OK> to change save and return to the 'Create air device' dialog. When you are finished with all data click on the <OK> button and the air device will show up in your library list.

If you want to edit an already existing component, please click on the

button. The same dialog for product description and measures as before will show up. To insert or edit technical data please open again the 

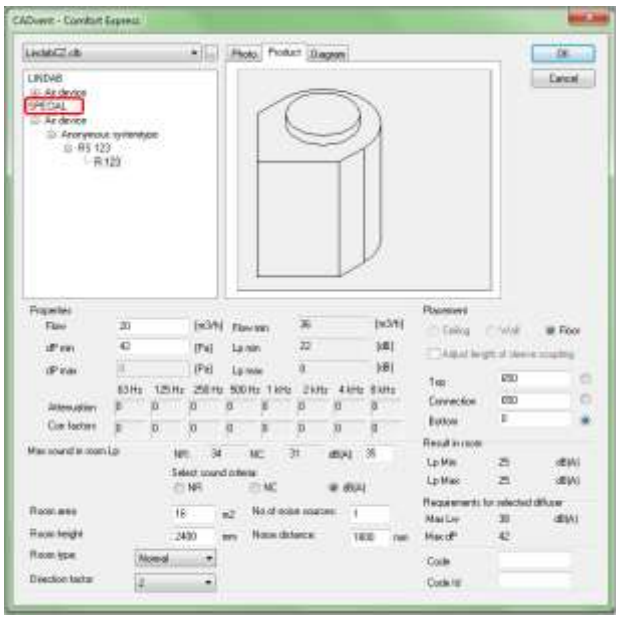
dialog and proceed as explained before.

Select an air device from the Product Manager

Your created air device is now ready for use in the ComfortExpress dialog.

To use a created component please proceed as followed:
Open the **Project Settings** , open the component file in the templates area that you saved your component in and click on <OK>.

Open **Comfort Express** . Select the created product from the hierarchical list and proceed as explained under the title *ComfortExpress*.



"ComfortExpress" dialog – created component

NOTE:
Please note that the calculation of self defined air devices is not as exact as with Lindab products. Due to the fact that the data for Lindab products is more precise and contains several internal parameters which are used in the calculations, self defined products can only be calculated according to the norms.

NOTE:
The created air device is now a full compatible CADvent object. You can use all CADvent features for drawing, calculating and Properties. The product will also show up in the reports and on the bill of materials.

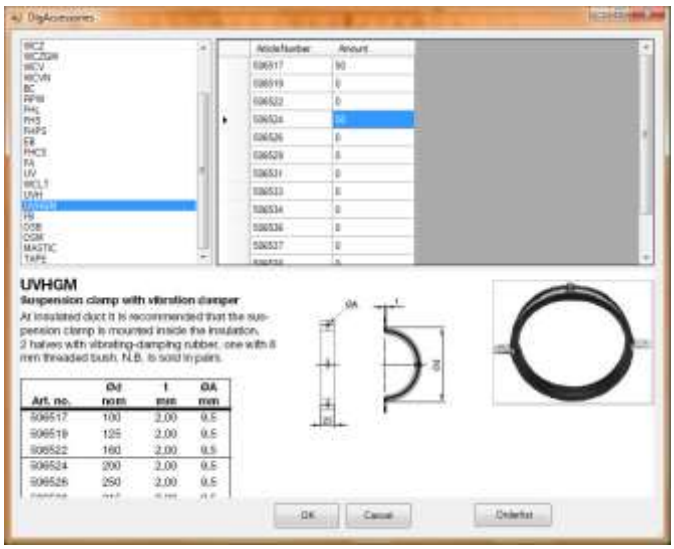
Duct Accessories:

In CADvent 6 Accessories are introduced, which enable the user to include mounting materials and other duct accessories on the Bill-of-Materials.

On the left hand side you select the product (we will put a short description of the product into the dialog, not just the product name). The lower part of the dialog will then change to the catalog data of the product. On the right hand side you can insert the amount of each available size.

You can view your materials in the “Orderlist” button. Here you have an overview over your selected products. To edit/erase them you have to go into the main accessories dialog.

When creating the Bill-of-Materials all selected accessories will also be shown in the material list.



Selection dialog for Duct Accessories

Accessories on Bill-of-Materials

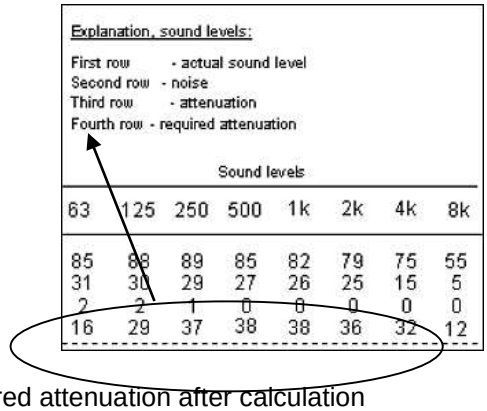
Silencer toolbar

DIMsilencer

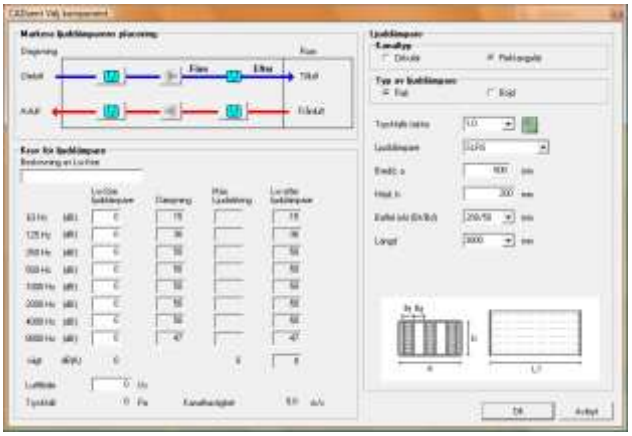
DIMsilencer is a program that can work on its own as a calculation and selection program for Lindab silencers as well as working as a sub-program in CADvent to find specified solutions. DIMsilencer is the best solution if you have a noise problem in your system and need to solve it.

To select rectangular silencers has always the difficulty that you must calculate the ventilation system before you could select a silencer.
This function has been changed now into a 2-way command button to be able to select silencers via DIMsilencer even without calculation.
On the left hand side of the DIMsilencer button you have the old command which you can run after a calculation which gives you control over sound and flow values from your calculation.

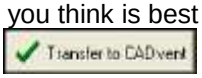
On the right hand side you have a function called “Select DIMsilencer” where you can mark a duct and directly call DIMsilencer to select a silencer manually.
In manual mode you can select whatever silencer you want, even select rectangular silencers for circular ducts, transitions will be created automatically.
NOTE:
You need to have DIMsilencer 5.0 to be able to use this function!



Required attenuation after calculation



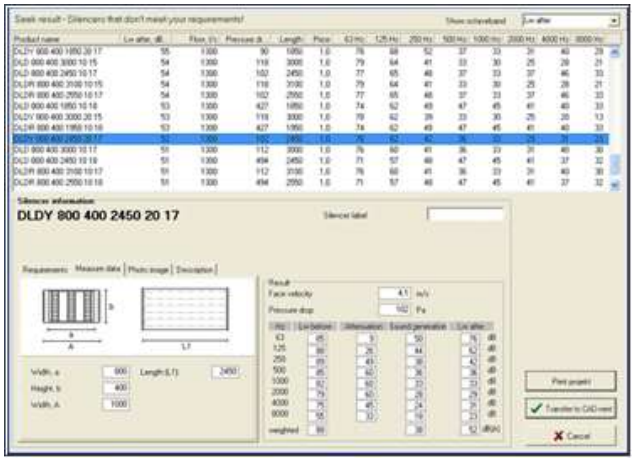
“DIMsilencer” dialog

1. DIMsilencer shows all available silencers with their measures and performance data. Select a silencer that you think is best and click on the 

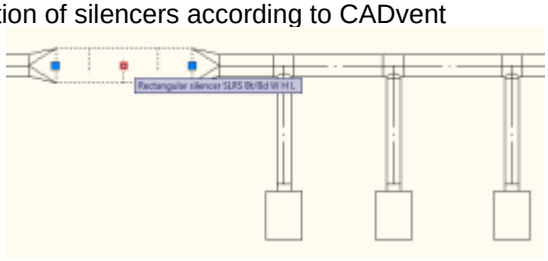
button to transfer the silencer into CADvent.

2. The screen switches now back to CADvent and the selected silencer can now be placed into the component that we selected before. The user must position the silencer now within the entity and left-click on the mouse to confirm.

3. When you repeat the calculation, the silencer is inserted into the list of components and reduces the noise so that no further silencer is needed.



Selection of silencers according to CADvent


Insert silencer into CADvent

Calculation with silencer

NOTE:
When you use fans with very high noise generation (>90 dB(A)) it may be necessary to insert more than one silencer.

NOTE:
CADvent calculates forward and backward, which means that the noise generation of components that follow the silencer may be higher than allowed. Therefore it is useful to insert the silencer close to the diffusers (see also *Calcs & Estimate – Calculation functions*)

Silencer-Express

CADvent also contains an easier way to insert a necessary silencer. But compared to DIMsilencer you have fewer possibilities. We recommend therefore using the comfortable **DIMsilencer** in the main ducts close to the AHU's and the quicker **Silencer-Express** in the branch ducts closer to the diffusers.

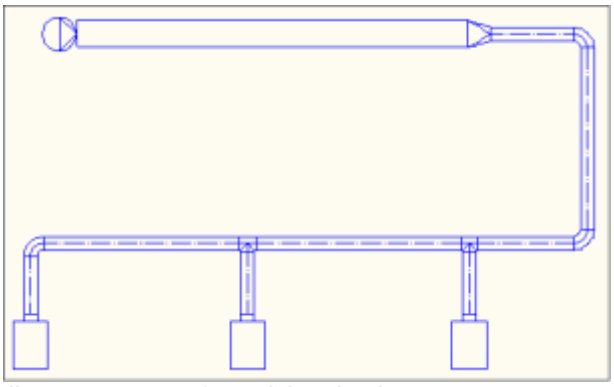
After drawing a ventilation system the user has to make a calculation to see if and where a noise problem occurs.

1. Activate the **Silencer-Express** command and click on the component where you want to insert the silencer.

2. CADvent show s now in the command line the necessary attenuation for the component and searches the **Lindab Safe toolbar** after an adequate silencer.

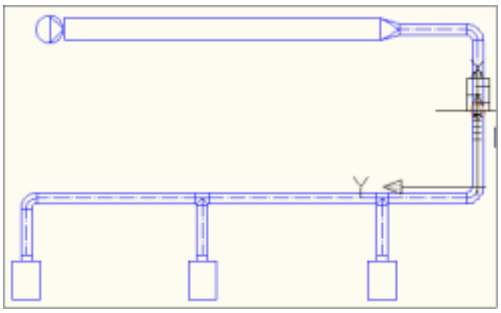
3. If there is a silencer available with the required performance, CADvent will insert it automatically into the component. Otherwise a message will show up in the command line: "Use best silencer?" Type <Y> to use the silencer or <N> to abort the command and search for another place or select a silencer manually.

4. Insert and position the silencer in the drawing and enter if necessary a rotation angle. The silencer is now inserted in the drawing.

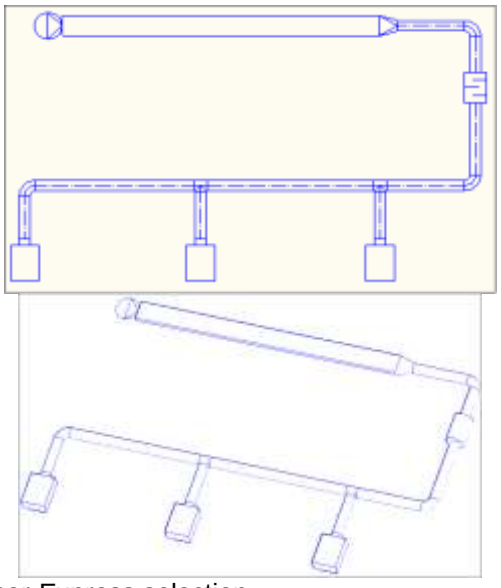


Silencer-Express for quick selection

Silencer-Express – Coomand line



Place silencer in the drawing

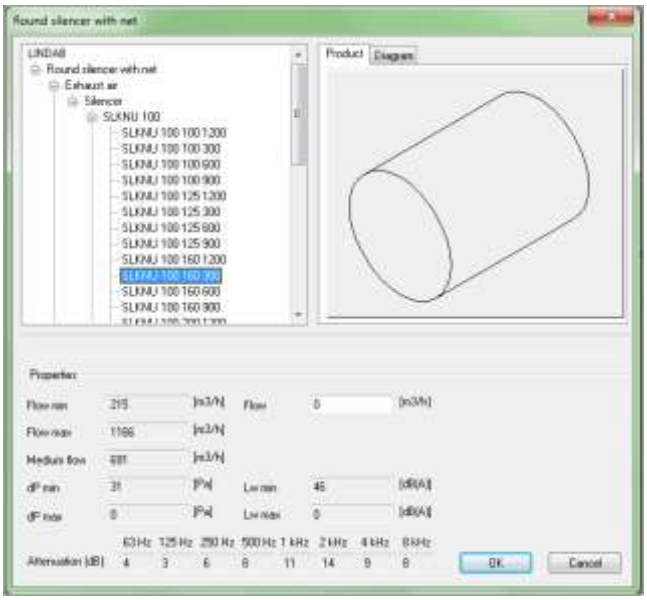


Silencer-Express selection

Round Silencer with Net – Product Manager

In this dialog you can select silencers who can also be used as supply or exhaust air devices because they have just on one side a duct connection. The other end is not connected and has a net to protect the ventilation system from taking damage if used as exhaust air device.

To select such a component you have to click on the **Round silencer with net** button. The product dialog like on the right hand side will show up and you can select your product and insert the airflow.
Click on the OK-button to transfer the product into the drawing and connect to the open connection.



"Round silencer wih net" dialog

Net grilles

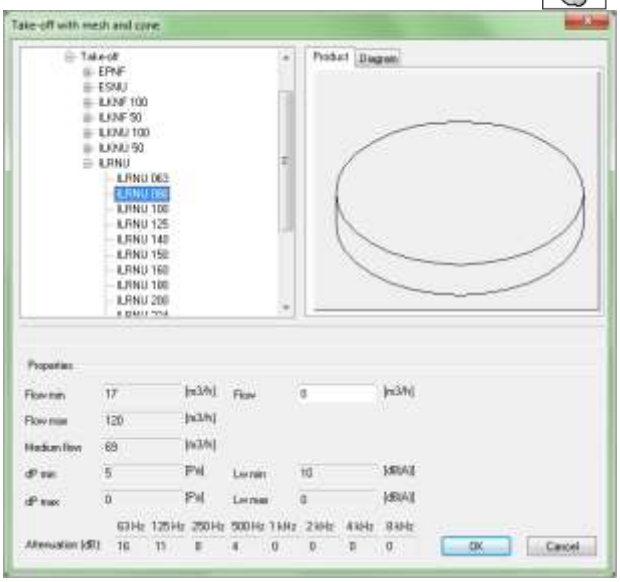
These are products that can be used in spaces where the visual look of the products comes in second but we need a controlled air flow. They are especially used for exhaust air.

Net grilles

The button for the Net grilles is located in the Safe toolbar. Left-Click on the button to open the dialog:

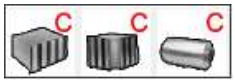
1. Select product to be used in dialog
2. Set flow
3. Insert in end of duct

Now the product is used as a terminal product when calculating the system.



"Take-Off with mesh and cone" dialog

Create a silencer in the Product Manager



As noted before you cannot just create air devices in the Product Manager but also silencers. We will now create silencers in the Product Manager. The user can create three different types of silencers:

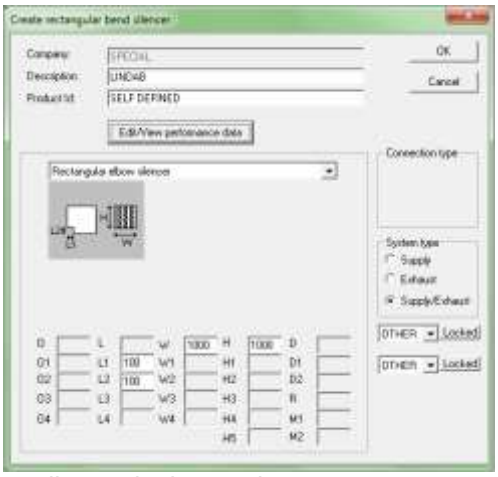
1. Create and use a **Round Silencer**
2. Create and use a **Rectangular Silencer**
3. Create and use a **Rectangular Bend Silencer**

Please proceed as followed to create and use a silencer:

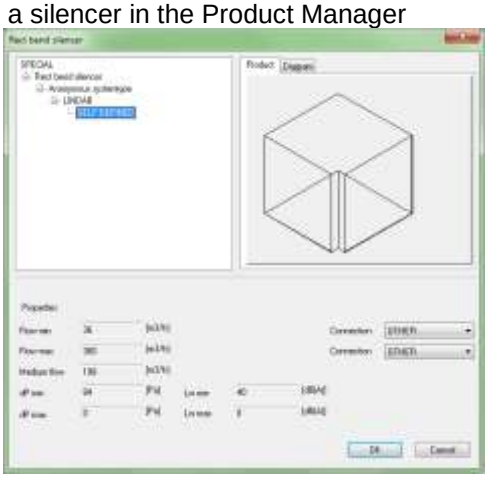
1. Open the Product Manager and create or edit the designated silencer type (in the example a rectangular bend silencer)
2. The dialog that opens is the same like for creating air devices. Please insert now all the necessary measures and enter the Performance Data. Click on <OK> to safe your silencer in the Product Manager.

   NOTE: Please make sure to enter the Sound level data, which is responsible for the noise generation due to the airflow.
3. Now open the Silencer Product Manager (in our example the rectangular bend silencer – Product Manager) and select the designated silencer from the hierarchical list. Select the component to insert the silencer and enter the rotation angle.

NOTE:
When the silencer and the connecting duct have different sizes, CADvent will automatically insert a fitting.

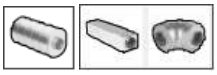


Create a silencer in the Product Manager



"Silencer – Product Manager" dialog

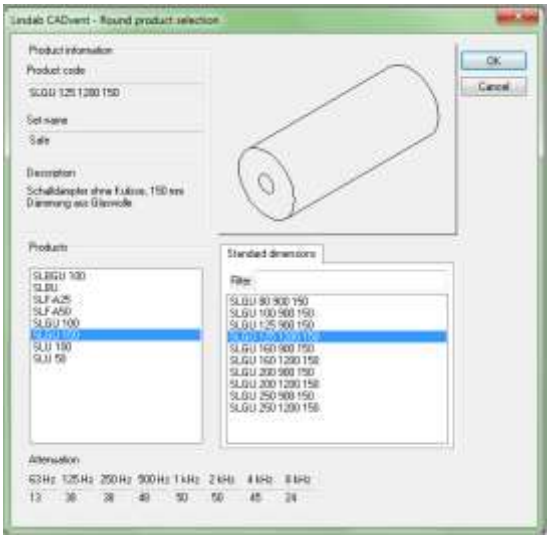
Select silencers manually from the “Lindab Safe“ toolbar



These functions are designed for quick manual insertion of round silencers. They do not contain calculation functions. The commands for round silencers are also imbedded in the **Safe toolbar**. The user can select:

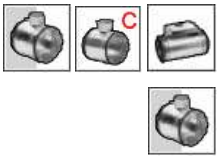
- Round straight silencer
- Round elbow silencer
- Rectangular silencer with round connection

By clicking on one of the buttons a dialog will open on the screen. The user can choose which product, size and length he wants to insert. Every product is shown with the attenuation as a benchmark for the performance.



Select the product and click on <OK> to return to the drawing. You can now insert the silencer at an open connection point or break a duct to insert it.

Balancing Dampers



Insert a balancing damper automatically

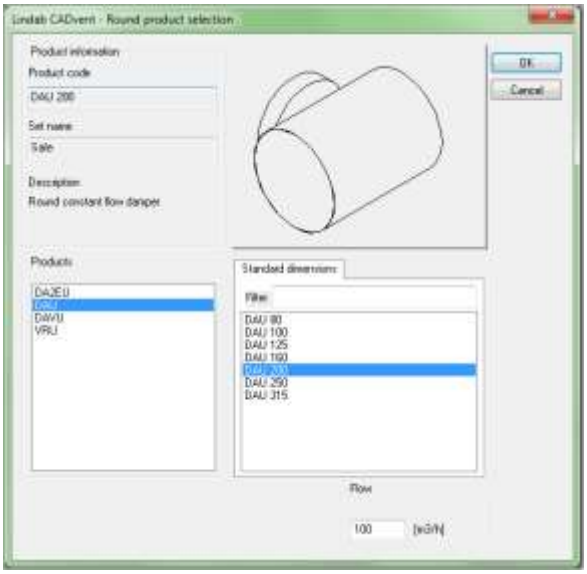
see *Construction method 2 - Insert a damper automatically*

Balancing damper Product Manager

Similar to Create and use a Silencer.

CAV-Damper Product Manager

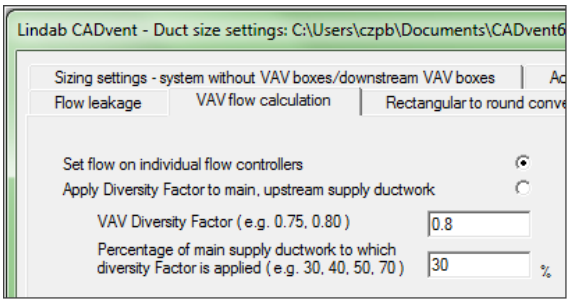
In the Product Manager for **CAV-Dampers** the user can select constant airflow dampers. The CAV-dampers are selected inserted like usual dampers, but they have special abilities when the inserted airflow is used in the calculations.



"CAV-Damper" Product Manager dialog

The CAV-dampers can be calculated like normal dampers or with a fixed airflow. In the normal calculation, the damper will automatically follow the airflow accumulated by the air devices at the end of the duct.

To use the airflow that you inserted, you have to open the Calculate floating toolbar and left-click on the *Duct size settings* button.
There you must open the index card for VAV flow calculation like shown on the right hand side. Mark the button "Set flow on individual flow controllers".
When you calculate the system now again, the flow through the damper will be the one that you inserted for the damper and the total airflow at the terminal air units is accumulated the airflow that passes through the CAV-damper.
No matter which way you calculate your system, the pressure drop and the sound generation is always calculated according to your airflow and the pressure drop the damper has to generate.



Index card for airflow to calculate

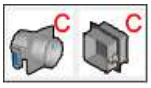
Shutoff Dampers

Insert a Shutoff Damper

see *Construction method 2 - Insert a damper manually*

Shutoff Damper Product Manager

Similar to Create and use a Silencer.



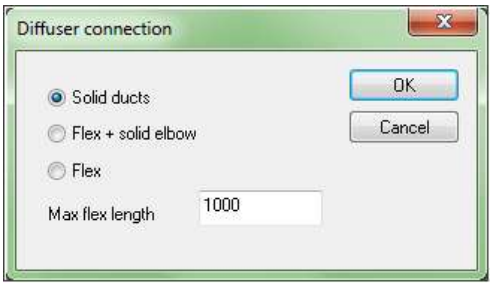
Fire Dampers

Fire Damper Product Manager

Similar to Create and use a Silencer.

Flexible Duct

In the **flexible duct settings** the user can select if flexible duct should not be used for connections (Solid ducts), if flexible ducts should be used for all purposes (Flex) or if the flexible ducts should be used, but without making elevation changes (Flex + solid elbow). Then the elbows will make the elevation change and the flex is only used for the terminal connection. Furthermore can you select what the maximum length for a flexible duct shall be? If you connect e. g. with the **Open Ends** command, CADvent will insert automatically flexible duct in the given length on the terminal duct to the air device.



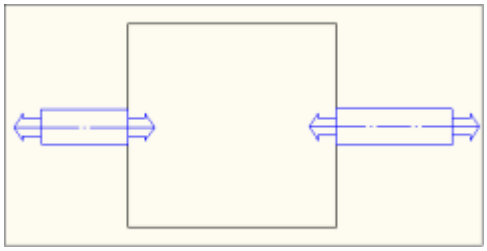
"Flexible duct settings" dialog

To use **flexible ducts** see *Construction method 2 – Connect with flexible Duct*.

Misc Vent Components

Create Special Component

Special components are components that don't exist in general in CADvent, e. g. a filter unit.
Please proceed as followed to create a **Special Component**:
Draw a 2D or 3D-object in AutoCAD and draw two round or rectangular ducts in the size and on the position, the connections of the component shall have and make sure that they have the correct elevation.

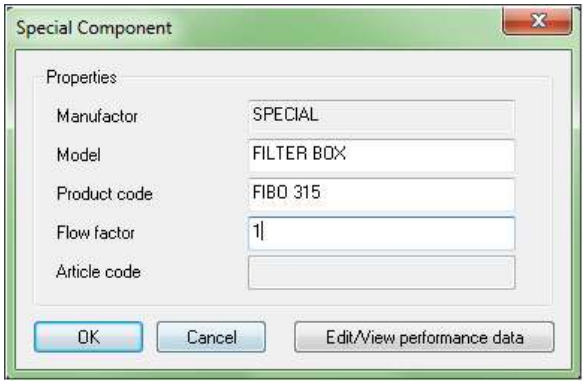


Creating a special component

NOTE:
You can use the OSNAP function to mark the correct connection point.

Click on the **Special component** button.

CADvent asks the user to select the object, the insertion point and the connected products.
NOTE:
When selecting the connected products make sure to click on or near the connection points close to the special component.



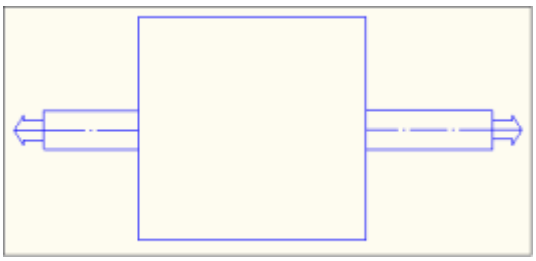
"Special component" editing dialog

After selecting the second connected product the editing dialog will open automatically.
Enter the Model and the Product code for the component (The name of the manufacturer is predetermined as SPECIAL) in the properties area. Click on

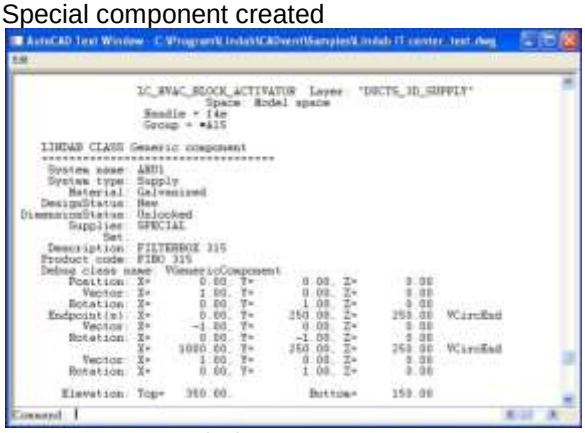
to insert the technical data for this component.
Please enter the technical data for airflow, pressure loss and, if necessary, sound data and confirm all your input with <OK>.

"Performance data" dialog

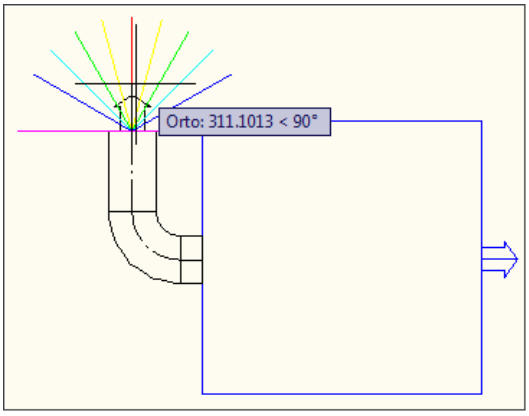
The colour of your new created special component changes and the component is shifted from an AutoCAD object to a CADvent object.
The arrows for the open connection points on the ducts disappear because they are now connected to the CADvent component.


Special component created

With the AutoCAD 'list' function you can control if the component was correctly switched into CADvent.
Click on the Special Component, type <list> and confirm with the <ENTER> key to sight your components properties in AutoCAD.


AutoCAD Text Window

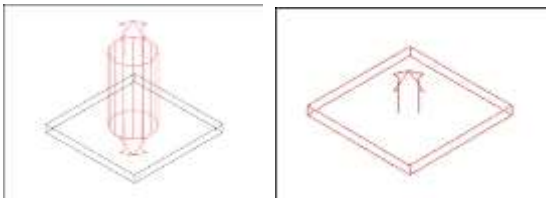
NOTE:
The connected ducts can be erased; they are not part of the Special Component. When you erase the ducts, the connection points for the Special Component will be shown with regular arrows to show an unconnected end.
You can now go on drawing with the regular CADvent drafting commands. The Special Component will be included in the calculations and shown on the reports and the bill of materials with the inserted data.



Special Component

Create a Special Terminal

A Special Terminal is basically an air device. The steps to create a Special Terminal are similar as to produce a Special Component. The difference is that a Special Terminal has just one connection point and you must enter an airflow. Like with a special component you can insert airflow, pressure loss and sound data.
This function is used, if you have a very special air device that does not match one of the standard air devices that you can create in the **Product Manager**. We recommend to create an air device with the Product Manager in the first place because it is more comfortable to use and offers more options (see also *CADvent Ventilation – Create an own Air Device*)


Creating a Special Terminal

Special Symbol

With the command Special symbol the user can create a product without any connection e. g. a fan coil. The Special component cannot be calculated but is shown in the BoM.
To create a Special Terminal see *Create a Special Component*.

Create a Plenum Chamber

The Plenum Chamber function allows the user to create a rectangular box where you can connect several ducts too and is used as a low velocity box near the AHU to spread or join the airflow into or from multiple ducts. Basically it is a rectangular duct but the pressure drop and sound calculation is different.

"Plenum Chamber" dialog

Use one of the duct system products or, if you are already familiar with the advanced drawing functions, use the **Continue** command and click on the position and where you want to continue with the duct from your plenum chamber and enter the <s>ize (see also *Construction method 2 – Drawing a duct system automatically*).

NOTE:

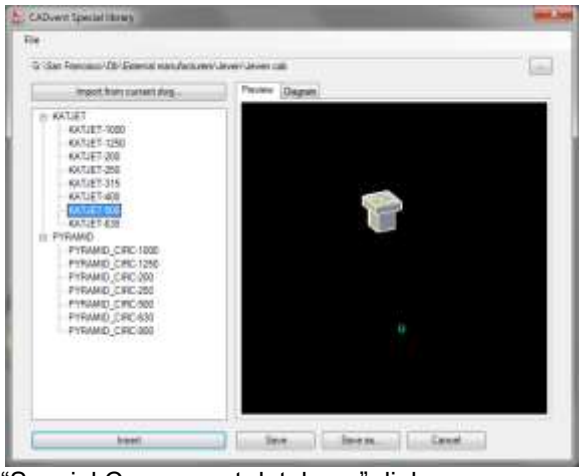
This function is only available in the CADvent Tool Palettes in the Rect tab.

Special Component Database

The Special Component database allows you to save and use Special Components, Special Terminals, Unconnected Objects and Air Handling Units in other projects.

To save an object into the Special Component database open click on the button to open the dialog:

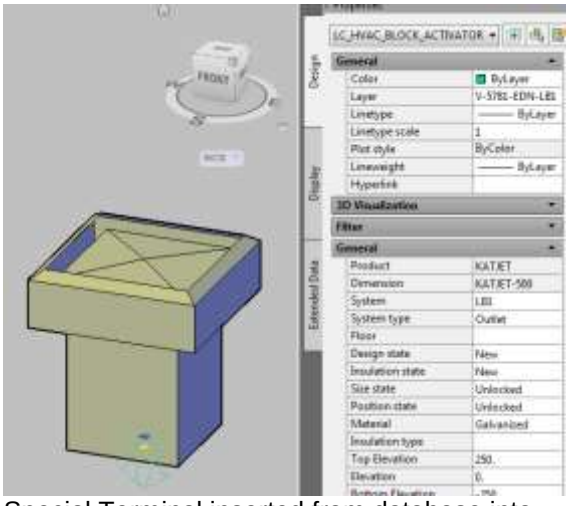
- Click on the button ”Import from current dwg”
- Select the product you want to save
- Save the database or click “Save As” if you want to save it under a new name.
-



“Special Component database” dialog

To insert a saved product into a new drawing open the dialog, select the database by clicking on the icon, go to the folder containing your saved database and open it.

Select now the product you want to insert and click on the “Insert” button. You can now insert the product into the drawing with the crosshair.



Special Terminal inserted from database into drawing

NOTE:

This function is only available from AutoCAD 2007 and newer versions.

Air Handling Units (AHU)

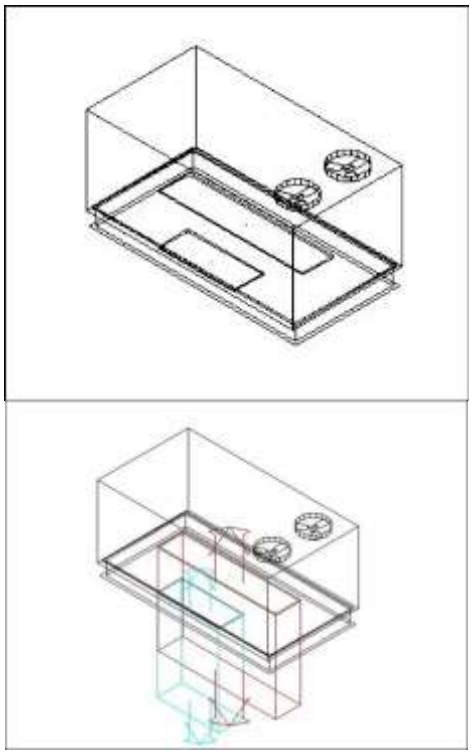
Every system in CADvent has to have a startsymbol to be able to calculate the system. Instead of a startsymbol you can insert an AHU into the drawing which automatically contains a startsymbol. As Lindab does not have own AHU to make an own CADvent command from, you can choose between two possibilities to create an AHU from an AutoCAD block or insert an AHU from a XML file.

Create an AirHandler from an AutoCAD block

To be able to transform an AutoCAD block into a fully compatible CADvent object offers the possibility to use AHU block symbols from other manufacturers (see example on the right hand side).

After pasting the block into the drawing you have to draw the ducts and position them with the connection point where the connection points for the AHU are supposed to be. Assigned the correct system types to the ducts in the **AutoCAD Properties** command. Activate the function **AirHandler from block** .
The user is now requested to enter the AHU, the insertion point and the connected ducts.

NOTE:
When selecting the connected products make sure to click on or near the connection points close to the special component.

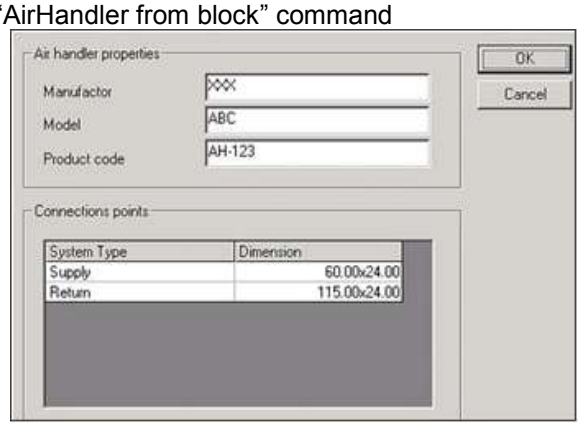


"AirHandler from block" command

After selecting the last connected duct you have to push the <ENTER> key twice to open the **Create Air Handler** dialog box.

Insert the Air handler properties and make sure that the connected ducts have the right size and belong to the right system. Confirm with the <OK> button.

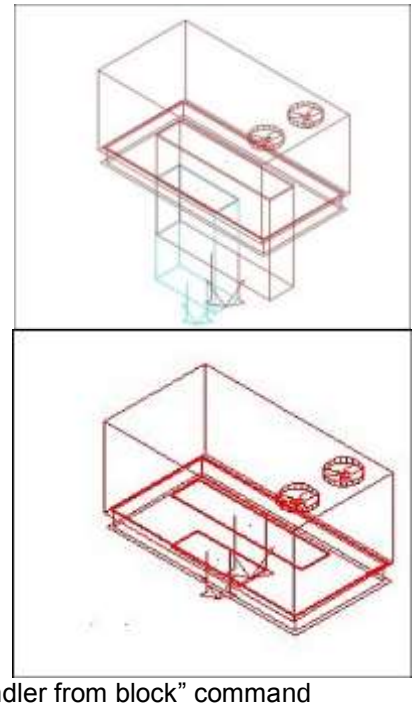
NOTE:
As an AHU is designed to have an own fan, there is no technical data to be added. The value for the noise generation can be inserted when calculating the system (see also *Calcs & Estimate – Calculation functions*)



"Create Air handler" dialog

The colour of your new created special component changes and the component is shifted from an AutoCAD object to a CADvent object. The arrows for the open connection points on the ducts disappear because they are now connected to the CADvent component.

NOTE:
The connected ducts are just used to specify the connection points, sizes and system types for the component. After creating the CADvent object they can be erased. The AHU object is now a fully compatible CADvent object. You can use all drafting, editing, calculating and reporting commands on it.

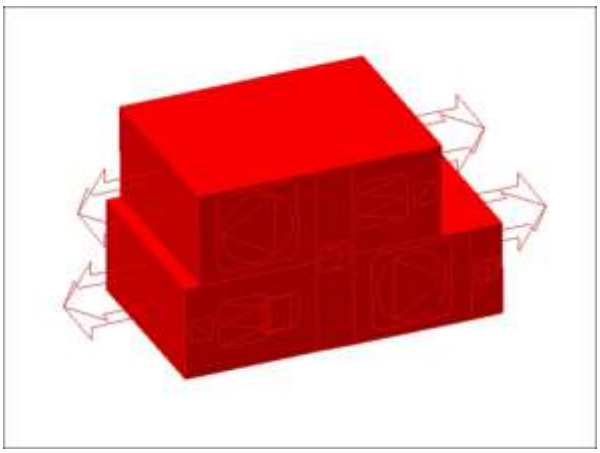


"AirHandler from block" command

Create an Air Handling Unit from a XML-file

Air Handlers can be imported from external files, if the manufacturer supports the CADvent format.

Activate the push-button **AirHandler from XML-file** .
Select the insertion point for the object in the drawing. The AHU will be inserted in the drawing with all connections, sizes and system types as it was created in the manufacturers program.



"AirHandler from XML-file" command

Improved flex functionality

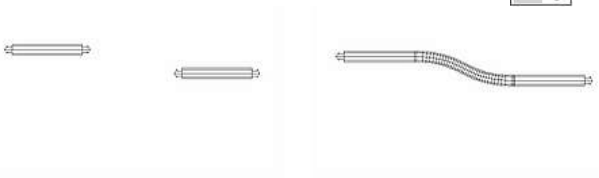
The flexible ducts are either inserted by:

- manually inserting a flexible in between 2 duct openings
- making the diffuser settings to insert flex ducts as diffuser connections

When making the 2D the representation of the flexible ducts are replaced with a zigzag display

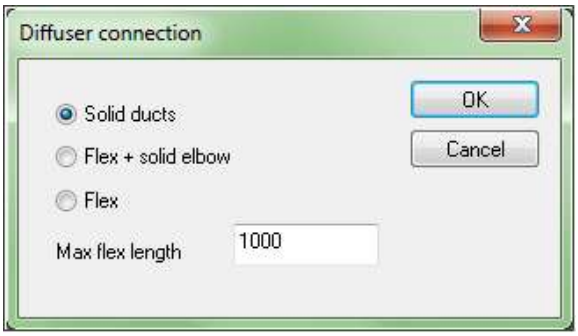
Manual insertion of flex:

1. Select either the pink automatic icon or the yellow manual icon, where a selection of different flex product can be made.
2. Click on the first open duct end
3. Click on the second duct opening
4. The flex duct is inserted



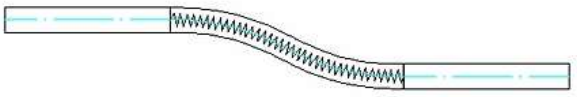
Flexible ducts in 3D

Join with flex:
To make the CADvent “Join command” using flexible ducts when connecting diffusers check radio button for “Flax + solid elbow” or “Flex”



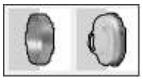
“Flexible connection settings” dialog

2D for flex:
The 2D representation of the flexible duct is shown when selecting either the 2D express or the normal 2D output button



2D-design for flexible ducts

Auto Endcaps toolbar



Auto Endcaps command

To make CADvent insert endcaps on specified products automatically, please proceed as followed:

Activate the push-button **Auto Endcaps** .
Select the products in the drawing where endcaps shall be automatically attached and confirm the command with the <ENTER> key.

NOTE:
When you type <ALL> in the command line, CADvent will check the whole drawing and insert automatically endcaps on all open ends.

Endcaps will be attached on all selected products with open connection points.

NOTE:
CADvent recognizes if it is a round or rectangular component and the kind of fitting (male or female) and mounts the adequate type of endcap (EPF or ESU).

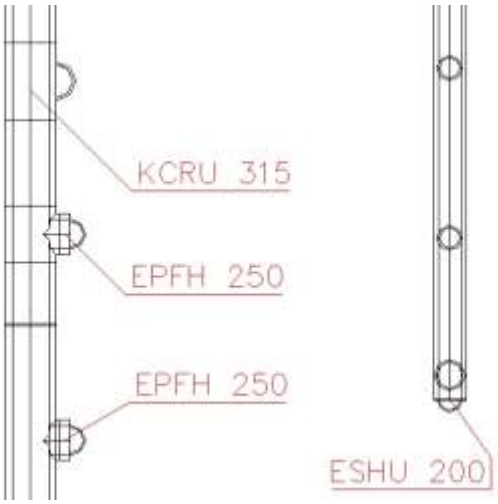
Auto Cleancaps command

The Auto Cleancap command is similar to the Auto Endcap command. The command functions are the same.

NOTE:
Cleaning caps in rectangular ducts are usually inserted on the long side of the duct. Therefore CADvents places a normal endcap on the open connection points.

Clean caps on circular ducts

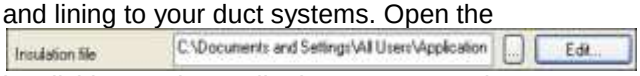
There are several ways of inserting circular clean caps. There are the 2 left icons for inserting a clean cap in end of a duct or fitting and there 2 icons for inserting a clean cap on a saddle tap or a clean cap on a tee-piece in one command.



Circular clean caps in drawing

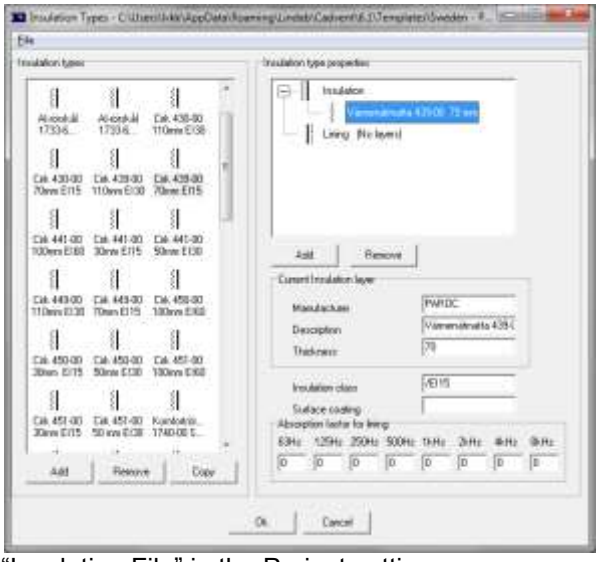
Insulation

With the insulation function you can insert insulation and lining to your duct systems. Open the



by clicking on the <Edit> button to open the insulation dialog (see picture on the right hand side) or **browse** to open an already existing file.

NOTE:
To get a better display of the insulation you can use the option **Hollow Appearance** in the **Project settings** . Then the duct and the insulation will be shown.



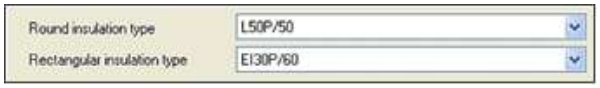
"Insulation File" in the Project settings

Insulation Type Settings

Ti define your insulation type for rectangular and circular components please proceed as followed:

Open the **Insulation Type Settings** .
Select the default insulation type you want to use.

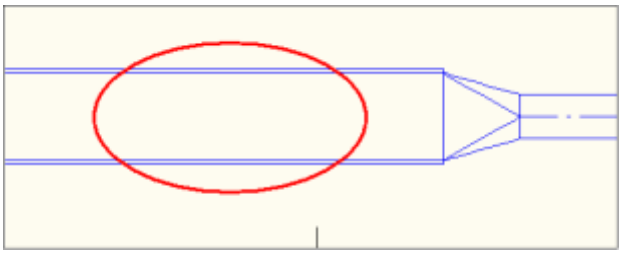
(see also *Advanced project settings -Create an insulation template*.)



"Insulation type settings" dialog

Add Insulation

Left-click on the button **Add insulation** . Mark the components that you want to attach insulation to.
Confirm your selection with <ENTER>. The insulation gets added to the components that you selected.


Add insulation

You can also use the button *Upstream- / Downstream selection* first and then left-click on the **Add Insulation** button. This is useful when you drafted a complicated ventilation system.

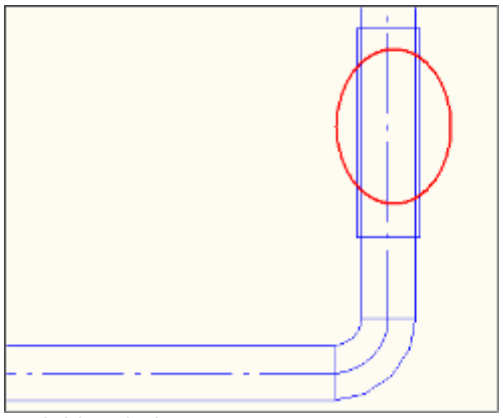
NOTE:
When you select a lining as insulation type, you will not see a difference because it's an inside insulation.

Add Partial Insulation

NOTE:
Just straight ducts can be added with a partial insulation. If other components are marked as well, they will get added insulation completely.

To add a partial insulation to a duct please proceed as followed:

Left-click on the button **Add Partial Insulation** . Select the straight duct you want to attach the insulation partly (In the example the rectangular duct that goes through the wall).
Mark the start- and the endpoint for the insulation and confirm with <ENTER>.
The insulation will be added between the marks you made.


Add partial insulation

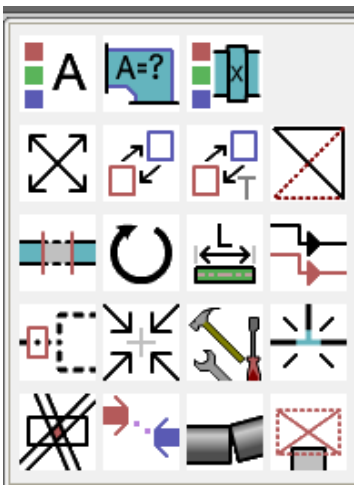
Remove Insulation and –Remove Partial Insulation

To remove insulation partially or completely, please proceed as followed:

Left-click on the button **Remove Insulation** or **Remove Partial Insulation** .
Select the objects you want the insulation totally or partially removed.

The insulation will be automatically removed on all selected objects. This includes also lining insulation.

CADvent Modify tab



CADvent Properties

Properties dialog

In this dialog you can modify the properties of an object. According to the object you are reffering too, the dialog can contain between two and four index cards.

NOTE:
All Properties are accessible also from the AutoCAD Properties menu

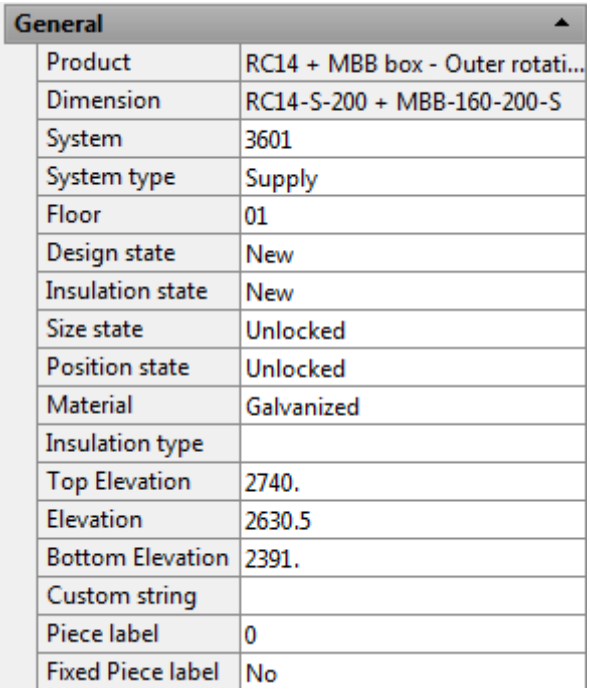
Index card General

System: Name of the duct system the component belongs too. Can be switched by opening the pull down menu.

System type: Type of air that flows through the system (supply, exhaust, surplus…). The System type can be changed at any time.

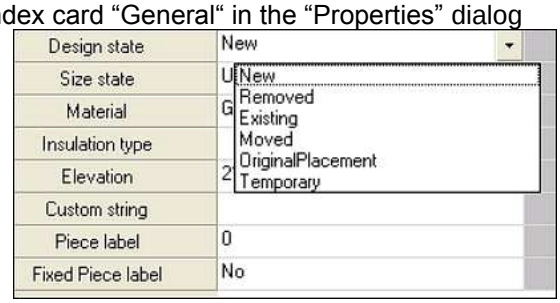
Floor: The floor level the component belongs to. A component should refer to a floor to ease up procedures, such as creating 2D-drawings and piece-labelling.

Position State: You can lock a product at its X,Y,Z coordinates to prevent it from being moved accidently or through combined move commands like Smart Move or Sizing. It is useful for products which must be kept in their position, like fire dampers, roof transitions, etc.



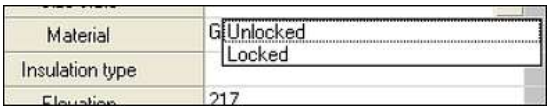
Index card “General“ in the “Properties” dialog

Design state: Here you can change from the default value ‘New’ to another Design state.



Insulation State: The insulation state can allow insulation material to be shown on the BoM, although the main product is set on another state than NEW (see **NOTE** below):

NOTE:
You can just change the size of an object and show it in the BoM if its design state is ‘New’.

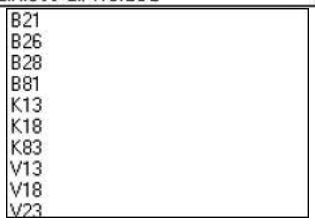


Size state: Here you can choose ‘Locked’ and ‘Unlocked’ (default value). If you change the value from an object from unlocked to locked, the dimension can not be changed by any command until you unlock it again.

Material: The type of material your component consists of.

The material of the product is not just shown in the Properties, but also in the Reports (see also *Calc and Estimate – BoM*)

Insulation type: Choose or change type of insulation from CADvents standard insulations or own created insulations.



NOTE:
If you change a parameter that you can choose from like in the pull down menus, you must confirm the change with the <ENTER> key, otherwise the change will not be executed. The pull down menus are executed when you choose your parameter with the mouse click.
Elevations: CADvent shows up to 3 different elevations, but at least the centre elevation is shown for each product. You can change elevations in all 3 elevations.

Custom String: The user can insert own text for this object that does not affect any of CADvents functions, but will be shown in the Bill of Materials.

Piece label: With that function can the user create an own designed label for every object inserted with CADvent. This label is shown in this text field.

Fixed Piece label: If you have inserted piece labels you can fix them with this function. It's a useful tool if you made a special piece label for an object and you don't want it to get overwritten again by the standard piece label functions (See also *Piece labelling – Piece label settings*)

Index card Size

Size	
Rectangular width	900.
Rectangular height	400.
Rectangular length	546.436389
Order length	546.436389

Index card "Size" in the "Properties" dialog

Diameter: The connection diameter of a circular product.

Rectangular – Width / Height: Dimensions of a rectangular component connection.

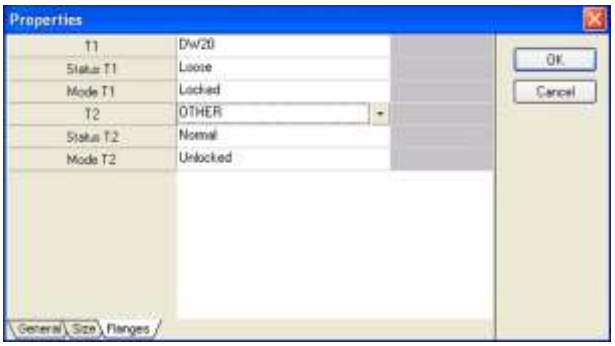
Length: Shows the length of a product. The length is a read-only parameter and can't be changed.

Order length: for rectangular duct, the user can indicate the length he wishes to order. This value must be equal or higher than the component length. It will be shown in the Bill of Materials.

The size of a component can be changed at any time. If you change the size of a component that is connected to one or more other components, CADvent will automatically insert reducers.

NOTE:
The size of a diffuser cannot be changed. You must delete the current diffuser and choose a new one or use the **Replace products** command (See also *Modify – Replace products*)

Index card Flanges



Index card “Flanges” in the “Properties” dialog

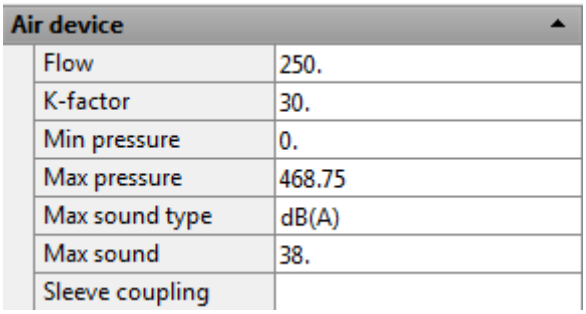
T1 / T2: In these fields you can choose a flange or select “Other”. The flanges will be shown in the Bill of Materials and in the Offer/Order reports for rectangular ducts.

Status: You can select if the flange on T1 / T2 should be mounted normally (fixed - default) or loose so you can use the duct as fitting length.

Mode: With this function you can set your flange selection in size and status on T1 / T2 locked or unlocked. When you lock the flange the

Connectors command or any sizing command will not adjust the flange until you unlock it again.

Index card Air Device



Index card “Air Device” in the “Properties” dialog

Flow: The airflow through the air device or damper in [m³/h] or [l/s].

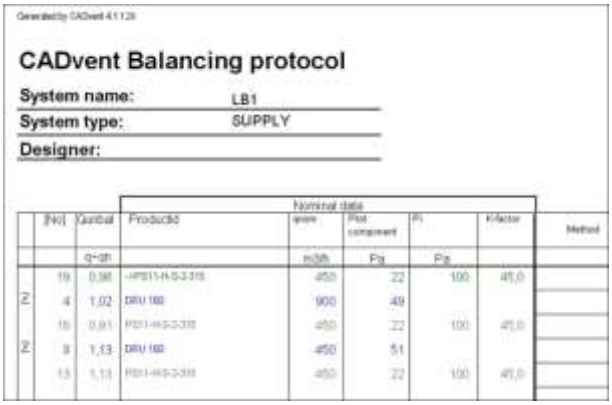
K–Faktor: [Quoted in Pa / (l/s)] The K-factor is used for the adjustment of the airflow in a complex system with several diffusers. This value is used and adjusted in the CADvent calculation and shown in the **Balancing protocol**. The K-factor and adjustment settings are published by the manufacturer.

Min. Pressure: Minimal value of the pressure drop with its current airflow.

Max. Pressure: Maximal value of the pressure drop. This is a given value of the component and it can not be changed to a higher level. Changing it will influence the Max sound value as well.

Max. Sound Type: Sound calculation method for the comfort zone in the room. The user can choose between db(A), dB(C), NR and NC type.

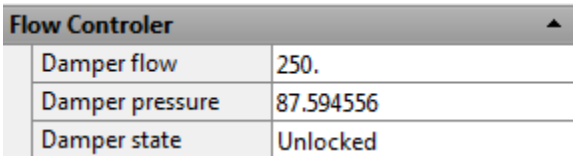
Max. Sound: Maximal allowed sound level in the comfort zone. The value is defined in *Comfort Express*, but can also be changed here.
If you change the value, the Maximum pressure value may be influenced by that.



Balancing protocol with calculated K-factors

Index card Flow Controller

Flow Factor:
Percentage of the nominal airflow in the diffuser, used in VAV-calculations and/or when simulating a duct system. The Flow Factor can be shown and adjusted for any adjustable component, like a damper or a diffuser with an integrated damper.



Index card “Flow Controller” in the “Properties” dialog

Damper State:
In the damper state dialog you can select how your balancing damper, dampers in air devices and pressure plates for FCL diffusers react when the duct system is calculated:

“Flow Controller” dialog for dampers

Unlocked:
The damper follows the airflow in the upstream air devices and damps dispensable pressure.

NOTE:
For **FCL** diffusers is the default value “Fixed damper position”. If you change it to “Unlocked” and calculate the system, CADvent will automatically insert the necessary pressure plate to achieve the required pressure loss! The pressure data is also shown in the *Bill-of-Materials*.

Fixed damper position:
The damper remains in the same angle-position when calculated, independent from the air devices.

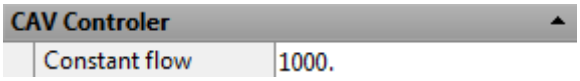
Fixed damper pressure:
The damper keeps the inserted pressure drop when calculated, independent from the air devices.

Fixed damper flow:
The damper keeps the inserted airflow when calculated, independent from the air devices.

NOTE:
When you lock the damper in one of the three possible settings the airflow and/or damper pressure cannot be 0! The system cannot be calculated with a 0 in a locked position.

Index card CAV-Controller

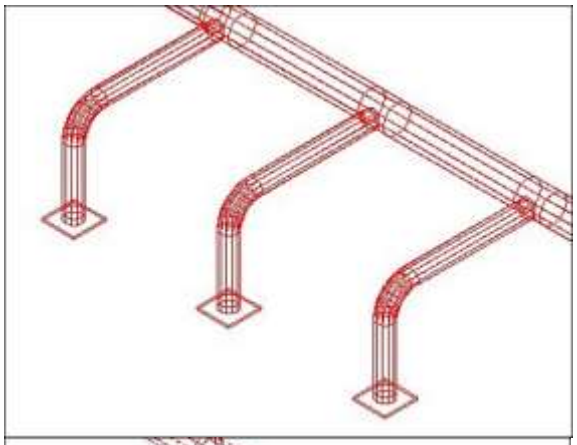
CAV Controller:
In the index card for the CAV-Controller you can adjust the airflow you want to go constantly through your CAV-damper. To use the CAV-damper and the airflow inserted please look at *VAV-flow calculations* in the Calc and Estimate chapter



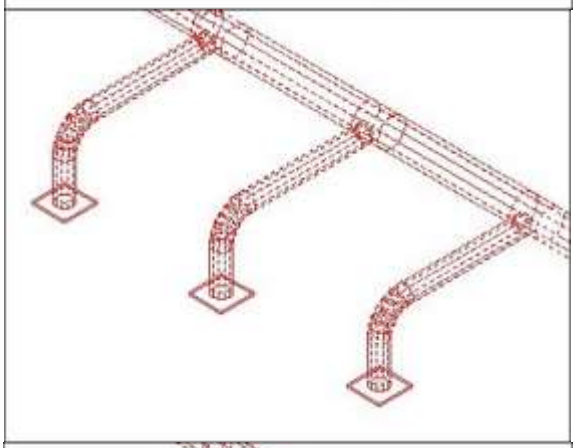
Index card “CAV-Controller”

Changing the drafting elevation of a duct system

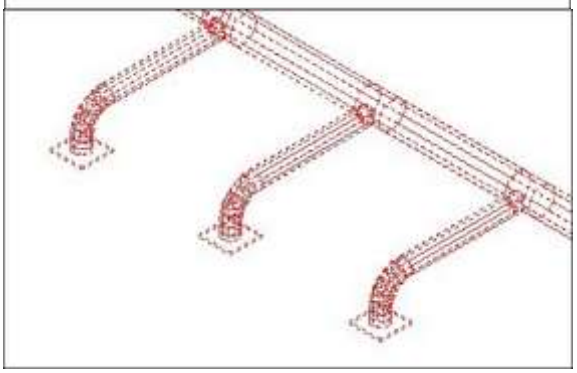
When inserting a new value in the elevation text field in the **Properties** dialog you can change the elevation of objects already drafted in CADvent.



CADvent updates the drawing after confirming the new height with <ENTER> and the OK button. The selected objects are shifted to their new elevations and components who are directly connected are adjusted in their length and/or position. In the example to the right we set a new lower elevation for the duct system. The diffusers keep their elevation and the vertical length of the branch ducts is adjusted.



NOTE:
The minimum length between two male connectors is a female coupling MF. If CADvent requires a duct shorter than a MF, the whole system (incl. the diffusers) will be moved downwards until the minimum length can be inserted.

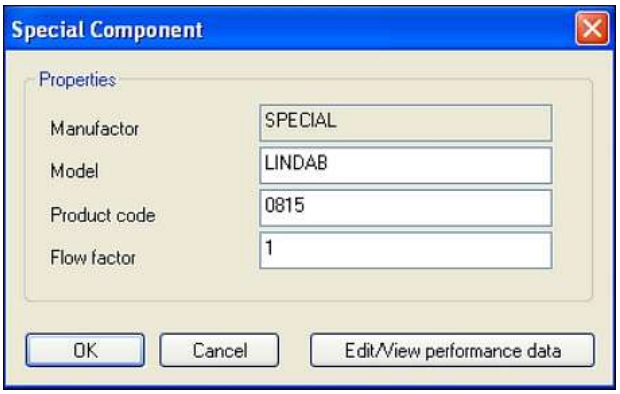


Edit special component

Please proceed as followed to show and/or edit a Special Component:

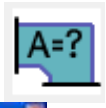
Activate the **Edit special component** command. Enter the designated adjustments and confirm them with the <ENTER> key.
Click OK.

(See also *CADvent Ventilation –Create a Special component*)

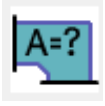


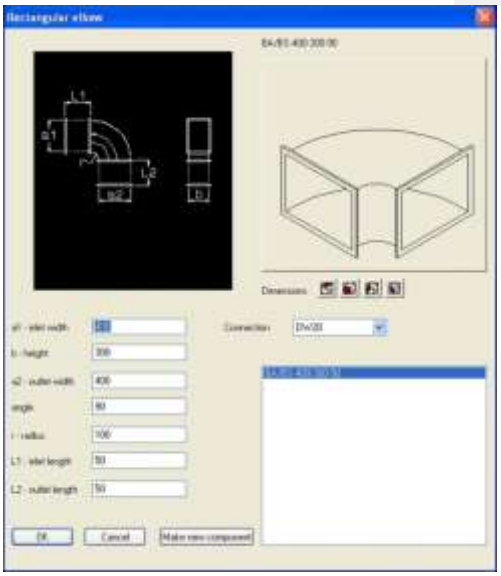
"Edit Special Component" dialog

Edit Rectangular components



To edit the dimensions of a rectangular component please proceed as followed:

Click on the **Edit Rectangular component**  button. The dialog box for the component opens and you can change the dimensions. To confirm the executed changes, click on the OK button.



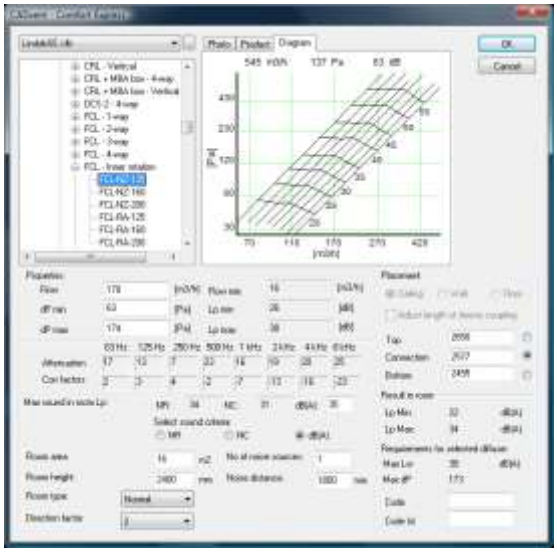
"Edit Rectangular component" dialog

General "Edit" Function

In CADvent 6.1 we introduced a new EDIT function to quickly edit diffusers, Special Components and rectangular products.

As shown in the dialog to the right, the command is available in the right-click menu in AutoCAD.

Click on "Edit", select the product and open the specific product dialog to edit the component.



List CADvent-object information

To show an objects information you have to type <list> in the AutoCAD command line and confirm with <ENTER>.

The information are shown in CADvent format, as well as in AutoCAD format. The command shows the Proxy-Entity for AutoCAD as well the CADvent settings information, technical data, sizes and position in the drawing.

The information shown in the window cannot be changed. To edit the object you must use the functions in the CADvent Modify toolbar.

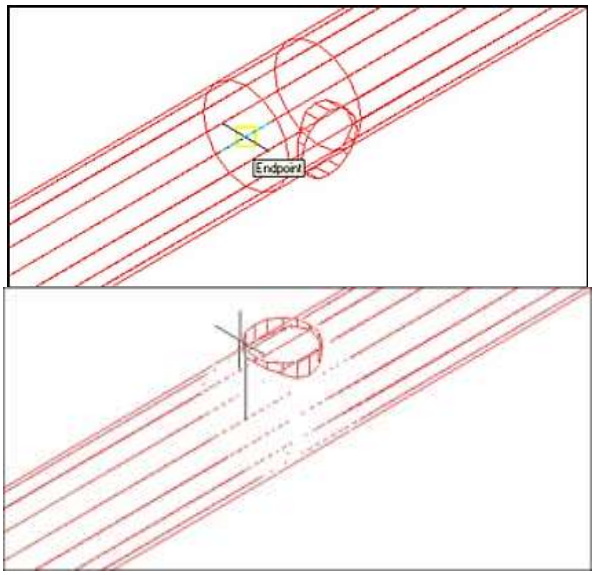
Text Window for object information

Rotate a component

The 3D rotate function can is used to rotate objects around their connection points:

To rotate an object please proceed as followed:

1. Activate the **Rotate** command.
2. Selects the connection point around which you want to rotate the object.
3. Rotate the object with the mouse pan or enter an angle in the command line.



Rotate component

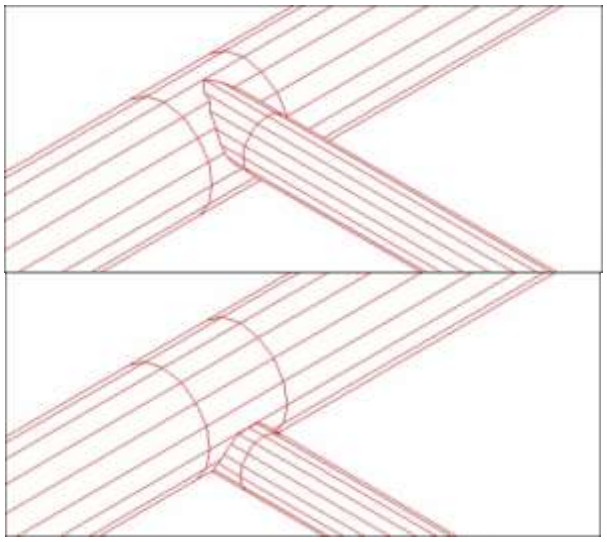
Flip a component

This function flips an eccentrically part of a component from one side to the other.

To flip an eccentrically component please proceed as followed:

1. Click on the **Flip** command.
2. Select the eccentrically component that you want to flip.

The eccentrically part of a component is flipped from one side to the other. If the object is connected to other objects, the connections will be adjusted automatically.



Flip components

Smart Move command

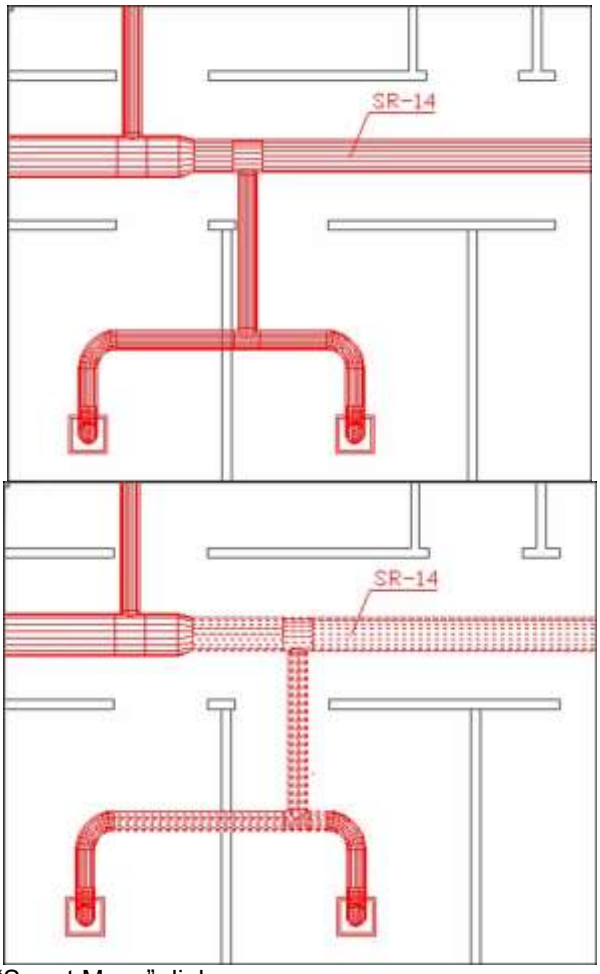
The function Smart can move one or more objects in a duct system. Please proceed as followed to work with the Smart Move commend:

Activate the **Smart Move** command.

1. Select the component or components which you want to move (In this case the Tee).
2. Select the base point.
3. Select the endpoint where you want to move your component to.

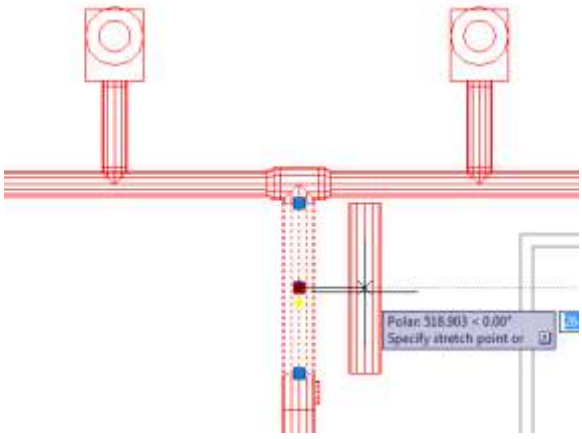
Position and length of the connected products are adjusted according to the new position of the component.

NOTE:
The adjusted components are shown as perforated lines. This accentuation can be cancelled with the AutoCAD <REGEN< command.



"Smart Move" dialog

In CADvent 6 you can mark a product and use the Centre Grip Point to use CADvents Smart Move function on any object (in ISO-view even horizontal).
To use the AutoCAD MOVE command mark a product, right-click and use "MOVE".

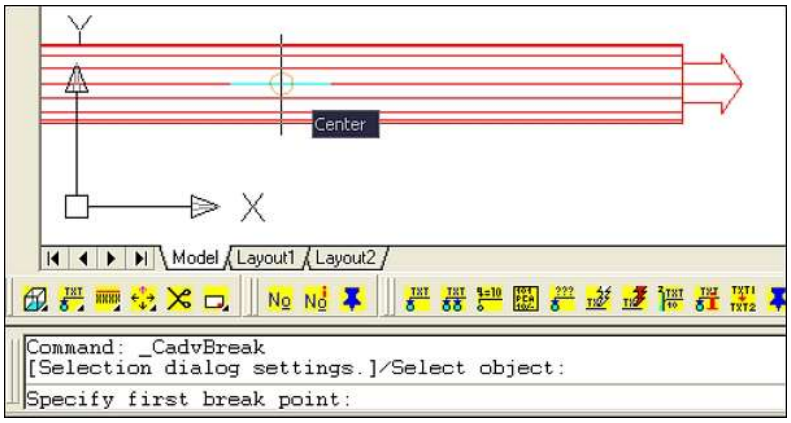


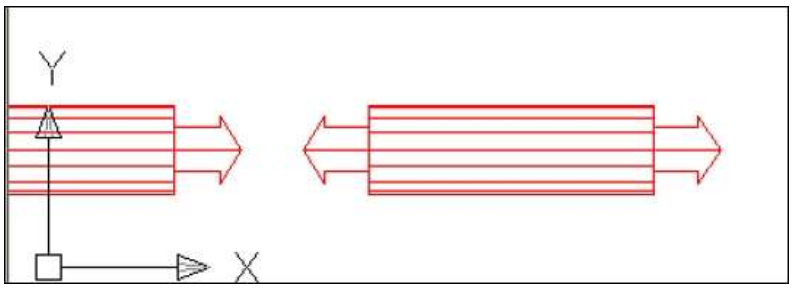
Break Duct command

The **Break Duct** function works in a similar fashion as the AutoCAD *Break* command and is used to break a straight duct between two selected points.

To use the **Break Duct** function:

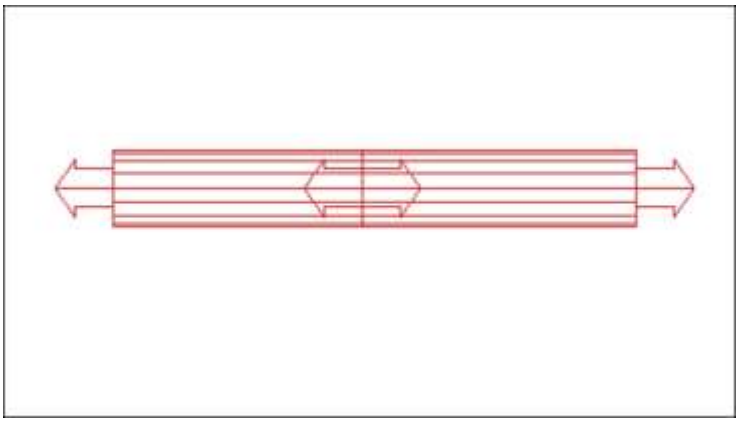
1. Select the **Break Duct** button.
2. Choose the desired component in the drawing.
3. Specify first and second break point.
4. CADvent erases the portion of the duct between the two points specified. If the points are not on the object, CADvent selects the nearest points on the object.





Break Duct Function – Erase a Portion

NOTE:
To split a straight duct in two without erasing a portion, enter the same point for both the first and second points.



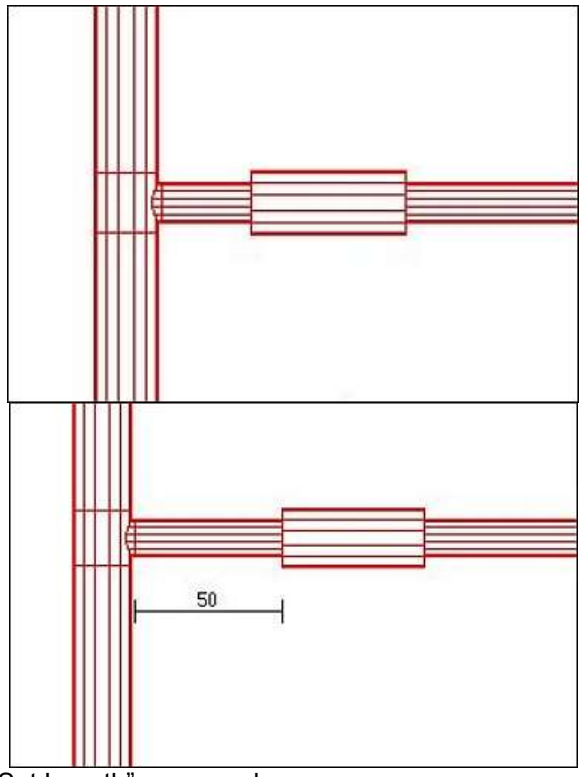
Break Duct Function – Split Duct in Two Parts

Set Length command

The command Set Length lengthens or shortens a duct to the specified length in the specified direction. The components connected with the object will be adjusted automatically.

Please proceed as followed to use the **Set Length** command

1. Push the command button for the function Set Length .
2. Enter the designated length (In this example we set the length to 50mm)
3. Select a position not far the endpoint of the duct on that side that shall keep the position (in this example we select the left hand side. The duct is extended to 50mm. The silencer gets moved on to the right.)



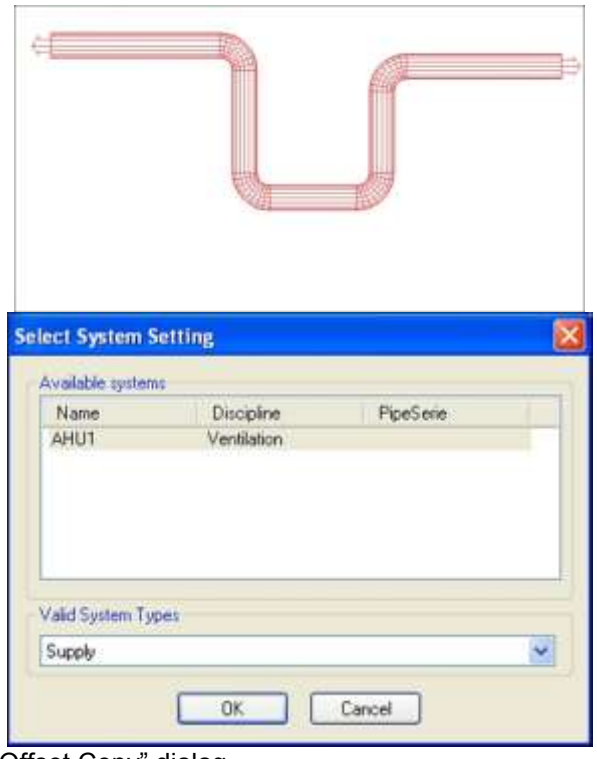
"Set Length" command

Offset Copy command

The **Offset Copy** function is similar to the AutoCAD offset command, but you copy not just a line but objects.

Please proceed as followed to use the **Offset Copy** command.

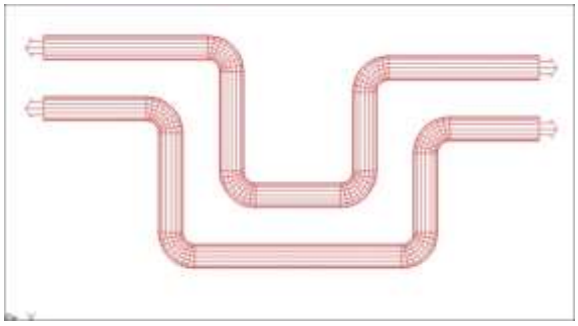
1. Activate the command **Offset Copy** .
2. Select a start and an endpoint in your existing system that you want to copy.
3. A dialog box opens up and shows what duct system you have marked for the Offset Copy command (in this case AHU 1/Supply) and what other duct systems are available.
4. Select the new name of the system and the system type in the dialog.
5. Now enter the position for the starting point of your copied system by clicking on the insertion point or point with the mouse pan in the direction of the offset copy and enter the length in the command line.



"Offset Copy" dialog

The placing and possible clashes are corrected automatically.

NOTE:
The Offset copy function does not work on dampers, silencers and diffusers because of the technical data they contain.



Duct system copied with “Offset Copy” command

Replace Product command

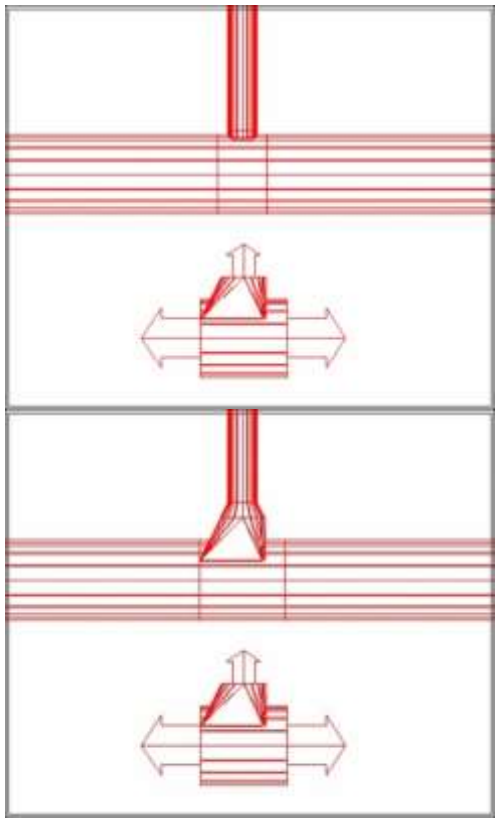
The **Replace Product** command replaces one product in the drawing by another.

To use this command please proceed as followed:

1. Select the component that you want to replace with and insert it somewhere in the drawing (In the example a Saddle Tap).
2. Push the button for the **Replace product** command.
3. Select the component or components you want to replace (in the example a 90º Tee-piece)
4. Select the component you want to insert into the duct system instead of the Tee.

The old component gets substituted by the new component (in the example gets the Tee replaced by the Saddle Tap). Reducers and connection points will be adjusted automatically if necessary.

NOTE:
Text marks and piece labelling disappears when replacing a product and have to inserted again. If you made a calculation before replacing, you must repeat it, to recalculate the system with the technical properties of the new object.



“Replace Product” command

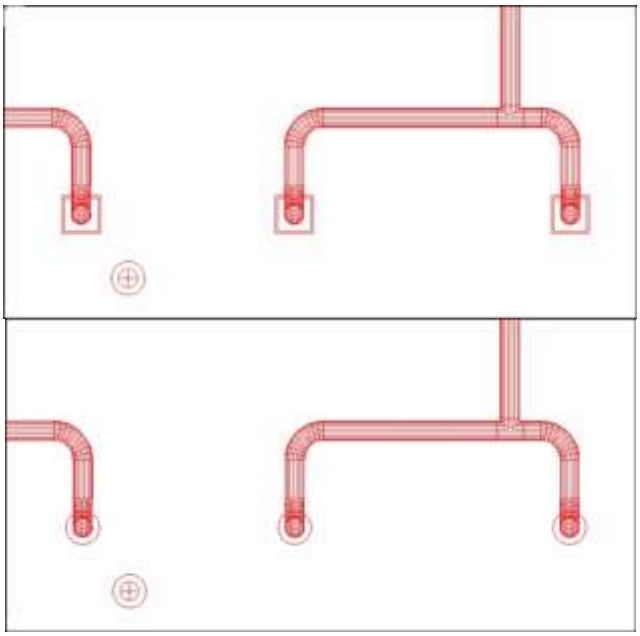
Replace products matching product code

This command is very much alike to the **Replace Product** command but replaces all the products that have the same product code like the one you want to replace.

To use this command please proceed as followed:

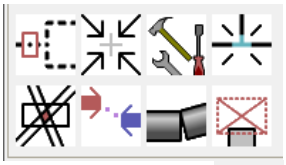
1. Place the new component to replace with somewhere in the drawing (in this example a circular diffuser).
2. Activate the **Replace products matching product code** command.
3. Select the diffuser type you want to replace (in the example the rectangular diffuser).
4. Select the new component.

All components with the product code from the diffuser you selected get substituted by the new product (in this example all rectangular diffusers get replaced by round diffusers).



Replace products matching product code

Connection Assistance



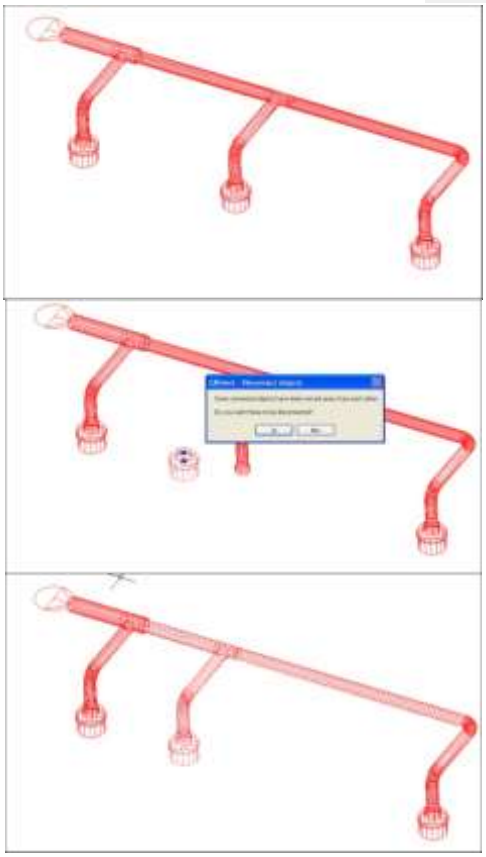
Smart Adjust command

The **Smart Adjust** function is alike the *Smart Move* function. The selected object works as a “Leading product” for all connected objects. It is used, when you move an object and the connected objects don’t follow up but are still connected. This can happen when you have been working with AutoCAD before and you’re used to the AutoCAD “move” and base point functions. You can go on working with these options and still use the advantages CADvent provides you with.

Example 1:
In the example we move one diffuser to another place.

1. Move the diffuser to another position.
2. You are asked if you want to disconnect the objects. Here you have to answer with ”No”.
3. Activate the **Smart Adjust** command
4. Select the diffuser as guiding product.

The connected duct gets adjusted and connected to the diffuser while the position of the main duct is not changed.

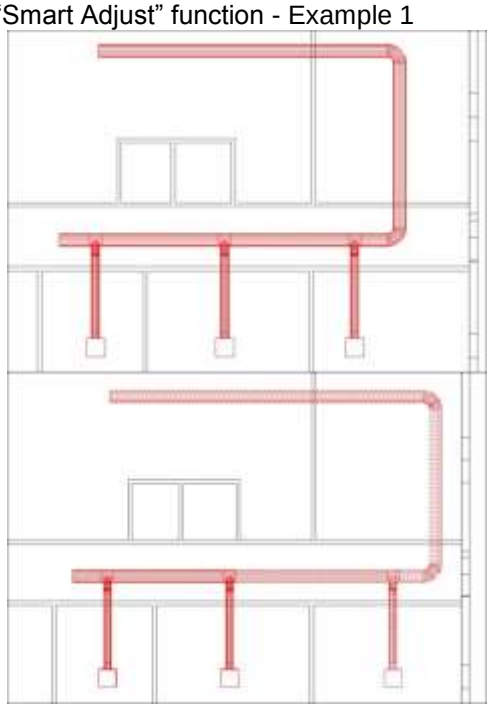


“Smart Adjust” function - Example 1

Example 2:
In this example we move the diffuser in the right room to the centre of the room. The main duct needs to be extended then.

1. Move the Diffuser to the centre of the room and leave it connected to the duct when CADvent asks you.
2. Activate the **Smart Adjust** command
3. Select the diffuser as guiding product.

The branch duct and the main duct get adjusted and connected to the diffuser again, while the other components in the system keep their position.



“Smart Adjust” function - Example 2

Repair connections command

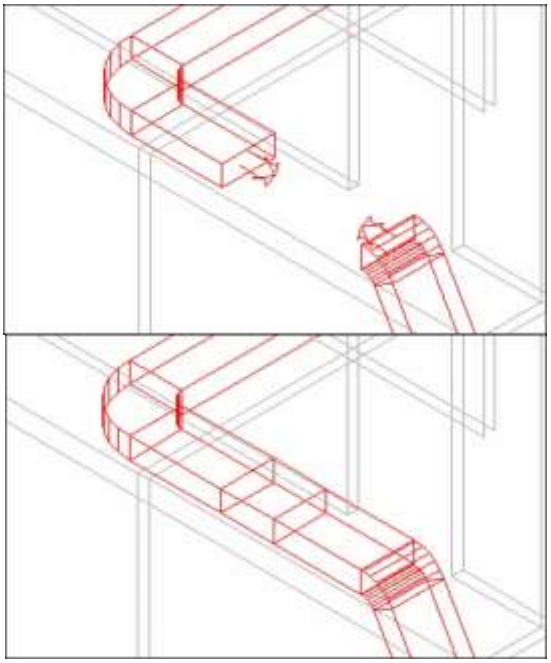
The command **Repair connections** joins all possible unconnected endpoints in the drawing whose gap is smaller than the distance between objects defined in the **Project Settings** (see also *Project Settings – Maximal Connection Distance*)

IMPORTANT:
It is very important that all connections are properly connected. The connections are part of every calculation performed in CADvent and in several modify commands!

You have basically two options to join unconnected ends:

Example 1: Connect open ends

Use the command **Connect Open Ends** to join unconnected endpoints.

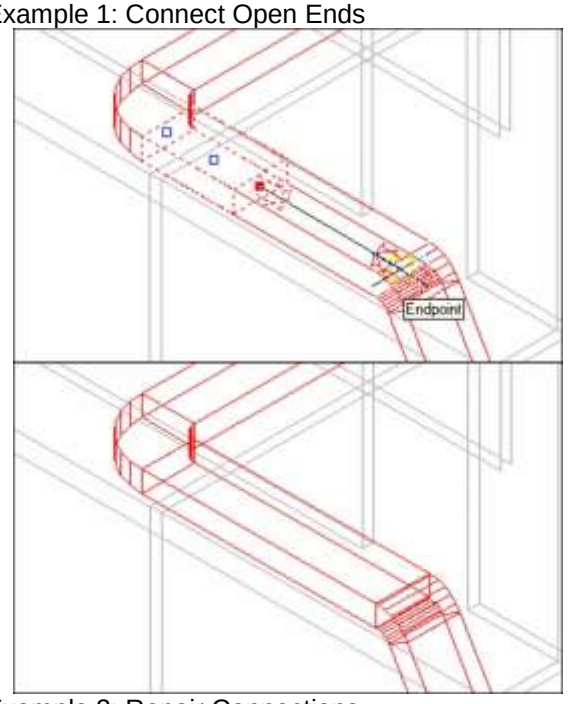


Example 1: Connect Open Ends

Example 2: Repair connections

1. Stretch the duct with the **Continue** command from the open connection to the second duct. Although the connection points of the two ducts have the same position they are not connected yet.

2. Activate the **Repair Connection** command to join the connection points. The two arrows disappear now which shows, that CADvent connected the ducts to one system.



Example 2: Repair Connections

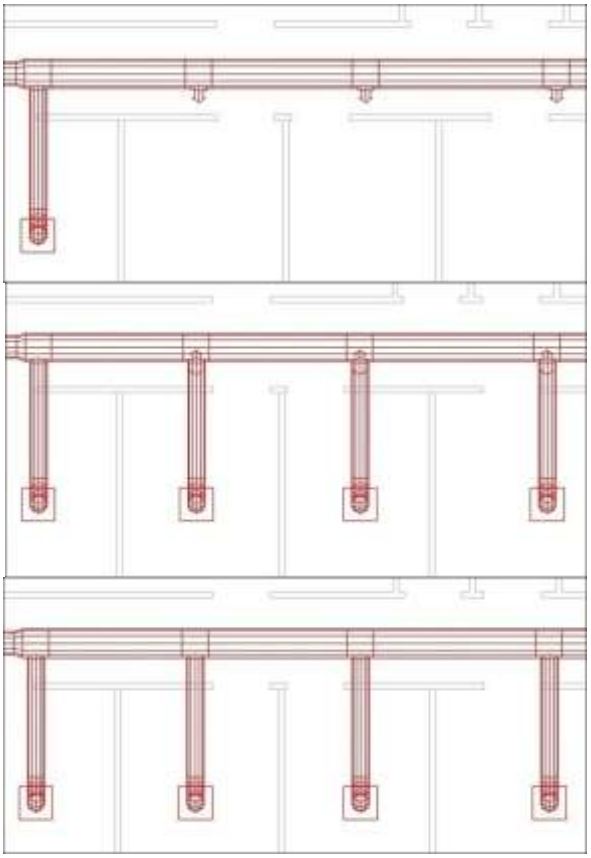
The **Repair connections** function can also be used after moving, copying or arranging of CADvent objects.

Example 3:
The brancch duct on the left hand side of the picture is copied and inserted at the endpoints of the tees.
Although we insert the branch ducts with the OSNAP function at the position so that the connection points of the tees and the branch ducts match each other, CADvent still doesn't know that we want them connected. This is shown with the arrows at the connection points, which means that these ends are open and unconnected.

Execute the command **Repair connections**

, to join the open connection points of the branch ducts with the connection of the tees in the main duct.

NOTE:
All connections must be joined to size and calculate the system. Whenever you see an arrow is this a sign, that your duct system is not enclosed.

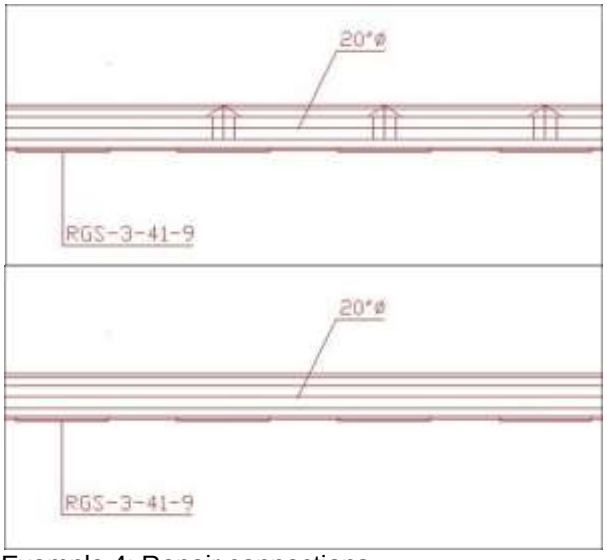

Example 3: Repair connections

Example 4:
The duct grille shown on the left hand side is copied and placed along the side of the duct. CADvent places the three grilles at the right place on the side of the duct, but like in the example before, does not know that we want to have them connected into the duct. As before this is marked with the arrows showing an unconnected endpoint.

Execute the command **Repair connections**

, to join the open connection points of the grilles with the duct.

NOTE:
Usually you cannot join products with having just one connection. You must have two "connection partner" to join components. If necessary CADvent will insert a fitting, e. g. a tee. But there are certain products such as special types of grilles and saddle taps who offer the possibility to be attached to the wall of a duct without having a connection partner.

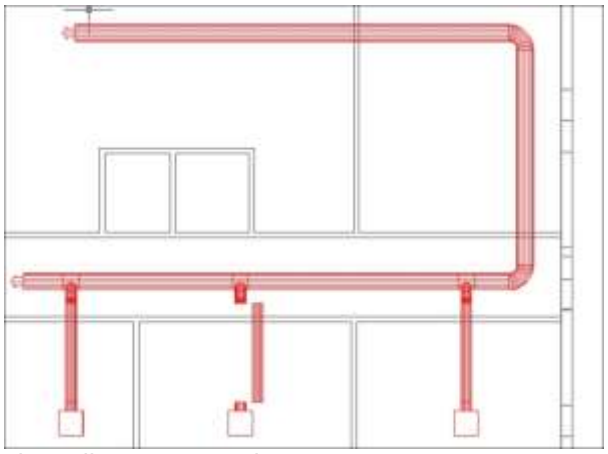


Example 4: Repair connections

Show distant connections command

The command **Show distant connections** shows unclosed connections whose displacement is bigger than the distance defined in the **Project Settings** .

This is a control function. Sometimes components can not be drafted as connected objects, although they are physically connected like in the picture to the right.

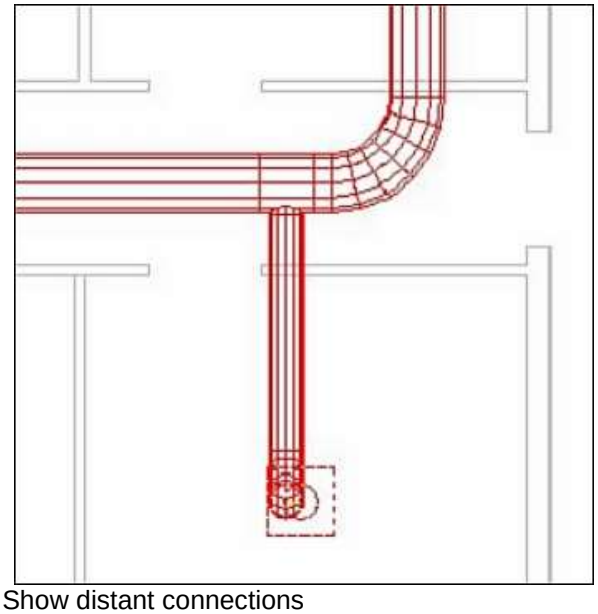


Show distant connections

Example:

After you used the command **Size ducts** the main duct, the tee and the elbow needs to be enlarged. The tee and the branch gets moved to the left to make room for a bigger female coupling.

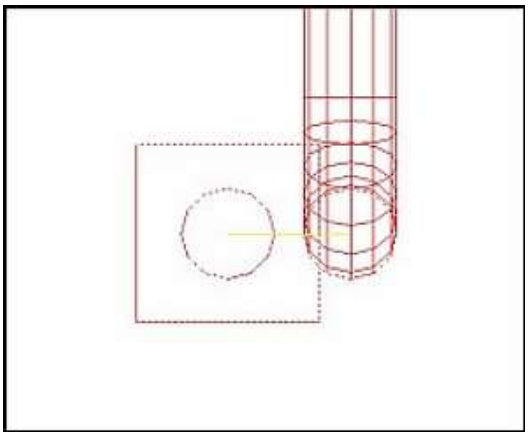
NOTE:
The diffuser keeps its original position. That leads to a displaced connection. Both objects are further on connected, although it does not look like in the drawing. As already described, the best way to check if a connection is joined or not is by looking if there are open arrows showing an unconnected object.
We therefore recommend to use the function *Show unconnected edges* in the **Project Settings** .



Show distant connections

To show the distant connections in a drawing please proceed as followed:

Activate the command **Show distant connections** .
The affected objects are accentuated and a line is shown between the two connected objects.
Restore the connection with the **Smart Adjust** command.

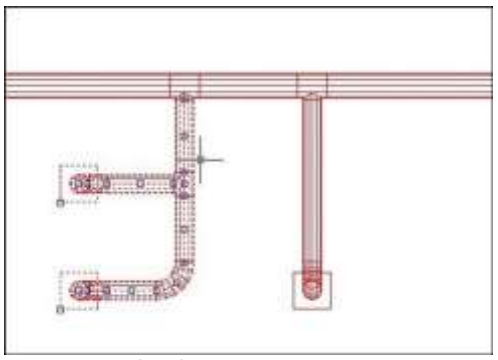


Show distant connections

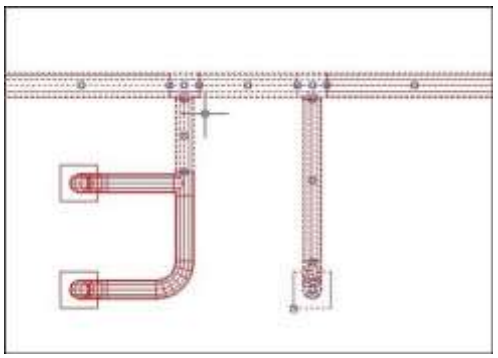
Upstream- / Downstream selection command

The Upstream- / Downstream selection command is very useful to select multiple components in a system, e. g. to attach an insulation within the **Properties** dialog.

Activate the **Upstream- / Downstream selection** command and select a component. All components upstream alternatively downstream that belong to this system are selected automatically. Select the next function that you want to use on your selected components.



Downstream Selection

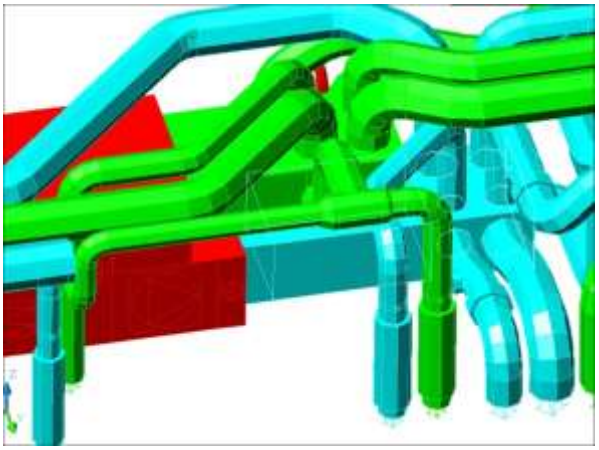


Upstream Selection

NOTE:
The descriptions upstream and downstream do not refer to the direction of the airflow. They are just indicators for the position of the marked components in relation to the selected object.

Show Connected objects command

Activate the **Connected Objects** command. Select a component. All the components connected to this object get marked. This command is usually used when you want to check if all connections are fixed in a complex system like a plenum chamber with several main ducts.



Show connected objects

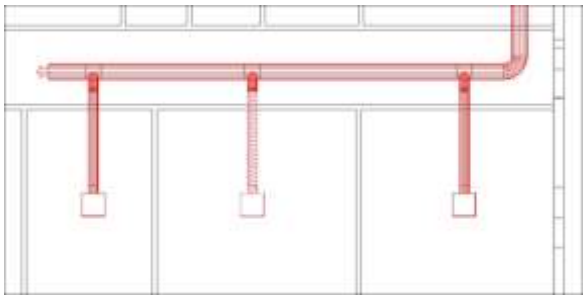
NOTE:
When connected objects are moved away from each other the dialog box shown to the right will be shown. If you click on the “No” button, the components will keep being connected although in the drawing it may look like they are disconnected. If you click on “Yes” they will also get physically disconnected and you must join them again.

Disconnect objects dialog

Show not fitting objects

This function is similar to the **Show distant connections** command. But in opposite the **Show not fitting objects** command shows all connections who are not properly drafted, not just those ones who are over the maximum connection distance.

Activate the **Show not fitting objects** command.
Click on a duct in the system you want to get checked by CADvent. CADvent shows all the connections which are joined but are not drafted properly.
If there are components who do not fit properly, CADvent will show them in the drawing and make a note in the command line which are the products that don't fit. You can select the next connection with the <ENTER> key.


Show not fitting objects

Show not fitting objects – command line

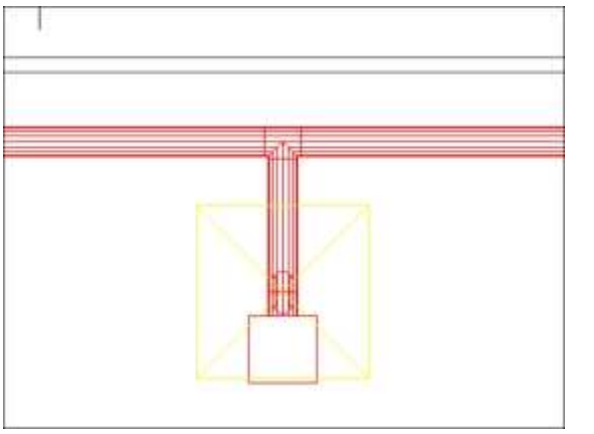
NOTE:
This is a pssive function. The not fitting objects are just shown. Restore the connection with the **Smart Adjust** command.

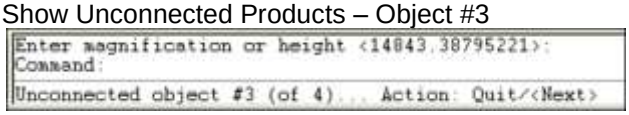
Show Unconnected Products

The **Show Unconnected Products** function is an alternative solution to using the **Show unconnected Edges** option available in the **Project Settings** dialog box, for checking if some objects have not been connected correctly:

1. Select the **Show Unconnected Products** button. CADvent will instruct the user to select the objects for which to verify non-existing connections. CADvent will show the identified unconnected objects one by one, marking the unconnected edges with yellow squares.

2. Select the objects or type <all> to check the entire drawing.


Show Unconnected Products – Object #3



Show Unconnected Products Command Line

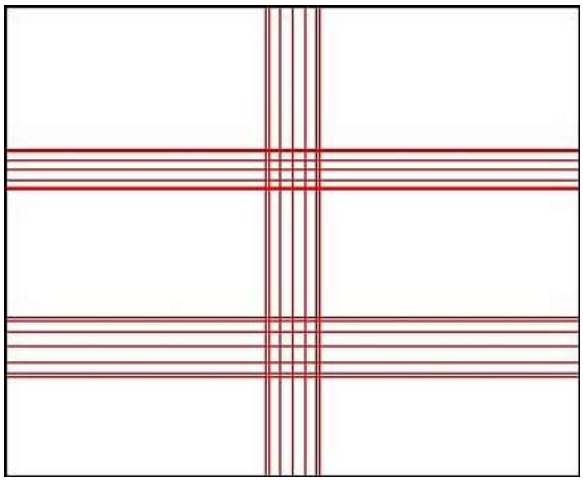
NOTE:
This is a passive function. The not fitting objects are just shown. Restore the connection with the **Repair connection** command.

Clash detection

The **Clash Detection** command checks if there are any CADvent objects in the drawing colliding with each other.

Please proceed as followed to use this function:

1. Activate the command **Clash Detection**



Clash detection

2. CADvent asks you to choose the objects that shall be checked with the clash detection.

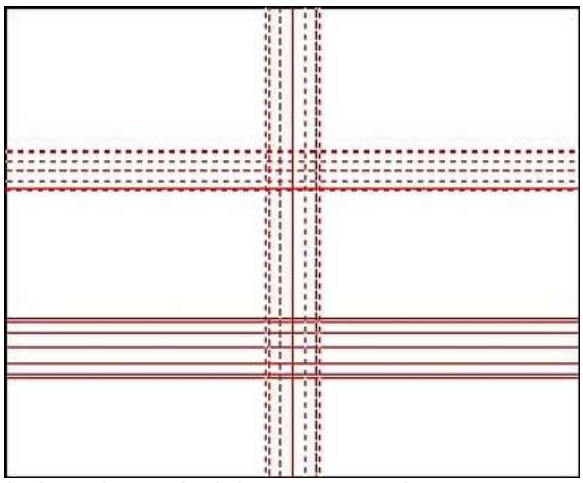
```
Command: _CadvDetectIntersections
Select objects for interference detection ...
Select objects:
```

Clash detection – command line – selection

3. If you want to select all objects in the drawing, please type <all> into the command line and confirm with <ENTER>.
4. CADvent shows the collisions one after the other and marks the affected objects with perforated lines.

```
Select objects:
Filtered out 3 items.
Press any key to show next intersection...
```

Clash detection – command line



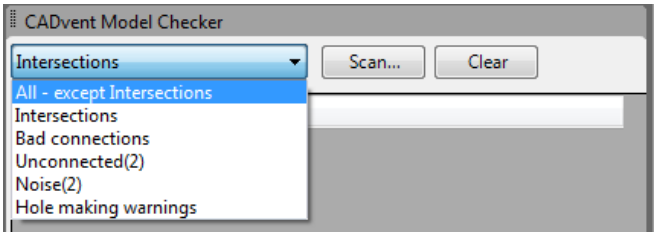
Clash detection – clash between two ducts

To repair the clashes you can use the tools presented in the **Modify toolbar**.

CADvent Model Checker

In CADvent 6.5 the CADvent Model Chcker tab has been introduced. The Model Checker combines several functions to check the objects in the drawing for errors. It is created as a Dashboard and therefore only available from AutoCAD 2007 on forward.
The Model Checker can search for:

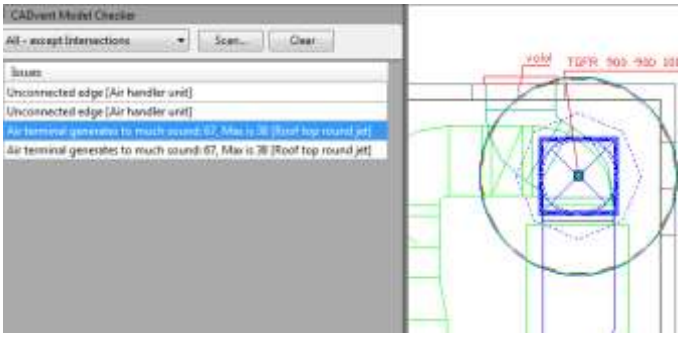
- Intersections
- Bad connections
- Unconnected edges
- Too high sound on diffusers
- And Hole making warnings (on 3D Architectural objects)



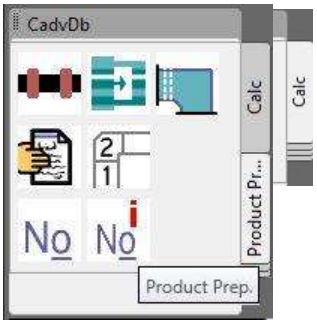
Model check functionc in tab

Select the function you want to be checked and click on the “Scan ...” button.

In the example to the right we ran “All except Intersections”. CADvent returned 4 warnings – two unconnected edges and two too high sound generations.
You can now click the warnings and CADvent will zoom into the selected object


Warnings after scanning the drawing

CADvent Calc & Estimate



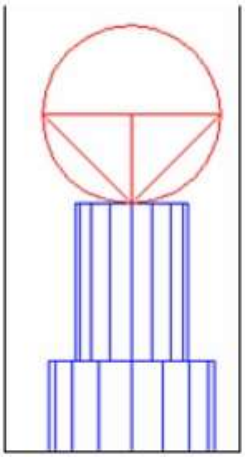
Calculate

Insert a Start symbol

A Start symbol marks the starting point of a system or an air handling unit (AHU). All calculations in this system refer on that point. If you use the piece labelling function, the numbering begins also from this point.

To use the Start symbol, please proceed as followed:

1. Left-click on the button **start symbol**.
2. Select the connection point from which you want to start your calculations (the connection point where the ventilation system is connected to the AHU).



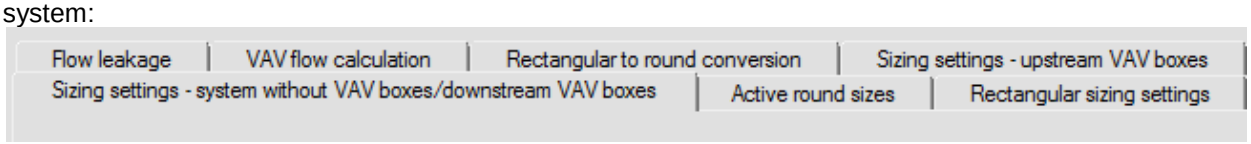
Start symbol inserted and connected to the duct

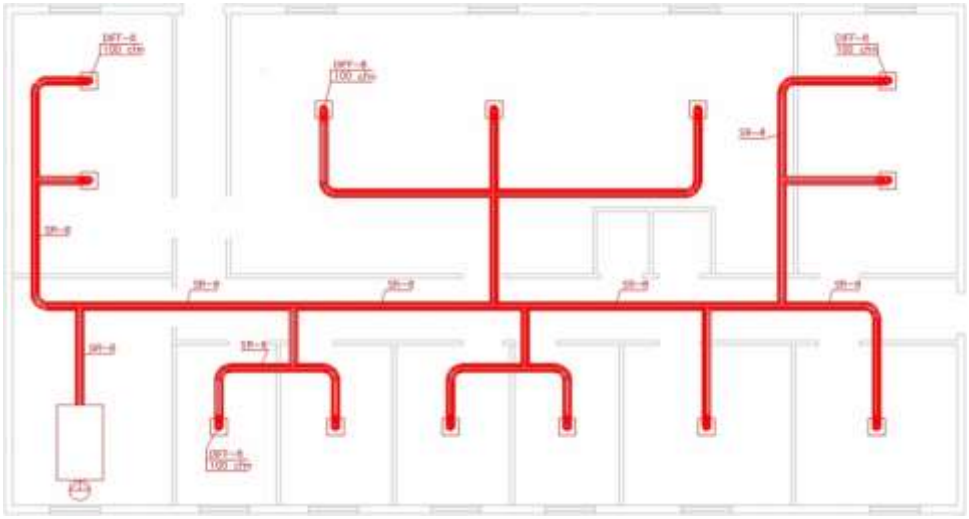
NOTE:
Autonomous of the **System Type** which is selected in the **Project settings** (Area “Current system”) will the Start symbol automatically get the same system type like the component it is connected to. If you change the system type for the Start symbol by using the ***Properties*** button and calculate the system after the change, all components in this system will get the same System type like the Start symbol.

Duct size settings

CADvent is able to size circular ducts autonomously. To use this function you must have a closed duct system with air devices with airflow and a start symbol on one end of the system.

In the **Duct size settings** you can choose between several functions and settings to size your ventilation system:





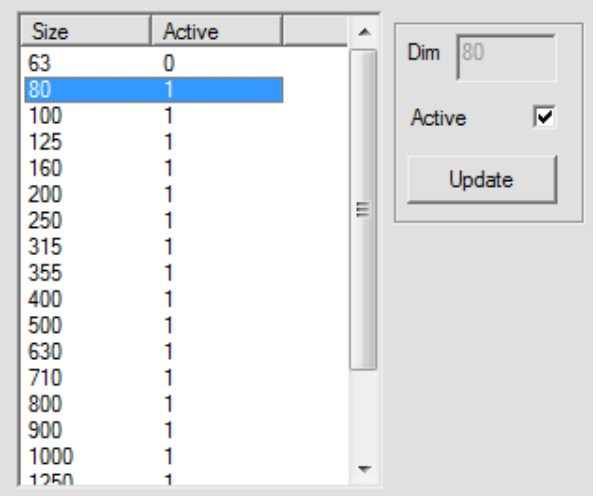
Duct system before automatic sizing

Active round sizes

The submenu ‚Active round sizes' in the duct size settings shows the round duct sizes CADvent shall use when sizing the ducts automatically. All sizes are active as default setting.
When sizing the system automatically, it can be useful that CADvent does not use all possible sizes, but just the most common ones. To deselect sizes, please proceed as followed:

1. Select the designated size from the list.

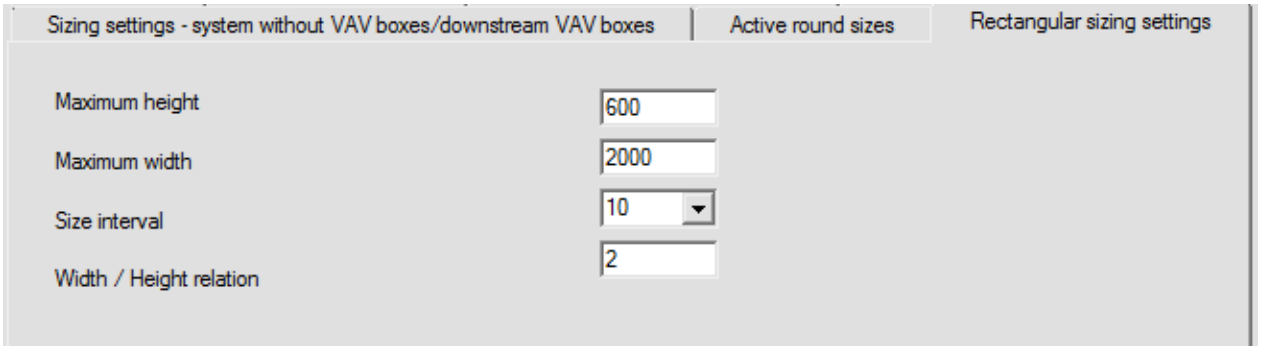
2. Deactivate the 'Active' field and press the 'Update' button.



"Active round sizes" index card

Rectangular sizing:

Click on the index card for rectangular sizing settings. Here you can set the parameters for the automatically sizing of rectangular ducts in CADvent. You are able to set maximum sizes, enter a size interval and the ratio for width and height to be kept. Of course you can lock products in the Properties when you don't want an object to be sized.



"Rectangular sizing settings" index card

Sizing settings – system without VAV-boxes / downstream VAV-boxes

The user can choose between several methods to size the ducts in the system.

Index card "Sizing settings"

Drawn size = max size:
If you activate this control button, the duct size in the drawing can not be enlarged by CADvent, even if the sizing method calculates that it should be enlarged to fulfil the demands. The duct size can just be the same or reduced.

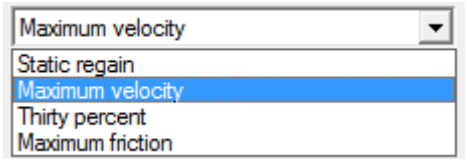
Terminal duct size = terminal connection: If you activate this control button, the terminal duct size will be the same size as the connection diameter to the terminal air device.

Maximum velocity, main duct:
This value is used by all calculation methods to size the duct system or double-check after using another calculation method.

Maximum velocity, terminal duct:
All duct components between a terminal air device and the next connection branch are terminal ducts. This value is used by all calculation methods to size the duct system or double-check after using another calculation method.

Maximum friction:
This value is only used in the sizing method 'Maximum friction' to size the duct system.

Methods to size ducts:



Static regain:
This method calculates the system so that the static pressure in the whole system is approximately the same. The maximum velocity is specified in the first duct after the start symbol. The downward velocity is defined by the design of the duct system. The velocities in the terminal ducts are ignored, therefore it can randomly happen that the velocity in the terminal ducts is higher than allowed. This happens rarely, because the velocity in the downward ducts is usually reduced to keep the static pressure constantly.

Maximum velocity (constant velocity):
This method sizes the duct system according to the maximum velocity the user has chosen for the main and the terminal ducts. CADvent calculates the sizes to get as close as possible to the inserted velocity. If the velocity is too high, the next smaller size will be calculated, so that the maximum velocity gets never exceeded.

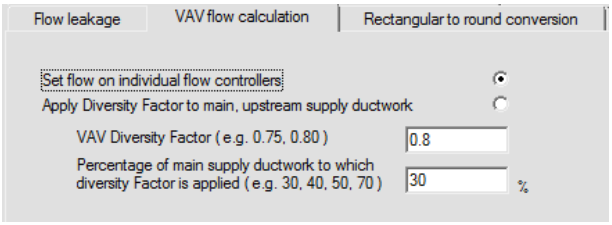
Thirty percent - method:
This calculation method uses the airflow to size the duct system. If the airflow in a branch is 30% or higher than the total airflow, the size of the main duct gets reduced by one size after the branch connection. The branch ducts is sized by the maximum velocity onto the next branch connection. There the 30% method will be used again to check the size of the continuative duct system.

Maximum friction (constant friction):
In this calculation, CADvent tries to size the ducts so that the friction pressure loss per meter is as constant as possible. If CADvent can't find a size with an accurate friction pressure loss the component with the next smaller friction pressure loss is selected. CADvent also checks if the maximum velocity does not get exceeded.

NOTE:
The sizing methods "Static regain" and "30%-method" are usually used only for supply air duct systems.
You can use different sizing methods to size supply and exhaust duct systems.

VAV-flow calculation

The user can choose between two options to optimize the size for duct systems with VAV/CAV-units.



Index card "VAV flow calculation"

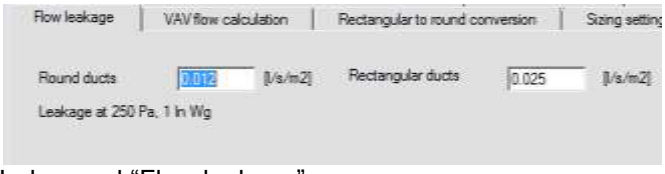
Set flow on individual flow controllers:
This calculation method uses the airflow on CAV-dampers. When you insert a **CAV-damper** (see *CADvent ventilation – CAV-Damper Product Manager*) you can also insert an own airflow for this damper or change it in the *Properties*-dialog. CADvent will use this airflow instead of the airflow of the terminal air devices for the upstream duct system. The airflow will be separated to the air devices according to the percentage of the air device airflow to the total available airflow.

Apply Diversity Factor to main, upstream supply ductwork:
The Diversity Factor is used to set a concomitance for the VAV-units. The user has to insert how high the Diversity factor is at the beginning of the system, which means how many VAV-units are damping how much airflow. A Diversity Factor of 1 means that CADvent calculates with 100% of the available

airflow in the connected air devices. The smaller the Diversity Factor is the more are the VAV-units damping. The Diversity accumulates linearly on the way to the duct system and gets the number 1,0 when streaming through the last VAV-unit.
The Diversity Factor gets only applied on main supply ductwork. Therefore the user has to insert the percentage of the main ductwork in comparison with the total ductwork.

Flow leakage

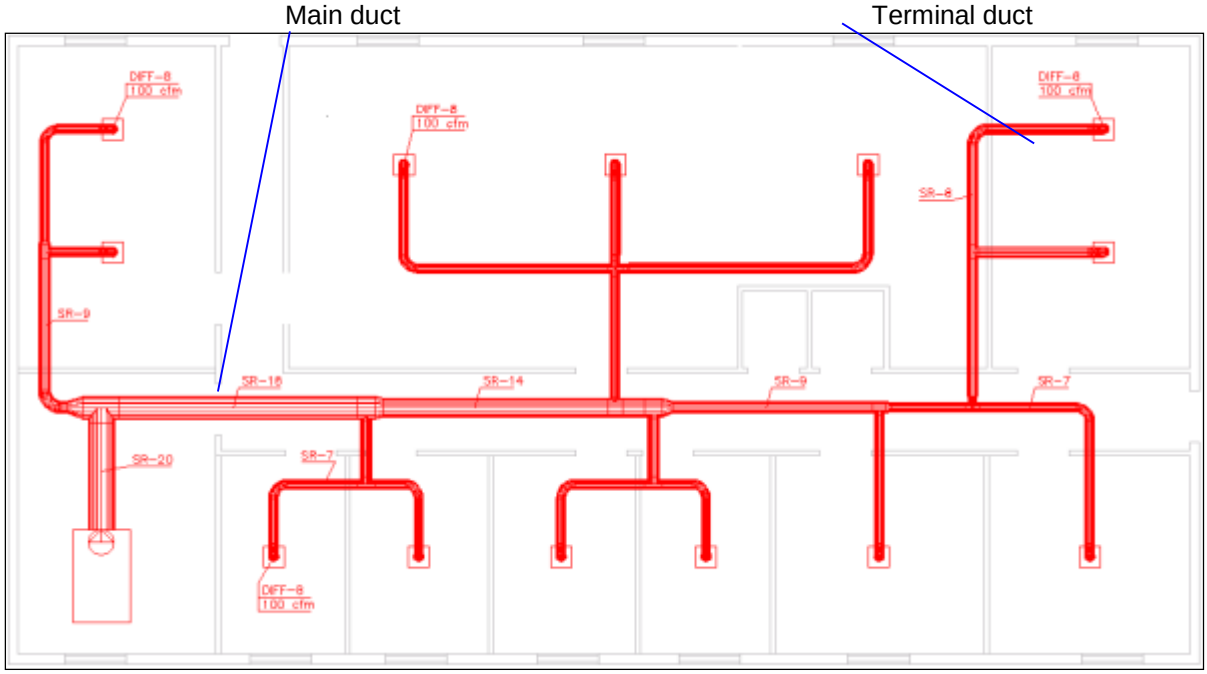
Here you can insert the flow leakage CADvent should include when calculating. You can get these values for Lindab products from our Lindab – Air Duct Systems catalogue according to the EN 12237.



Index card “Flow leakage”

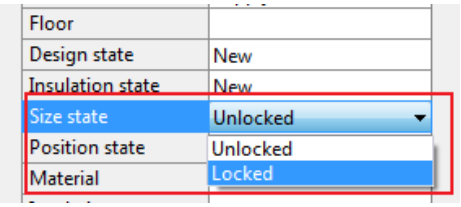
Size ducts

Activate the control button **Size ducts** .
Left-click on a component in the duct system or on the start symbol. The duct gets calculated and sized automatically by the setup you selected in the **Duct size settings dialog** before.



Duct system after sizing

NOTE:
You can manual override objects in CADvent not to be sized in the Properties. Mark the component and set “Size State” parameter to “Locked”, then CADvent will not size this product, but keep the current size.

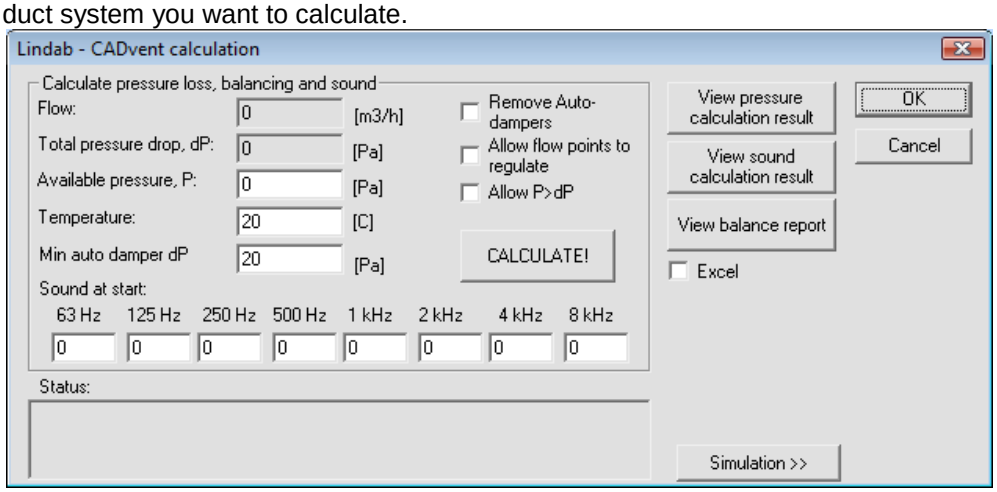


Calculation functions

The calculation function makes pressure loss and sound calculations for the selected duct system and inserts the necessary balancing dampers to balance the system automatically. In the **Balance report** you can also print out the data for the vernier adjustment of the dampers.
The sound data for the components is saved, so you can insert a silencer if necessary and CADvent inserts automatically the necessary damping (see also *CADvent Ventilation – Silencer toolbar*)
If you have not already done it, please insert a start symbol into the place from where you want to calculate your duct system.

To calculate a duct system

Activate the control button **Calculate** and left-click on a component or the start symbol in the duct system you want to calculate.



"Calculate" dialog

Flow: The total airflow of the summation of all air devices and, if setup, the leakage.

Total pressure drop, dp: The pressure drop in the duct system calculated by CADvent to achieve the airflow on all air devices and balance the system.

Available pressure, p: The available pressure at the starting point. CADvent checks if the available pressure is higher than the Total pressure and carries out the necessary changes automatically.

Temperature: The temperature in the duct system (necessary just if you have high temperature to calculate with the correct density).

Min auto damper pressure drop: CADvent calculates always a perfect balancing of all diffusers and inserts dampers automatically if necessary to ensure that the nominal airflow reaches each terminal. Sometimes the user wants to manually change this, as a perfect balancing is not necessary or there are certain zones which need to have an airflow, but not each terminal in this zone.
Therefore the user can now state a value in the calculation dialog. If the pressure drop between the branches with the highest pressure drop is lower than the stated value, CADvent will not insert a damper.
NOTE:
The higher the value, the less dampers will be inserted for balancing, but the less precise the calculation will be. We recommend to keep the value between 10 and 20 Pa

Sound at start: Here you can insert the sound power level spectrum at the start of the system (e.g. to simulate the noise generation from the fan). The unit for the sound spectrum is dB without any filter.

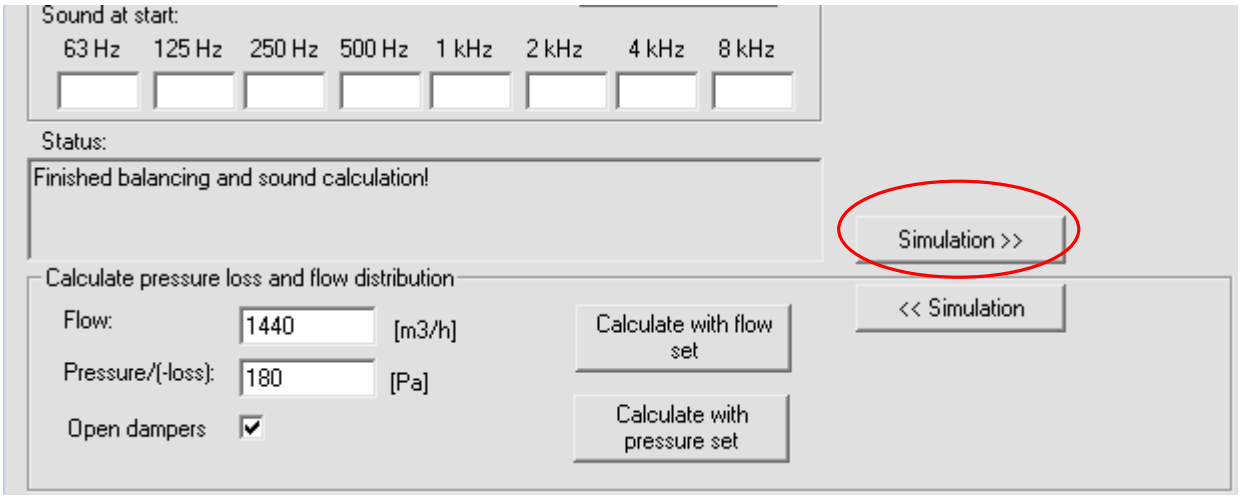
Remove Autodampers: If this control button is activated, CADvent is allowed to remove the automatically inserted dampers again. The function is usually used for multiple calculations.

Allow Flowpoints to regulate: Already in CADvent 5.6 we introduced a function in the calculation dialog which allows the user to regulate flowpoints without inserting a balancing damper.
Mark the check button as shown on the right to allow flow points to balance any pressure drop, uncheck the button if CADvent shall set a balancing damper to balance the pressure on this branch.

Allow p>dp: If this control button is activated, the available pressure is allowed to be higher than the total pressure drop.

To simulate a duct system

If you left-click on the **Simulation** button in the calculation dialog, a drop down menu will appear. Here you can simulate the airflow through the system without adjusting it or with default flow or pressure loss. In this way you can check the efficiency of the duct system without balancing dampers.
If you make a calculation before, the dampers will keep the position from the calculation and you can simulate the airflow in the duct system with a changed airflow or pressure loss value.



"Simulation" dialog

Calculation with given flow:
Calculates the pressure loss with a given total airflow in the system.

1. Enter the total airflow. If this value is missing, CADvent uses the total airflow consisting of the airflows at the air devices.
2. Left-click on the "Calculate with flow set" button.

Calculate with pressure set:
Calculates the total airflow and the airflow for the air devices with a given pressure.

1. Enter the pressure tob e simulated with.
2. Left-click on the "Calculate with pressure set" button.

Open dampers:
If you mark this control button all inserted dampers will be opened, even if they were adjusted before.

NOTE:
The dynamical pressure is regarded as a square function of the airflow in these calculations. Therefore the calculation is just an approximated value.

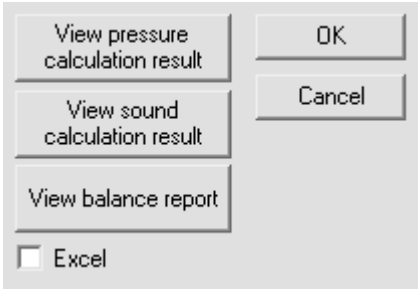
View calculation reports

When running a calculation, every component that belongs to the system and is calculated gets a number. These numbers are shown in the reports. With the Analyze function you can also show the product in the drawing with the related calculation data for sound and airflow. You can left-click on the buttons to show the report.

View pressure calculation result: Shows the calculations for airflow and pressure loss in the calculated system.

View sound calculation result: Shows the calculated sound data for the sound after the component, the attenuation, the sound generation and the possible damping that is needed.

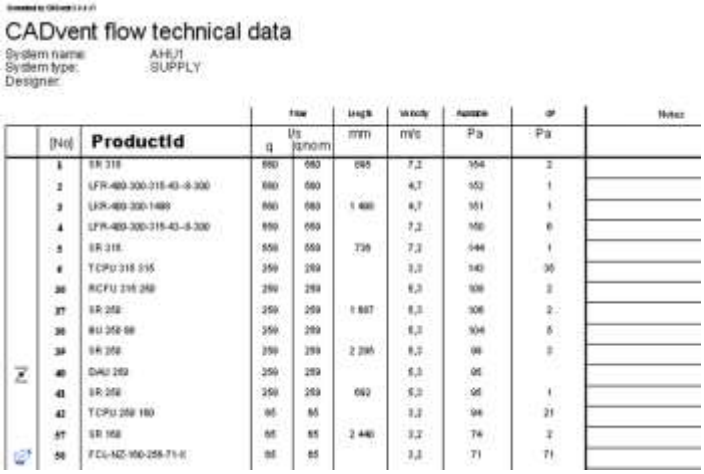
View balance report: The balance report inherits a list of all dampers (incl. dampers in air devices) and the balancing data to make the necessary adjustments for airflow and pressure loss.



"Calculation" dialog with reports

If you activate the control button for Excel, the reports will be transferred and opened in Excel in pre-defined Excel sheets.

Calculation report:
The calculation report demonstrates a nominal / actual airflow comparison together with the calculation number and the Product-ID. It also shows the velocity and the pressure drop for the components as well as the accumulated pressure drop in the system which is shown as "Total pressure drop, dp".


CADvent flow technical data

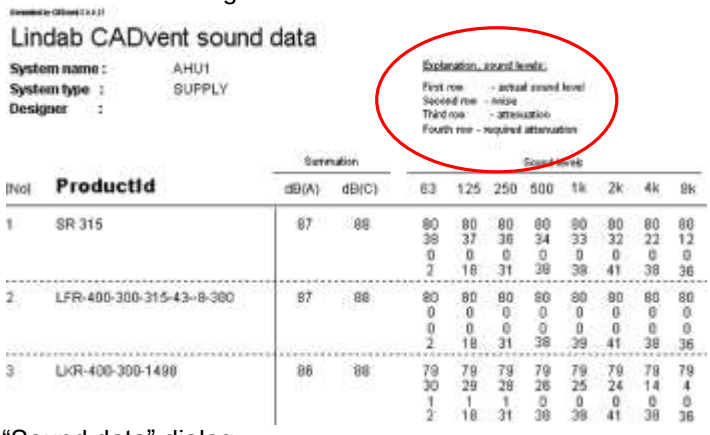
System name: AHU1
System type: SUPPLY
Designer:

[No]	ProductId	q	Vs /qnom	mm	m/s	Pa	Pa
1	SR 315	660	660	695	7,2	154	2
2	LFR-400-300-315-43--8-380	660	660		4,7	153	1
3	LKR-400-300-1490	660	660	1 490	4,7	151	1
4	LFR-400-300-315-43--8-380	660	660		7,2	150	6
5	SR 315	550	550	735	7,2	144	1
6	TCPU 315 315	350	350		3,2	143	36
36	RCFU 315 250	350	350		6,3	106	2
37	SR 250	350	350	1 667	6,3	104	2
38	BU 250 00	350	350		6,3	104	6
39	SR 250	350	350	2 295	6,3	98	0
40	DAU 250	350	350		6,3	98	
41	SR 250	350	350	660	6,3	98	1
42	TCPU 250 160	95	95		3,2	94	21
57	SR 160	95	95	2 440	3,2	74	2
58	FCU-MZ-160-250-71-0	95	95		3,2	71	71

"Airflow data" dialog

Sound report:
The sound data report displays the Productcode together with the calculation number and the summation of the sound spectrum in dB(A) and dB(C).

The four rows on the right hand side have a special relevance. They are used to calculate the duct system by sound generation damping and necessary sound damping to achieve the required sound in the room (see also *Ventilation – Comfort Express*)


Lindab CADvent sound data

System name : AHU1
System type : SUPPLY
Designer :

Explanation, sound levels:
First row - actual sound level
Second row - noise
Third row - attenuation
Fourth row - required attenuation

[No]	ProductId	Summation dB(A)	Summation dB(C)	Sound levels 63	125	250	500	1k	2k	4k	8k
1	SR 315	87	88	80	80	80	80	80	80	80	80
				38	37	36	34	33	32	22	12
				0	0	0	0	0	0	0	0
				2	18	31	38	38	41	38	36
2	LFR-400-300-315-43--8-380	87	88	80	80	80	80	80	80	80	80
				0	0	0	0	0	0	0	0
				0	0	0	0	0	0	0	0
				2	18	31	38	39	41	38	36
3	LKR-400-300-1490	86	88	79	79	79	79	79	79	79	79
				30	29	28	26	25	24	14	4
				1	1	1	0	0	0	0	0
				2	18	31	38	39	41	38	36

"Sound data" dialog

The first row shows the actual sound level in the spectrum after the component.
The second row shows the sound generation created by the component itself, mostly due to fluid dynamics.
The third row shows the attenuation the component generates.
The fourth shows the required attenuation to fulfil the demands you have selected for the diffusers.

NOTE:
The value in the fourth row is just relevant when it is shown on an air device.

Explanation, sound levels:

First row - actual sound level
Second row - noise
Third row - attenuation
Fourth row - required attenuation

Sound levels

63	125	250	500	1k	2k	4k	8k
85	88	89	85	82	79	75	55
31	30	29	27	26	25	15	5
2	2	1	0	0	0	0	0
16	29	37	38	38	36	32	12

Explanation for the sound levels

NOTE:
CADvent calculates in both directions! The program calculates forward from the start point. But when a component is found that has effect on the actual noise level because of it's own noise generation, then does CADvent also calculate backwards again and checks the effect on the components which are laying downstream!

Balance report:

The balance report shows all adjustable products. During the calculation, the dampers are adjusted automatically by CADvent.
In the first column is CADvents internal handle no. displayed. The second column shows the difference between the nominal and the actual airflow without adjusting the damper. The third column shows the component. The fourth and fifth column displays the nominal airflow and the pressure drop.

In the sixth column, the necessary pressure drop to balance the system is shown. In the seventh column the K-factor is displayed, if the data is attached when creating an product from another manufacturer.

The eighth row shows the position the damper should be adjusted to, to achieve the necessary pressure drop displayed in column six.

CADvent Injusteringsprotokoll

Systemnamn : LB1
Systemtyp : SUPPLY
Injusterad av :

Balance report

The balance report can be printed and should be handed over to the workes on the construction place. The report makes it very easy to pre-adjust the ventilation system before launching it for the first time. Furter on it contains all necessary data to use it as journal for the adjustment.

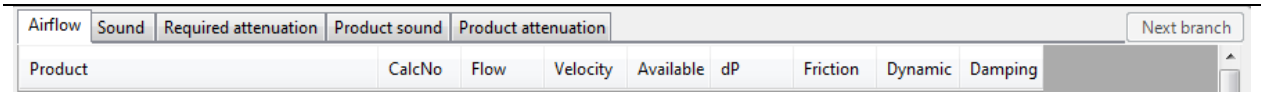
CADvent Analyzer

Instead of printing out the reports and searching for a particular component, you can also activate the **Analyze** function by left-clicking on the shown symbol.
The analyzer function offers the same calculation data like the reports, but you can peek on a certain component to show the specified data.

Pick object:
Left-click on the **Pick object** button and mark the component in the drawing you want the calculation data to be shown.
The object will be marked in the drawing with a line and an arrow in the analyzer chart.

"Analyzer" dialog with picked component

NOTE:
The chart is sorted after the calculation number. Therefore are the calculation numbers for the main duct shown first, then the T-pieces and in the end the terminal ducts and diffusers.



"Analyzer" dialog - functions

Next branch: Jumps to the calculation data of the next subsystem.

Airflow: Shows the flow and pressure drop data per component
Sound: Shows the current sound level per component
Required Att.: Shows the required attenuation per component (should be "0" to fulfill requirements)
Product sound: Shows the self generated sound per product
Product att.: Shows the attenuation for each component

NOTE:
By clicking on the columns you can sort the technical data ascending or descending to find for example the component with the highest pressure loss or the highest sound generation

Legend for the Flow data

Node	Calculation number
Flow	The airflow in the component
Velocity	The average velocity of the airflow in the component
Available	The available pressure on the start of the component
dp	The total pressure loss of the component
Friction	The static pressure loss of the component
Dynamic	The dynamical pressure in the component
Damping	The pressure drop a damper in the component should be adjusted to

Legend for the sound data

dB–A	The sound power level at the end of a component through an A-filter
dB–C	The sound power level at the end of a component through a C-filter
R_63 … R8k	The required attenuation of a component to fulfil the sound requirements at the air devices.
Lw_63 ... Lw_8k	The calculated sound level in the spectrum at the end of the component

Att_63 ... Att_8k	The attenuation of a component
Gen_63 ... Gen_8k	The sound generated from the component

Advanced calculation in CADvent with diffusers and VAV-units

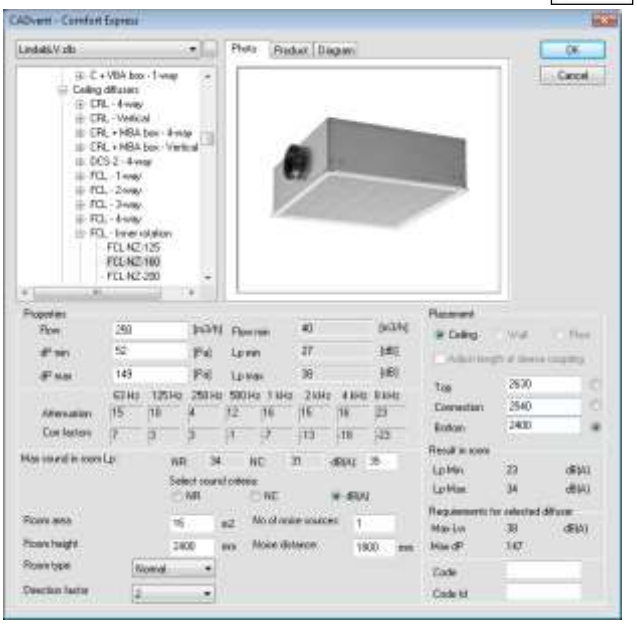
Facilies calculation

These diffusers are configurable and when delivered their nozzle setup is pre set to get the right flow and pressure. The products make the balancing very easy but the hard job is normally to select the right nozzle configuration but in CADvent this data is made automatically.

Select the product

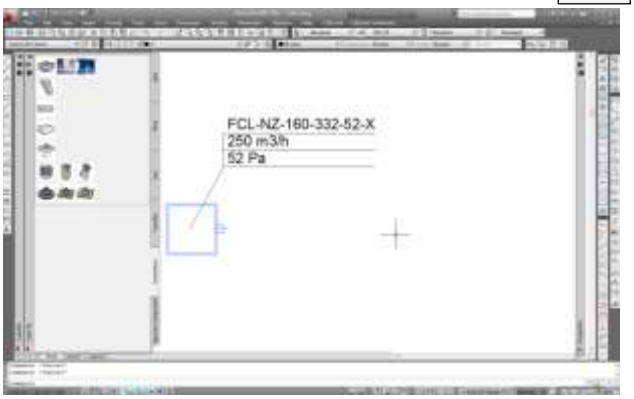
1. Select product to be used in air device dialog, Comfort Express
2. Set flow
3. Set minimum pressure
4. Insert product in drawing

The product is now configured for the flow and minimum pressure.



View product code with configuration setup

1. Use the list command or
2. The text command to see the configuration setting. In the code FCL-NZ-160-332-52-X, the 332 is the nozzle setup.

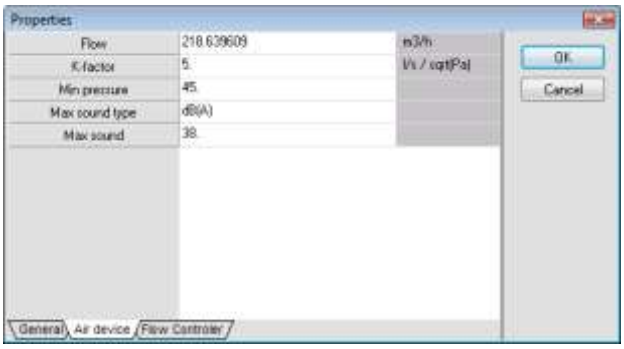


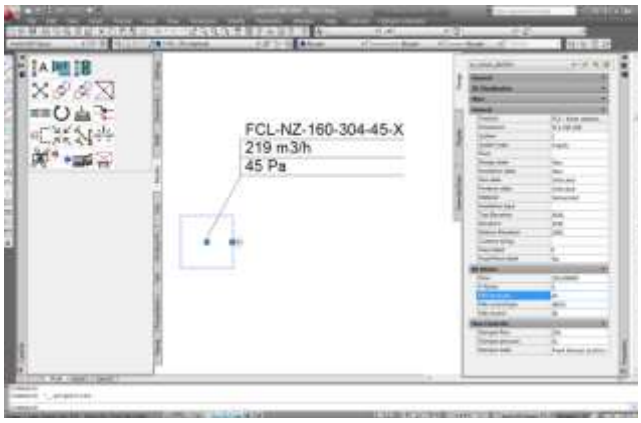
Change product data and get new configuration in Properties

The data of the FCL product can be changed in the property dialog.

1. Set new flow or/and set new pressure
2. Click on OK
3. New product code is shown

The product has many possible configurations and CADvent selects the closest.



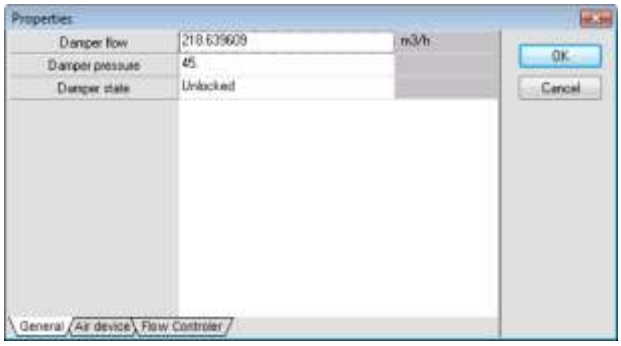


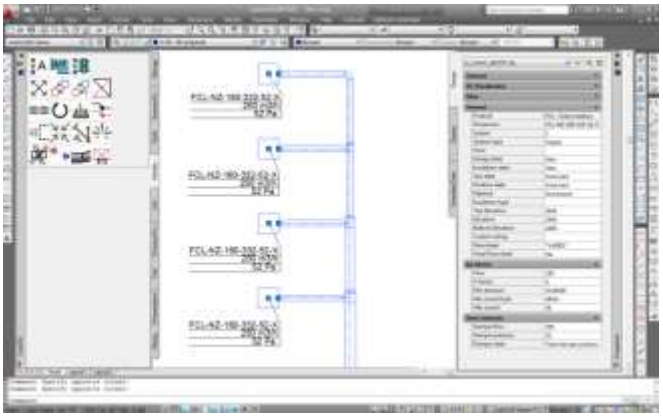
Change product data and get new product configuration w. calculation

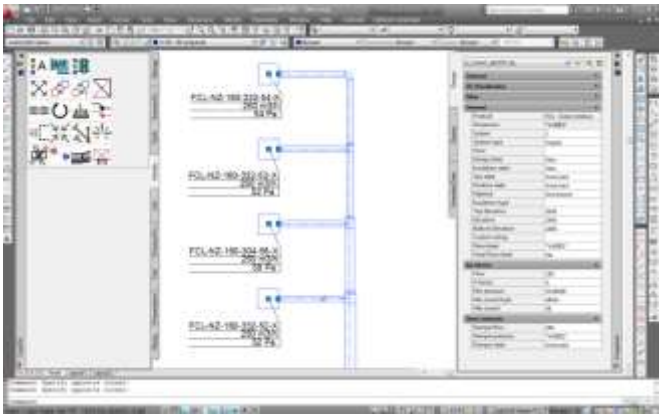
When the diffuser is inserted the nozzle configuration is locked on “Fixed damper position”. If you want CADvent to set different data on all diffusers to get exact balancing go to AutoCAD or CADvent properties and unlock the Damper State. If the Damper State is not “Unlocked”, dampers will be inserted if needed. The flow distribution can be shown by using simulation in the calculation.

1. Select AutoCAD or CADvent properties
2. Select products
3. Go to the Flow controller tab
4. Change the damper state to Unlocked
5. Calculate

The product has many possible configurations and CADvent selects the closest.





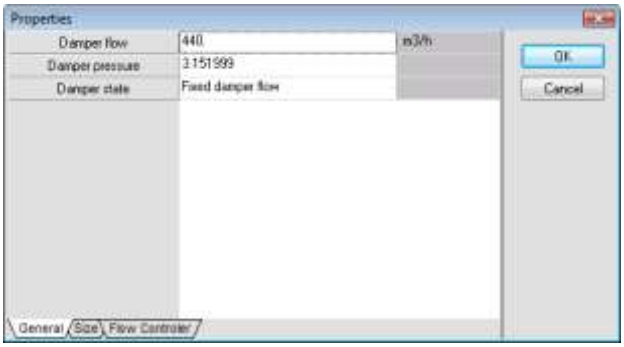


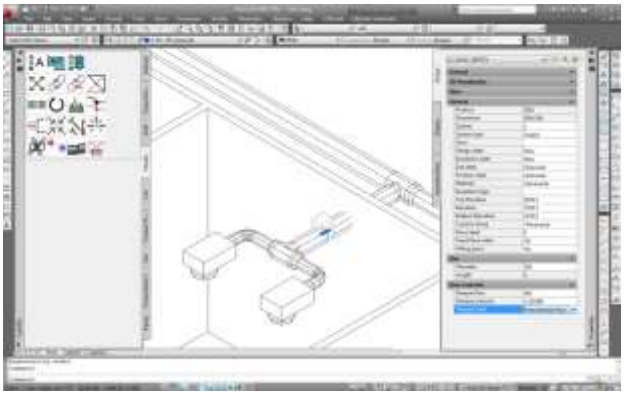
VAV-dampers and constant pressure dampers

All dampers in CADvent can be motorized and controlled by flow or pressure. The motorization is shown with a 3D motor object attached to the damper.

Make a damper motorized

1. Select AutoCAD or CADvent properties.
2. Select the damper(s)
3. Go to the Flow controller tab
4. Select regulation method.
5. Set data for flow and/or pressure
6. The motor is shown in 3D

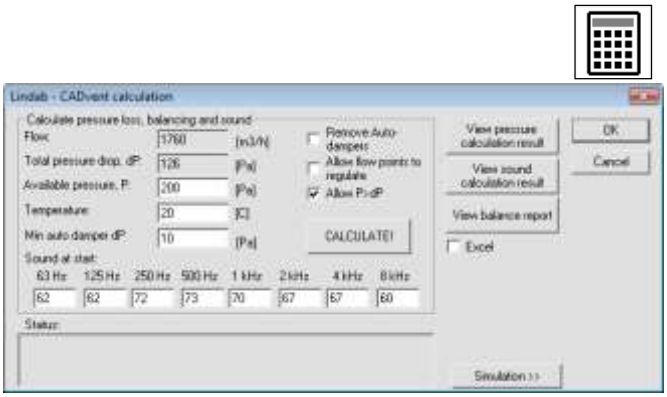




Calculation with VAV dampers

Set fixed fan pressure

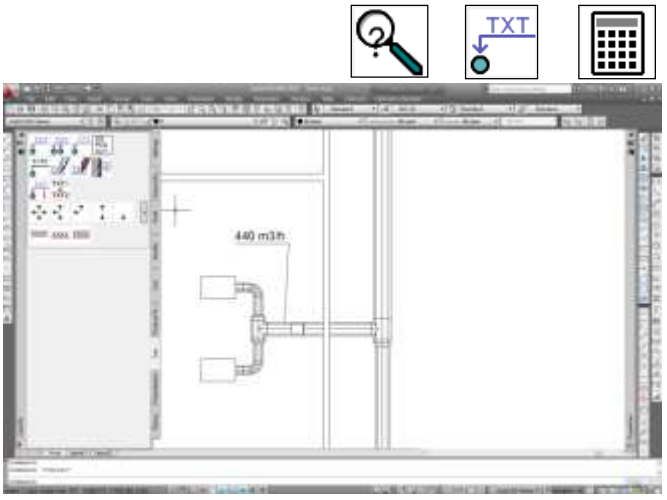
When calculating VAV-system it is normal to keep the fan pressure constant. This is done in the dialog of the calculation by checking the “Allow pressure > dp” and setting the fan pressure in the Available pressure edit box.

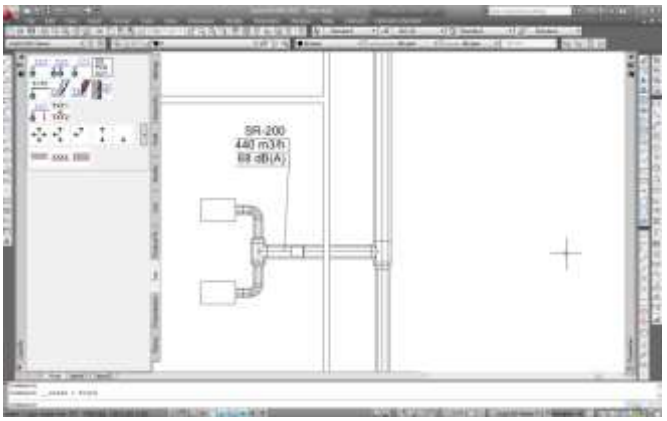


Calculation wit VAV-units

When data has been set according to the previous sections the calculation method in CADvent can start to work.
CADvent uses the data on the dampers to control the flow “below” the dampers in the system.
It is now possible to see the resulting noise levels when a damper starts to close to keep the flow set on the damper. This can be presented either in:

- the calculation report
- text information in the drawing
- the analyze tool



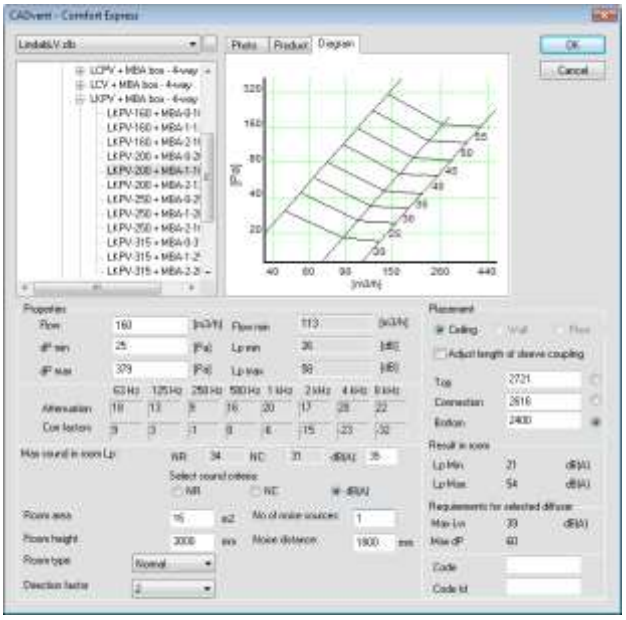


VAV functionality on diffusers

As with the dampers the diffusers can be motorized and control the flow in the room. Normally these diffusers have a damper in the same branch that sees to that the pressure level is almost equal to all diffusers. The diffusers works so that the air flow velocity is kept constant independent of the flow and the pressure over the diffuser is also constant.

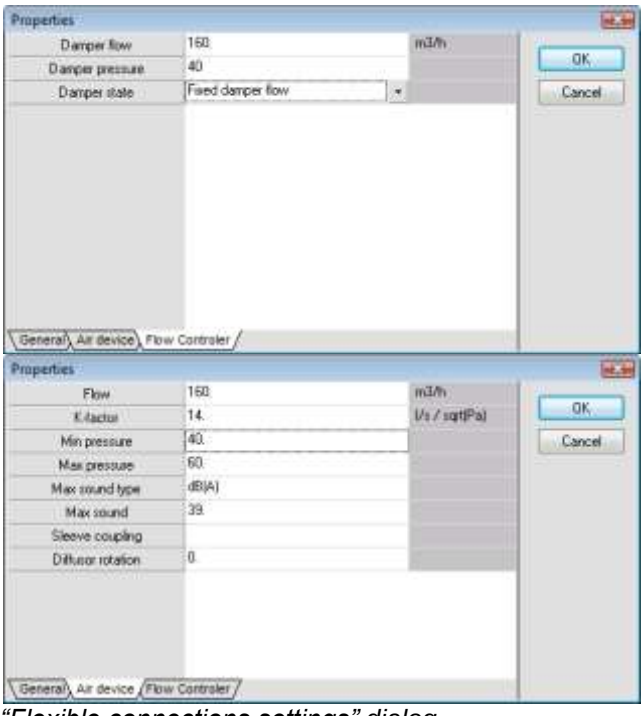
Selecting a VAV diffuser

1. Select VAV diffuser from the component file via Comfort Express.
2. Set flow
3. Set working pressure as dP min
4. Insert diffuser



Make the diffuser motorized

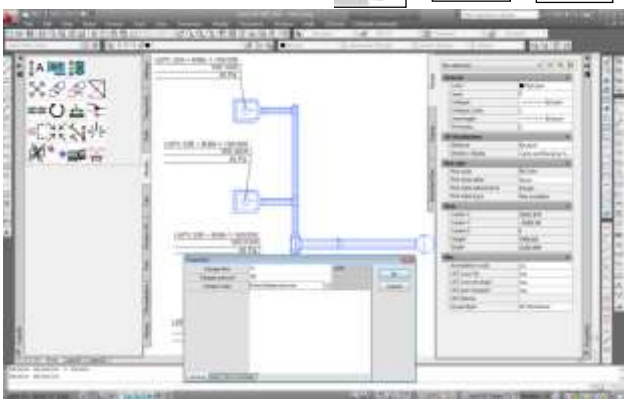
1. Use AutoCAD or CADvent properties to set the Damper state to: Fixed damper flow or to set the Damper state to: Fixed damper state
2. Set the minimum pressure to the configured pressure level for the diffuser



"Flexible connections settings" dialog

Insert branch damper

When the VAV diffusers have been connected to the system insert a branch damper to control the available pressure to the diffusers. If there isn't any damper the flow distribution will not be correct.



1. Find out the pressure level for the damper from the diffusers pressure levels + the pressure drop to the place of the damper position.
2. Calculate the small system to see to that you don't get too much difference in between the rooms. If there are large deviations the flow will not distribute correct.
3. Insert the damper
4. Make it motorized by setting the Damper State to: Fixed damper pressure and entering the pressure level.

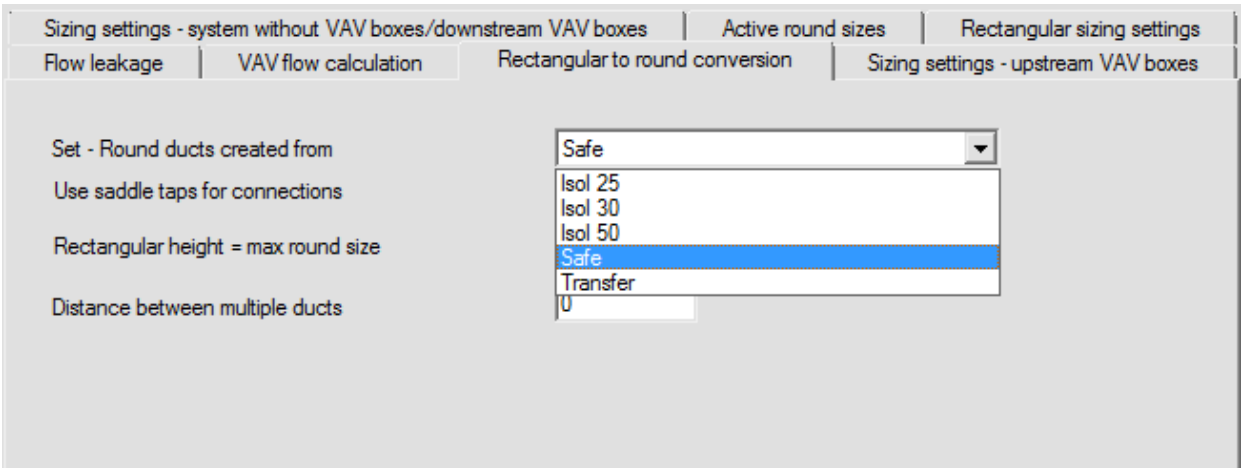
Rectangular to round conversion

To use this function please proceed as followed:

1. Adjust the settings for the rectangular to round conversion in the **Duct size settings dialog** (see below).
2. Left-click on the rect to round conversion button and click on the rectangular duct you want to convert into a round duct.

Settings for the rectangular to round conversion

The settings for the rectangular to round conversion are adjusted in the **Duct size settings**.



"Duct size settings" dialog – rect to round conversion

Set – Round ducts created from:
Here the user can select which duct should be used when converting the duct system. We recommend using the Lindab Safe system if you have no special demands.

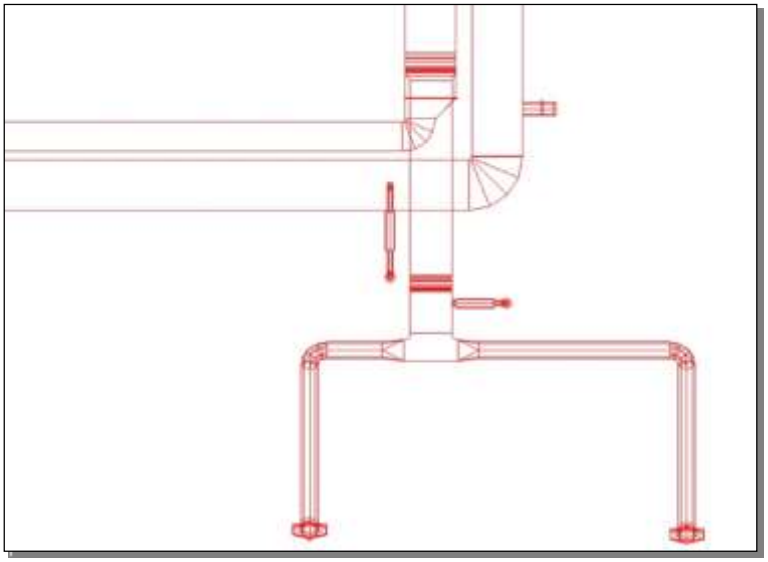
Use saddle taps for connections:
If you activate this control button, CADvent will use saddle taps instead of T-pieces when converting the duct system to round duct.

Rectangular height = max round size:
If you activate this control button the height for the round duct can not be higher than the rectangular duct including the height for the flanges.
If there is not enough height for a single duct, CADvent will insert multiple duct lines in order to get the airflow with low velocity through the duct system.

Distance between multiple ducts:
With this function you can set the distance between multiple ducts (see above). The distance is quoted between the two outer diameters of the ducts.

Connectors command

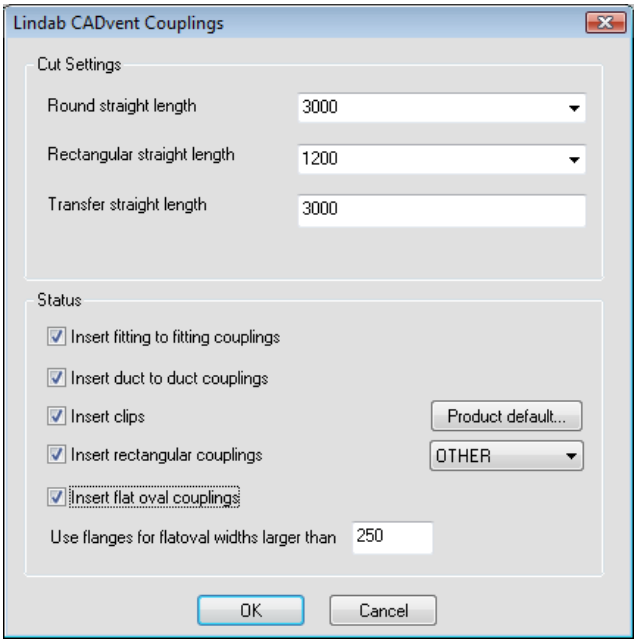
When you have finished drawing the ventilation system and made the necessary calculations, you can insert the connectors for round and rectangular components.



Drawing without inserted connectors

To insert connectors and couplings into the drawing please proceed as followed:

1. Left-click on the control button **Connectors.**
2. Select the components you want to be inserted with connectors or right-click on the mouse to select all components in the drawing.
3. The Connectors dialog opens with the following options:



"Couplings" dialog

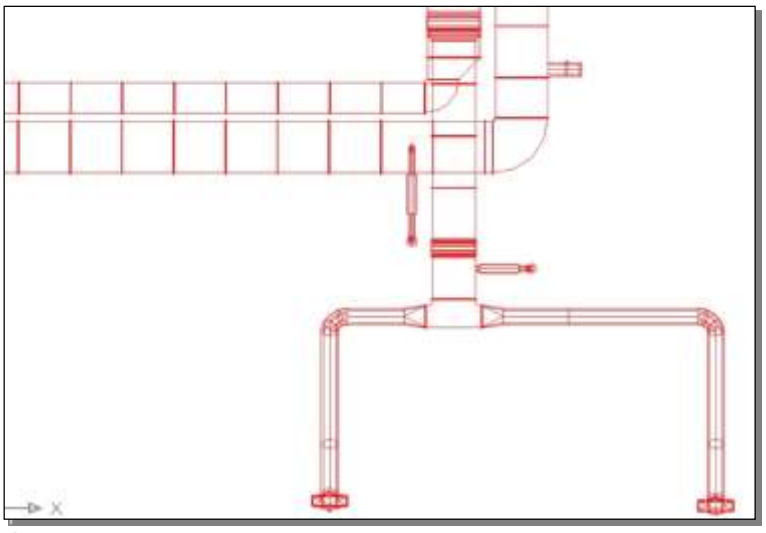
Cut settings:
The user can select the standard lengths for the round Safe system, the Transfer system and rectangular ducts depending on the standard lengths used in the countries.

The connectors will be shown in the Bill-of-Materials together with the number of ducts shown in standard lengths.

NOTE:

The standard length for circular ducts (Safe and Transfer) is usually 3000mm.
The standard length for rectangular ducts is usually between 1200 and 1500mm depending on the countries standardisation.

Status:
The user can select in this dialog the connectors and couplings that shall be inserted into the drawing:
- fitting to fitting (female coupling)
- duct to duct (male coupling)
- clips (Transfer connectors)
- rectangular couplings (flanges)
- flat oval couplings (male and female couplings or flanges according to the size for flat-oval ducts)

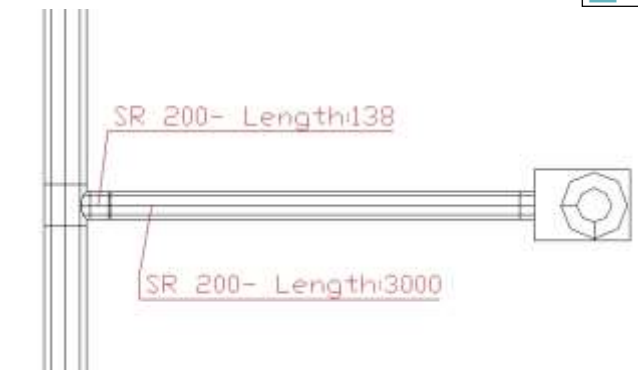

Drawing with inserted connectors

NOTE:
CADvent inserts automatically female couplings with the minimum length between to fittings.

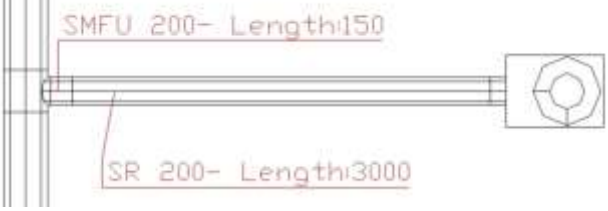
Sliding couplings as connectors

In some cases it seems unnecessary to insert a connector and a short piece of duct. In this case you should use 'Insert Sliding-connectors' command:

1. Select the Insert sliding connector command
2. Select objects
3. Short ducts and couplings are replaced



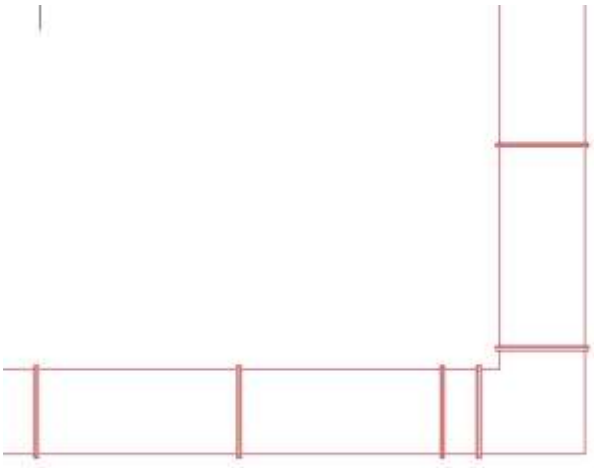
Without sliding coupling



With sliding coupling

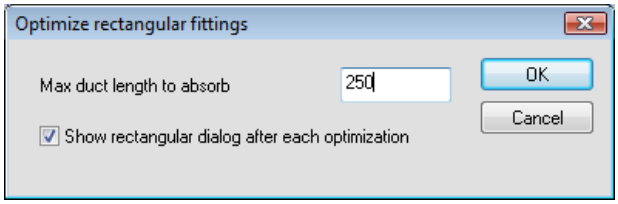
Optimize rectangular fittings function

After applying the **Connectors** command the rectangular duct system can be broken into lengths where it is practical to use the Optimize fittings function. This command applies the possibility of rectangular fittings to stretch the length of certain connections to take away very short straight ducts.



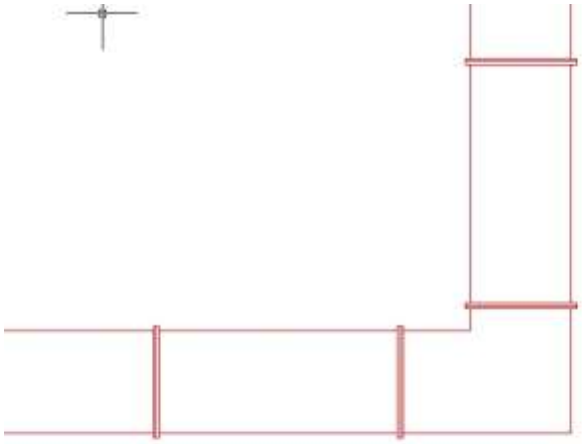
Drawing before optimizing rectangular fittings

Left-click on the **Optimize fittings** button, select the components you want to check manually or right-click on the mouse to select all components in the drawing and enter the maximum distance CADvent should use the command on to optimize lengths.



"Optimize fittings" dialog

CADvent checks now the ventilation system and optimizes the rectangular duct lengths where possible.



Drawing after optimizing rectangular fittings

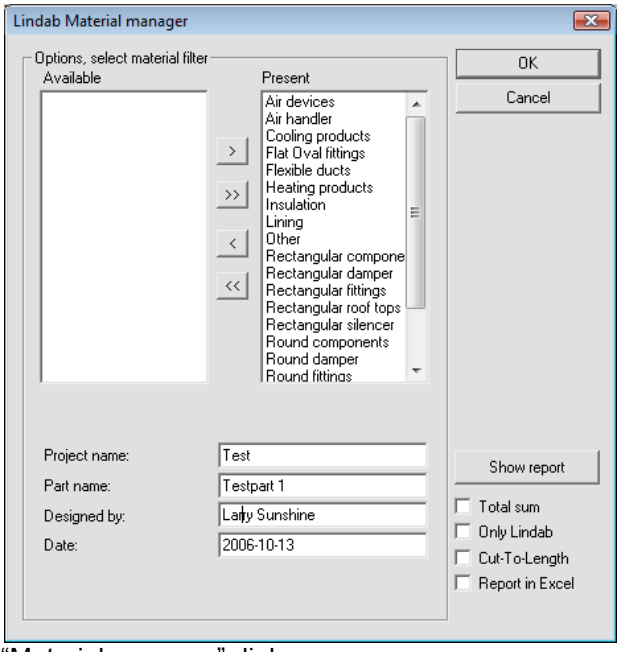
Material toolbar

Bill-of-Materials (BoM)

In the BoM the user can show all the components with their Product-IDs and quantity that are in the drawing or in parts of the drawing. The data can be printed out, transferred to Excel for further handling or in some countries directly be ordered from Lindab.

You have the following functions to use the **BoM**:

1. Left-click on the **Bill of Materials** button.
2. Select the components from the drawing that you want to apply the BoM to, or right-click with the mouse in the drawing to select all components. After the selection the **Material manager** dialog opens.
3. Select the products that you want to be shown in the BoM by clicking on the products and then on the arrows to transfer them between **Available** and **Present** filter. All product groups that are in the **Present** list will be shown in the BoM.
4. You can enter the project information in the lower part of the dialog.
5. You have four control buttons to select additional functions:
   - Total sum: Shows the total number in a product group, not divided by floors
   - Only Lindab: Shows only Lindab products
   - Cut-To-Length: All products are shown in the length like they are in the drawing and not in standard lengths you have chosen in the **Connectors** command.
   - Report in Excel: All data is transferred into Excel, using pre-defined Excel sheets.
6. Left-click on **Show report**.

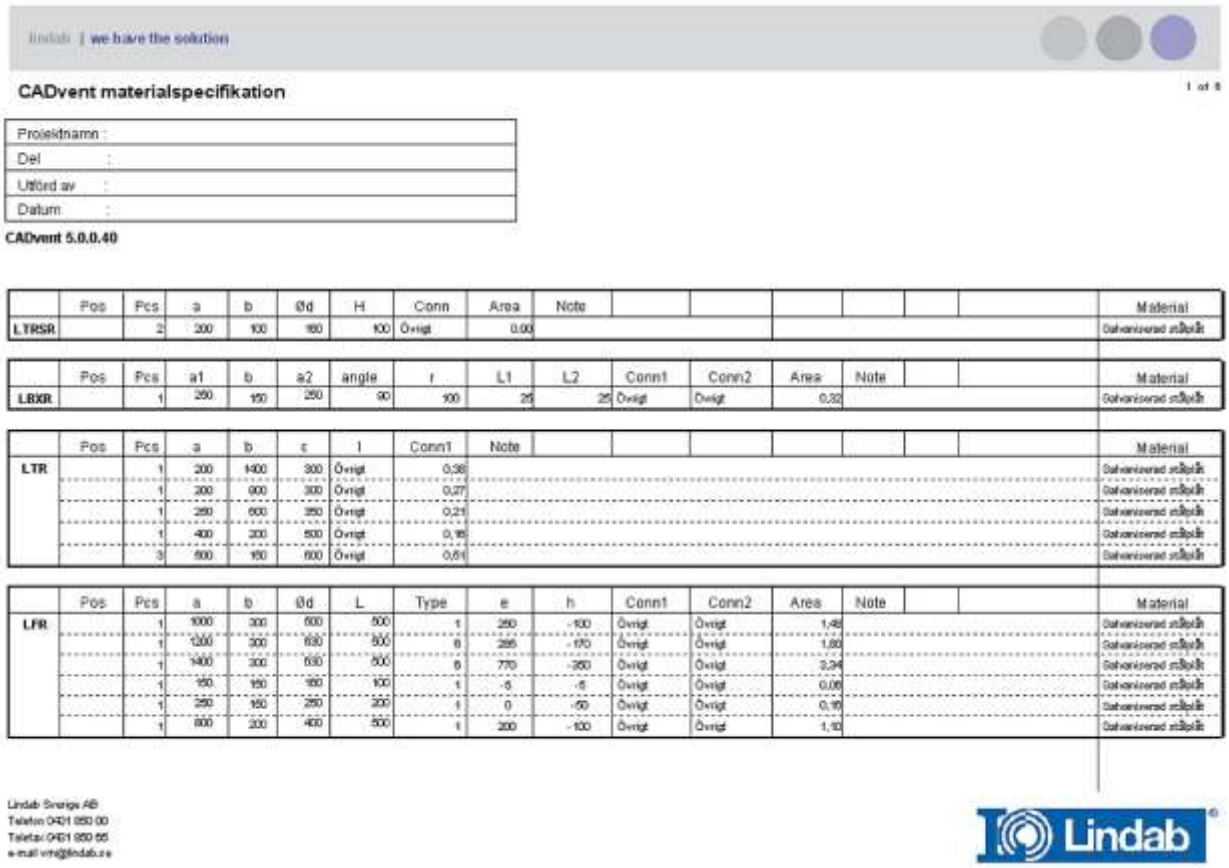


"Material manager" dialog

The BoM is shown in two reports. One report includes the round duct products, air devices, round dampers, round silencers and special components. The other repost shows all rectangular products including rectangular dampers and silencers.

NOTE:
Only components whose **Design state** is set on "New" are shown in the BoM (see also *Modify toolbar – Design state*)

Bill-of-Materials for rectangular components



CADvent materialspecifikation

Projektnamn	:
Del	:
Utförd av	:
Datum	:

CADvent 5.0.0.40

	Pos	Pcs	a	b	Ød	H	Conn	Area	Note	Material
LTRSR		2	200	100	160	100	Övrigt	0,00		

	Pos	Pcs	a1	b	a2	angle	r	L1	L2	Conn1	Conn2	Area	Note	Material
LBXR		1	250	150	250	90	100	25	25	Övrigt	Övrigt	0,02		

	Pos	Pcs	a	b	c	l	Conn1	Note	Material
LTR		1	200	1400	300	Övrigt	0,38		
		1	200	900	300	Övrigt	0,27		
		1	250	600	350	Övrigt	0,21		
		1	400	200	500	Övrigt	0,16		
		3	600	150	600	Övrigt	0,61		

	Pos	Pcs	a	b	Ød	L	Type	e	h	Conn1	Conn2	Area	Note	Material
LFR		1	1000	300	500	500	1	250	-100	Övrigt	Övrigt	1,48		
		1	1200	300	630	500	6	285	-170	Övrigt	Övrigt	1,80		
		1	1400	300	630	500	6	770	-250	Övrigt	Övrigt	3,34		
		1	150	150	160	100	1	-5	-5	Övrigt	Övrigt	0,06		
		1	250	150	250	200	1	0	-50	Övrigt	Övrigt	0,16		
		1	800	200	400	500	1	200	-100	Övrigt	Övrigt	1,10		

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CADvent material dialog for rectangular components

The rectangular components are listed after type and, if available, piece labelling. The report shows the same measures and names like in the rectangular dialogs where you configure the component including the connections (see also *Drawing Methods – Rectangular ducts and fittings with fixed sizes*).
Additional to this data CADvent shows also the surface area, calculated according to the inserted sizes.

Check for Hyperlink

NOTE:
The data shown in this report can change according to the specifications of the country. Therefore it can happen that the same product has different surface areas for example in Denmark and in Germany.

Bill-of-Materials for all non-rectangular components

In this BoM all products are listed, which are not rectangular. Rectangular components can be contained, if these are *Special Components* or air devices.

The BoM lists all products after the following key:

Floor: The

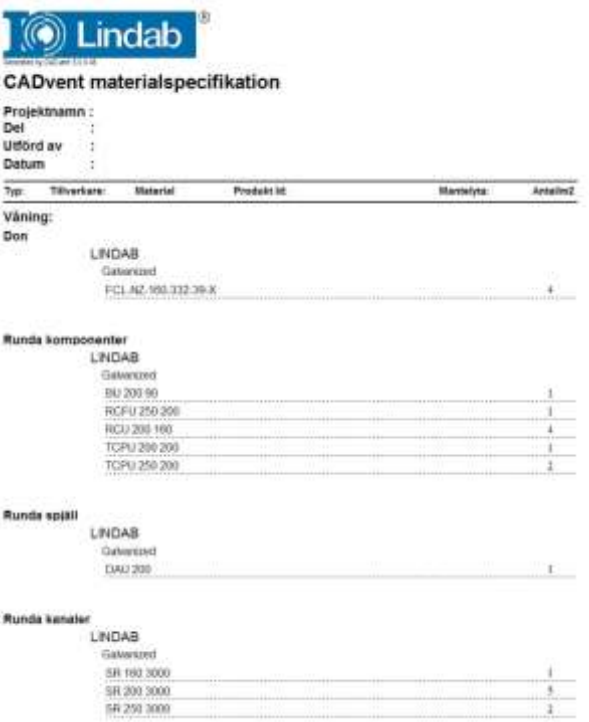
Type: air device, circular component …

Manufacturer: The Manufacturer for the specific component.

Material: The in the **Properties** dialog chosen material, the standard value is ‘Galvanized steel’.

Product ID: From the manufacturer named product description for the component.

Amount: The total sum for every product according to your selection.



Lindab

CADvent materialspecifikation

Projektnamn :
Del :
Utförd av :
Datum :

Typ:	Tillverkare:	Material	Produkt Id:	Mantelyta:	Antal/m2
Våning:					
Don					
	LINDAB				
		Galvanized			
		FCL-NZ-160.332.39-X			4
Runda komponenter					
	LINDAB				
		Galvanized			
		BU 200 90			1
		RCFU 250 200			1
		RCU 200 160			4
		TCPU 200 200			1
		TCPU 250 200			1
Runda spjäll					
	LINDAB				
		Galvanized			
		DAU 200			1
Runda kanaler					
	LINDAB				
		Galvanized			
		SR 160 3000			1
		SR 200 3000			5
		SR 250 3000			1

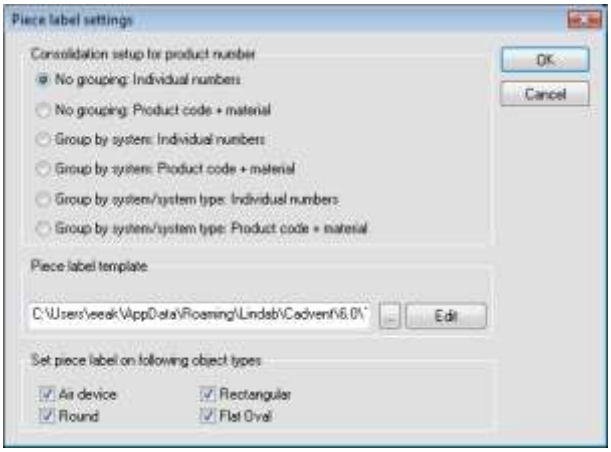
Report for non-rectangular products and air devices

Piece-labelling in CADvent and on BoM

The Piece-labelling function is a good tool to list products in the drawing and on the order after a customized key. Especially rectangular components need to be mounted in the right order and in the correct place as they are very often unique in their sizes.
The Piece-labelling makes it much easier for the workers on the building site, to find the ordered products on the drawings and to mount the ventilation system.

Settings for Piece-labeling

On the right hand side is the Piece label settings dialog shown.
Before you can start with the piece labeling you should make the settings to customize the function to your wishes.



"Piece label settings" dialog

Consolidation setup for product numbers:

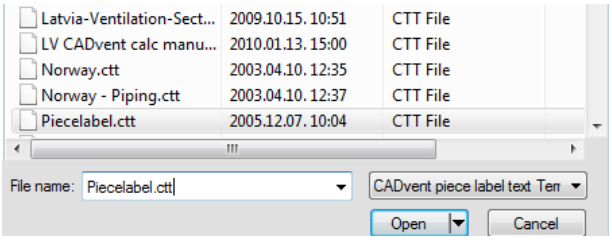
In this domain the user can select which of *CADvents system settings* should be included to customize the numbering:

- No grouping: Individual numbers: If you activate the control button every product will get an own number according to the Piece label template. Each number will be unique in the drawing.
- No grouping: Product code + material: This means that all components who have the same product code and the same material will get the same piece label number
- Group by system: Individual numbers: This setting allows the user to individual numbers for each system. The numbers are unique in each system, but can be repeated for each ystem seperately.
- Group by system: Product code + material: As before, but each product with same product code and same material gets the same number.
- Group by system/system type: Individual numbers: As "Group by system, but here numbers can be repeated for each system type and each system.
- Group by system/system type: Product code + material: As before, but products with similar product code and similar material get the same numbers

Piece label template:

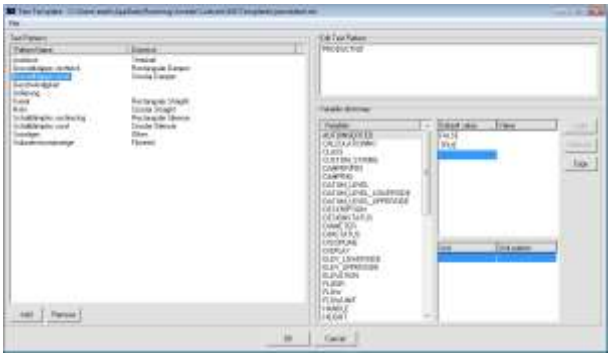
In the Piece label template the user can customize the numbering for the piece labeling.

NOTE:
The piece label template is related and uses functions from the Text template (see also *Advanced project settings*). Before creating or editing your own template you should left-click on the browse button and copy CADvents default template, which is named **piecelabel.ctt**.



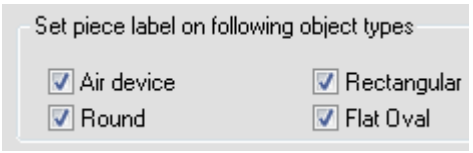
Piece label template as text template

You can select all variables like in the text template to customize your piece label numbers. Make sure that the **Text Pattern** ALWAYS contains the variable **'PRODUCTNO'**. The product number is the piece label according to the selection you made in the **Consolidation setup for product numbers**.


Dialog for the piece label template

Set piece label on following object types:

In this domain the user can select with the control buttons on which object types the piece label function shall be used. Only the selected product types will get a number in the drawing and on the BoM.



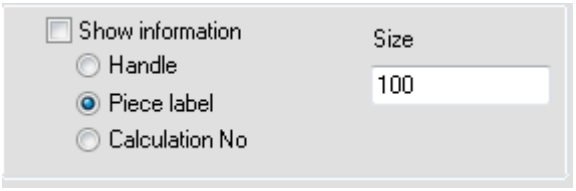
Domain for object types

You can select rectangular, circular, flat oval components and/or air devices.

The selection can be useful if you don't want to set a piece label on all components, but only e. g. the rectangular components.

Show Piece-labeling in drawings

1. Left-click on the **Project settings** dialog
2. Mark the control button **Show information** and left-click on **Product No** to show the piece label information



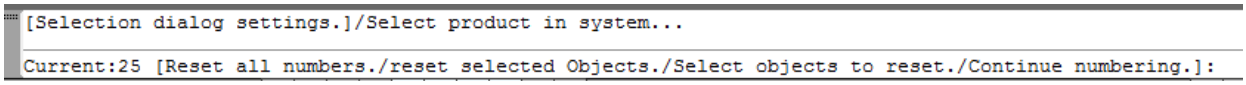
Information domain in the Project settings dialog

You can change the size of the shown information by changing the **Size**.

Update Piece label

The **Update Piece label** function allows the user to execute the piece labelling from the start, to change an already made labelling or to update the piece labelling.

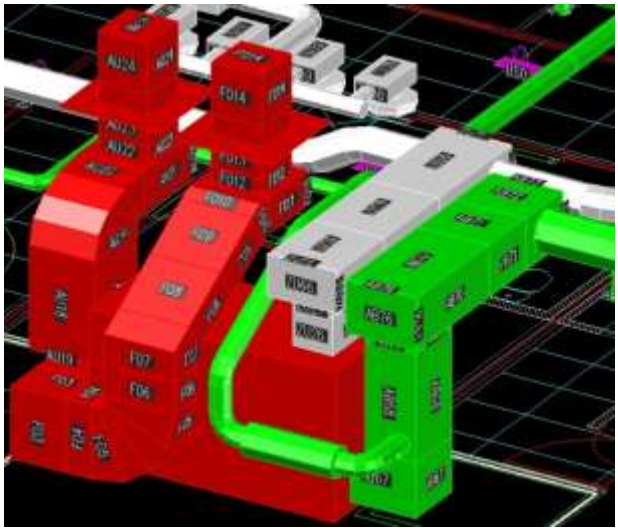
Left-click on the **Update Piece label** button and select the start point for the labelling. Click on the **Start symbol** or the AHU of the duct system that you want to label.



This dialog will show up in the AutoCAD command line.

To start or continue with the piece labeling type now <C> and execute your command with the <ENTER> button.
Your duct system gets now labeled according to your settings, like in the picture on the right hand side.

NOTE:
If the numbering does not show up it may be, that you didn't change the 'Show information' button in the **Project settings**.



Piece-labeling function in the drawing

NOTE:
The texting switches so that you can read the piece label from every angle and viewport.
NOTE:
CADvent continues automatically with the numbering. If the first system ends with number 100, the second system will automatically start with the number 101. To change this start number to e. g. 200, please click on the update piece label button and type <N> to set a new start number. Then the numbering continues with 200.
NOTE:
The numbering will always continue according to your **Piece label settings**. This means, that when you have several systems, you can not start again with the number 1. The lowest number you can continue with is the number CADvent offers.

Material list of a whole system

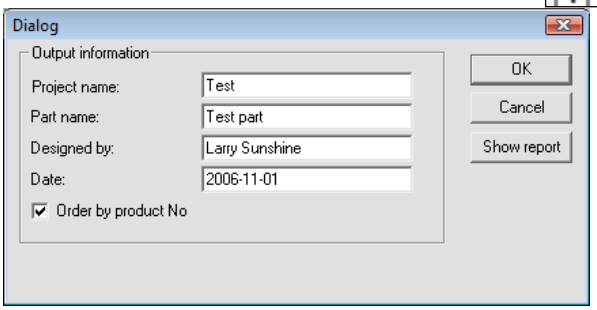
This function allows to show a report of all products which are connected to a specific system with or without piece labeling.

1. Left-click on the **Material specification** command and click on a component in the ventilation system you want to list.

2. Enter the project data like in the picture shown to the left.

3. If you activate the control-button ‘Order by product No’ the products will be listed after their piece label no.

4. Click on **Show report** to display the products in the selected ventilation system. All products in the system are shown with their piece label, the manufacturer and the Product ID.



Material specification dialog

The material report is divided into two separate reports, one for circular ducts and fittings and technical components (picture on the right) and in rectangular components (picture below).

Lindab

CADvent materialspecifikation

Projektnamn : Test
Del : Test part
Utförd av : Larry Sunshine
Datum : 2006-11-01

Produkt nr.	Tillverkare:	Produkt Id:
1	LINDAB	SR 250 2010
2	LINDAB	TCPU 250 200
3	LINDAB	SR 250 1288
4	LINDAB	TCPU 250 200
5	LINDAB	RCPU 250 200
6	LINDAB	SR 200 1285
7	LINDAB	TCPU 200 200
8	LINDAB	SR 200 1734
9	LINDAB	BU 200 90
10	LINDAB	SR 200 2626
11	LINDAB	RCU 200 160
12	LINDAB	SR 160 95
13	Lindab	FCL-NZ-160-332-39-X
14	LINDAB	SR 200 2701
15	LINDAB	RCU 200 160
16	LINDAB	SR 160 95
17	Lindab	FCL-NZ-160-332-39-X
18	LINDAB	SR 200 2679
19	LINDAB	RCU 200 160
20	LINDAB	SR 160 95
21	Lindab	FCL-NZ-160-332-39-X
22	LINDAB	SR 200 682
23	LINDAB	DAU 200
24	LINDAB	SR 200 1716
25	LINDAB	RCU 200 160
26	LINDAB	SR 160 95
27	Lindab	FCL-NZ-160-332-39-X

	Pos	Pcs														Material

	Pos	Pcs	a1	b	a2	angle	r	L1	L2	Conn1	Conn2	Area	Note			Material
LBXR	61	1	1200	2000	1950	90	200	50	50	LS	LS	15.37				Galvaniserad stålplåt

	Pos	Pcs	a	b	c	l	Conn1	Note								Material
LTR	69	1	700	2000	800	LS	0.64									Galvaniserad stålplåt
	96	1	800	800	900	LS	0.39									Galvaniserad stålplåt
	22	1	950	800	1050	LS	0.43									Galvaniserad stålplåt

	Pos	Pcs	a	b	Ød	L	Type	e	h	Conn1	Conn2	Area	Note			Material
LFR	33	1	1200	1200	1250	385	1	25	25	LS	Other	1.86				Galvaniserad stålplåt
	64	1	500	500	500	100	1	0	0	LS	Other	0.20				Galvaniserad stålplåt
	60	1	525	525	500	350	1	38	13	LS	Other	0.77				Galvaniserad stålplåt
	49	4	700	725	400	580	4	150	325	LS	Other	7.77				Galvaniserad stålplåt
	98	1	800	800	630	350	1	85	85	LS	Other	1.18				Galvaniserad stålplåt
	95	1	800	800	800	300	1	0	0	LS	Other	0.96				Galvaniserad stålplåt
	12	1	800	800	800	385	1	0	0	LS	Other	1.17				Galvaniserad stålplåt

	Pos	Pcs														Material
LKCR	4	2	400	400												Galvaniserad stålplåt

Total Flow

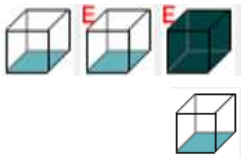
The Total flow function shows the total airflow of an air device. Left-click on the **Total flow** command and then on the air device or air devices you want to check. When you are finished with the selection confirm your selection with <ENTER>.

The dialog shows then the total airflow in the AutoCAD command line:

```
OUTLET: 1998 m3/h (1998 m3/h nominal flow)
Command:
```

NOTE:
The airflow of a single terminal device is also shown in the **Properties** dialog.

CADvent Text & 2D



Plane Drawing

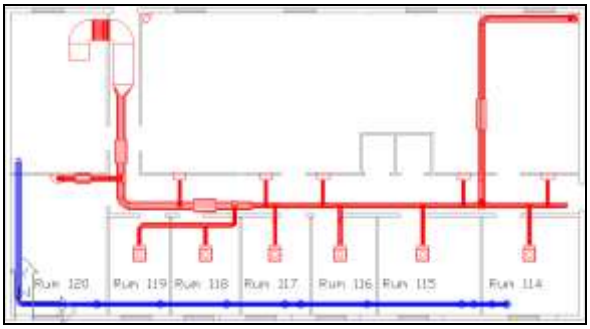
Creating a 2D Drawing

3D model of a duct system can be converted to a 2D drawing. The 2D drawing can be created as an internal block or as an external drawing.

The appearance of a 2D drawing can easily be updated, regardless of its format.

To create a 2D drawing:

1. Open the **Create 2D drawing** dialog box.



3D Model

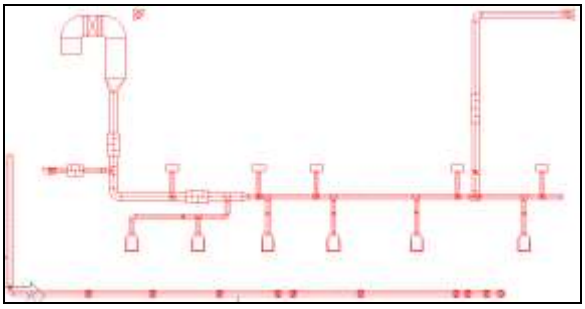
2. In the Selection section, choose the objects to include in the 2D drawing. The options for doing this include:

   Select objects: Allows user to choose specific products to include in the drawing.
   All: Selects all the objects in the drawing.
   Floor: Allows the user to create a 2D drawing floor by floor. Note: Ducts must have been assigned a value for the variable "floor" to select this option.

Create 2D Dialog Box

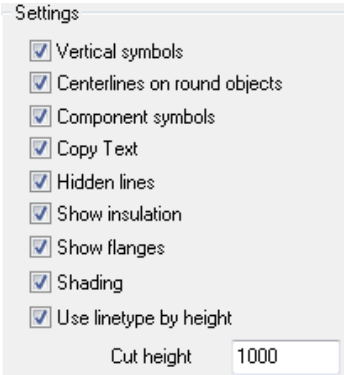
3. In the Output section, select how the 2D drawing will be displayed. The options for doing this include:

   Block: Creates an internal block. Remember not to use spaces when naming the block.
   Drawing: Creates an external drawing. In the space to the right, give the drawing a name and specify a path. (Use the (...) button to browse to the folder under which to save the drawing.)
4. Specify the desired Settings for the 2D drawing. If you have checked “Include XREF in 2D” then the currently attached XREF(s) will also be shown in the 2D drawing.
5. Click *Insert* to create the 2D drawing. If creating an internal block, specify insertion point, scale factors and rotation angle.



2D as an External Drawing

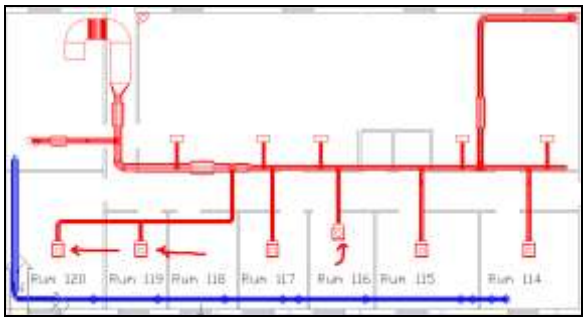
Note:
The insertion point for the above block is (0,0,0). The duct system retains its coordinates based on the insertion point. By using (0,0,0) the existing information in the drawing (text, architectural background, etc.) can be retained.
On the right hand side of the dialog you have some settings to show or hide 2D symbols, text and adjust the linetype to the elevation of the duct in 3D.
The Shading function fills the ducts completely with colour, even in 2D. The colour for the filling can be added or adjusted in the CADvent Layer Properties.



Updating 2D Information After Changing 3D Model

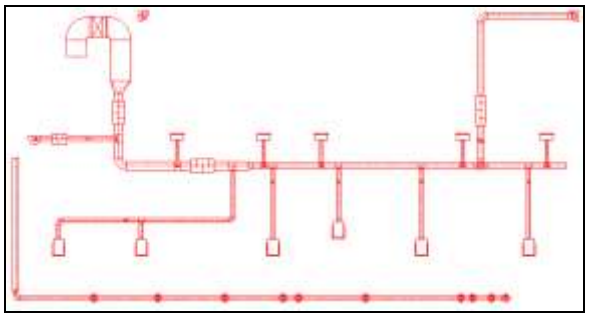
If changes are made to the 3D model and a 2D drawing was already inserted, this should be updated by repeating the same steps as described under **Creating a 2D Drawing**.

1. Open the **Create 2D Drawing** dialog box.
2. In the Selection section, choose the objects to include in the 2D drawing.
3. Make sure that the name of the block indicated is the correct one.
4. Select *Insert* to update the 2D drawing.



Changed 3D Model

Create 2D Dialog Box



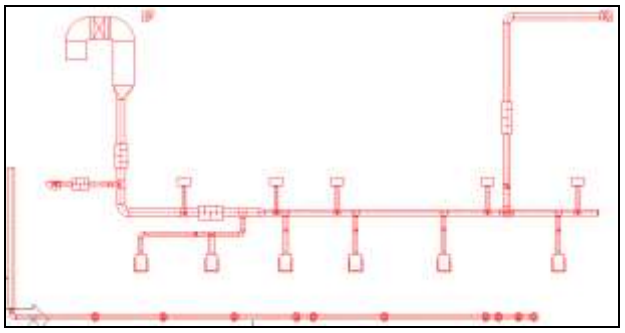
Changed 2D Drawing

2D Express – Show

The **2D Express – Show** function displays the drawing in a format that can be plotted. The function is especially useful if the drawing only contains a single floor.

To display the drawing in 2D:

1. Select the **2D Express – Show** button. CADvent automatically displays the 2D drawing, with all 3D objects hidden. Note: The architectural drawing doesn't disappear!



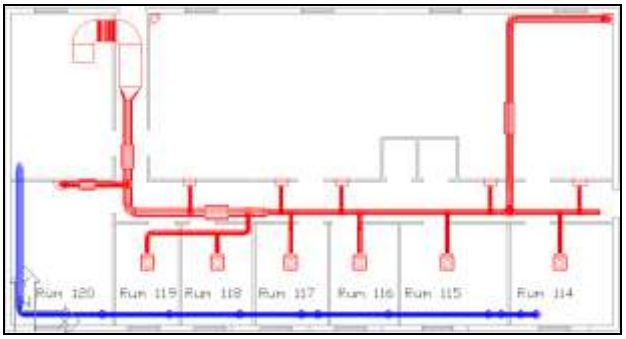
2D Express-Show

2D Express – Hide

When the drawing has been displayed in 2D, the **2D Express - Hide** function returns to the 3D model.

To display the drawing in 3D:

Select the **2D Express – hide** button. The 2D drawing will disappear and all 3D objects will reappear.



2D Express-Hide

2D Section

This function allows the user to create 2D cross sections from your 3D drawing.

Press the button, then you set the first point of a straight section line or select "P" to make poly section line.

When finished with your straight or poly section line you are asked to set the section depth then the dialog to the left will be shown. Here you can give a section name, set an elevation for the section and auto text the section.

```
Command: _CADvCut
[Poly/Edit/Update all/Copy]/First point of section line...
```

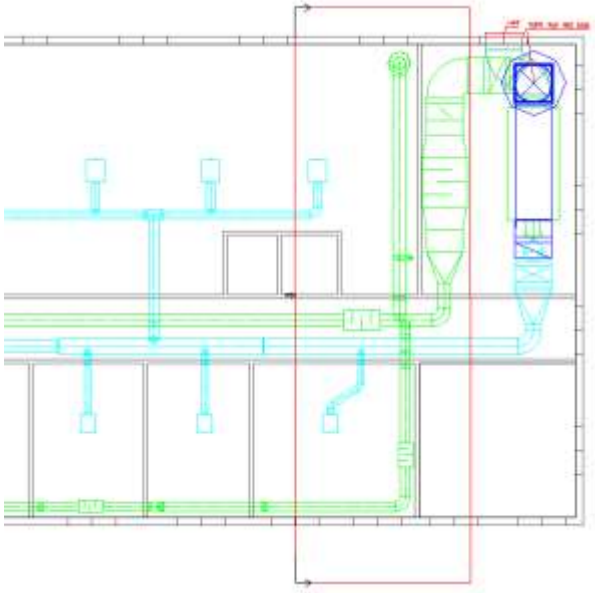
Section dialog

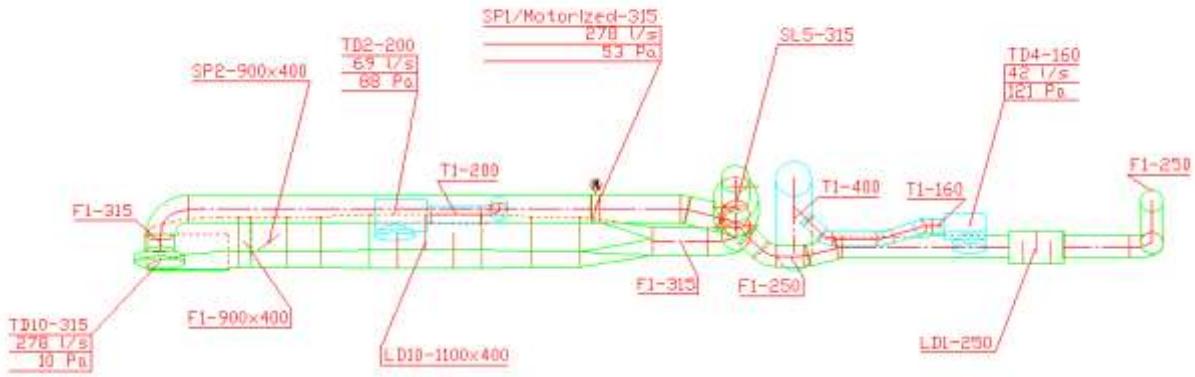
A rectangle (straight section line) or a polyline (polysection line) will be placed around the area that is shown in the section.

NOTE:
In the drawing accessoirees you can select section arrows.

NOTE:
Do not erase the rectangle; otherwise you will not be able to update the section.

If you make changes to the 3D objects in the drawing you can update all sections by pushing the section button once more and then press ”U” to update all sections.

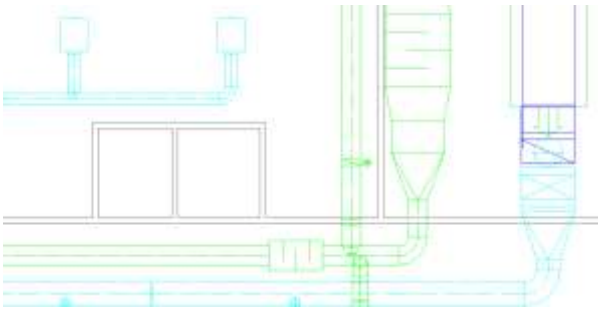




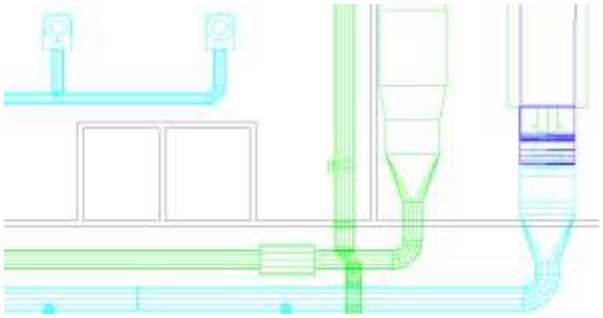
2D section

2D Preview

The 2D Preview enables / disables the 2D Preview in Visual Style 2D Wireframe.



2D Preview



3D Preview

Text

Texting Products

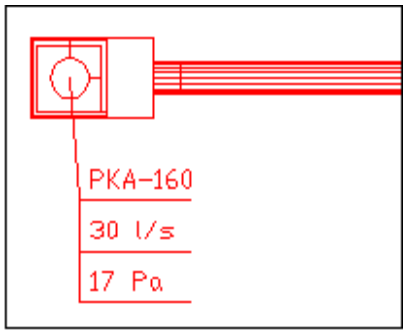
Before adding text to a CADvent drawing, specify the text size. Type TEXTSIZE at the command prompt and insert a new value for the text size, or set the value in the Text & 2D section of the **Project Settings** dialog box.

The text height depends on the scale of the plotted drawing. Suggested values are:

Scale – Text height
1:20 – 60
1:50 – 150
1:100 – 300

To text an object manually:

1. Select the **Text Product** button.
2. Select the object to be labelled.
1. Select a reference point for the text leader.
2. Select a text insertion point for the bottom left–hand corner of the text flag.

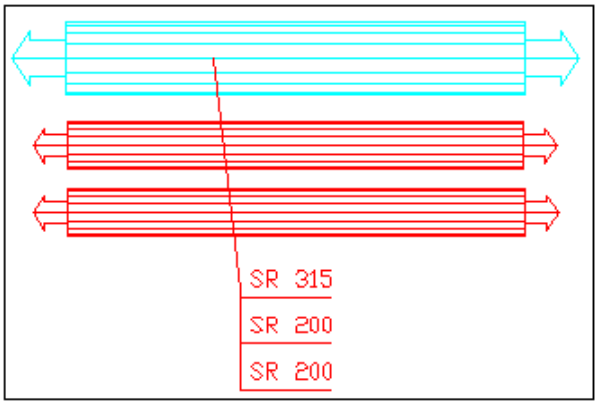


Text Product

Labelling Several Products in the Same Text Flag

To text multiple objects manually:

1. Select the **Text Multiple Products** button.
2. Select the objects to be labelled. The products must be selected in the order they are to appear in the text flag.
3. Select a reference point for the text leader.
4. Select a text insertion point for the bottom left-hand corner of the text flag.



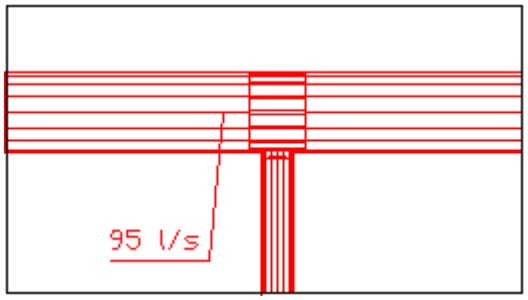
Text Multiple Products

Labelling Airflow

To text air volume flowing through an object:

1. Select the **Text Flow** button.
2. Select the object to be labelled.
3. Select a reference point for the text leader.
4. Select a text insertion point for the bottom left–hand corner of the text flag.

Note: If the flow in an air outlet is changed, the system must be recalculated so that the flow is updated.



Text Flow

Labelling Products with a Free Text

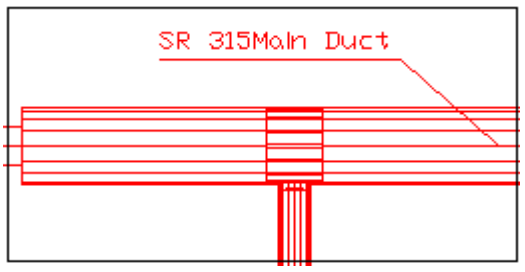
If the text manually associated to a particular object has to contain different information from the one inserted for other objects of the same type:

1. Select the **Free Text** button. The Free Text dialog box shown in the figure to the right will open.

Free Text Dialog Box

2. Insert a static text in the Text Pattern section or
3. Select the type of object among the available ones to make active the Text Pattern associated to it in the current Text Template file, and edit it. In this example, the static text “Main Duct” has been added to the Text Pattern for Round Straight Duct that contained by default only the variable ‘PRODCODE’.
4. Click *OK*.
5. Select the object to be labelled.
6. Select a reference point for the text leader.
7. Select a text insertion point for the bottom left–hand corner of the text flag.

Free Text Dialog Box

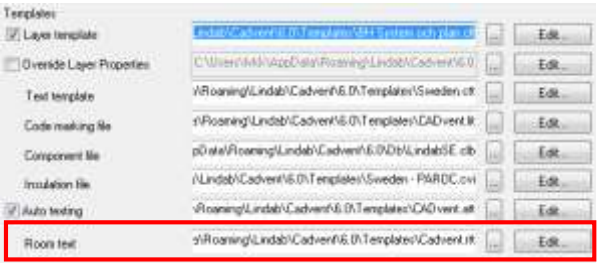


Free Text for a Selected Round Duct

Room Text

101 PCA 10/–

"Room Text" containing information about grouped objects may be inserted into the drawing. Room text settings are edited in the Room Text Template file that is current in the **Project Settings** dialog.



Templates Section of Project Settings Dialog Box

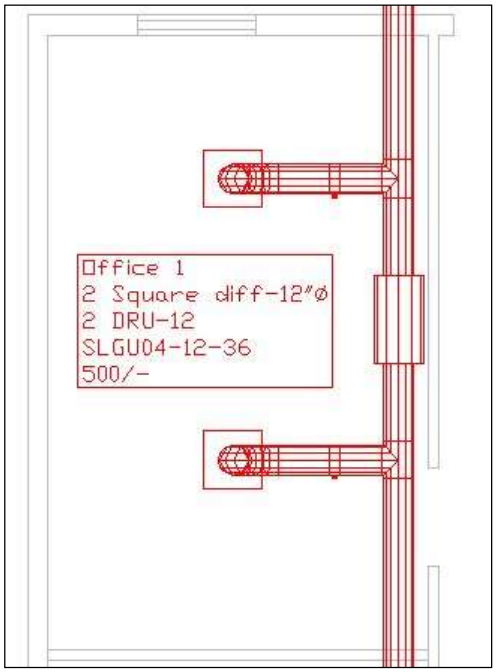
To insert a Room Text:

1. Select the **Room Text** 101 PCA 10/– button.
2. In the drawing, select the components to be listed in the Room Text.
3. Type the 'static text' to appear in the Room Text box.
4. Select the point on the drawing where the bottom left-hand corner of the Room Text box should appear.

Note: Checking "Frame" will put a frame around the Room Text box.

Note: The total number of each type of object is inserted at the beginning of the line dedicated to the 'components'.

Note: The current Text Template file controls the content of the text inserted for the 'components'. It is possible to use a different Text Template for Room Text.



Room Text Inserted into Drawing

The information that appears in the Room Text box is sorted according to the 'Current Types and Order' set in the Room Text Template dialog box.

In this particular example:

1. **Static text**: Chosen to appear as the title of the Room Text box (*Office 1*).
2. **Components**: Air device, Round balancing damper and Round silencer have all been chosen among the list 'Available objects' to appear after the Static text row.
3. **Flow**: Total flow in the room (Supply / Exhaust) chosen to appear after the Components rows.

Room Text Template Dialog Box

Auto Text

The **Auto Text** feature automatically inserts text into the drawing according to the current Text Template and Auto Text Settings in the **Project Settings** dialog box.

The text is placed in free space, meaning that the texting procedure can be carried out with minimal user assistance. However, this automatic search process can be time-consuming on large drawings with dense objects.

A function such as **Auto Text** uses the speed of the computer and the knowledge of a designer to put text on a drawing. The user can decide which products should be texted and whether a duct component should be texted when the content of the text changes. There are three choices: Never, Always, or When changed. This needs to be added for each product type in the Auto Text Settings dialog box within the **Project Settings** dialog box.

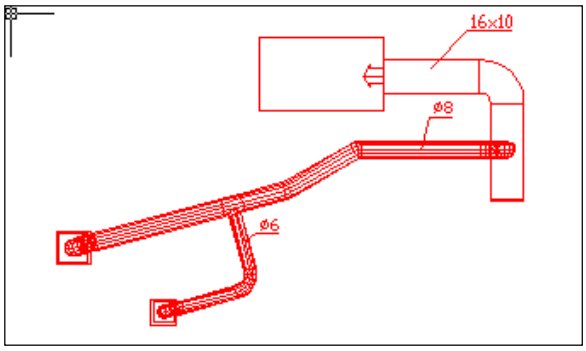
The **Auto Text** function uses the Auto Texting file to determine which objects are to be texted and the Text Template file to determine which text to put on those objects.

(*See also Advanced Project Settings - Auto Text Template*)

Auto Text Complete System

To Auto Text an entire system:

1. Select the **AutoText - system** button.
2. Select either the start symbol or any product belonging to the system to be texted. CADvent will automatically text all the products belonging to the selected system according to the Auto Text Settings.

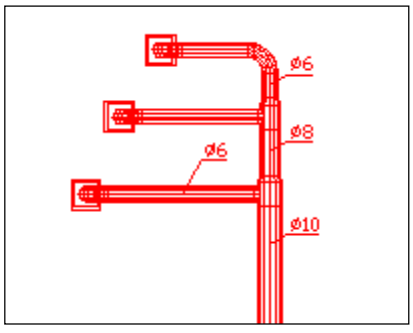


Auto Text System

Auto Text Selected Objects

To Auto Text certain objects only:

1. Select the **AutoText** button.
2. In the drawing, select the object or objects to be texted. The selected objects will be texted according to the Auto Text Settings.



Auto Text Selected Objects

Text setting

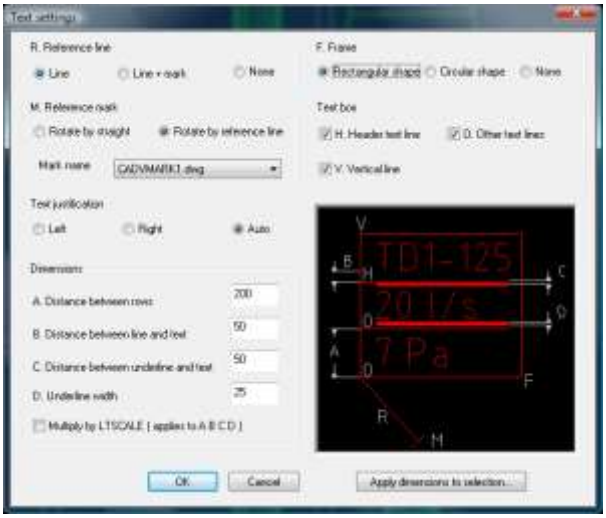
To change text settings please open the dialog.

In this dialog the user can change the settings for the appearance of texts in the drawing.

You can set the dimensions, the settings for the reference line and marking on the product and the text box.

To change settings for texts that are already in the drawing please make your changes in the settings and left-click on the button:

You can now select the texts in the drawing you want to apply your settings to. Please confirm your selection by pushing the <ENTER> button.



Text settings dialog

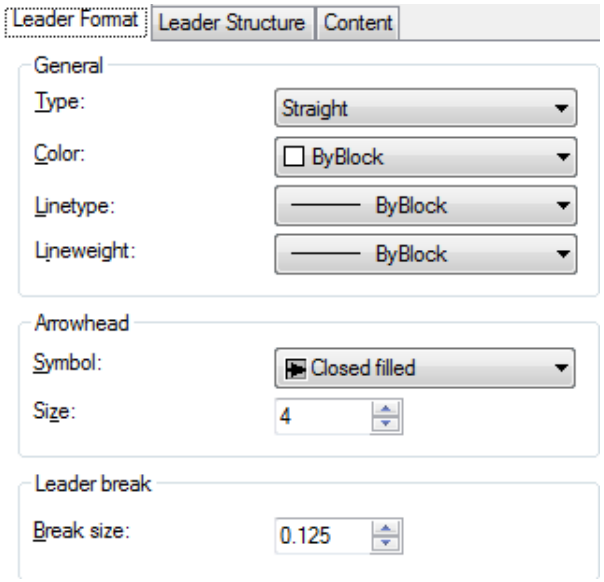
Overline and Underline Text

Use one of the buttons above to add line above, below, or above *and* below existing text.
Note: Line thickness is set in the Text & 2D section of the **Project Settings** dialog box.

Flow Arrows

Size of Arrowhead

Select the **Size of Arrowhead** button to set the dimension of the arrowhead.
This function is shared with the AutoCAD settings for the leader format.

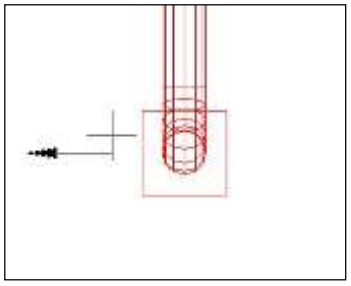


Leader Style in AutoCAD

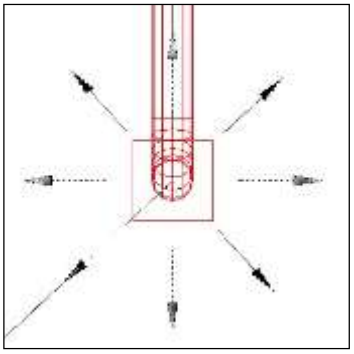
Air Patterns

To insert symbols for the diffusers' air patterns:

1. Select the desired air pattern button from the **Air Patterns** Toolbar.
2. Select the centre of the terminal.
3. Specify the beginning and ending points for the leader.



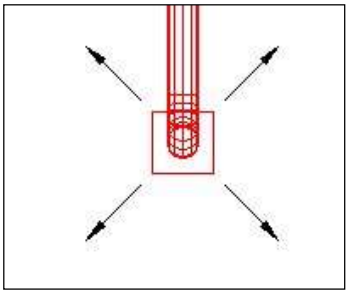
Note: To indicate a supply diffuser, click outside the diffuser and drag the line toward the diffuser. To indicate an exhaust diffuser, click outside the diffuser and drag the line away from the diffuser.



4. Specify the angle at which the arrows should be shown.
5. Press <ENTER>.

Inserting Air Patterns

6. To insert the same air pattern arrows just created on other terminals, select the center of the desired terminals.
7. When all of the air pattern arrows have been added to the drawing, press <ESC> to end the command.

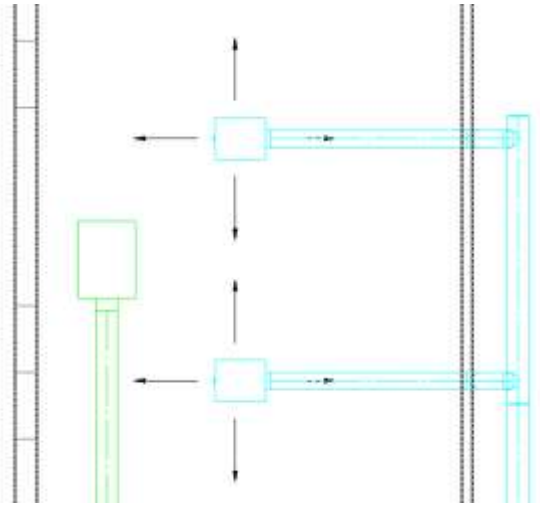


Inserting Air Patterns

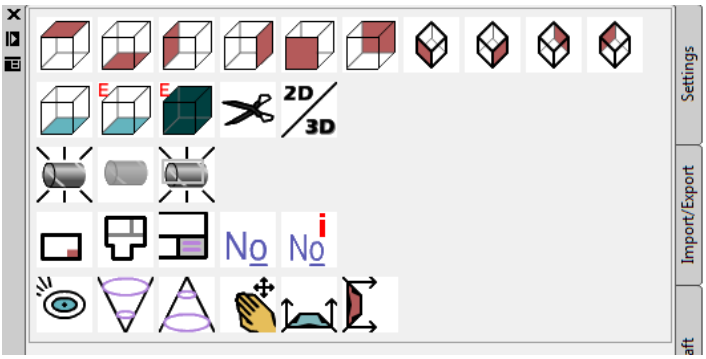
Grouping of flow arrows

You can enable a grouping function if you have similar diffusers you want to display with flow arrows.

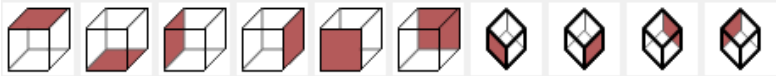
If enabled you just need to make the size and position of the arrows once, then you can set it on multiple diffusers until you cancel the command. If disabled you set the type, size and position of the flow arrows separate for each diffuser.



CADvent Presentation



CADvent view-perspectives



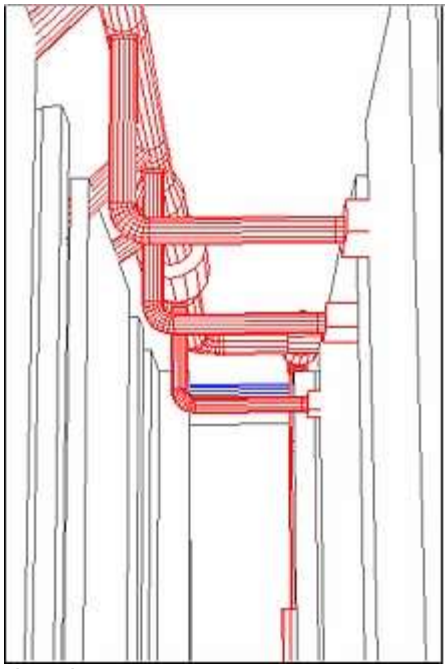
With these buttons you can select 2D or 3D isometric views in your current viewport. It can be

helpful sometimes to have several viewports with different perspectives for a drawing.

Create perspective view

A perspective view shows a part of the drawing in a 3D perspective from a certain point in the drawing.
To create a perspective view please proceed as followed:

1. Left-click on the button Create perspective view.
2. Mark the position in the drawing from which the perspective view shall be taken.
3. Enter the elevation for the position in the AutoCAD command line.
4. Point with the cursor into the direction the perspective shall view.



Perspective view

Zoom in and out of a perspective view

When you are in the perspective view you can click on Zoom-in button to move into the drawing, or click on the Zoom-out button to move out of the drawing until you reached the desired perspective.

Pan in Perspective view

When you are in the perspective view you can also use the CADvent pan function , if you want to move and change the viewpoint of the perspective. Left-click on the button 'Pan in perspective view' and move your mouse to change the perspective.
You don't need to hold the button when moving in the drawing.

3D-Visibility

Make 3D-Models invisible / visible

If you are making a 2D-drawing with the same insertion point (overlay) as the 3D-drawing this function can be used to print the drawing in 2D without that the 3D objects are visible.
To hide the 3D objects please proceed as followed:

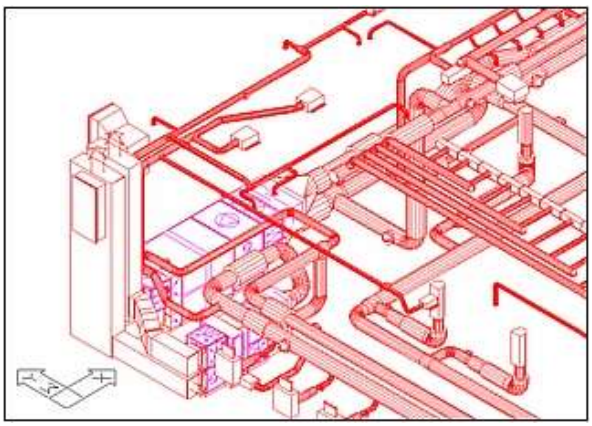
Left-click on the button 3D Invisible . All 3D objects in the drawing will be set invisible so that only the 2D objects are visible. You can now go on and print the drawing. When you are finished you just have to click on the 3D Visible button to show the hidden 3D objects again.

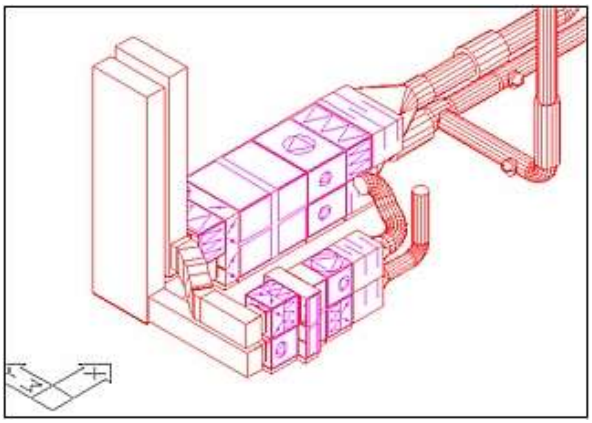
NOTE:
This function only takes effect on CADvent components. Components that are created from an AutoCAD block like Special components are not affected, they are still shown as 3D objects.

3D Isolate

In drawings with a high complexity of products, like for example rooms with air handling units, it can be very helpful to hide components that are not relevant for the moment to get a better survey and make it more easy to select the right components for the task you want to fulfil. In this case you can use the 3D Isolate command .

To use this function left-click on the 3D Isolate button and select the objects in the drawing that you want to show. Confirm your selection by pressing the <ENTER> button.
All not selected objects will turn immediately invisible (not AutoCAD blocks, see above).
When you are finished with your task you just left-click on the 3D Visible button and all the hidden objects are shown again.


Complex drawing


Complex drawing with 3D Isolate

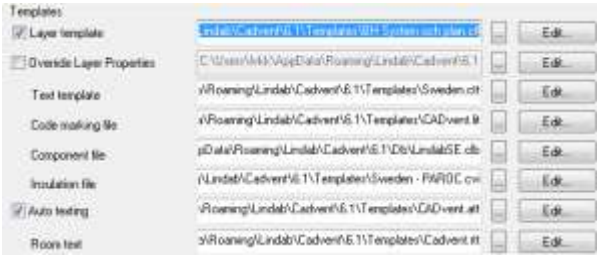
CADvent - Advanced Project Settings

Creating a Layer Template

When drawing CADvent objects, it is possible to create the layers to which they belong by using AutoCAD (in the Layer Properties Manager) or by using a CADvent Layer Template.

To use CADvent layers:

1. Check the box next to "Layer Template" in the **Project Settings** dialog.



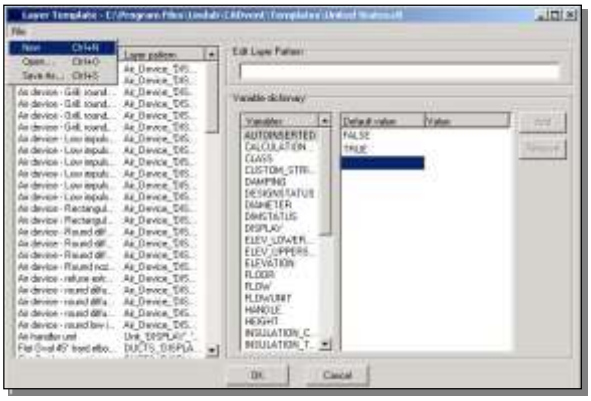
Templates Section of Project Settings dialog

The advantage to using layer templates is their flexibility in following various layer standards. Different layer structures can be created with great variation using “variables”.

The layer template enables dynamic control of the layer name on which the object is to be placed. For this reason, each object type has a Layer Pattern.

There are two ways to create a Layer Template file:

1. Editing an existing layer template file stored in the …CADvent\Templates folder and save it under a new name.
   -or-
2. Creating a completely new one.



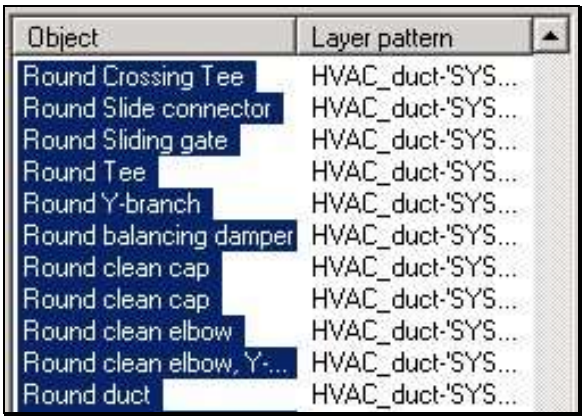
Layer Template dialog

Setting a Layer Pattern

To set a layer pattern for one or more objects:

1. Select the desired products from the list of objects available in the Layer Template Dialog.

NOTE:
To select multiple objects, select the first one, and hold down <CONTROL> while selecting the last desired object type. All objects in between will be highlighted.



Layer Template dialog (detail)

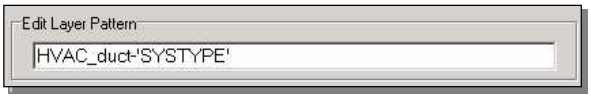
2. In the **Edit Layer Pattern** section of the **Layer Template** dialog, enter the desired static text and variables to give the layer pattern a 'dynamic' content. To select a variable double click on the chosen one in the variable list. The layer pattern created will be associated with the objects selected in Step 1.

In the example to the right, the layer pattern for round duct components is going to be <HVAC_duct–'SYSTYPE'>, where:

- **<HVAC_duct–>** is the static text that will always appear at the beginning of the name of the layer of each round duct component.
- **<'SYSTYPE'>** is the variable chosen from the list on the right.

Note: To distinguish between static text and variables, CADvent puts apostrophes around all variables.

(*See Advanced Project Settings - CADvent Variables*)



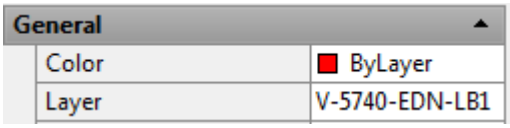
Layer Template dialog (detail)

Variable List

3. Once the desired Layer Pattern has been assigned to each object type, save the layer template by selecting File/Save As in the Layer Template Dialog and entering the new filename.
4. Back to the **Project** Settings dialog, select the browse "…" button and then select the new layer template to make it active in the CADvent file.

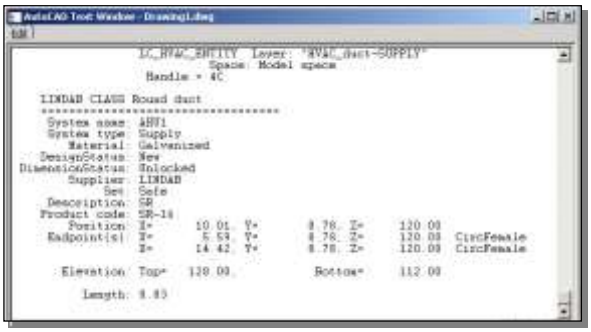
Layer Template dialog (detail)

All CADvent objects on the drawing will be placed on a specific layer according to the Layer Template that is current in Project Settings.



Layer pattern

NOTE:
In the example above, the round duct has been placed on the layer "HVAC_duct–SUPPLY" because it is a supply duct. To use another word (besides 'supply') to represent the system type, the values that the SYSTYPE variable can take must be changed. To do this, go to **Project Settings** and reselect Edit Layer template.



AutoCAD Text Window

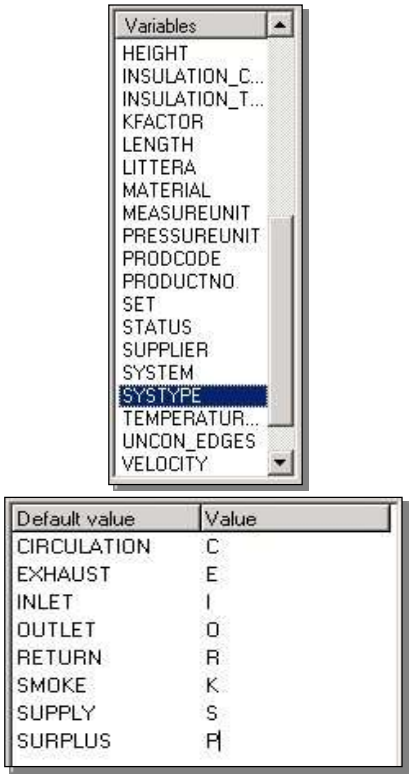
Translating Variable Values

CADvent uses the default values (listed in the Variable Dictionary section of the Layer Template Dialog) when no other value has been assigned to a variable.

In order to change variable values:

1. In the Layer Template Dialog, select the variable to be changed.
2. Select where the row containing the Default value to be changed intersects the “Value” column.
3. Type the desired “value” to apply to the selected variable when it is the Default value.
4. Repeat the above procedure for the remaining values.

In the example to the right, the variable SYSTYPE was selected. When SYSTYPE takes the Default value of SUPPLY for example, its Value has been changed to S.



Translating Variable Values

NOTE:
Even if the layer template is changed and the object is moved to a new layer, the old layers will remain. The layer template can only create layers. To delete an unused layer, use the AutoCAD PURGE command.

Layer Patterns for Text and Text Lines

The Text and Textline object types are handled in a special way in the layer template.

Example 1: No Layer pattern is created for Text and Textline.

Object type	Layer Pattern
Round duct	HVAC_duct–'SYSTYPE'
Text	
Textline	

The text and text flag for a Supply Round duct will be placed on the same layer as the duct: "HVAC_duct–S" (similarly for any other duct component, the product pattern will apply).

Example 2: Text and Textline are given their own Layer patterns.

Object type	Layer Pattern
Round Tee	HVAC_duct–'SYSTYPE'
Text	TEXT
Textline	TXTLINE

The text and text flag for all the products, including round duct, will be placed on the layers: "TEXT" and "TXTLINE" (regardless of the product pattern).

Default Values

CADvent Variables

Auto inserted: Refers to the "Auto Dampers" inserted by CADvent after the balancing calculation. This variable can be used in a Layer Template to distinguish between dampers inserted automatically or manually.

Default value
FALSE
TRUE

Calculation No.: Value that CADvent generates for each object during the **Calculate** function. Can be displayed by checking "Show Information—Calculation No." in the **Project Settings** dialog.

Class: Description of the object that is displayed when making an AutoCAD List.

Custom String: Any additional information the user wants to add about a CADvent object in the "General" tab, within the **Properties** dialog.

Damperpos.: Shows the damper position in degrees (angle), position for dampers and in % for dampers in diffusers.

Damping: "Pressure Drop" calculated for any damper, diffuser, or special component inserted in the system.

Datum Level: The absolute elevation of the centreline of the duct, referring to the value of the "datum level" inserted in the **Floor Set Up** dialog.

Datum Level Lower Side: The absolute elevation of the bottom of the duct, referring to the value of the "datum level" inserted in the **Floor Set Up** dialog.

Datum Level Upper Side: The absolute elevation of the top of the duct, referring to the value of the "datum level" inserted in the **Floor Set Up** dialog.

Description: Texts the name of the product

Design Status: Assigned to every object in the **Properties** dialog. By default, each object drawn in CADvent is New. However, the user can classify the object as any one of the Default values to the right.

Default value
EXISTING
MOVED
NEW
ORIGINALPLACEME
REMOVED
TEMPORARY

Diameter: Round dimension of an object.

Dimstatus: Assigned to every object in the **Properties** dialog. By default, each object drawn in CADvent has the dimension "unlocked." It can be locked, however, if the user does not want CADvent to change the size of a specific object during the **Size Ducts** function.

Default value
LOCKED
UNLOCKED

Discipline Currently only *Ventilation* duct systems can be drawn in CADvent. Future versions of CADvent may include piping systems as well.

Default value
Coldwater
Cooling
Drainage
Heating
Sewage
Sprinkler
VVC
Varmwater
Ventilation

Display: This function is typically used in the **Layer Template** file when the user wants different parts of an object on different layers. The Default values are listed in the table at right.

Default value
CENTERLINE
ELEVATION
HIDDEN
INSULATION
LINING
PLANE
SECTION
SOLID
TEXT
TEXTLINE

Elevation: Relative elevation of the centreline of the duct.

Elevation Lower Side: Relative elevation of the bottom of the duct.

Elevation Upper Side: Relative elevation of the top of the duct.

Floor: By default, each object drawn in CADvent belongs to the floor that is current in the **Project Settings** dialog. As it is a property of the object, the floor on which each object is located can be changed in the object's **Properties** dialog. Since there are no default floors created in CADvent, the user must first edit the **Floor Set Up** dialog to display the desired floor in **Project Settings** or **Properties**. *(See Settings - Floor Setup)*

Flow: Air volume flow.

Flow unit: Cubic feet per minute, cfm (lower case).

Handle: The AutoCAD handle of the object shown when making a List.

Height: Height dimension of a rectangular or flat oval object.

ID: The Product ID specified in the **Properties** dialog. As the information inserted in this field can only be a number, it is recommended to create the list of the possible Default Values the user is willing to use and the correspondent Values he/she wants to read.

Insulation Class: Specified under "Insulation Type Properties" in the **Insulation File** dialog within the **Project Settings**.

Insulation Type: The name assigned to a certain insulation created in the **Insulation File** dialog within the **Project Settings**.

K–factor: [In W.G./cfm^2] = p_i/q^2. This value is provided by the component manufacturer. It is shown in the Balancing report and can be used during the system Balancing procedure to calculate the flow in the component itself from the measurement of the pressure p_i.

Length: Length of a duct or a silencer.

Litt ID: Tag assigned to a CADvent object during the **Texting** function. The user can assign unique tags to different objects by editing the "Code Marking File." CADvent automatically creates this file when text with the variable Litt ID (or Littera) in the "Text Pattern" has been inserted on the drawing.

Littera: Tag assigned to a CADvent object during the **Texting** function. The user can assign unique tags to different objects by editing the "Code Marking File." CADvent automatically creates this file when text with the variable Littera (or Litt ID) in the "Text Pattern" has been inserted on the drawing.

Material: Assigned to every object in the **Properties** dialog. By default, each object drawn in CADvent is Galvanized. However, the user can choose the Default value from the materials listed at right.

Measure Unit: Inch (lower case).

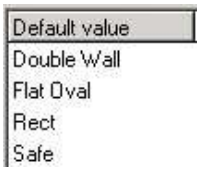
Piece Label: Text out the current piece label

Pressure Unit: In W.G.

Prod Code: Object's "Product Code" that is shown when making an AutoCAD List.

Product No.: "Product Number" that CADvent generates for each type of object that can be displayed by checking "Show Information-Product No." in the **Project Settings** dialog.

Set: Additional description of the object displayed when making an AutoCAD List referring to one of the types of products: Round, Single Wall, Double Wall, Rectangular, or Flat Oval.



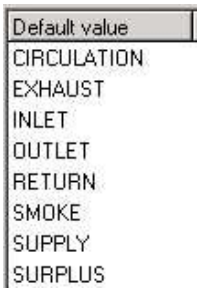
Sound: The value (dB(A)) of the resulting global Sound Power Level in the component saved in the drawing after the last calculations performed. Note: The unit dB(A) is not included in the value of the variable Sound. Therefore, it has to be added manually in the Layer Pattern or the Text Pattern as a static text after the variable 'SOUND'.

Status: The Product Status specified in the **Properties** dialog. As the information inserted in this field can only be a number, it is recommended to create the list of the possible Default Values the user is willing to use and the correspondent Values he/she wants to read.

Supplier: An object's manufacturer.

System: By default, each object drawn in CADvent belongs to the current system in the **Project Settings** dialog. This can be changed in the **Properties** dialog. Since there are no default system names created in CADvent, the user can choose the desired one.

System Type: By default, each object drawn in CADvent belongs to the current system type in the **Project Settings** dialog. This can be changed in the **Properties** dialog. The default system types to choose from are listed on the right.



Temperature Unit: Currently inactive. Future versions of CADvent may include heat loss/gain calculations.

Text_Tab_Viewport: Text on different layers depending on Viewport /see next page).

Velocity: Velocity in a duct system. Can only be shown after calculating a duct system.

Velocity unit: Unit of the velocity when texted.

Unconnected Edges: A CADvent object's endpoints may be connected (FALSE) or unconnected (TRUE) to another object. This variable can be assigned in the Layer Template to place objects with unconnected edges on one layer and objects with connected edges on another. Those layers can be assigned different colours so objects with unconnected edges are easier to find in the drawing.

Default value
FALSE
TRUE

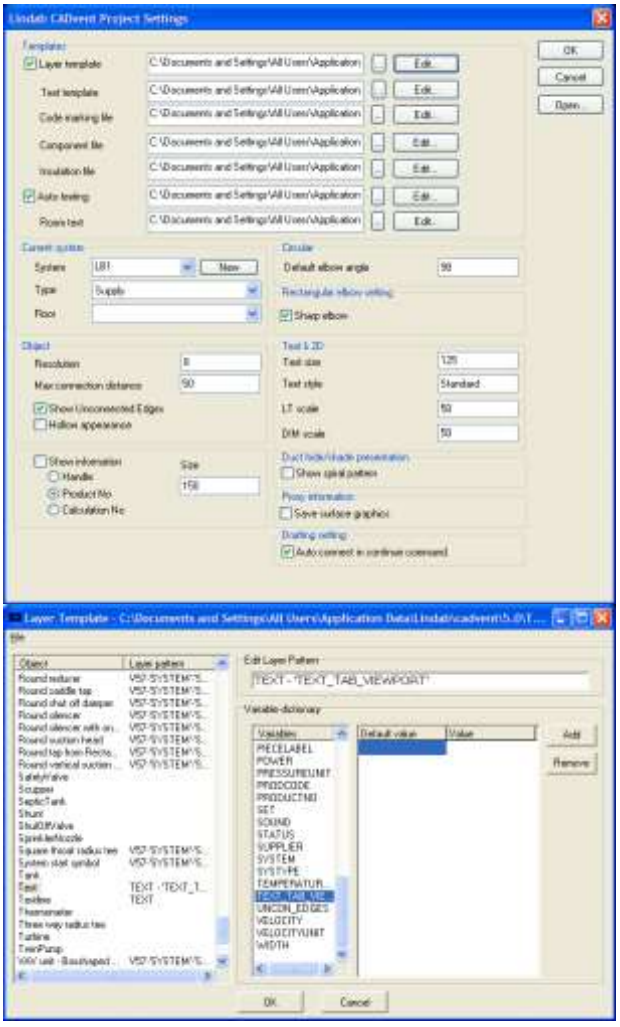
Width: Width dimension of a rectangular or flat oval object.

Text on different layers depending on Viewport

In CADvent it is possible to put the text on different layers depending on the viewport where it is created. This enables the user to thaw and freeze text information in the different layouts.

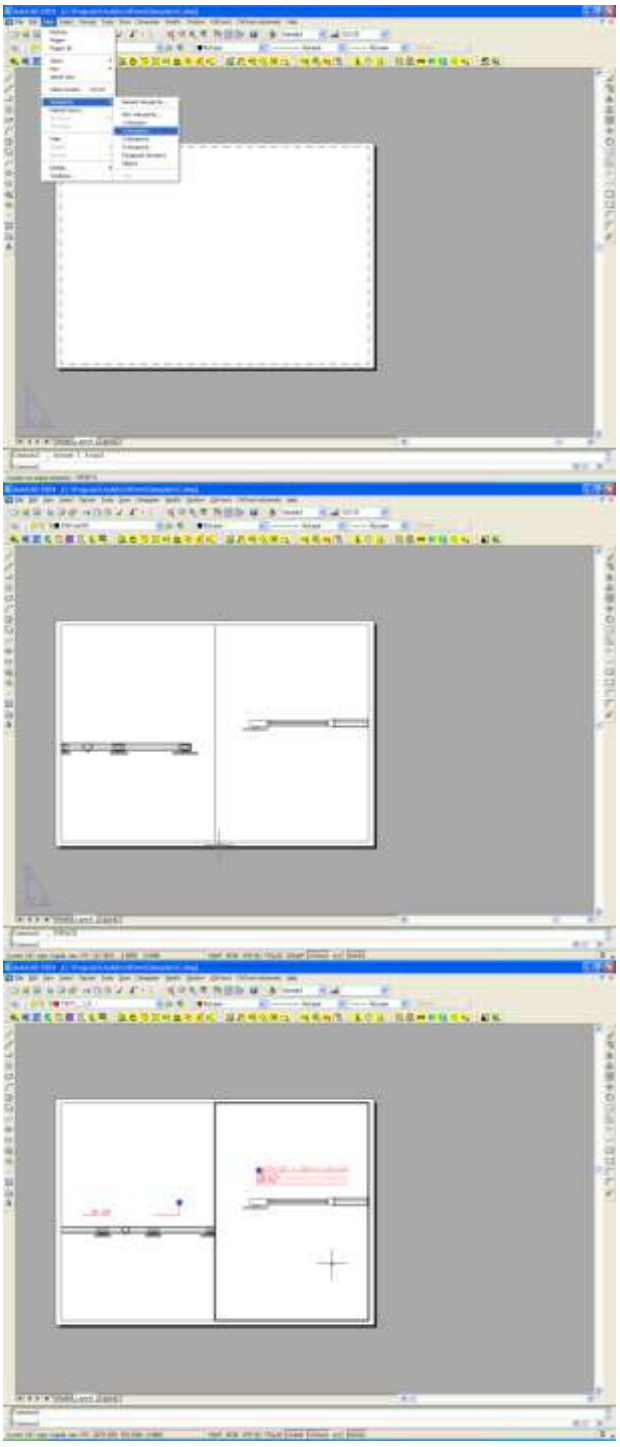
Layer settings

1. Open project settings
2. Click on Edit for the current layer template
3. Go to the Text object
4. Add the variable TEXT_TAB_VIEWPORT to the layer pattern
5. Repeat for the Textline object
6. Click OK and save



Add text objects in different view ports in the layouts

1. Add 2 viewports to Layout1
2. Set different view directions for the 2 viewports
3. Set the UCS according to view in 1 of the viewports
4. Add text
5. Click on the text object to see the layer name
6. Repeat for the other viewport



Freeze layer for different viewports

1. Open Layer manager
2. Go to column Current VP freeze
3. Set layers of other viewports text to Freeze
4. Repeat for all Viewports

Creating a Text Template

Text Templates are similar to Layer Templates.

The advantage of using text templates is their flexibility in following various text standards. An infinite number of text patterns can be created using variables.

Template Section of Project Settings dialog

A text template allows the user to dynamically control the labels associated with objects in the drawing. For this reason, each Pattern Name has a Text Pattern.

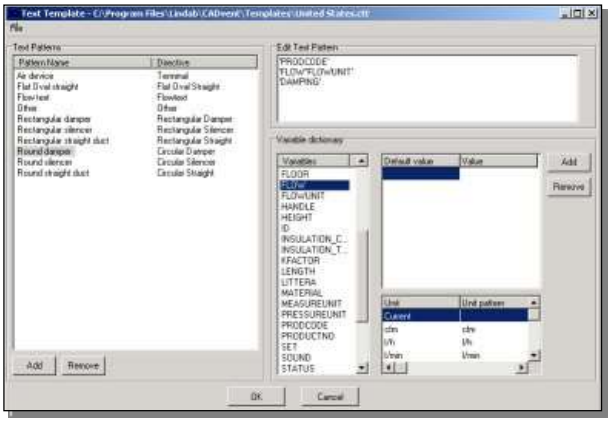
When labelling, CADvent will automatically select the correct text pattern depending on the **Directives** that have been set.

There are two ways to create a Text Template file:

1. Editing an existing template file and save it under a new name.

-or-

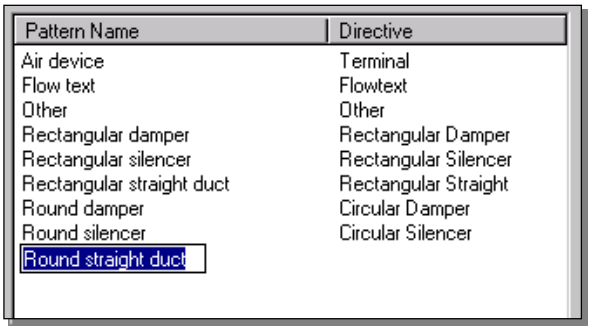
2. Creating a completely new one.



Text template dialog

Creating Pattern Names

Before creating a Text Pattern for each Pattern Name, make sure that the correct directive is selected to ensure CADvent will automatically select the right pattern when an object is being labelled.



Text Patterns Section of Text Template dialog

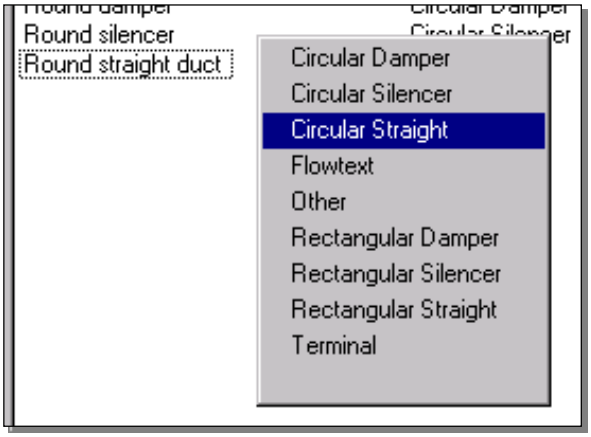
NOTE:

When creating a NEW Text Template file, no Pattern Name or Directive is available; they must be created.

To create a Pattern Name:

1. Select *Add* in the Text Pattern section of the **Text Template** dialog.
2. Type the desired Pattern Name.
3. Press <ENTER>.
4. With the new Pattern Name still highlighted, click the right mouse button. A pop-up list of possible Directives will appear on the screen.
5. Select the correct directive.

After creating Pattern Names and assigning their Directives, Text Patterns can be assigned.



Pop-Up List of Possible Directives

Setting Text Patterns

Enter the static text and/or variables in order to give the Text Pattern a dynamic content.

To set a Text Pattern for one or more objects:

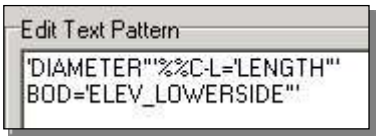
1. Select the products from the list of available Pattern names.

NOTE:

To select more than one product at a time, select the first one. Then hold down the <CONTROL> key while selecting the rest of the products.

2. In the **Edit Text Pattern** section of the **Text Template** dialog, enter the desired static text and variables to give the text pattern a 'dynamic' content.
3. Add the desired variables to the Text Pattern by double selecting on the highlighted variable in the Variable List in the Variable Dictionary section of the Text Template dialog.
4. Add the optional static text (words not in apostrophes) to appear in the label for the Pattern Name. The text pattern created will be associated with the object types previously marked.

Variable List in Variable Dictionary Section of Text Template dialog

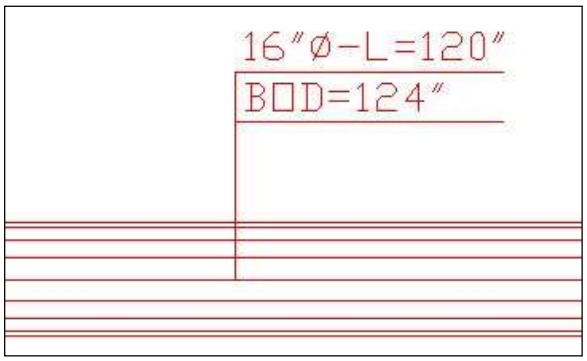


Edit Text Pattern Section of Text Template dialog

Example:
To have the label for a round duct follow the form:
'DIAMETER'" ϕ – L= 'LENGTH'"
BOD= 'ELEV_LOWERSIDE'"

1. Double click on DIAMETER in the Variable List so it appears in the Edit Text Pattern Section.
2. Next enter the static text: the symbol for inches ("), the diameter ϕ symbol (%%C), a hyphen (–), and 'length equals' (L=).
3. Double click on the variable LENGTH and enter another symbol for inches (").
4. Press <ENTER> to create another line for the text.
5. Enter the static text (BOD=).
6. Double click on ELEV_LOWERSIDE and enter another symbol for inches (").

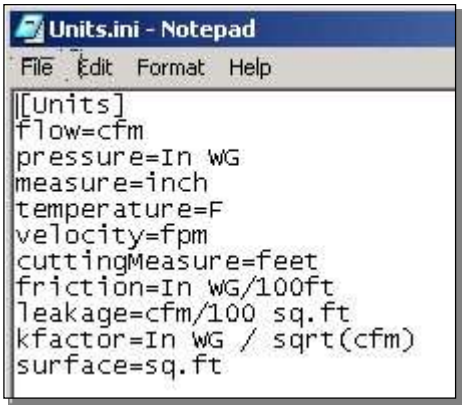
When texting the selected round duct, dimension 16", length 120", and elevation of the bottom of the duct 124" will appear in the text flag as in the figure to the right.



Text Example

NOTE:

Unless differently specified, the units used for the selected variables will be the 'current' ones set as default in the Units.ini file shown to the right.



Default CADvent Units

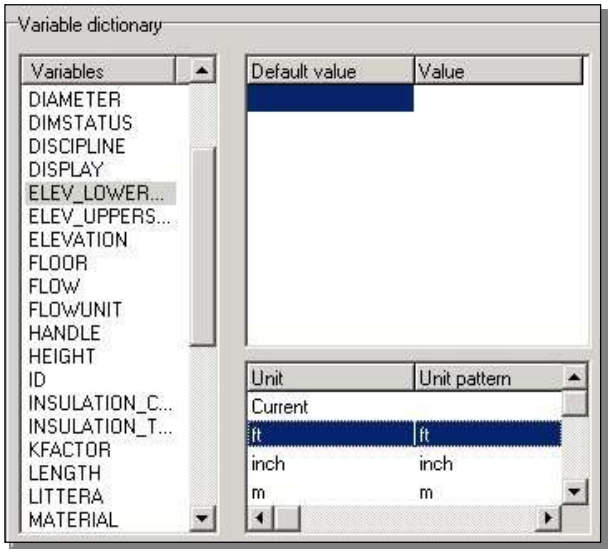
Setting Unit Patterns

If other units than the default ones are desired for one or more variables inserted in the created text pattern, it is necessary to make a different selection.

Example:
To have the previous label for a round duct show the elevation in feet:

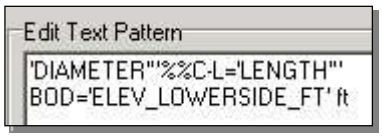
'DIAMETER'" ϕ – L= 'LENGTH'"
BOD= 'ELEV_LOWERSIDE'ft

1. Select the variable ELEV_LOWERSIDE.
2. In the Unit – Unit Pattern section move the unit preference from 'Current' to 'ft'.
3. Double click on the variable ELEV_LOWERSIDE or directly on the unit 'ft'.



Variable Dictionary Section of Text Template dialog

4. The new text pattern will appear as shown in the picture to the right.

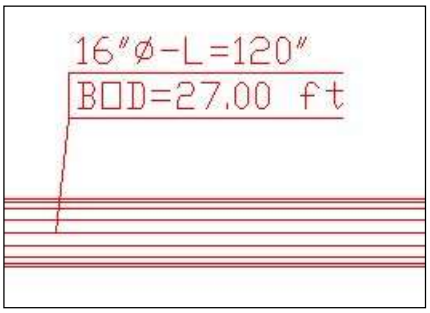


Edit Text Pattern Section of Text Template dialog

NOTE:

The unit 'ft' is automatically inserted together with the new variable 'ELEV_LOWERSIDE_FT'. It is not possible to use the symbol (') for feet!

This time, when texting the round duct, the elevation 27.00 ft for the bottom of the duct will appear in the text flag.



Text Example

After assigning the desired Text Pattern to each Pattern Name, save the text template by selecting File/Save As and entering the desired filename. Make sure this text template is active in the Text Template field in the Templates Section of the Project Settings dialog.

Note:

In the previous example the values of the variables (diameter, length, elevation) used were taken directly from the drawing. Sometimes, variables must be translated in order to attain a value different from that of the default.

(See Advanced Project Settings -Translating Variable Values).

Top of Templates Section of Project Settings dialog

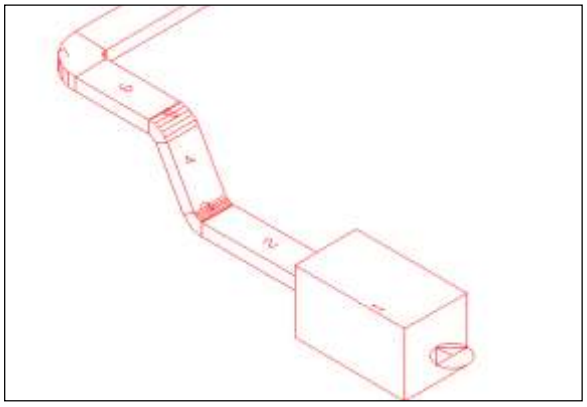
Writing Product Numbers

Sometimes it is useful to display piece markings on one or more duct components within a drawing.

To add product numbers:

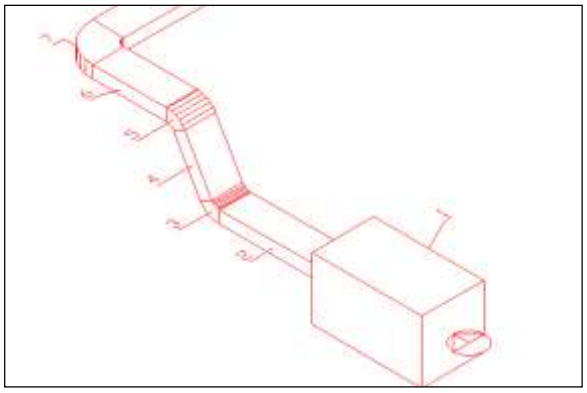
1. Open the **Project Settings** dialog.
2. Select the browse (…) button for the Text Template field.
3. Select the "ProductNo.ctt" text template to make it active in the CADvent file.
4. Click *OK*.
5. Select one of the **AutoText** buttons.
6. Select the objects on which the product numbers are to be written.

When using the **AutoText** button for rectangular duct components, the text is automatically placed at the centre of each component. To move the text, drag the product number to the desired location.



AutoText Function for Writing Product Numbers

When using the **AutoText - system** button, the text is placed outside each component.



AutoText System Function for Writing Product Numbers

NOTE:

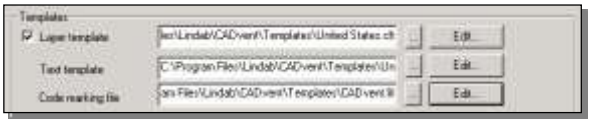
Product numbers may need to be updated. *(See Calc and Estimate - Update Piece Label)*

NOTE:
Remember that the **AutoText** and **AutoText - system** functions follow the settings that are active in the current AutoText template file, which may be edited in **Project Settings**.

NOTE:
The same sequence of steps described above can be used for writing Calculation numbers (using the "CalculationNo.ctt" text template)

Creating a Code Marking File

A code-marking file creates a shorter code that is more practical for the drawing than the standard, longer product code.



Templates Section of Project Settings dialog

LITTERA

The code marking is referred to in the **Text Template** dialog with the variable LITTERA or with the variable LITT_ID.

Example:

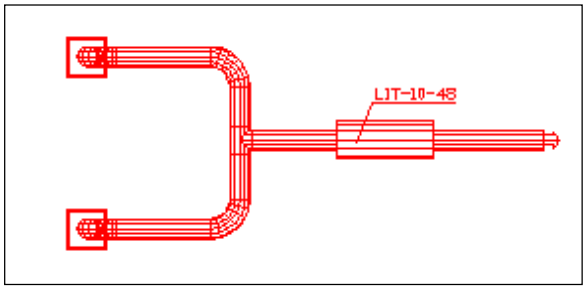
1. In this example, the Text Pattern for the Pattern Name ‘Round silencer’ is:

<’LITTERA’–’DIAMETER’–‘LENGTH’>

NOTE:

If the product does not have a code marking assigned yet, the text inserted for that object will include the text LIT for the variable LITTERA.

In order for CADvent to use a custom label, the variable LITTERA must be translated for each product type that has this variable in its Text Pattern. (*See below*).

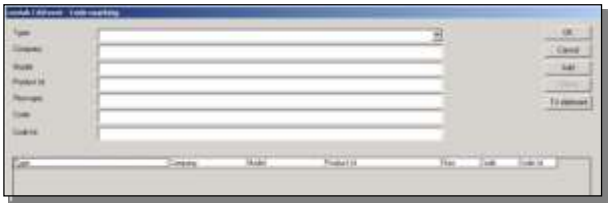


Code Marking - LITTERA Example - Before

Editing Code Marking

NOTE:

If the variable LITTERA has been used in the Text Pattern for one or more product types, and those objects have not been labelled yet, the current fields in the **Code Marking** dialog within **Project Settings** will be empty.

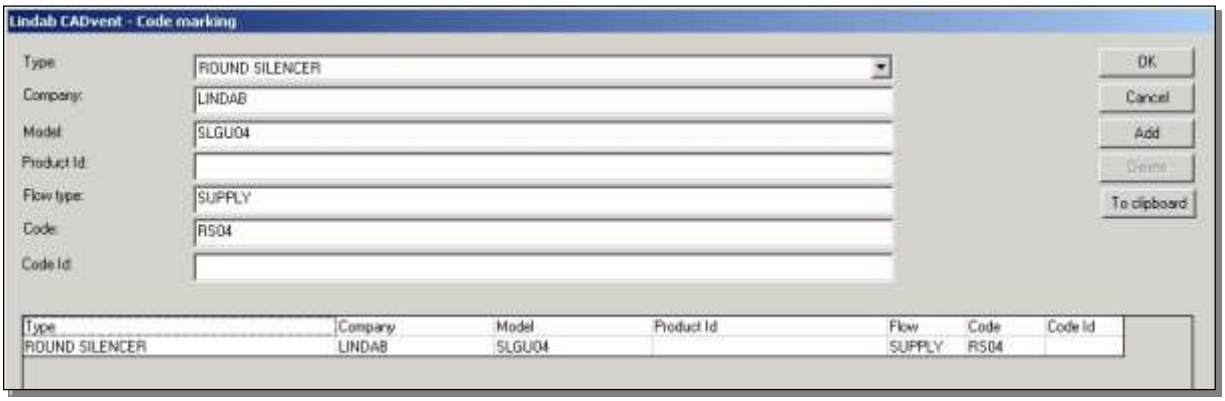


Code Marking dialog—Empty

However as soon as the drawing is labelled, a list is automatically created with those objects that have the variable LITTERA in their Text Patterns.

To edit a Code Marking file:

1. Select the desired object type from the list.
2. Enter the desired “tag” for the object type selected in the **Code** field (in this example the code mark chosen for the round silencer is <RS04>).
3. Repeat Steps 1 through 2 to specify Codes for additional object types present in the list.
4. Click *OK*.



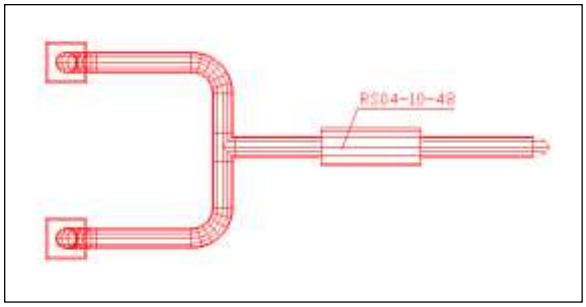
Code Marking dialog

Update Code Marking

To activate the changes made in the Code Marking file:

1. Select the **Update Code Marking** button.

The product labels will automatically be updated according to the current Code Mark associated with it.



Code Marking - LITTERA Example - After

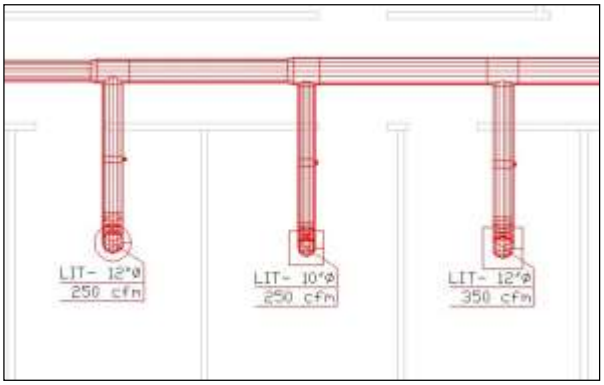
LITT_ID

If using the variable LITTERA in the Text Pattern, the tag (indicated as **Code** in the Code Marking file) is associated with a type of object rather than a single object.

Example:

Place three supply diffusers (made by the same manufacturer) with the following characteristics in the drawing:

- Round, 12" ϕ, 250 CFM
- Square, 10" ϕ, 250 CFM
- Square, 12" ϕ, 350 CFM

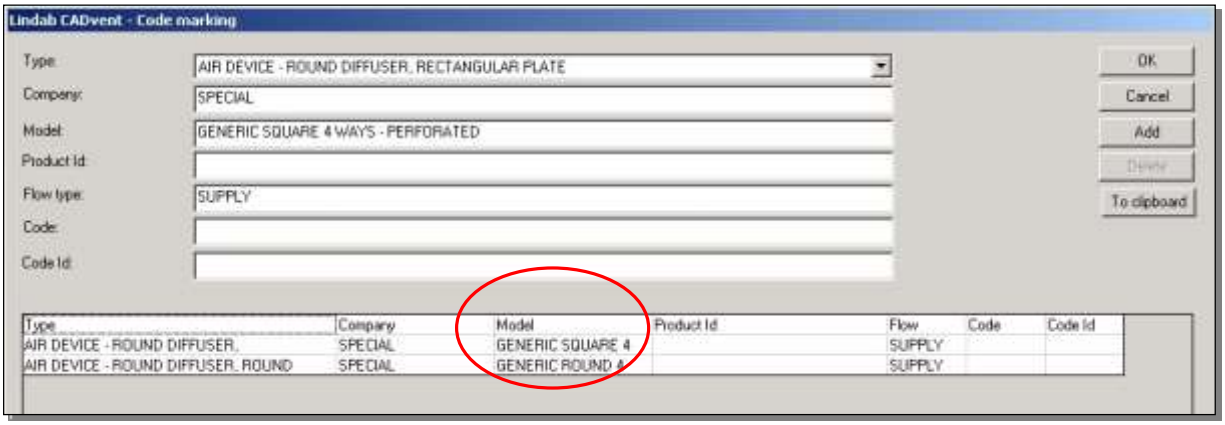


Code Marking - LITTERA Example - Before

If using the variable LITTERA in the Text Pattern, the corresponding Code Marking file will include only two object types, according to the Model:

- Round 4 ways – Perforated
- Square 4 ways – Perforated

No distinction is made between the Square diffuser, 10" ϕ, 250 CFM and the Square diffuser, 12" ϕ, 350 CFM.



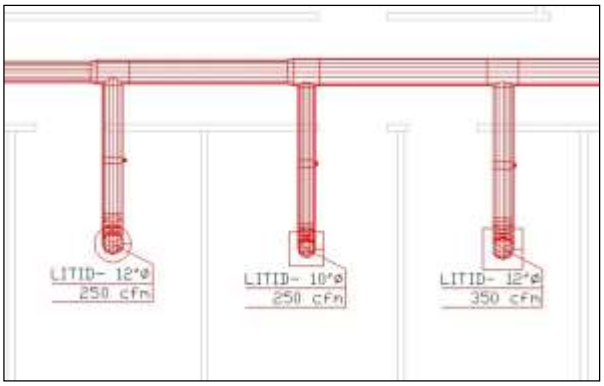
Code Marking dialog

NOTE:
It is possible to use the variable LITT_ID instead of LITTERA in the Text Pattern in order to apply a different Code Mark to components of the same type according to their size or flow type.

NOTE:

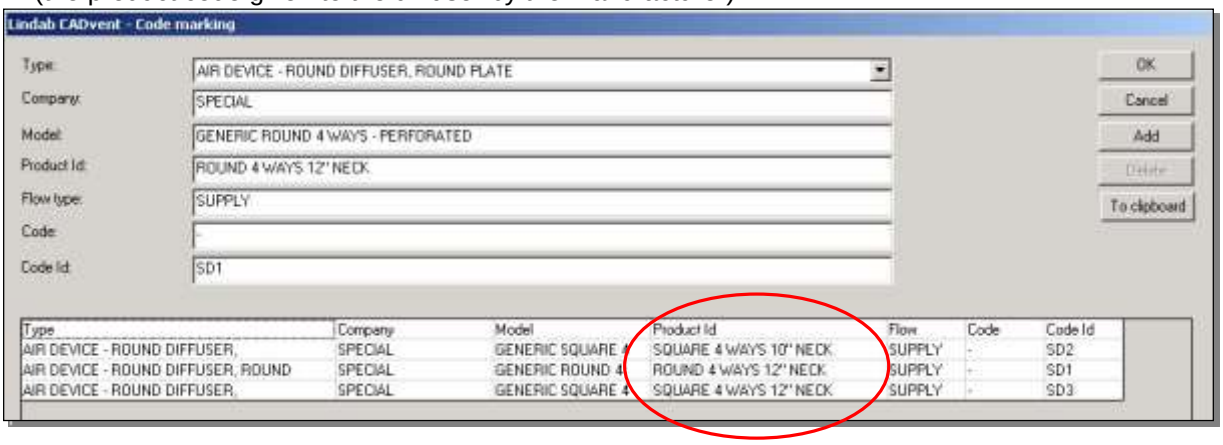
If the product does not have a code mark value assigned yet, the text inserted for that object will include the text LITID for the variable LITT_ID.

In order for CADvent to use a custom label, the variable LITT_IT must be translated for each product type that has this variable in its Text Pattern.



Code Marking - LITT_ID Example – Before

The corresponding Code Marking file will now include all the three object types, distinguished by Product ID (the product code given to the diffuser by the manufacturer).

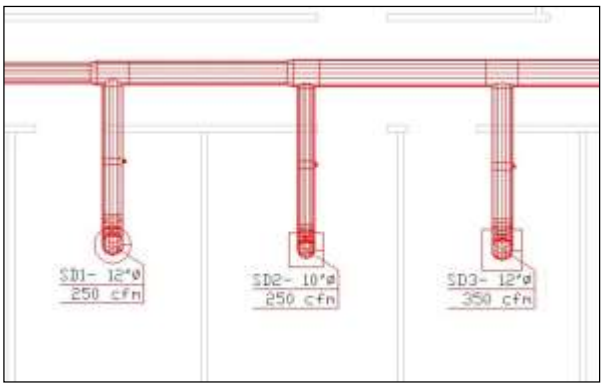


Code Marking dialog

Select the desired object from the list.

1. Enter the desired “tag” for the object type selected in the **Code Id** field.
2. Once a Code Id has been specified for any additional object present in the list, click *OK*.
3. Autotext the diffusers or use **Update Code Marking** to activate the changes made in the Code Marking file.

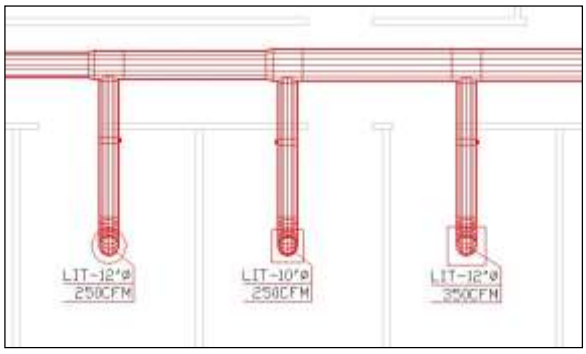
The product labels will automatically be updated according to the current code marks associated with them.



Code Marking - LITT_ID Example - After

Custom String

It is possible to apply a different Code Mark to components of the same type according to their size or air flow by using the variable CUSTOM STRING instead of LITTERA or LIT_ID in the Text Pattern.



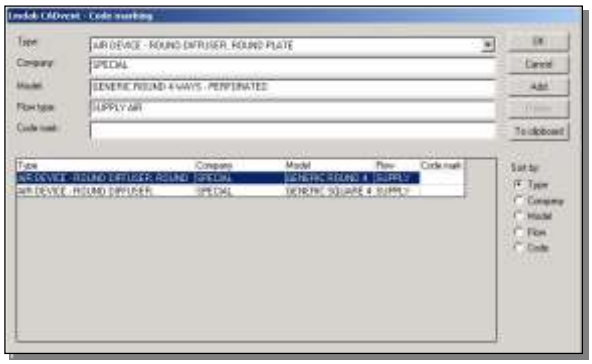
Custom String Example-Before

Example:

Place three supply diffusers (made by the same manufacturer) with the following characteristics in the drawing:

- Round, 12" ϕ, 250 CFM
- Square, 10" ϕ, 250 CFM
- Square, 12" ϕ, 350 CFM

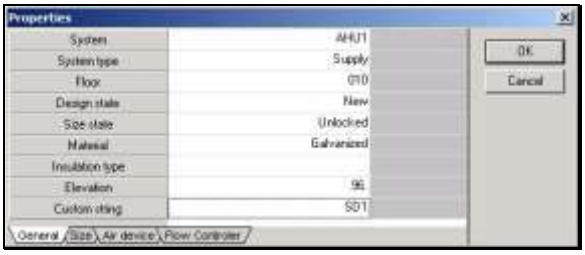
If the variable LITTERA has been used in the Text Pattern, the corresponding Code Marking file will include only two object types, according to the Model (Round 4 ways – Perforated, Square 4 ways – Perforated) as shown in the illustration to the right. No distinction is made between the Square diffuser, 10" ϕ, 250 CFM and the Square diffuser, 12" ϕ, 350 CFM.



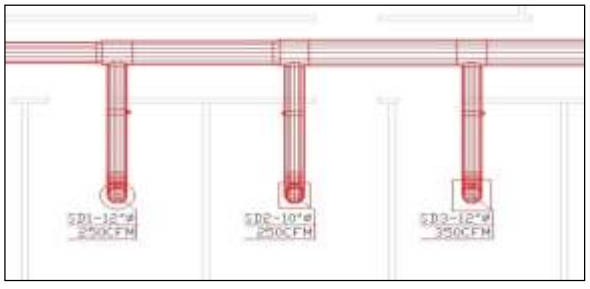
Code Marking dialog

To apply different tags to diffusers of the same type according to their size or air flow:

1. Open the **Properties** dialog for each diffuser or group of diffusers to which a different tag will be associated.
2. Select the "General" tab.
3. Enter the desired text tag in the Custom String field.
4. Select the **AutoText** button.
5. In the drawing, select the diffusers on which the new text reporting the custom string is to be written.



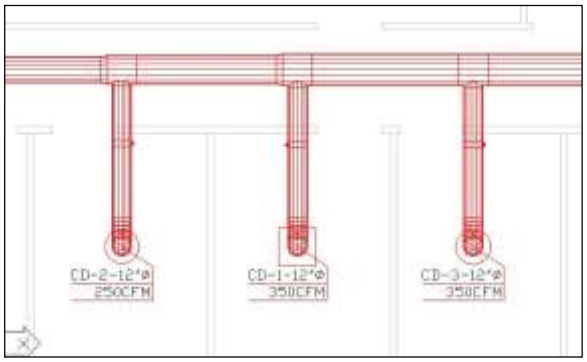
Properties dialog



Custom String Example-After

To Clipboard

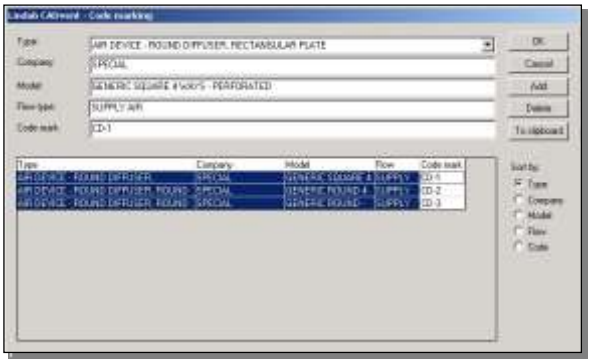
Information inserted in the Code Marking file can be used to create a schedule in the drawing (Bill-of-Materials).



To Clipboard Function

Example1:

1. Highlight the lines in the list in the Code Marking dialog that will be used to create the schedule.
2. Select *To Clipboard*.
3. Click *OK*.
4. Under the AutoCAD Draw menu, select *Text/Multiline Text*.
5. Specify the size of the window in which the text is to be included. The **Multiline Text Editor** dialog will open.
6. Under the Edit menu, select *Paste* to insert the text that was previously saved on the clipboard. A fully-editable schedule is automatically inserted in the drawing.



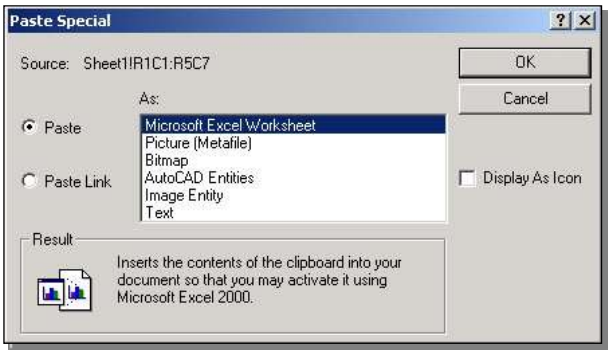
Code Marking Dialog

Multiline Text Editor Dialog

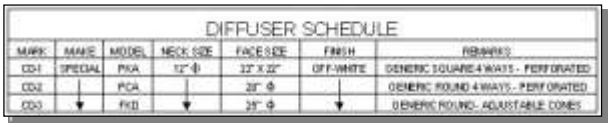
Text Detail

Example2:

1. Highlight the lines in the list in the Code Marking dialog that will be used to create the schedule.
2. Select *To Clipboard*.
3. Click *OK*.
4. Open Windows Excel.
5. Paste the text saved on the clipboard.
6. Edit the schedule as desired and then select *Copy*.
7. Go back to AutoCAD. Under the Edit menu, select *Paste Special*. The **Paste Special** dialog will open.
8. Make sure that the schedule saved on the clipboard is pasted as a Microsoft Excel Worksheet and click *OK*.
9. The content of the clipboard is automatically inserted in the drawing and it can be activated for editing at anytime using Microsoft Excel.



Paste Special Dialog



Diffuser Schedule from Excel File

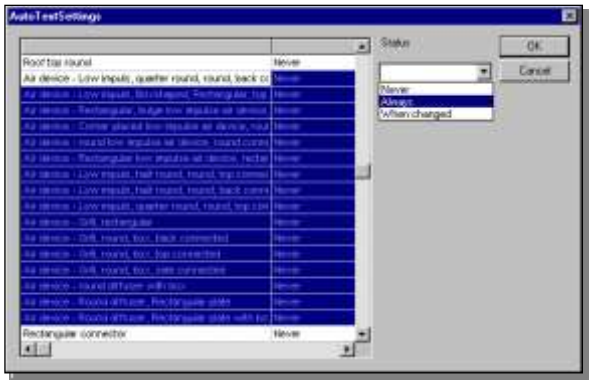
Auto Text Template

The Auto Text Template file regulates when to insert a text label for a specific product type.

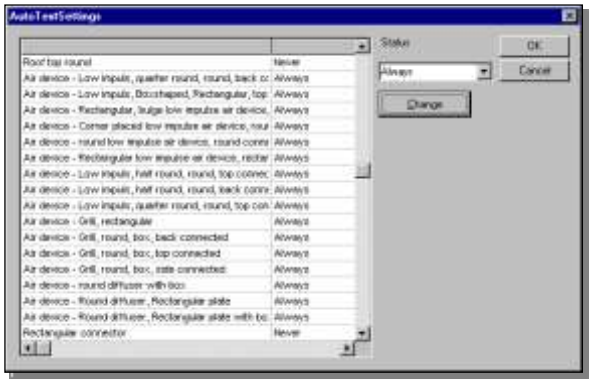
1. In the **Project Settings** dialog, check the box before Auto texting.

Auto Texting Field in Project Settings dialog

2. Select the browse (...) button to activate the desired AutoText Template in the CADvent file.
3. Select *Edit* to open the AutoText Settings dialog.
4. Select the product types to be changed by clicking on the single or multiple product types.
5. In the Status field, specify when text is to be inserted, by selecting “Never”, “Always”, or “When changed”.
6. Select *Change*.
7. Click *OK*.



AutoText Settings dialog



AutoText Settings dialog

NOTE:
To label each object in the drawing, either set the Status to “Always” for all the objects in the list of the Auto Text Template, or simply uncheck the box before Auto texting in the **Project Settings** dialog.

Auto Texting Field in Project Settings dialog

Room Text Template

(See CADvent Text & 2D – Room Text)

Room Text Field in Project Settings dialog

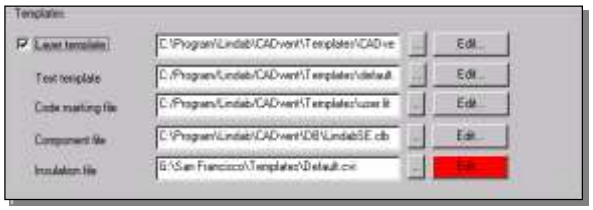
Creating an Insulation File

The insulation file contains an optional number of insulation types.

1. Select *Edit* to open the **Insulation File** dialog.

In the dialog, the wall of the duct is represented by a thick line. Each type of insulation can have several layers with internal and external insulation, each represented by different symbols:

Insulation (external insulation) = zigzag line
Lining (internal insulation) = dashed line



Templates Section of Project Settings dialog

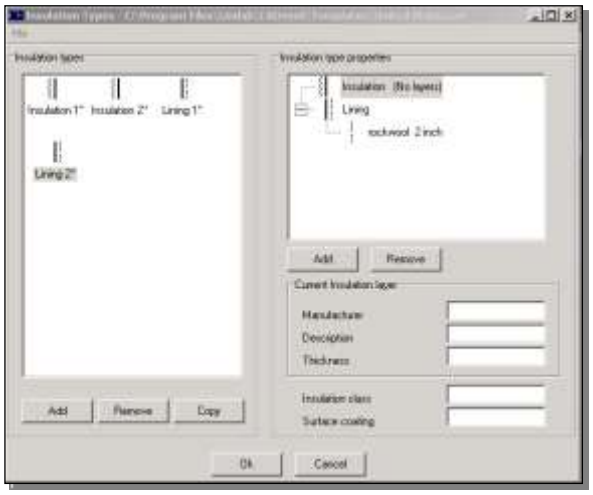
There are two ways to create a custom Insulation file:

1. Editing an existing file and save it under a new name.

-or-

2. Creating a completely new one.

(See below)



Insulation File dialog

Adding Insulation Types

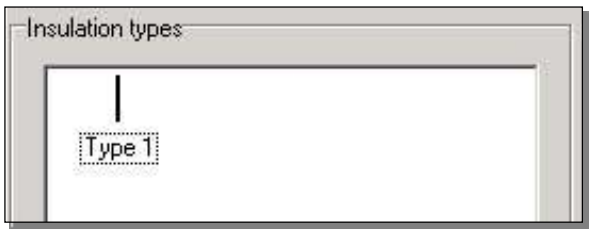
To add an insulation type:

1. Select *Add* in the Insulation types section of the **Insulation File** dialog.
2. Enter a name for the new insulation type.

NOTE:

Since no layer has been created yet, only the thick line for the duct wall is shown.

3. Complete the insulation type by adding insulation and lining layers, as shown in the following section.



Insulation Types Section of Insulation File dialog

Adding an Insulation Layer

NOTE:

As no layers have been created yet, “No layers” is shown beside Insulation and Lining in the Insulation type properties section.

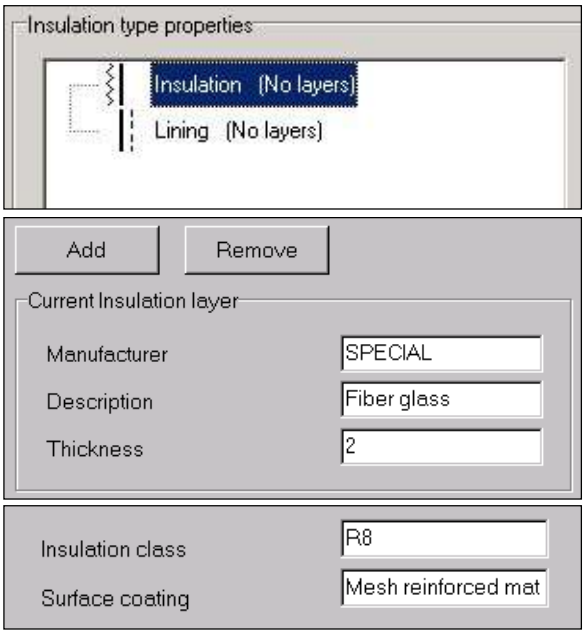
To add an insulation layer:

1. In the Insulation type properties section, select “Insulation.”
2. Enter the data for the insulation layer, in the Current Insulation layer section. This includes: Manufacturer, Description, and Thickness.
3. Each type of insulation may also have one class and one external cladding. Enter the data for Insulation class and Surface coating, if desired.

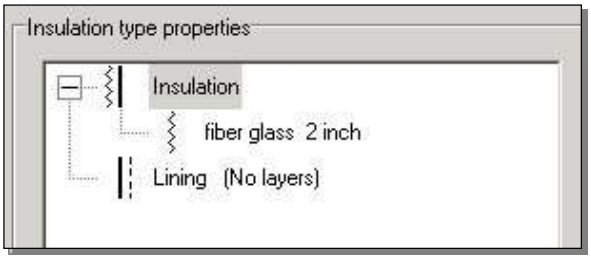
NOTE:
Several types of insulation can have the same class. For example, separate insulation types can be created for both round and rectangular insulation and yet the same insulation class entered for both.

4. Select *Add* to save the insulation layer in the Insulation Type properties section.

The new layer of external insulation is now shown with the correct symbols both in the Insulation types section and in the Insulation type properties section.



Insulation Type Properties Section of Insulation File dialog

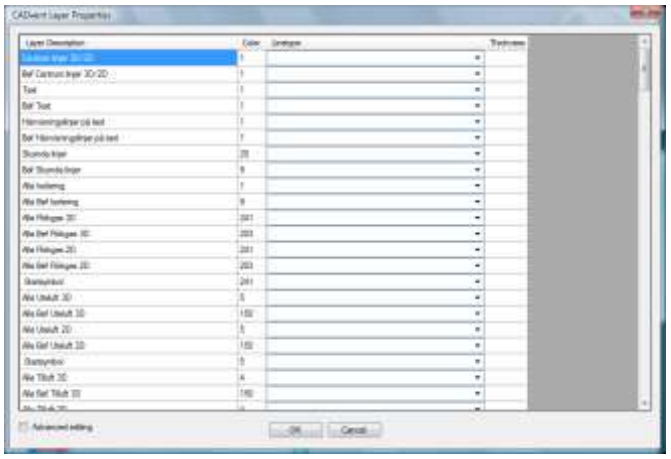


Insulation Type Properties Section of Insulation Types dialog

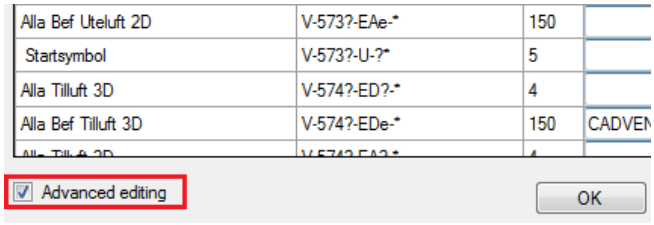
Insulation Types Section of Insulation Types dialog

CADvent Layer Properties

The colour management has been changed in CADvent 6.0.
Instead of selecting a colour file to a layer template looks CADvent automatically for colour file that has the same name as the layer template and loads it automatically.
The interface for the colour template has been changed completely and supports now settings for lineweight and linetype.
When pushing the CCT-button in the Settings tab you open the automatically selected CCT-file. The file structure has not changed, you have the Layer description on the left, the layer key is hidden by default, then the colour selection, the linetype selection and the lineweight (thickness).
If you want to view, add or edit the layer key you must check the button “Advanced editing” in the lower left corner of the dialog.
The advanced editing function should only be used by advanced CADvent users.



CADvent Layer Properties dialog



Advanced editing option

NOTE:
There are a number of “wild cards” that can be used to simplify the creation of the Colour Template file:
= Any number
? = Any number or letter
* = Any combination of letters and numbers, not including hyphens (–).

The advantage to using colour Templates is that colours can easily be associated to layers according to the value of one or more variables or to the type of object. This eliminates the need for the correspondence ‘layer name – colour’ that is necessary in the AutoCAD **Layer Template** dialog for each layer. The easiest way to create a Colour Template file is to edit an existing one and save it under another name.

NOTE:

A LISP file is created to read the Colour Template file and associate the colours with layers of the drawing. In order for the file to work, the presence and sequence of apostrophes, commas, colour codes, etc. must be saved.

Example:

The “United States.cct” file (which is associated with the “United States.clt” layer template file) has been created so that different colours can be given to duct components according to the system type and/or object type.

The file is divided into several sections according to the colour settings. (“Default colours for each system type”, “Common objects”, “Supply”, etc.)

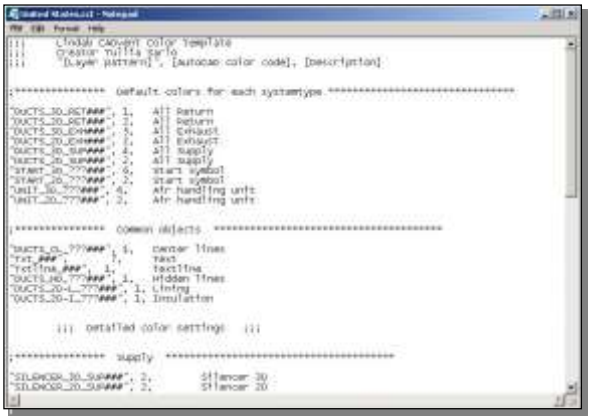
Each section includes a list of layer names, the given AutoCAD colour code and a description.

NOTE:

CADvent uses only the first part of each line: the layer name and the AutoCAD colour code. The description can be added by the user to better identify the association layer or colour.

In this case, all the duct components that have the layer pattern:

<DUCTS_’DISPLAY’_’SYSTYPE’’FLOOR’> have been given a colour according to the system type and the display values regardless of which floor they are on.



Colour Template File Example in Notepad

```
;*************** Default colors for each systemtype ******************************

"DUCTS_3D_RET###", 1,   All Return
"DUCTS_2D_RET###", 1,   All Return
"DUCTS_3D_EXH###", 5,   All Exhaust
"DUCTS_2D_EXH###", 5,   All Exhaust
"DUCTS_3D_SUP###", 4,   All Supply
"DUCTS_2D_SUP###", 2,   All Supply
"START_3D_???###", 6,   Start symbol
"START_2D_???###", 2,   Start symbol
"UNIT_3D_???###", 6,    Air handling unit
"UNIT_2D_???###", 2,    Air handling unit
```

Colour Template File Detail

In this particular template, objects such as the Start Symbol, AHU’s, centrelines of round ducts, hidden lines, lining and insulation, will always be colour #1 (red), no matter what floor they are on or what system type.

```
;*************** Common objects ***************************************

"DUCTS_CL_???###", 1,   Center lines
"Txt_###",         7,   Text
"Txtline_###",     1,   Textline
"DUCTS_HD_???###", 1,   Hidden lines
"DUCTS_2D-L_???###", 1, Lining
"DUCTS_2D-I_???###", 1, Insulation
```

Colour Template File Detail

Also in this particular template, objects such as silencers, dampers, diffusers and hoods are given the same colour for different system types (the supply, exhaust, return sections are the same).

```
      ;;;  Detailed color settings  ;;;

;*************** Supply ***********************************************

"SILENCER_3D_SUP###", 2,        Silencer 3D
"SILENCER_2D_SUP###", 2,        Silencer 2D

"DAMPER_3D_SUP###", 6,  Damper 3D
"DAMPER_2D_SUP###", 6,  Damper 2D

"AIR_DEVICE_3D_SUP###", 2,      Air Device 3D
"AIR_DEVICE_2D_SUP###", 2,      Air Device 2D

"HOODS_3D_SUP###", 2,   Hoods 3D
"HOODS_2D_SUP###", 2,   Hoods 2D
```

Colour Template File Detail

The same results can be obtained using the settings on the right.

Using '???' for the system type has reduced the detailed colour settings from 3 sections (supply, exhaust, return) to one.

```
        ;;;  Detailed color settings   ;;;

;*************** Special| ***************************************
"SILENCER_#D_???###", 2,        Silencers
"DAMPER_#D_???###", 6,  Dampers
"AIR_DEVICE_#D_???###", 2,      Air Devices
"HOODS_#D_???###", 2,   Hoods 3D
```

Colour Template File Detail

NOTE:
There are a number of "wild cards" that can be used to simplify the creation of the Colour Template file:
= Any number
? = Any number or letter
* = Any combination of letters and numbers, not including hyphens (–).

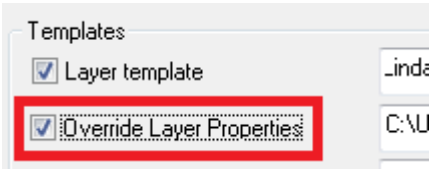
Every time the active Colour Template is changed, the colours must be updated on the drawing.

To update the colours on the drawing:

1. Select the **Update Colours** button in the Settings Toolbar.

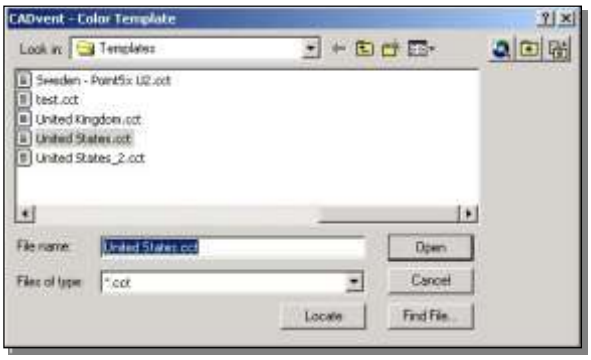
To select another Colour Template file instead:

1. Open the CADvent Project settings, activate "Override Layer Properties"
2. Select another file in the CADvent\Templates folder or in an existing personal folder.
3. Select *Open*.



NOTE:

If the colours do not change as expected, verify that the name of the layers used in the Colour Template file are the same as the names CADvent has created according to the Layer Template file active in the **Project Settings** dialog.



Open Colour Template

Editing Colour Template

Example:

1. Create a simple Layer Template that has the following layer patterns:
   - <V-57SYSTYPE'> for all the duct components

2. Decide the association colour - objects based upon their system type and the type of object as follows:
   - GREEN (colour code 3) for the EXHAUST duct components;
   - CYAN (colour code 4) for the SUPPLY duct components;
   - BLUE (colour code 3) for the INLET duct components;
   - GREY (colour code 1 for the OUTLET duct components.

4. Translate the variable SYSTYPE as shown on the right. The layers created will be:

EXHAUST:	V-576	
SUPPLY:	V-574	
INLET:		V-573
OUTLET:	V-571	

5. Make sure that the name of the layers used in the Colour Template file are the same as the layers CADvent creates according to the Layer Template file.

Default value	Value
CIRCULATION	9
EXHAUST	6
INLET	3
OUTLET	8
RETURN	7
SMOKE	2
SUPPLY	4
SURPLUS	5

Template Dialog - Variable Dictionary Section of Layer

NOTE:
If instead the diffusers and duct components are to be given colour only according to the system type, then the colour template file is made of only three lines as shown to the right.

Layer Description	Layer Filter	Color
Startsymbol	V-573?-U-?*	5
Alla Tilluft 3D	V-574?-ED?-*	1
Alla Bef Tilluft 3D	V-574?-EDe-*	150
Alla Tilluft 2D	V-574?-EA?-*	4
Alla Bef Tilluft 2D	V-574?-EAe-*	150

CADvent Layer Properties