

# ArCADia- TELECOMMUNICATIONS NETWORKS

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ArCADia-TELECOMMUNICATIONS NETWORKS  
User Manual

2019-05-22

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## Introduction

# 1 INTRODUCTION

## 1.1 ABOUT

**ArCADia-TELECOMMUNICATIONS NETWORKS** is a smart tool which enhances ArCADia-INTELLICAD/AutoCAD applications with functions necessary for development of professional individual discipline documentations covering outdoor telecommunications network designing (optical-fibre cables and copper cables).

The user of the **ArCADia-TELECOMMUNICATIONS NETWORKS** application is able to develop in a short time outdoor telecommunications networks drawings on land development plans or to create a totally new drawing of an existing or designed network in the view of its passive components.

Due to the specificity of outdoor telecommunications networks designing (the necessity to construct or expand primary or secondary communication cable ducts, cable subways, existing or designed overhead lines, rearrangement of existing cables), the Application functions cover the designing of optical-fibre and copper cables and the above mentioned network components. The fact that the Application is dedicated to the designers of outdoor telecommunications networks, does not exclude the possible use of the Application by design and construction companies developing telecommunications network concepts, preparing individual discipline drawings, doing inventory of the existing network and a possible use by any person engaged in communication issues.

The Application shares the database used for cost estimation on the basis of a comprehensive bill of basic materials used for the construction of telecommunications networks, including cables and equipment for termination of optical-fibre and copper cables in target buildings. The user is provided with the library of design objects, which may be used during designing, or may be modified and parameterised by the User. Along with the advantage in the form of easy and fast development of drawings and diagrams, the Application provides calculations necessary for the correct design of a network. A combination of the specialised functions of this Application with the calculations and the quality inspection for the designed network is a perfect solution for development of telecommunications network designs using optical-fibre and copper cables.

## 1.2 APPLICATION FEATURES AND POSSIBILITIES

**ArCADia-TELECOMMUNICATIONS NETWORKS** enables the user to design outdoor telecommunications networks on the route: start point distribution frame (start point cable termination: switch, outdoor cabinet, cable box) – telecommunications line route – end point distribution frame (end point cable termination: switch, outdoor cabinet, cable box, cable termination inside a building), as well as to design a network of any configuration, divided into the selected components.

During designing of underground line you must specify the required length of cable ducts, cable chambers, secondary cable ducts, cable subways and underground or duct cables. The character of telecommunications network designing requires considering such elements as: cable joint, cable allowance, fibre optic distribution frame or cable terminal installed inside a building or outdoor cabinet. The Application provides the possibility to add these objects and inserting them in the place selected within the project. In case of designing telecommunications cables using the existing infrastructure, the Application allows the user to define the selected elements and to store them as the existing ones, and then adding the elements being designed. The Application provides freedom of designing and does not impose the necessity to design complete network.

## Introduction

Therefore, you are not limited in any manner in designing and drawing the whole network or just its component - depending on your needs. Considering the fact that the following three variants are available: a wholly new network design, designing with the use of existing network after its predefinition (e.g. primary or secondary cable ducts for installation of e.g. optical-fibre cable) and development of the existing network, the application scenarios will be highly dependent on the initial design state. The Application provides the possibility to freely choose the design start and end points on the network. So, the Application may be used only to design primary cable ducts, a cable chamber or cable duct segments. Due to the required construction sequence for the newly constructed network or the existing network being extended (first you must choose conduits for cable ducts or subways, and only after that you can route cables through them, or you have to choose and construct an overhead network), the only limitation in designing of telecommunications cables is the necessity to predefine the above mentioned network components.

During designing of outdoor cable lines on land development plans, the designer is able to get in a short time the list of survey point coordinates (in the form of an .rtf file) relating to the key points of the network (line bend, cable chamber, overhead line pole, cable container). The Application also provides basic calculations and a report generation, as well as inspections of designed network components.

The Application's substantive scope and basic functions:

- Designing of underground primary or secondary cable ducts, cable subways.
- Designing of overhead lines.
- Designing of optical-fibre and copper cables (including IT or coaxial cables) with the use of existing or designed telecommunications infrastructure.
- The control of routing of designed cable individual segments, control of selected cable route and connections of other project components.
- The generation of calculation reports, such as an attenuation analysis, cable segments lists, cable routes annotations, summary of primary and secondary cable duct segments.
- The generation of cable route schemes, schemes of primary cable ducts, cable subways, bill of materials for the project or the link selected.
- The report for a selected object or a group of objects.
- The export of the bill of materials to cost estimation applications.

All calculations and checks performed by **ArCADia-TELECOMMUNICATIONS NETWORKS** were developed on the basis of the following standards and regulations:

- [1] BN-89/8984-17/3. Local telecommunications networks. Cable lines. General requirements and tests.
- [2] EN 50173. Cable and cable joint categories. Measurements parameters.
- [3] PN 76/E-05125 Power and signalling cable lines. Design and construction.
- [4] BN-73/8984-01. Local telecommunications cable networks. Cable chambers. Classification and dimensions.
- [5] BN-85/8984-01. Local telecommunications cable networks. Cable chambers. Classification and dimensions.
- [6] BN-73/8984-05. Cable ducts. General requirements and tests.

## Introduction

- [7] ZN-96/TPSA-002, ZN-96/TPSA-005, ZN-96/TPSA-006, ZN-96/TPSA-007, ZN-96/TPSA-008, ZN-96/TPSA-009. Corporate standards. Optical telecommunications lines.
- [8] Technical manual K-1. Major Map.
- [9] Corporate standards. Design and construction of telecommunications network. Construction of copper access networks, construction of optical telecommunications networks.
- [10] PN-92/T-90335. PN-T-90335:1992/Az1:1998 Telecommunications local cables with phantom groups, bunch-type, with polyethylene insulation, polyethylene sheath with moisture barrier, filled up. General requirements and tests.
- [11] Ordinance of the Minister of Infrastructure of 26/10/2005 on technical conditions to be met by telecommunications buildings and their location. (Journal of Laws, 2005, No. 219 item 1864).

## 2 INSTALLING AND RUNNING THE APPLICATION



## Installing and running the Application

### 2.1 HARDWARE REQUIREMENTS

- Processor Intel Core 2 Duo lub AMD Athlon II (recommended min. Intel Core i5-6500)
- 3 GB RAM (recommended min. 12 GB and system 64-bit)
- 5 GB of free HDD space (recommended SSD)
- For standard 3D view graphics card compatible with DirectX 9.0c 1GB RAM, for advanced 3D view graphics card compatible with DirectX 11 and min. 3GB RAM
- Windows 10 , Windows 8.1 , Windows 7 SP1 (recommended Windows 10 64-bit)

### 2.2 INSTALLING

The Application installation is started automatically when the CD is inserted into the CD drive. The installation should be started manually, if the Autostart function is disabled. Explore the CD folder (My Computer/CD drive), and run Setup.exe. Once the installation is started, proceed according to the instructions displayed on the screen.

### 2.3 RUNNING

The Application may be initialized by double-clicking on the CAD software icon, which generally may be found on the desktop, and then selecting one of the icons on the ribbon or toolbar of the **ArCADia-TELECOMMUNICATIONS NETWORKS** Application.


### 2.4 OPENING PROJECT (CAD)

You can open any of the following files:

- Standard DWG file.
- It is possible to use any of the example drawings delivered with ArCADia-INTELLICAD.
- Exchange file format DXF.
- Network file format DWF.
- Drawing templates DWT.

To open a recently used drawing in the fastest way, select File > <file name>. The Application remembers the names of four recently opened drawings. To open quickly a drawing from the dialogue box, Open the drawing by double-clicking on its name. It is possible to open a drawing during browsing of drawing files with Windows Explorer. You just have to double-click on a file to open it in ArCADia-INTELLICAD. In order to facilitate drawing identification during browsing of files, the miniatures showing their contents are displayed.

The method of opening an existing drawing

1. Choose one of the following methods:
  - Select file > Open.
  - Click Open tool () on the Standard toolbar.
  - Write *open* and then press Enter.
2. Set file type to the type of your interest.
3. Select the folder containing a desired drawing.

## Installing and running the Application

4. Use one of the following procedures:
  - Select the drawing you want to open and click Open.
  - Double-click on the drawing you want to open.

If the drawing requires a password, enter the password, click on OK to check the password, and then click on Open.

## 2.5 SAVING PROJECT (CAD)

A drawing may be saved at any time.

Use one of the following methods to save the drawing:

- Click on Save on the Standard toolbar.
- Select File > Save.
- Write *save* and then press Enter.
- Write *qsave* and then press Enter.

While saving a drawing for the first time, the Application opens the "Save drawing as" dialogue box, which allows the user to choose a target folder and drawing name. You can give any name to the drawing saved for the first time. To save the drawing under another name later, reselect the option File > Save as, and enter a new name.

## 2.6 AUTOSAVE AND BACK-UP COPY (CAD)

Save your drawing files as often as it is possible in order to avoid loss of data in case of a power failure or system error. The Application may be configured to auto save drawings periodically. The *Autosave* setting determines the time period (in minutes) between auto saves. The application resets this timer every time the user saves the drawing file.

When the *Autosave* function is enabled, the Application makes a copy of the drawing. This file is stored in a directory specified in Options > Paths/Files> Temporary file, and has an extension defined in the box "Extension of drawing autosave file".

The method of configuring ArCADia-INTELLICAD for drawing autosave:

1. Do one of the following:
  - Select Tools > Options.
  - Write *config* and then press Enter.
2. Click on the General tab.
3. Tick the check box in the *Autosave* area in order to activate the *Autosave* function and set the auto save frequency.
4. Click on OK.

## 3 WORKING WITH THE APPLICATION

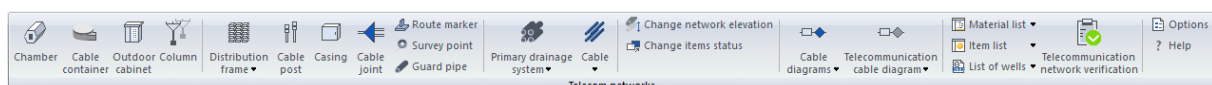
### 3.1 BASIC INFORMATION ABOUT THE APPLICATION

**ArCADia- TELECOMMUNICATIONS NETWORKS** enables the user to design outdoor underground and overhead telecommunications networks. The cable route is drawn in metric scale (single unit on the screen of ArCADia-INTELLICAD corresponds to 1 metre in the design). The network design procedure is as follows:

1. You may start drawing of the network from the design of a cable chamber, primary cable duct segment, cable subway, fibre optic distribution frame, casing for line terminal. You can also insert poles, an overhead line, cable container. These objects may be freely modified, and their parameters and location may be changed. Afterwards, you may add to the design telecommunications cables and the equipment (specifying the allowance locations, joints, cable terminations and their parameters).
2. While designing a primary cable duct only, use the following objects: primary cable duct profile, cable chamber.
3. Adding a secondary cable duct to the project requires the primary cable duct profile to be defined first.
4. The cable subway is inserted directly from the "cable subway profile" object.
5. Designing of overhead cables is defined in the overhead line object with the use of the overhead line pole object.
6. All the objects used in the project, except the survey point object, may be assigned with the status "designed" or "existing".
7. The reports, calculations and inspections generated by the Application will be available after entering in the Project all the required parameters used by the Application to generate these summaries. If the object for which you want to generate a report is missing, the report will not be generated or will be available as blank.
8. The objects are numbered according to the abbreviations assigned to them in the general options, in the sequence of their insertion into the project.
9. If the selected objects cannot be linked to each other, the Application generates an appropriate message.
10. The network being designed is represented in a 3D View available in the project after the objects have been added. This visual tool facilitates the designing process and enables the detection of any altitude data errors that might occur (object foundation level).

### 3.2 DESCRIPTION OF THE APPLICATION ELEMENTS

**ArCADia-TELECOMMUNICATIONS NETWORKS** Add-on adds to ArCADia-INTELLICAD/AutoCAD menus and to ArCADia-START its own modules described in the table below:




















ArCADia Telecom network toolbar



















## Working with the Application

The functions of the **ArCADia-TELECOMMUNICATIONS NETWORKS** module :




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

Icon	Option	Description	*BIM
	<i>Chamber</i>	Inserts and edits the properties of a cable chamber along with its symbol and description.	<b>X</b>
	<i>Cable container</i>	Inserts and edits the properties of a cable container along with its symbol and description.	<b>X</b>
	<i>Outdoor cabinet</i>	Inserts and edits the properties of an outdoor cabinet along with its symbol and description.	<b>X</b>
	<i>Column</i>	Inserts and edits the properties of an overhead line pole along with its symbol and description.	<b>X</b>
	<i>Distribution frame</i>	Inserts and edits the properties of a telecommunications distribution frame along with its symbol and description.	<b>X</b>
	<i>Fibre optic distribution frame</i>	Inserts and edits the properties of a fibre optic distribution frame along with its symbol and description.	<b>X</b>
	<i>Cable post</i>	Inserts and edits the properties of a cable post along with its symbol and description.	<b>X</b>
	<i>Casing</i>	Inserts and edits the properties of a line terminal casing along with its symbol and description.	<b>X</b>
	<i>Cable joint</i>	Inserts and edits the properties of a cable joint along with its symbol and description.	<b>X</b>
	<i>Route marker</i>	Inserts and edits the properties of a routing marker along with its symbol and description.	<b>X</b>
	<i>Survey point</i>	Inserts and edits the properties of a survey point along with its symbol and.	<b>X</b>
	<i>Guard pipe</i>	Inserts and edits the properties of a conduit along with its symbol and description.	<b>X</b>
	<i>Primary drainage system</i>	Inserts and edits the properties of a primary cable duct along with its symbol and description.	<b>X</b>
	<i>Cable pipeline</i>	Inserts and edits the properties of a cable subway along with its symbol and description.	<b>X</b>
	<i>Cable</i>	Inserts and edits the properties of a cable along with symbol its and description.	<b>X</b>
	<i>Overhead cable line</i>	Inserts and edits the properties of an overhead cable line along with its symbol and description.	<b>X</b>
	<i>Change network elevation</i>	Changes the foundation altitude of an object used in the project.	<b>X</b>

## Working with the Application

	<i>Change object status</i>	Changes the status of an object used in the project: <i>designed/existing</i> .	<b>X</b>
	<i>Cable diagram</i>	Inserts and edits a selected diagram for the selected optical-fibre cable link designed in the project.	<b>X</b>
	<i>Fibre optic cable diagram</i>	Inserts and edits a selected diagram for the selected telecommunications cable link designed in the project.	<b>X</b>
	<i>Telecommunication cable diagram</i>	Inserts and edits a selected diagram for the selected primary cable duct route segment designed in the project.	<b>X</b>
	<i>Cable pipeline diagram</i>	Inserts and edits a selected diagram for the selected cable subway route segment designed in the project.	<b>X</b>
	<i>Material list</i>	Generates the bill of materials used in the project.	<b>X</b>
	<i>Selected elements material list</i>	Generates a quantitative material list for the elements selected in the projection.	<b>X</b>
	<i>Item list</i>	Inserts the legend of symbols along with a description.	<b>X</b>
	<i>Selected elements list</i>	Inserts the legend of symbols along with a description of elements marked on the projection.	<b>X</b>
	<i>List of wells</i>	Generates a list of cable chambers used in the project.	<b>X</b>
	<i>List of primary ducting system sections</i>	Generates a table summarizing the primary cable duct segments used in the project.	<b>X</b>
	<i>List of survey point coordinates</i>	Generates a table summarizing survey point coordinates for the objects used in the project and the points indicated.	<b>X</b>
	<i>Description of fibre optic cableroute</i>	Generates a table summarizing descriptions of the selected optical-fibre cable link.	<b>X</b>
	<i>List of fibre-optical cable sections</i>	Generates a table summarizing the optical-fibre cable segments.	<b>X</b>
	<i>Analysis of fibre optic damping</i>	Generates a table in the form of a report with attenuation calculations for the selected optical-fibre cable.	<b>X</b>
	<i>Description of telecommunication cable route</i>	Generates a table summarizing descriptions of the selected optical-fibre cable link.	<b>X</b>
	<i>List of telecommunications cable sections</i>	Generates a table summarizing telecommunications cable segments.	<b>X</b>
	<i>Analysis of cable circuit damping and impedance</i>	Generates a table in the form of a report with attenuation and impedance calculations for the selected cable path.	<b>X</b>




## Working with the Application

	<i>Telecommunications network verification</i>	Enables the user to run standard checks of the designed network for the project.	<b>X</b>
	<i>Option</i>	Sets standard options for the whole project.	<b>X</b>
	<i>Help</i>	Displays the help window.	<b>X</b>

**ArCADia-TELECOMMUNICATIONS NETWORKS** Add-on also adds to the menu toolbars for report generation:

**ArCADia-TELECOMMUNICATIONS NETWORKS toolbar: General reports**

The functions of the **General reports** toolbar:

Icon	Option	Description
	<i>List of cable chambers</i>	Generates a list of cable chambers used in the project
	<i>List of primary cable duct segments</i>	Generates a table summarizing the primary cable duct segments used in the project
	<i>List of survey point coordinates</i>	Generates a table summarizing survey point coordinates for the objects used in the project and the points indicated




**ArCADia-TELECOMMUNICATIONS NETWORKS** Add-on also adds to the menu toolbars for report generation:

**ArCADia-TELECOMMUNICATIONS NETWORKS toolbar: Fibre optic reports**

The functions of the **Fibre optic reports** toolbar:

Icon	Option	Description
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## Working with the Application




	<i>Description of optical-fibre cable</i>	Generates a table summarizing descriptions of the selected optical-fibre cable link
	<i>List of optical-fibre cable segments</i>	Generates a table summarizing the optical-fibre cable segments
	<i>Analysis of optical-fibre cable attenuation</i>	Generates a table in the form of a report with attenuation calculations for the selected optical-fibre cable

**ArCADia-TELECOMMUNICATIONS NETWORKS** Add-on also adds to the menu toolbars for report generation:

**ArCADia-TELECOMMUNICATIONS NETWORKS toolbar: Telecommunications reports**



The functions of the **Telecommunications reports** toolbar:

Icon	Option	Description
	<i>Description of optical-fibre cable route</i>	Generates a table summarizing descriptions of the selected optical-fibre cable link
	<i>List of telecommunications cable segments</i>	Generates a table summarizing telecommunications cable segments
	<i>Attenuation and impedance analysis for cable paths</i>	Generates a table in the form of a report with attenuation and impedance calculations for the selected cable path

**ArCADia-TELECOMMUNICATIONS NETWORKS** Add-on also adds to the menu toolbars for report generation:

**ArCADia-TELECOMMUNICATIONS NETWORKS toolbar: Cable diagrams**





The functions of the **Cable diagrams** toolbar:

Icon	Option	Description
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## Working with the Application



	<i>Generate optical-fibre cable diagram</i>	Inserts and edits a selected diagram for the selected optical-fibre cable link designed in the project
	<i>Generate telecommunications cable diagram</i>	Inserts and edits a selected diagram for the selected telecommunications cable link designed in the project

**ArCADia-TELECOMMUNICATIONS NETWORKS** Add-on also adds to the menu toolbars for report generation:

**ArCADia-TELECOMMUNICATIONS NETWORKS toolbar: Cable duct diagrams**

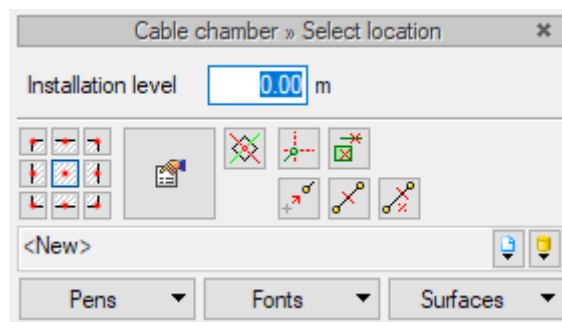


The functions of the **Cable duct diagrams** toolbar:

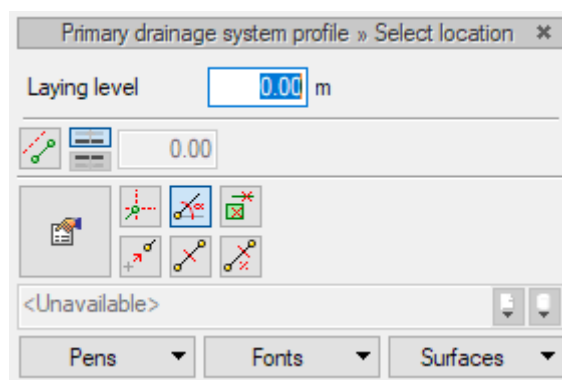
Icon	Option	Description
	<i>Generate primary cable duct diagram</i>	Inserts and edits a selected diagram for the selected primary cable duct route segment designed in the project
	<i>Generate cable subway diagram</i>	Inserts and edits a selected diagram for the selected cable subway route segment designed in the project

After clicking on the object on the **ArCADia-TELECOMMUNICATIONS NETWORKS** toolbar, the following window will be displayed on the model (relates to the following objects: cable chamber, cable container, outdoor cabinet, pole, fibre optic distribution frame, cable post, line terminal casing, telecommunications distribution frame, cable joint, routing marker, survey point):

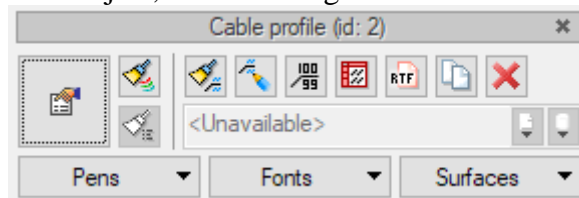
## Working with the Application



After clicking on the object on the model, the following window will be displayed (relates to the following objects: primary cable duct profile, cable subway profile, cable profile, overhead line):



After clicking on the conduit object, the following window will be displayed:



After setting the object insertion parameters and insertion of the objects into the project (on a raster map, .dwg map or directly in the program), click on the object symbol to activate the toolbar defined for each object.




The functionality of the **ArCADia-TELECOMMUNICATIONS NETWORKS MINI** version is restricted.

### **The functions which are not available in the MINI version**




#### **ArCADia-TELECOMMUNICATIONS NETWORKS toolbar: General reports**






## Working with the Application

Icon	Option	Description
	<i>List of cable chambers</i>	Generates a list of cable chambers used in the project
	<i>List of primary cable duct segments</i>	Generates a table summarizing primary cable duct segments used in the project
	<i>List of survey point coordinates</i>	Generates a table summarizing survey point coordinates for the objects used in the project and the points indicated

**ArCADia-TELECOMMUNICATIONS NETWORKS toolbar: Fibre optic reports**

Icon	Option	Description
	<i>Description of optical-fibre cable</i>	Generates a table summarizing descriptions of the selected optical-fibre cable link
	<i>List of optical-fibre cable segments</i>	Generates a table summarizing optical-fibre cable segments
	<i>Analysis of optical-fibre cable attenuation</i>	Generates a table in the form of a report with attenuation calculations for the selected optical-fibre cable

**ArCADia-TELECOMMUNICATIONS NETWORKS toolbar: Telecommunications reports**

Icon	Option	Description
	<i>Description of optical-fibre cable route</i>	Generates a table summarizing descriptions of the selected optical-fibre cable link
	<i>List of telecommunications cable segments</i>	Generates a table summarizing telecommunications cable segments
	<i>Attenuation and impedance analysis for cable paths</i>	Generates a table in the form of a report with attenuation and impedance calculations for the selected cable path

**ArCADia-TELECOMMUNICATIONS NETWORKS toolbar: Cable diagrams**

## Working with the Application




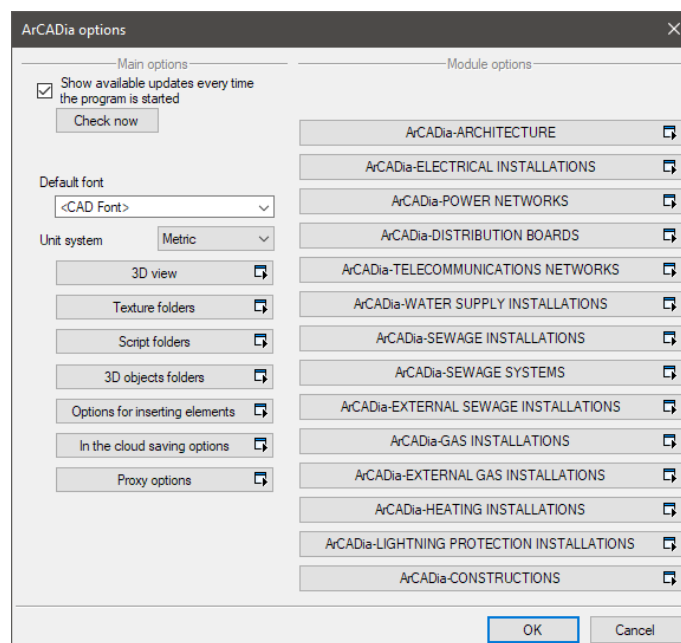
Icon	Option	Description
	<i>Generate optical-fibre cable diagram</i>	Inserts and edits a selected diagram for the selected optical-fibre cable link designed in the project
	<i>Generate telecommunications cable diagram</i>	Inserts and edits a selected diagram for the selected telecommunications cable link designed in the project

**ArCADia-TELECOMMUNICATIONS NETWORKS toolbar: Cable duct diagrams**

Icon	Option	Description
	<i>Generate primary cable duct diagram</i>	Inserts and edits a selected diagram for the selected primary cable duct route segment designed in the project
	<i>Generate cable subway diagram</i>	Inserts and edits a selected diagram for the selected cable subway route segment designed in the project

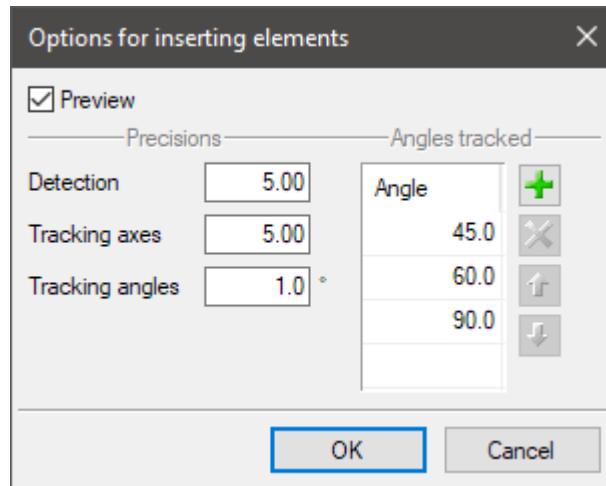
**3.2.1 General options of the Application**

Click on  icon, the general options window for the ArCADia Application will be displayed:



## Working with the Application

Option for each of the ArCADia modules and the options for the entire software are available in this window. **Options for inserting elements** are available on the left side of the window. After clicking the tracking options, the user will see a precision settings window:



The user may select the precision for detecting the elements to be connected, what will the precision be for tracking these elements and the angles tracking (detection) precision. Apart from that the user may also indicate, what angles are to be tracked.

Select the **ArCADia-TELECOMMUNICATIONS NETWORKS** module and in the Application option window enter the scale of symbols edited in the Application, their tracking and detection accuracy settings. It is also possible to change the Application object names. The objects added to the Application will be numbered automatically with the defined default symbol. It is also required to specify the default address separator.

The settings for the project options may be defined in the window:

## Working with the Application

**Object properties: Project options** [X]

Object management

Element id:

Appearance

Symbol scale:  ☐ Update all

Default symbols

Cable chamber	<input type="text" value="ST"/>	Fibre optic distribution frame	<input type="text" value="FOS"/>
Outdoor cabinet	<input type="text" value="SZ"/>	Telecommunication distribution frame	<input type="text" value="PG"/>
Route marker	<input type="text" value="CM"/>	Cable post	<input type="text" value="SK"/>
Telecommunications pole	<input type="text" value="P"/>	Line terminal enclosure	<input type="text" value="OZL"/>
Cable container	<input type="text" value="ZZ"/>	Cable joint	<input type="text" value="ZK"/>
Survey point	<input type="text" value="GEO"/>	Default address separator	<input type="text" value="."/>

Project options


Address separator	<input type="text" value="."/>
Cable pipeline length factor	<input type="text" value="1.03"/>
Secondary drainage system length factor	<input type="text" value="1.03"/>
Cable length factor in primary drainage system	<input type="text" value="1.04"/>
Cable length factor in cable pipeline	<input type="text" value="1.03"/>
Buried cable length factor	<input type="text" value="1.04"/>
Overhead cable length factor	<input type="text" value="1.04"/>
Warning cable length factor	<input type="text" value="1.03"/>
Warning tape length factor	<input type="text" value="1.03"/>
Maximum primary drainage system section length	<input type="text" value="120.00"/>
Maximum cable reserve length	<input type="text" value="100.00"/>
Maximum overhead line section length	<input type="text" value="60.00"/>

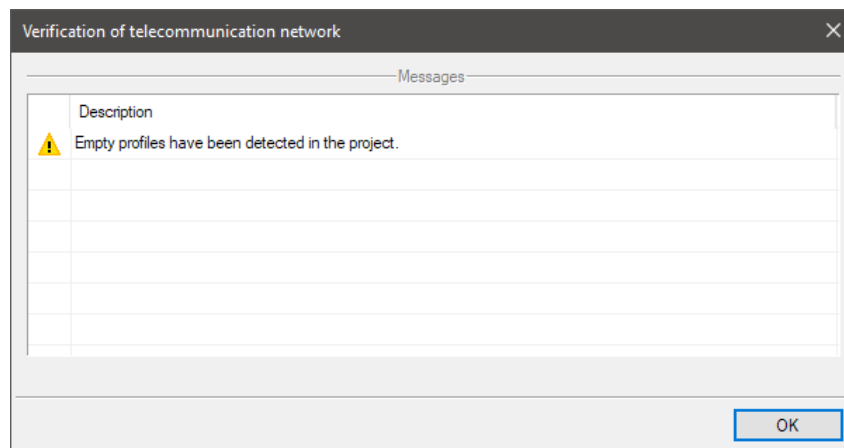
Save to template [v] [↺] **OK** Cancel


The user defines the project options such as the length factors of the cable subway, secondary cable duct, cable in primary cable duct, cable in cable subway, in ground, signal cable, overhead cable and warning tape. The Application also defines the maximum lengths of primary cable duct segments between neighbouring cable chambers, cable allowance and lengths of overhead line without supports. The factors defined will be taken into account in reports and controls carried out with the use of calculation applications. If the maximum lengths defined are exceeded, the Application will generate a suitable message during inspection of the network designed.

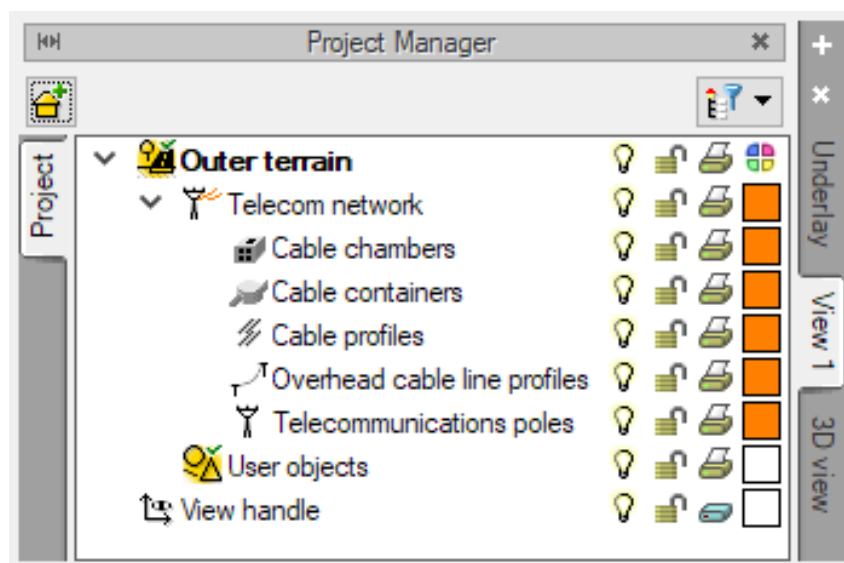
## Working with the Application



After clicking on  icon, and selecting the first element of the designed network, the Application starts the inspection. The example window with checks defined in the Application general options:



After clicking on the  (*Show/Hide Project Manager*) icon on SYSTEM ribbon , the Project Manager window will be displayed:



In this window, after adding selected objects of the Application to the project, you may define and manage layer properties which are created by the Application (each group of added objects is edited on a separate layer). In the Manager window you may also switch the currently active View, e.g. from the current drawing View to the generated schema of the cable installed

### 3.3 CALCULATIONS

When the network is designed and parameterised, the **ArCADia-TELECOMMUNICATIONS NETWORKS** application performs standard calculations. These include:

- optical-fibre line attenuation analysis,
- cable line attenuation and impedance analysis,
- calculations of route and optical path lengths for optical-fibre cables along with cable route annotations,
- calculations of route and electrical path lengths for telecommunications cables along with their item range,
- calculations of defined segments and item ranges for primary cable duct, secondary cable duct, cable subway,
- calculations of optical-fibre cable lengths between neighbouring joints.

For the technical calculations to be performed it is necessary to properly specify the length factors, attenuation and impedance values for the designed cables. It is also necessary to properly define cable allowances and their addresses. The technical calculations and analysis are not performed when the project does not include any cable or the cable path for the analysis is not correctly selected.

After completion of the optical-fibre cable route design and after specifying the joint parameters, the Application should generate an attenuation report for the selected optical-fibre cable. The data necessary for the summary generation is as follows: parameters specified in the Application general options, total designed cable optical path including the optical-fibre cable being added to the project, total length of cable allowance at cable joints, allowances in containers and the optical cable joints defined.

The total attenuation of the installed optical-fibre cable regeneration section is calculated with the following formula:

$$A_L = A_W + A_r + A_s$$

where:

$A_W$  – optical fibre attenuation calculated as the product of the attenuation constant  $a_o$  and the cable optical path

$$A_W = a_o \times L_{opt}$$

$A_r$  – joint connection attenuation calculated as the product of the joint connection attenuation mean value  $a_r$  and the quantity of this type of connections  $n_r$

$$A_r = a_r \times n_r$$

$A_s$  – welded connection attenuation calculated as the product of the welded connection attenuation mean value  $a_s$  and the quantity of this type of connections  $n_s$

$$A_s = a_s \times n_s$$

In order to carry out a power balance, the calculated attenuation  $A_L$  must be increased by the so called operational attenuation resulting from cable ageing and the provisions for additional



## Working with the Application

welds (cable midsegments) which could be necessary to remove a failure or to modify the optical fibre line. This value is equal to 10% of the line attenuation.

The total line attenuation which must be taken into account while calculating the power balance is defined as follows:

$$A_c = 1.1 A_L$$

The calculated optical fibre line attenuation is increased by the attenuation of the teletransmission devices defined by the user (by default it is 3 dB).

When the telecommunications cable routes are designed and the joint parameters are specified, the Application should generate an attenuation and impedance report for the selected cable (cable segment). The data necessary for the summary generation is as follows: parameters defined in the Application options, i.e. the designed cable wire diameter, total length of the designed cable including cable allowances added, and additional attenuation and impedance of the cable path defined.

In the calculation of the path impedances the following unit values have been taken into account (at 20 °C) for various diameters of local cable wires:

0.4 mm – 300 Ω/km,
0.5 mm – 191.8 Ω/km,
0.6 mm – 133.2 Ω/km,
0.8 mm – 73.6 Ω/km,

The value for the selected cable segment (link) is calculated as the sum of the impedance of individual segments.

Attenuation constant for local copper cable paths at  $f = 1020$  Hz and various wire diameters (measured in dB/km):

Local cable with wire	0.4 mm – 1.90 dB/km
Local cable with wire	0.5 mm – 1.52 dB/km
Local cable with wire	0.6 mm – 1.27 dB/km
Local cable with wire	0.8 mm – 0.94 dB/km

Attenuation constant for temperatures other than 20 °C should be calculated with the following formula:

$$T = 20 [1 + 0.00393 (T - 20 \text{ °C})]$$

The calculations of the above mentioned parameters are presented in a table including partial calculations for individual segments of the cables selected. Other calculations performed by the Application are described in section *Generation of calculation reports*.


## 3.4 OBJECT DESCRIPTION

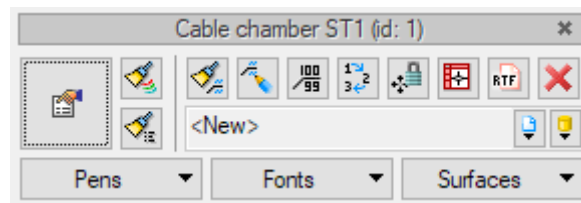
### 3.4.1 Cable chamber

The cable chamber is an underground object constructed within the route of a cable duct, cable subway which is used for pulling or maintenance of cables and devices installed in it.









## Working with the Application

The cable chambers are classified according to their size and localization within a cable duct route.



After selecting  icon you are able to add an element to the project. Click on the added object, the following window will be displayed:



The object edit functions, its specification and a table with descriptions may be defined for a particular object (applies to all objects used in the Application) with the buttons available in the object window:


-  - *Enable/disable description.* The object is described with successive numbers assigned to the names defined in the general options
-  - *Description location change* (vertically/horizontally).
-  - Insert a list of object joints. If designed optical cable or telecommunications (copper) cable joints are defined in the particular object, an editable list of these joints is available in the form of a table. For the description, appearance and edit method of such a table see below.
-  - Object specification. The Application edits the specification of each object in the form of an RTF file. An example of object specification is presented in section *Generation of lists*.
-  - *Insert item list.* If a few components are defined in the object, a list of such components is displayed in the form of an editable table. It applies to the following objects: primary cable duct profile, cable subway profile, telecommunications cable profile. For the description, appearance and edit method of such a table, see the "primary cable duct profile" object.
-  - *Export of Bill of materials to the Ceninwest application.* Exports BoMs of all the materials used in the project (or a selected material group) to the Ceninwest application.
-  - *Copy profile content.* The defined primary cable duct profile, cable subway profile or underground profile may be quickly copied to another segment in the project.
-  - List Filter Manager. This function allows the user to define the list to be generated by applying appropriate search filters, e.g. path filter, type filter.

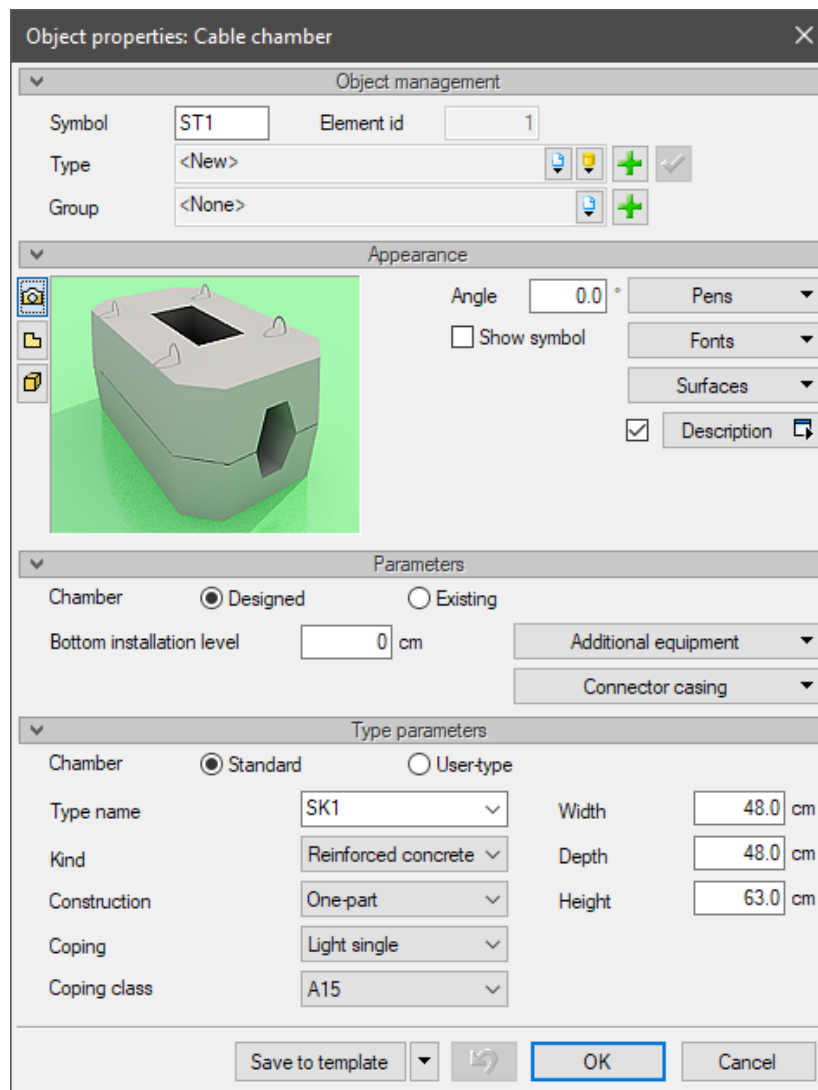
### **The functions which are not available in the MINI version**

-  - Insert list of object joints. If the designed optical cable or telecommunications (copper) cable joints are defined in the particular object, an editable list of these joints is available in the form of a table. For the description, appearance and edit method of such a table see below.
-  - *Insert item list.* If a few components are defined in the object, a list of such components is displayed in the form of an editable table. It applies to the following objects: primary cable duct profile, cable subway profile, telecommunications cable profile. For the

## Working with the Application

description, appearance and edit method of such a table, see the "primary cable duct profile" object.

While selecting the  icon by using the button or double-clicking on the element used in the project, a window for defining the cable chamber properties is displayed:



Cable chamber properties window

The type of the cable chamber may be selected from the types available in the project library or may be defined by the user. The cable chamber created by the user will be stored in the library and will be available in other projects. In order to create your own specification, click on Add new.

First, you need to set the parameter defining the object status in the project, i.e. *designed/existing*. Next, set the type parameters: chamber type, type of material used for construction of the chamber, its structure, coping and coping class.

Optionally, you may choose additional equipment (option available for each object) using the editable drop-down list:

## Working with the Application

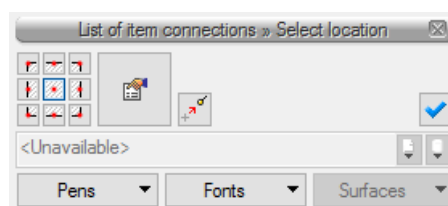
It...	Name	Unit	Quantity	
1	Cable container	pcs	1.00	
2	Additional safety cover	pcs	1.00	
3	Additional safety cover	pcs	1.00	

The cable chamber may also be added to the project by selecting the object *Insert primary cable duct profile*. The cable chamber may be defined at any time during the project development. The cable chamber may be placed over a previously defined primary cable duct profile, cable subway or next to an overhead line pole. This object is also the point for selection of a network segment drawn, from which the analysis of the defined fibre optic cables, telecommunications (copper) cables is to be started and from which you may start editing a list of primary cable duct segments.

In the properties window (applies to each object), by choosing the appearance option for the symbol description in the description appearance edit window, you may define the presentation form of the object description. The object in the drawing is presented in the following form (size according to the dimensions determined by the type or object custom specification):



If the joints on the designed cables are defined in the cable chamber (joints are defined on the cable being designed), a list of such joints may be opened in the form of an editable table:

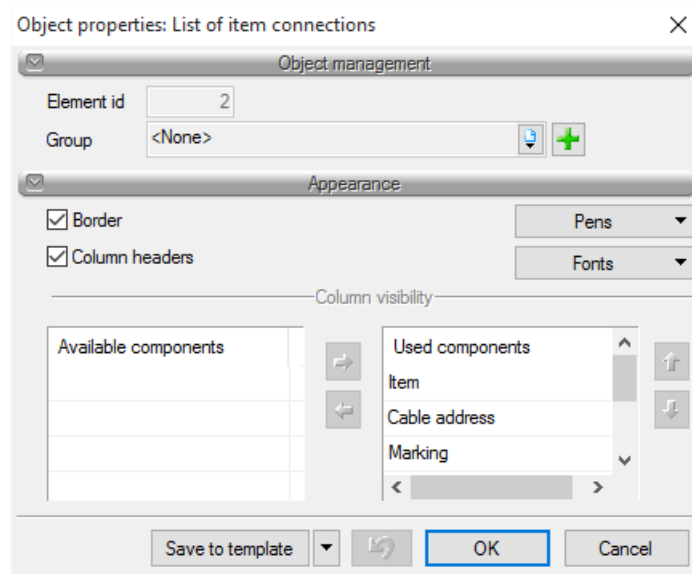



List of item connections: ST9

Item	Address	Marking	Reserve
------	---------	---------	---------

In order to edit or set the table parameters you must double-click on the table and select the icon switching to the properties dialogue box in the window:

## Working with the Application

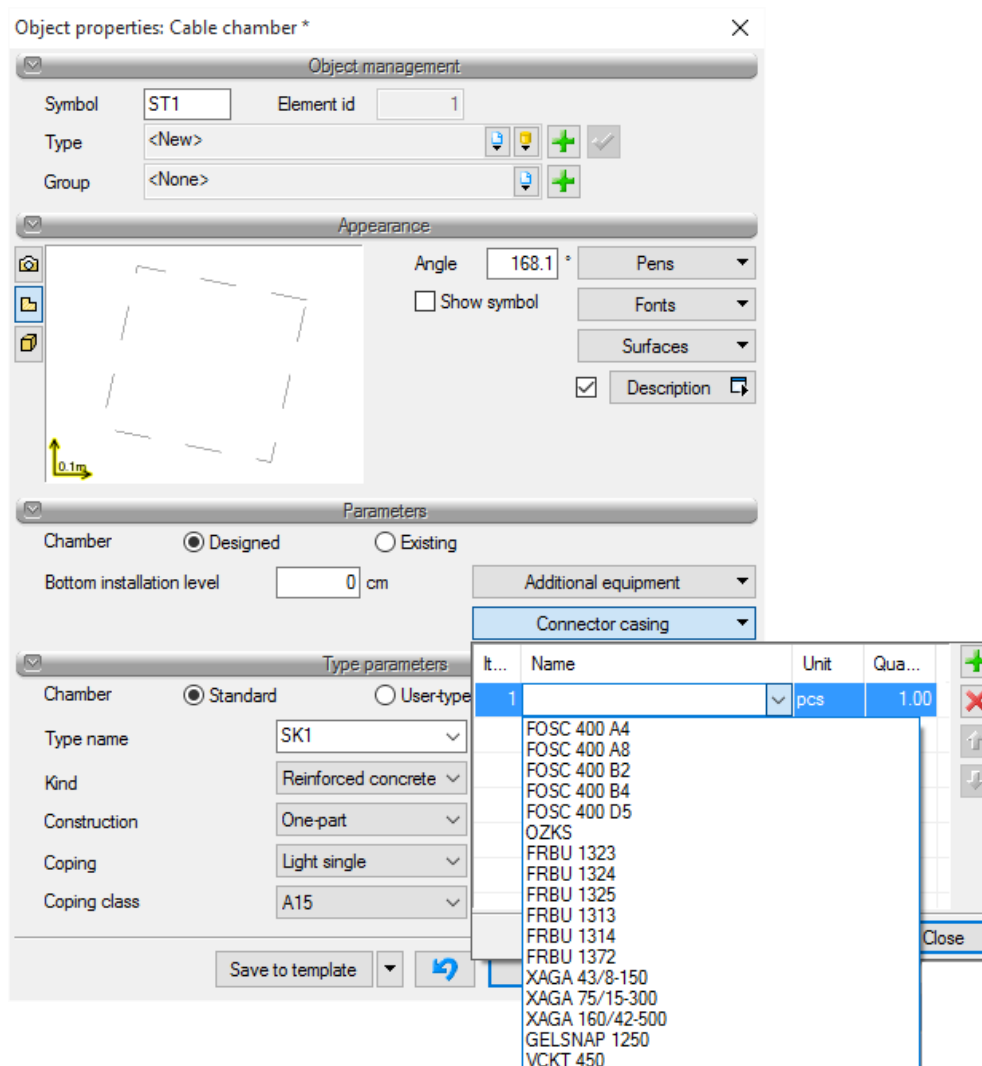


The table may be also edited in an RTF format (after clicking on the table and selecting the  icon from the window:

Similarly, you may edit the list of joints for the following objects: cable container, cable pole.

The joint casing is defined in the window below after selecting it from the drop-down list or after defining a custom type.

## Working with the Application




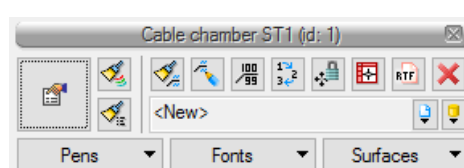
In the fibre optic cable or telecommunications cable (copper) properties window you may add to the joint such elements as core connectors, weld casings.

The cable chamber object cannot be directly connected with the overhead line object.

### 3.4.2 Cable container


**The cable container** is a component of cable subways and is used to protect fibre optic cable joints and cable allowances. Cable containers are also optionally used in primary cable duct routes.

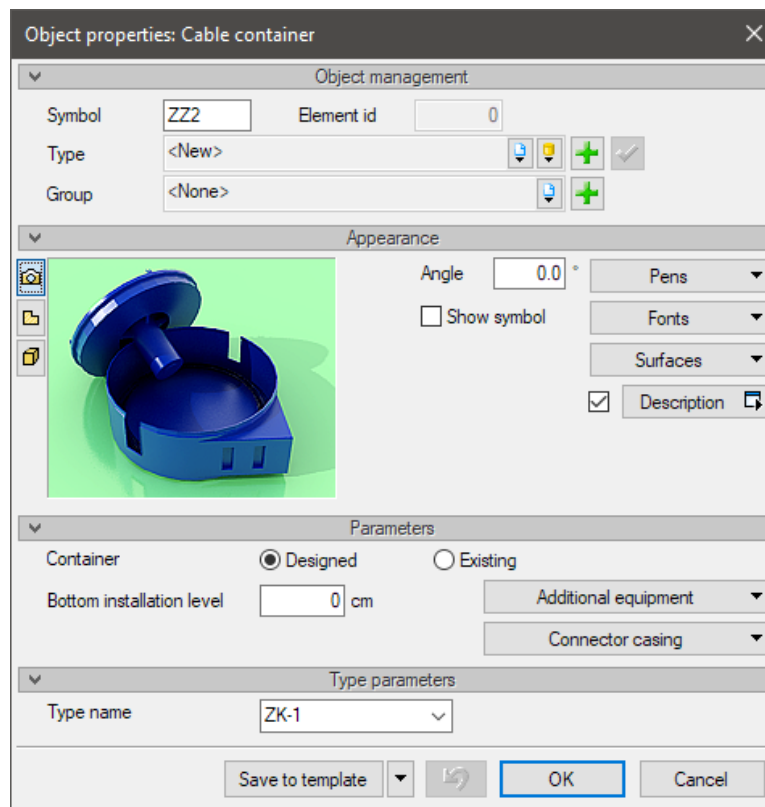
After selecting the  icon you are able to add an element to the project. Click on the added object, the following window will be displayed:



## Working with the Application

The object edit functions, its specification and a table with descriptions may be defined for a particular object (applies to all objects used in the Application) with the buttons available in the object window:

While the  icon is selected, by using the button or double-clicking on the element used in the project, a window for defining the cable container properties is displayed:



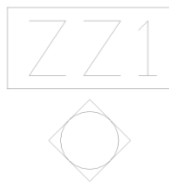
Cable container properties window

First, you need to set the parameter defining the cable container status in the project, i.e. *designed/existing*. If the option *existing* is selected, all the parameters of the container will only be of informative value (uneditable in the lists and reports generated by the Application). Select this option if you are developing e.g. a detailed drawing of an existing network or if you are going to use an existing element of the network for a new scope of the design works. Selection of the above mentioned option influences all the objects with this parameter assigned available in the Application. If the option *designed* is selected you must also specify the cable container type and its additional equipment from the editable drop-down list. If there is a cable joint inside the container, you must define the joint casing type. In the fibre optic cable or telecommunications cable (copper) properties window you may add to the joint such elements as core connectors, weld casings.

In the objects defined by the Application, in properties windows, the bottom installation level parameter is available. Setting this parameter to a specific value is important in view of the possibility to edit the project in 3D View. In the next step you must define the appearance parameters, the name edited in the description and the description localization in the drawing.

The step sequence: defining parameters, inserting an object into the drawing (raster map or DWG map) is arbitrary. The object in the drawing has the following form:


## Working with the Application

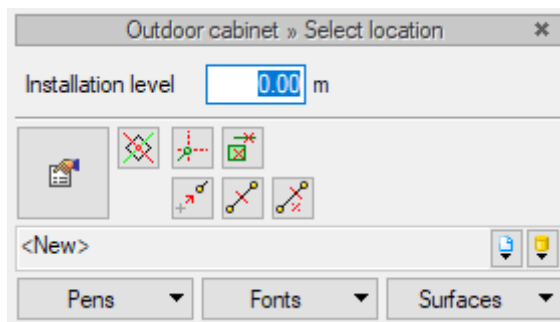


The cable container object cannot be directly connected with the overhead line object.


### 3.4.3 Outdoor cabinet

**Outdoor cabinet** – the localization of the line terminal of passive network cable segments. The line terminal for optical-fibre cables shall be designed in the fibre optic distribution frame localized inside a building or in an outdoor distribution cabinet; in case of telecommunications cables (copper), the linear termination shall be designed on cable connectors installed in an outdoor cabinet or other housing of the line termination.

By selecting the  icon, you may add an element to the project. After clicking on the inserted object, the following window will be displayed:



The object edit functions, its specification and a table with descriptions may be defined for a particular object (applies to all objects used in the Application) with the buttons available in the object window:

While selecting the  icon, by using the button or double-clicking on the element used in the project, a window for defining the outdoor cabinet properties is displayed:



## Working with the Application

**Object properties: Outdoor cabinet**

**Object management**

Symbol: SZ2    Element id: 0

Type: <New>

Group: <None>

**Appearance**

Angle: 0.0 °

☐ Show symbol

☒ Description

**Parameters**

Cabinet: ☒ Designed    ☐ Existing

Bottom installation level: 0 cm

☒ Distribution frame    Distribution frame properties

☒ Earthing    Earth electrode Galmar    m    3.00

**Type parameters**

Type name: ONU 100 FTTB

Width: 48.0 cm

Depth: 48.0 cm

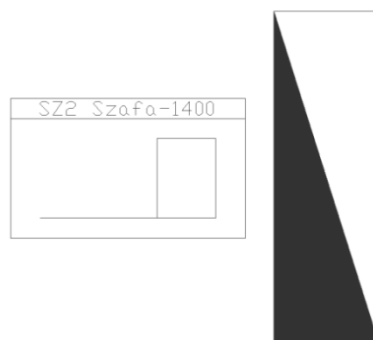
Height: 63.0 cm

Save to template    OK    Cancel

Outdoor cabinet properties window

Similarly to other objects, you must start from defining the appearance properties and the location angle in the drawing. Next, you must specify if the particular object is an existing or a designed one. After that, specify the type parameters, i.e. the outdoor cabinet type and optional additional equipment. If the fibre optic distribution frame is designed in an outdoor cabinet, the procedure is the same as for a distribution frame. As an option, you may also choose a joint casing for copper cable joints and the properties of the cabinet earthing.


The object in the drawing has the following form:

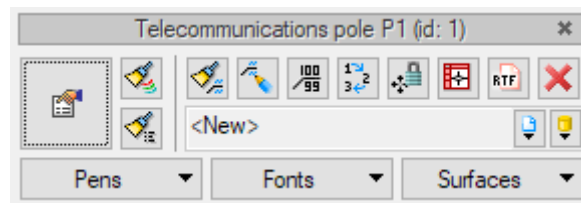



## Working with the Application

**3.4.4 Telecommunications pole**

**Telecommunications pole - ArCADia-TELECOMMUNICATIONS NETWORKS** allows to insert poles in the design; they are used in designing of overhead line segments or, if the pole is defined as existing, used to suspend designed cables to the existing pole substructure (or to e.g. outdoor lighting poles).

After selecting the  icon you are able to add an element to the project. Click on the object used in the project, the following window will be displayed:



When the  icon is selected, select the button or double click on the element inserted into the project to open the window for defining the pole element properties:

Telecommunications pole properties window

---

## Working with the Application

Similarly to other objects, you must start from defining the appearance properties and the location angle in the drawing. Next, you must specify if the particular object is an existing or a designed one.

The user also defines the pole function:

Straight-line pole – used when a line route is curved at an angle not exceeding 2 degrees.

Angle pole – which is under the action of the resultant tension force from both sides of the pole. Curve angles are small, therefore the resultant force is not high either.

Terminal pole – designed to resist one-side tension force from the cables only and therefore inserted at the beginning or end of the line.

Anchor pole – constructed at the ends of a pull-off section, with straight-line posts in the middle, on straight line segments.

Branch pole – constructed in the branch point of a line.

Buried depth (bottom installation level) – buried depth measured from the earth surface.

In the next step the user defines "Style parameters", i.e. the pole structure type (single, double, A-pole, supported, lighting), rod type and length, base diameter, top diameter.

Depending on the pole structure type selected and its function in the project (cable pole or pole without a line terminal casing), the pole symbols change along with the above mentioned object parameters. Thus, for example:

Straight-line single pole, existing:



Straight-line twin pole, existing (earthed):



Cable single pole, designed:



When selecting the particular pole, the user is provided with a Bill of Materials necessary for reinforcement of this pole. You must include these materials in the additional equipment. The user is able to fix a cable allowance or cable joint to the pole. You may also define the joint casing, line terminal casing and optionally the pole earthing.


## Working with the Application

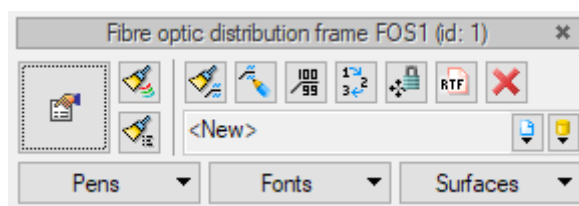
The parameters defining the allowances and joints are assigned to the cables being defined. If such equipment is fixed to the pole, the symbol and address of the cable allowance will be visible in the drawing, as well as list of joints used in the object will be available. In order to define these parameters click on the overhead cable in the overhead line object.

Depending on the parameters set in the properties window, the object in the drawing is presented in a form consistent with the examples specified above.


### 3.4.5 Fibre optic distribution board

**Fibre optic distribution board** – equipment providing fibre optic switching as well as connecting of the substation cables. The fibre optic distribution frame is installed at each end of the optical communication line. The fibre optic distribution frame may be installed indoor (inside a telecommunications cabinet, cable rack) or outdoor, in an outdoor distribution cabinet.

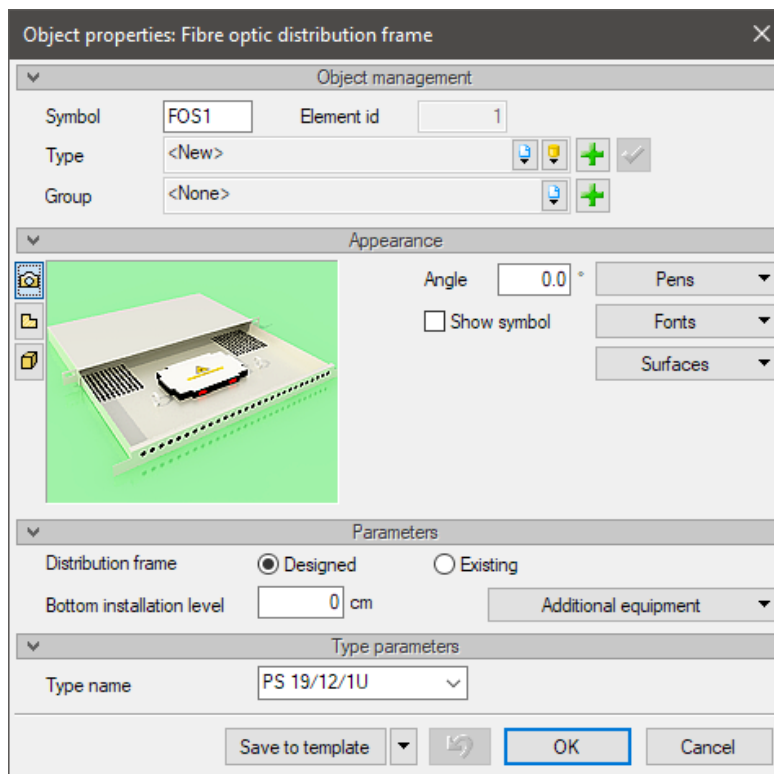
After selecting the  icon you are able to add an element to the project. Click on the added object, the following window will be displayed:



The object edit functions, its specification and a table with descriptions may be defined for a particular object (applies to all objects used in the Application) with the buttons available in the object window.

When the  icon is selected, select the button or double click on the element inserted into the project to open the window for defining the fibre optic distribution frame properties:

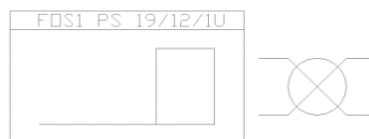
## Working with the Application



Fibre optic distribution board properties

Similarly to other objects, you must start from defining the appearance properties and the location angle in the drawing. Next, you must specify if the particular frame is an existing or a designed one. In the next step you must define the following parameters: the fibre optic distribution frame type and, optionally, the additional equipment selected from the drop-down list. Other parameters, e.g. pigtails for cable termination in the fibre optic distribution frame, will be defined while defining the joint in the description of the optical-fibre cable.

The object in the drawing has the following form:




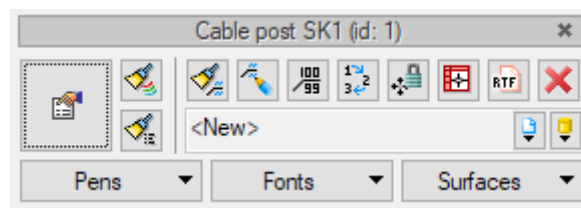
The fibre optic distribution frame object cannot be directly connected with the primary cable duct object.

### 3.4.6 Cable post

**Cable post (distribution)** – casing in the form of a column with a cap, cover or doors, designed to be installed directly in the soil and to protect the telecommunications cable terminals.


## Working with the Application

After selecting the  icon you are able to add an element to the project. Click on the added object, the following window will be displayed:



The object edit functions, its specification and a table with descriptions may be defined for a particular object (applies to all objects used in the Application) with the buttons available in the object window.

Similarly to other objects, you must start from defining the appearance properties and the location angle in the drawing. Next, you must specify if the particular object is an existing or a designed one. In the next step, define the style parameters, i.e. the cable post type and optional additional equipment, earthing parameters and, if a joint is installed directly under the post, define the joint casing style.

When the  icon is selected, select the button or double click on the element inserted into the project to open the window for defining the cable post properties:

Cable post properties window

## Working with the Application

Depending on the status selected in the project, the object has the following form:



The cable post object cannot be directly connected with the overhead line object.

### 3.4.7 Line terminal enclosure


**Post (cable) box** – housing with a cap or doors, with internal support structure for cable terminals, protection devices and optional matching units, designed to be fixed to the land line post.

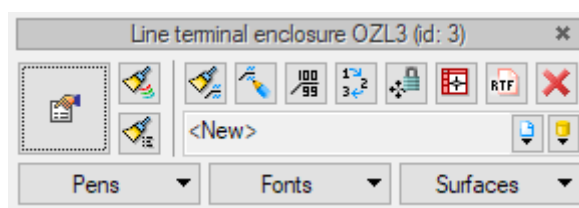
**Indoor (cable) box** – housing with a cover or doors, with internal support structure for cable terminals and optional protection devices, mounted on the internal wall of a building.

**Wall (cable/post) box** – small housing with a cap or cover, mounted on the land line post or external wall of a building, designed to protect the distribution cable terminal, end user cables and optional protection devices.

**Indoor (cable) box** – housing with a cover or doors, mounted in the wall recess or internal wall of a building, designed to protect the distribution cable terminal and end-user cables.


One domain object called the line terminal casing is defined for the above mentioned types of cable terminals.

After selecting the  icon you are able to add an element to the project. Click on the added object, the following window will be displayed:



The object edit functions, its specification and a table with descriptions may be defined for a particular object (applies to all objects used in the Application) with the buttons available in the object window.

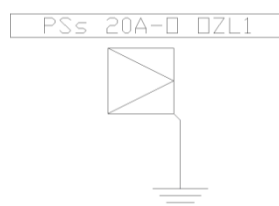
Similarly to other objects, you must start from defining the appearance properties and the location angle in the drawing. Next, you must specify if the particular object is an existing or a designed one. In the next step, set the style parameters, i.e. the housing type and, optionally, additional equipment and earthing parameters.

When the  icon is selected, select the button or double click on the element inserted into the project to open the window for defining the line terminal casing:

## Working with the Application

Line terminal enclosure properties window

The object presented in the drawing has the following form (dependant on the parameters defined in the properties window):




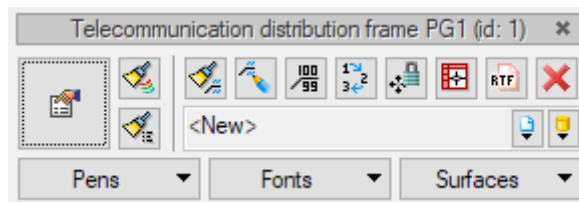
### 3.4.8 Telecommunications distribution frame

**Telecommunications distribution frame** – the frame which contains terminals of every wire path, connected to the local exchanges or other telecommunications units, and which is the primary location for connections and switches between the line and substation cables. This distribution frame may be installed indoor or in an outdoor container predefined for the distribution box.




## Working with the Application

After selecting the  icon you are able to add an element to the project. Click on the object used in the project, the following window will be displayed:



The object edit functions, its specification and a table with descriptions may be defined for a particular object (applies to all objects used in the Application) with the buttons available in the object window.

Similarly to other objects, you must start from defining the appearance properties and the location angle in the drawing. Next, you must specify if the particular frame is an existing or a designed one. In the next step you must define the following parameters: the fibre optic distribution frame type and, optionally, the additional equipment selected from the drop-down list. Specify the cable joint casing type (joint equipment, i.e. the connector type defined while defining a joint for the particular cable in the particular object) for cable joints defined in the distribution frame room.

When the  icon is selected, select the button or double click on the element inserted into the project to open the window for defining the telecommunications distribution frame properties:

## Working with the Application

Telecommunications distribution frame properties


The object in the drawing has the following form:



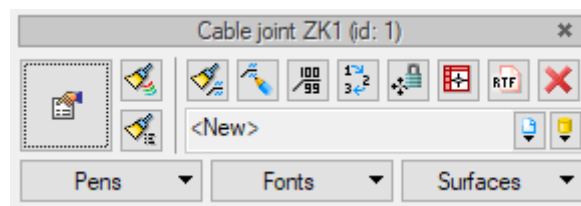
The telecommunications distribution frame object cannot be directly connected with the following objects: overhead line, primary cable duct profile.

### 3.4.9 Cable joint

**Cable joint** – the network point in which two or more cable segments are connected altogether. The cable joint may be designed in a cable chamber, cable container, on cable post or as buried directly in the soil (in none of the objects defined in the Application). Therefore a domain object called the cable joint has been defined.


After selecting the  icon you are able to add an element to the project. Click on the added object, the following window will be displayed:

## Working with the Application



The object edit functions, its specification and a table with descriptions may be defined for a particular object (applies to all objects used in the Application) with the buttons available in the object window.

First you need to set the parameter defining the cable joint status in the project, i.e. *designed/existing*. If the option *existing* is selected, all the parameters will be only be of informative value (uneditable in the lists and reports generated by the Application). Select this option if you are developing e.g. a detailed drawing of an existing network or if you are going to use an existing element of the network for a new scope of the design works. Selection of the above mentioned option influences all the objects with this parameter assigned available in the Application. If the option *designed* is selected you must also specify the cable joint type and its additional equipment from the editable drop-down list. In the telecommunications cable (copper) properties window you may add such elements as core connectors. Defining of the cable joint object aims to locate this object physically in the drawing and to assign to it a joint casing type. If the cable joint (straight-line or branch) is designed in another object, its parameters may be defined in the properties window for this object.

In the objects defined by the Application, in properties windows, the bottom installation level parameter is available. Setting this parameter to a specific value is important in view of the possibility to edit the project in 3D View. In the next step you must define the appearance parameters, the name edited in the description and the description localization in the drawing. When the  icon is selected, select the button or double click on the element inserted into the project to open the window for defining the cable joint properties:

## Working with the Application

Cable joint properties window

The step sequence: defining parameters, inserting an object into the drawing (raster map or DWG map) is arbitrary. Depending on the cable joint type and the status selected in the project, the object has the following form:



The cable joint object cannot be directly connected with the primary cable duct profile.


### 3.4.10 Route marker

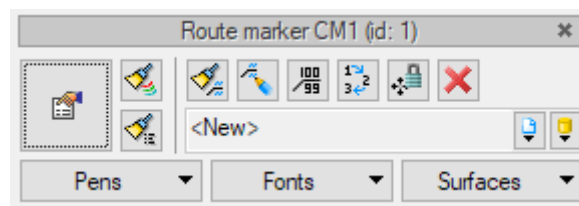
**Route marker** – physical designation of special points in the telecommunications cable route. In case of optical-fibre cables, in particular, due to dielectric character of the cable subway and OTK cable, in order to enable the line route to be determined in detail by using electrical methods, the tracking cable or warning tape (parameters defined in the cable subway object) must be laid directly on the top of the cable subway. In places where fixed objects facilitating accurate surveying of underground telecommunications line characteristic points do not exist, marking posts or markers (routing markers) should be used.


## Working with the Application

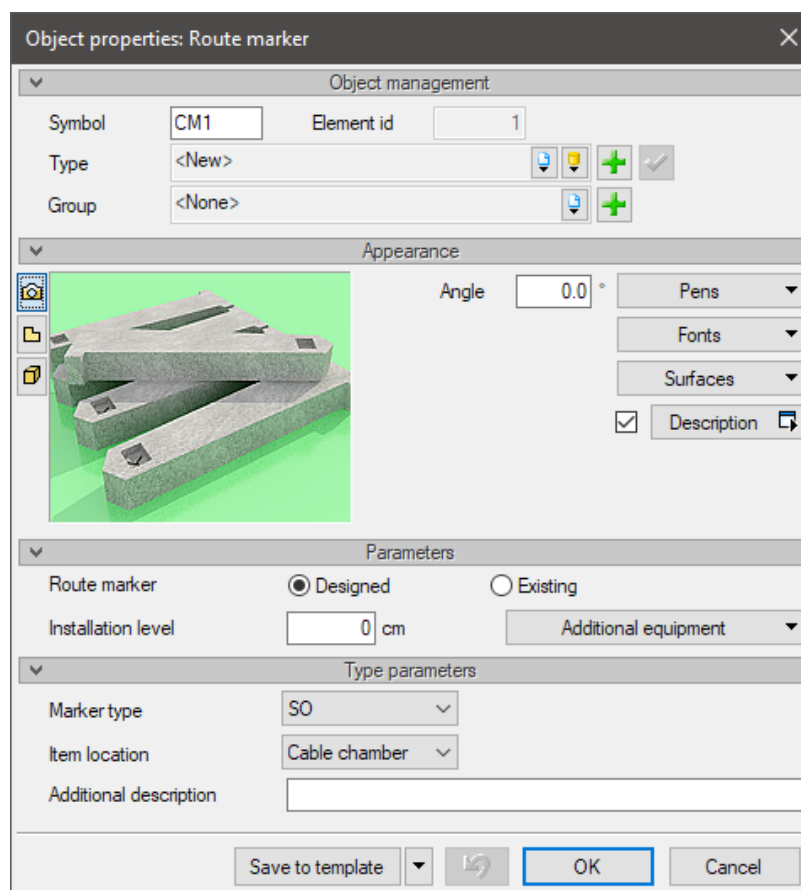
Routing markers are used in installations employing cable subways. These characteristic points mentioned above include, e.g. the cable route curve, cable joint, cable allowance. This object is not linked directly with the cable being designed, it is just an additional element of this cable. The markers are arranged along the cable route, as close to its trace as it is possible.

The Route marker parameters include the marker type and optional additional equipment. Location box of the object is an informative box editable in the View.

After selecting the  icon you are able to add an element to the project. Click on the object used in the project, the following window will be displayed:



When the  icon is selected, select the button or double click on the element inserted into the project to open the window for defining the routing marker properties:



Route marker properties window


The object in the drawing has the following form (dependant on the marker type selected and configuration of the description appearance):

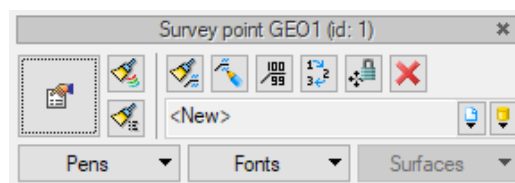



### 3.4.11 Survey point

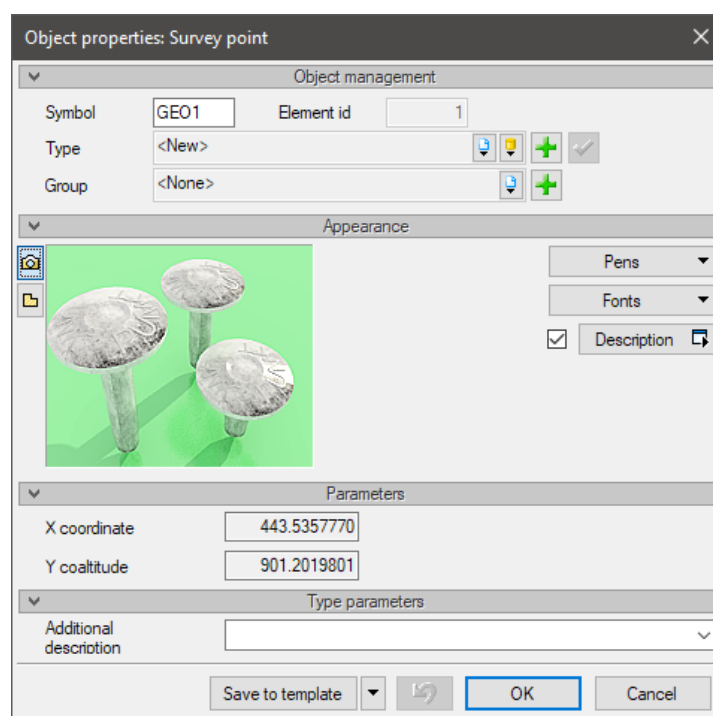
**Survey point** – designation of characteristic points along the cable route with a view to specify their coordinates. In places where fixed objects facilitating accurate surveying of underground telecommunications line characteristic points do not exist, marking posts or markers (see object: routing markers) should be used additionally.

The Application automatically generates coordinates and generates a report with survey point list for the defined survey points. Moreover, the report also includes the survey points relating to objects used in the project.

After selecting the  icon you are able to add an element to the project. Click on the object used in the project, the following window will be displayed:



When the  icon is selected, select the button or double click on the element inserted into the project to open the window for defining the survey point element properties:



Survey point properties window

## Working with the Application

Similarly to other objects, you must start from defining the appearance properties and the location angle in the drawing. In addition, you may define an additional description for the particular point (e.g. collision with a gas pipeline).


The survey points inserted into the project may be edited in the list of survey point coordinates along with the coordinates generated automatically by the Application for the objects inserted.

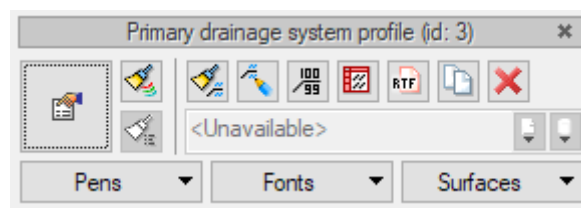
The object description in the drawing has the following form:




### 3.4.12 Primary drainage system

**Primary drainage system** – system of underground conduits and cable chambers, into which telecommunications cables or secondary duct conduits are pulled.

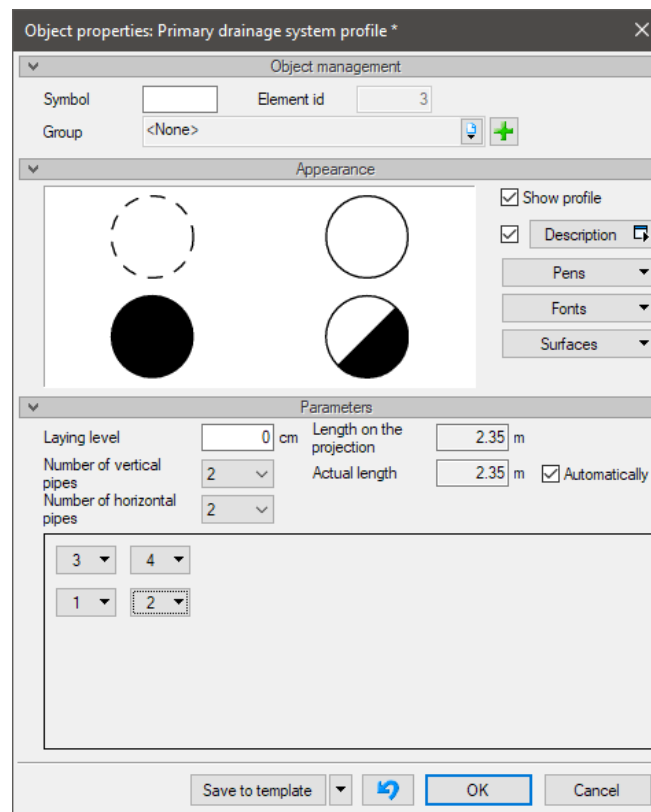
After selecting the  icon you are able to add an element to the project. Click on the object used in the project, the following window will be displayed:



When the  icon is selected, select the button or double click on the element inserted into the project to open the window for defining the primary cable duct element properties.

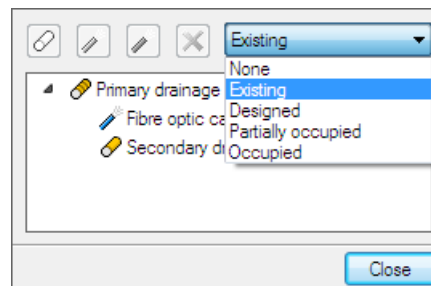
This window is used to define the primary duct profile, i.e. the quantity of conduits laid down in a trench and their arrangements (the number of layers and conduits per each layer). The Application, as it is assumed, may also be used to define each conduit individually and, during designing of a cable duct extension it enables part of conduits to be set as existing objects, or, if the only aim is to develop a detailed design of e.g. cable in the existing cable duct, it enables the complete profile to be set as existing. It is represented graphically in the form of an editable duct profile described above, in which a broken line indicates the conduits being designed and a continuous line indicates the existing ones; a partially occupied opening is represented as a partially filled circle, and a fully occupied opening is represented as a fully filled circle.

## Working with the Application



Primary drainage profile properties window

This selection must be made for every opening of the duct individually, using the selection list in the window:



When the opening properties are set, define the type of conduit material by clicking on the primary duct under the particular profile number and, optionally, by defining additional equipment using the editable drop-down list:



## Working with the Application

The dialog box 'Object properties: Primary drainage system' contains the following sections:

- Object management:** Type symbol (empty), Element id (0), Type (<New>).
- Parameters:** Pipe (radio buttons: Designed, Existing), Pipe length (0.0 m), Additional equipment (dropdown).
- Type parameters:** Pipe type (RHDPE), Outside diameter (110 mm), Wall thickness (6.3 mm).
- Buttons:** Save to template (dropdown), OK, Cancel.

Primary drainage properties window

When the primary cable duct profile is defined, you may insert in each opening defined an optical-fibre cable, telecommunications cable or secondary cable duct through which an optical-fibre cable will be pulled.

If secondary conduits, optical-fibre cables or telecommunications cables are put in a primary cable duct, it is indicated symbolically irrespective of the quantity of the secondary conduits or cables defined for the opening. This symbol has the following form in the drawing (a single opening profile with a secondary conduit through which an optical-fibre cable is pulled, while a telecommunications cable is pulled through the primary conduit):

The dialog box 'Object properties: Primary drainage system profile \*' contains the following sections:

- Object management:** Symbol (empty), Element id (3), Group (<None>).
- Appearance:** A preview window showing a circular profile with a central dot. To the right are checkboxes for 'Show profile' and 'Description', and dropdowns for 'Pens', 'Fonts', and 'Surfaces'.
- Parameters:** Laying level (0 cm), Number of vertical pipes (1), Number of horizontal pipes (1), Length on the projection (2.35 m), Actual length (2.35 m), and an 'Automatically' checkbox.
- Legend:** A list of objects with corresponding symbols: Primary drainage system, Fibre optic cable, Telecommunication cable, and Secondary drainage system.
- Buttons:** Close, OK, Cancel.

Primary drainage system profile properties window

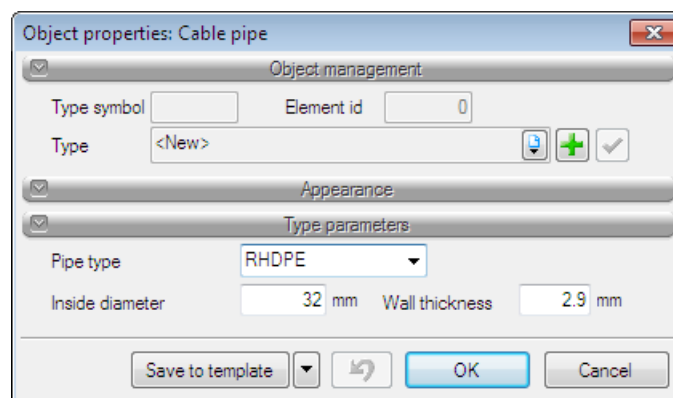
## Working with the Application

The defined cable duct single opening and its contents may be easily transferred to another opening. To do so, right-click on the opening number and select the option Copy, right-click on the target opening and select Paste.

**Secondary cable duct** it is an additional conduit whose aim is to protect the optical-fibre cables installed in a primary cable duct.

The secondary cable duct always coincides with the primary cable duct. It uses the existing route or the one being designed. The secondary conduits are not split when running through cable chambers, as opposed to the primary conduits. Due to the coincidence of the primary and secondary cable duct, the latter should be defined in a separate layer of the drawing.

When the opening properties are set, define the type of conduit material by clicking on the secondary duct under the particular profile number and, optionally, by defining additional equipment using the editable drop-down list:

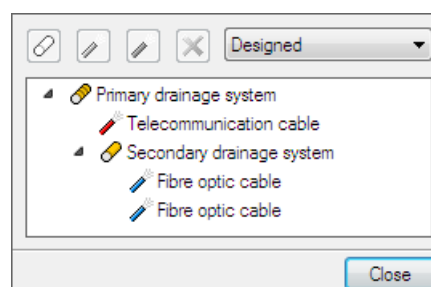


Conduit properties window (secondary duct)

If more than one secondary cable duct route is designed, the routes should be marked with successive numbers facilitating their identification during selection of the object for report or calculation purposes.

The secondary conduit end must be located only in a cable chamber, outdoor cabinet or on the overhead line pole, provided that this pole is located next to a cable chamber. In such a case, the secondary conduit shall be defined using the cable subway object.

When the appropriate option is selected, describe the duct in the selection window similar to the one displayed for a primary duct. Next, you may define cables directly in a primary or secondary conduit, as in the following example:




## Working with the Application

For the cable being defined, e.g. optical-fibre cable, you may specify the allowance length in the nearest object, i.e. in case of a cable duct, in cable chambers on the particular route, and cable joint parameters (if the joint is used). All the parameters and their definition methods are described in the cable profile object.

In the drawing you may also specify the description format for the particular profile from the tab, the description appearance and, after clicking on the profile defined in the profile window and selecting the option *insert item list*, you may edit a table summarizing all the defined conduits and cables for the particular duct route. The description appearance, graphical symbol and item list are presented in the drawing as follows:

List of telecommunication network materials

Item...	Name	Unit	Quantity
Ungrouped			
1	Cable chamber SK1 reinforced concrete two-part light single A15 designed	pcs	2.00
2	Cable chamber SKR1 reinforced concrete two-part heavy normal B125 designed	pcs	2.00
3	Cable chamber SKR1 reinforced concrete two-part heavy reinforced D400 designed	pcs	3.00
4	Cable chamber SKR1 reinforced concrete two-part light single A15 designed	pcs	1.00



The parameters of a profile defined in this way may be transferred to another duct profile without the necessity of its redefinition. To do so, select the profile to be transferred and then select *Copy* in the profile window.

Double-click on the table with the profile item list to change its appearance:

Object properties: List of profile items

Object management

Element id: 0

Group: <None>

Appearance

☒ Border ☒ Column headers Pens

☒ Number ☒ Primary drainage system Fonts

☒ Cable ☒ Secondary drainage system


☒ Cable address

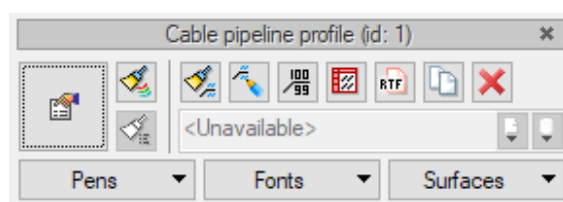
Save to template OK Cancel


Profile item list properties window

### 3.4.13 Primary drainage system profile

**Primary drainage system profile**— system of conduits and joint containers buried in the soil and protecting telecommunications cables (optical-fibre cables). In most cases these will include new routes of cable subways, and rather rarely, extensions of the existing routes. The Application enables a cable chamber or joint container to be placed on the cable subway being designed. The characteristic of the cable subway differs from the primary cable duct only in the defined maximum route lengths between cable chambers (in case of the cable subway, instead of a cable chamber you may use a joint container or additional routing markers). Also, there are some differences in the design process, as different conduit types are used.

After selecting the  icon you are able to add an element to the project. Click on the object used in the project, the following window will be displayed:



When the  icon is selected, select the button or double click on the element inserted into the project to open the window for defining the cable pipeline profile element properties:

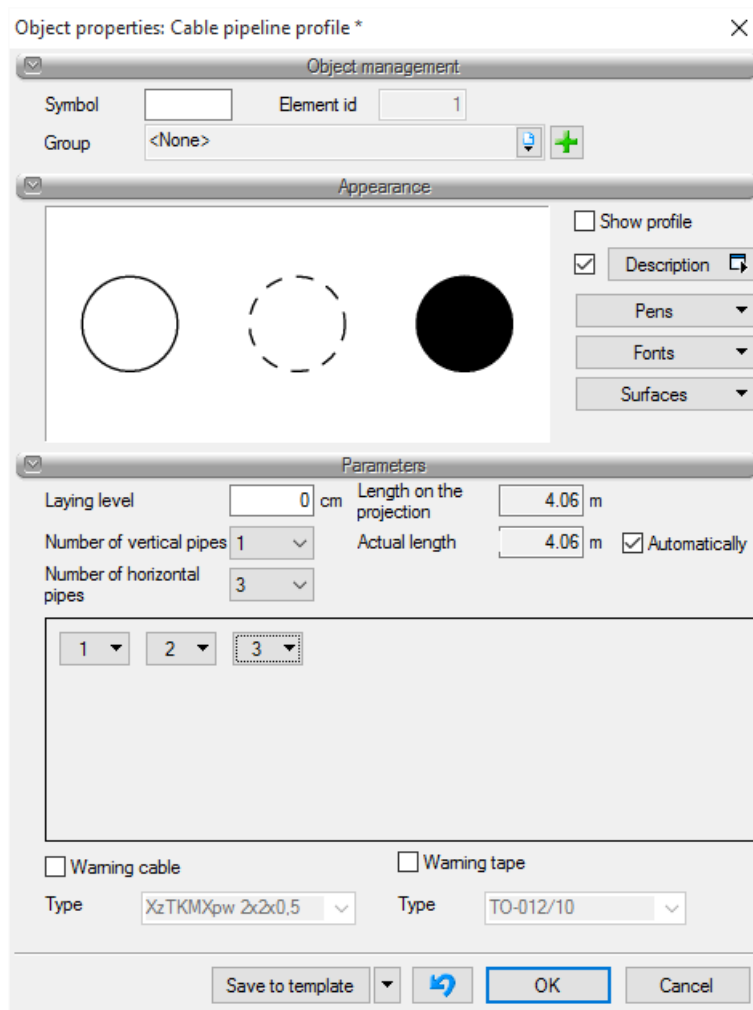
## Working with the Application

Cable pipeline profile properties window

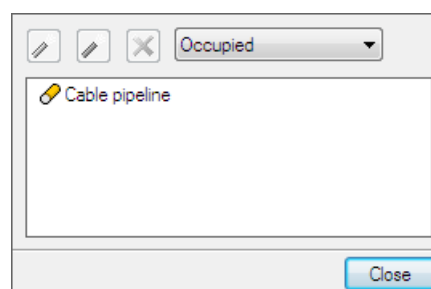
This window is used to define the cable pipeline profile, i.e. the quantity of conduits laid down in a trench and their arrangements (the number of layers and conduits per each layer). The Application, as it is assumed, may also be used to define each conduit individually and, during designing of a cable duct extension it enables part of conduits to be set as existing objects, or, if the only aim is to develop a detailed design of e.g. cable in the existing cable duct, it enables the complete profile to be set as existing.

It is represented graphically in the form of an editable duct profile described above, in which a broken line indicates the conduits being designed and a continuous line indicates the existing ones; a fully occupied opening is represented as a fully filled circle.

## Working with the Application

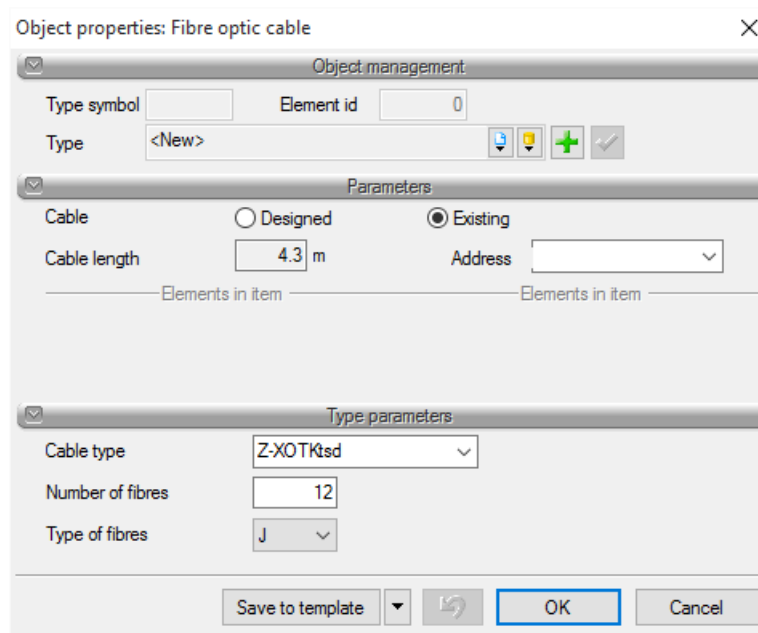


The selection of the cable subway conduit type must be made for each opening of the duct individually, using the selection list in the window:



When the opening properties are set, define the type of conduit material by clicking on the cable pipeline under the particular profile number and, optionally, by defining additional equipment:

## Working with the Application

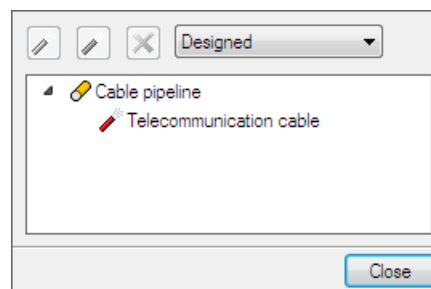


The dialog box 'Object properties: Fibre optic cable' is divided into three main sections:

- Object management:** Contains 'Type symbol' (empty), 'Element id' (0), 'Type' (<New>), and icons for selection, deletion, and confirmation.
- Parameters:** Includes radio buttons for 'Designed' and 'Existing' (selected). It also has 'Cable length' (4.3 m), 'Address' (dropdown), and 'Elements in item' labels.
- Type parameters:** Includes 'Cable type' (Z-XOTKtsd), 'Number of fibres' (12), and 'Type of fibres' (J).

At the bottom are buttons for 'Save to template', 'OK', and 'Cancel'.

When the cable pipeline profile is defined, you may put optical-fibre or telecommunications cables being designed in defined opening every.





It is also possible to define a signal cable and warning tape from the available editable drop-down list for the cable subway. These are the elements which are designed during placing of underground optical-fibre cables with the aim to facilitate localization of the cable with special instruments. If these network elements are designed, select the chosen items. In this case the Application automatically calculates lengths of the cable and/or warning tape, provided that the factors for these network elements were defined previously in the Application general options.

## Working with the Application




Object properties: Cable pipeline profile \*

Object management


Symbol  Element id


Group   


Appearance


  

☐ Show profile

☒ Description 

Pens 

Fonts 

Surfaces 

Parameters



Laying level  cm Length on the projection  m

Number of vertical pipes  Actual length  m ☒ Automatically

Number of horizontal pipes

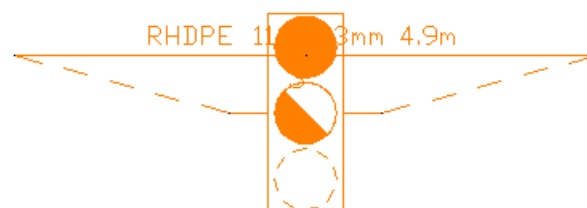
☒ Warning cable ☒ Warning tape

Type  Type

Save to template   OK Cancel

In the drawing you may also specify the description format for the particular profile from the tab, the description appearance and, after clicking on the profile defined in the profile window and selecting the option insert item list, you may edit a table summarizing all the conduits and cables defined for the particular cable pipeline segment.


The parameters of a profile defined in this way may be transferred to another cable subway profile without the necessity of its redefinition. To do so, select the profile to be transferred and then select *Copy* in the profile window. The list of a cable subway segments and its length will be generated by the application in the form of a report, as the cable route description, and after clicking on the selected segment and choosing the object specification option in the subway profile window, the profile specification in the form of an RTF file will be generated. The description appearance, graphical symbol and item list are presented in the drawing as follows:






### 3.4.14 Fibre Optic Cable

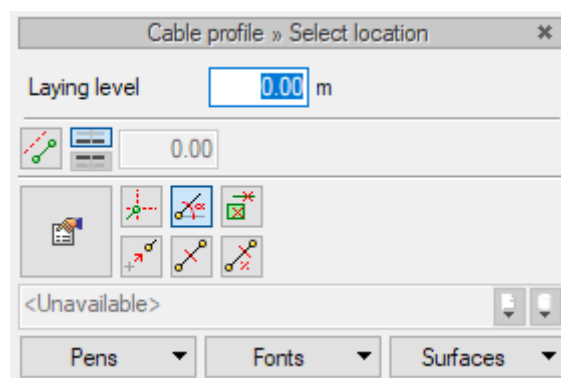
**Fibre optic cable** – transmission medium consisting of pure quartz glass fibre coated with a non-transparent coat of the central core.


Fibre optic cables shall be designed in the primary duct, primary and secondary duct, cable subway, in the form of overhead or underground cables. The cable may be defined directly from the cable profile object (  ) or from the primary cable duct, cable subway, overhead line objects in which, after definition of these objects, the cable appears as an option. The fibre optic cable definition procedure using the objects mentioned above is the same.

A single project may include different types of the designed cable routes, i.e. routes only in the primary or secondary ducts or, for example, in a cable subway, and then on overhead poles. Irrespectively of the arrangement of the network being designed, the designer is able to generate a summary for the whole cable route being designed and on the basis of the results achieved (total cable length, lengths of individual segments) create desired reports.

The fibre optic cable laid directly in the ground is defined in the window displayed after clicking on the  icon.

After selecting the  icon you are able to add an element to the project. Click on the added object, the following window will be displayed:

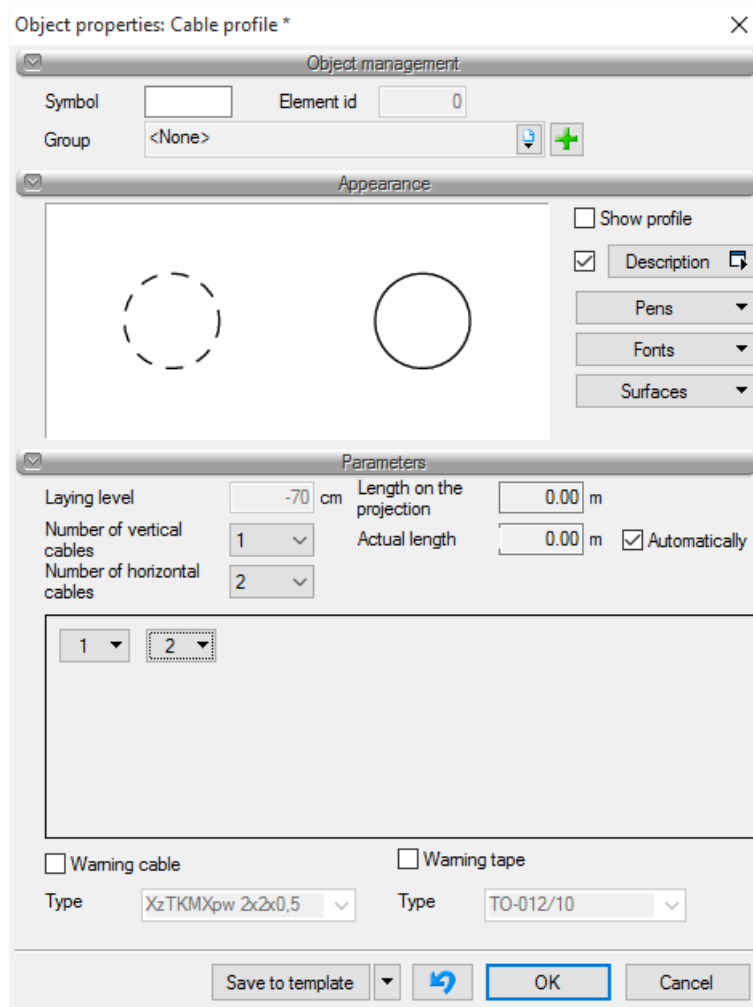


When the  icon is selected, select the button or double click on the element inserted into the project to open the window for defining the cable profile element properties.

This window is used to define the cable profile, i.e. the quantity of cables laid down in a trench and their arrangements (the number of layers and cables per each layer is just a reference value). The Application, as it is assumed, may also be used to define each cable individually and, during designing of a cable extension it enables part of the cables to be set as existing objects, or, if the only aim is to develop a detailed design of e.g. cable inventory, it enables the complete profile to be set as existing.

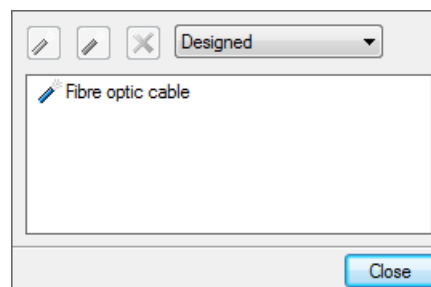
It is represented graphically in the form of an editable cable profile described below, in which a broken line indicates the cables being designed and a continuous line indicates the existing ones.

## Working with the Application



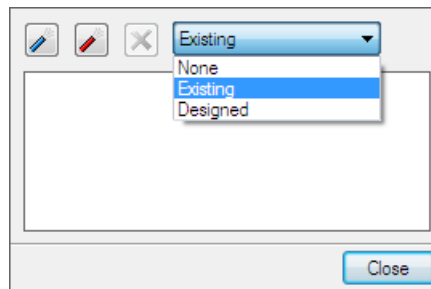
Cable profile properties window

When defining a consecutive number of the cable as existing or designed, click on the fibre optic cable icon in the selection window:



The selection must be made for each cable individually, using the selection list in the window:

## Working with the Application



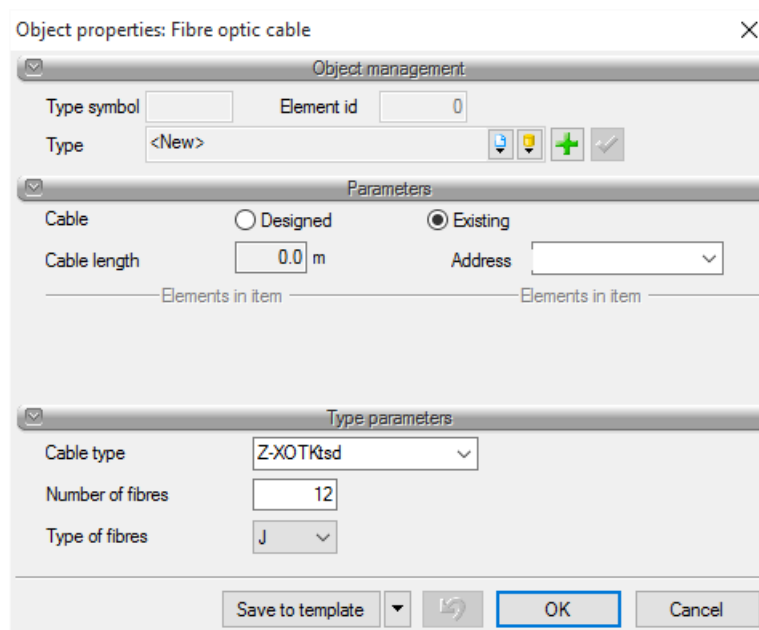
Set the properties and then define the cable type (fibre optic, telecommunications). Defining of the fibre optic and telecommunications cables is similar and is carried out in the same window after selection of the cable type. It is also possible to define a combined type of the cable, i.e. a profile combining the fibre optic and telecommunications cable.

The optic fibre cable, when laid in ducts or subways, is always in coincidence with these object routes.

The cable shall be designed along the existing or designed duct routes. The optic fibre cable cannot be split. The optic fibre cable runs across cable chambers, poles, characteristic points such as: the cable container, distribution frame, switch in the outdoor cabinet.

The cable may only be terminated in such objects, and these objects are used as cable definition points, which can house cable joints and allowances. Due to the coincidence of the primary cable duct, secondary cable duct, cable subway and cable, the cable object should be defined in a separate layer of the drawing.

After selection of one of the methods for the cable insertion into the project (from the primary duct, cable subway, cable profile or overhead line object), characteristic parameters of the cable being designed or defined as existing are to be set in the window:



Fibre optic cable properties window

## Working with the Application

In the following order, specify for the optic fibre cable: the cable status in the project (*existing/designed*), cable address: a characteristic cable symbol which, in majority of cases, is the cable number assigned by the network investor/user. This number will be indicated in reports, calculations and dialogue boxes. The cable analysis and its route description will be based on the cable address. The default address separator is set in the application general options.

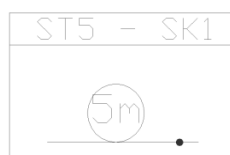
Cable allowance/cable joint: the cable allowance is defined in such objects as the chamber, cable container, outdoor cabinet, cable post. The allowance and cable joint parameters are assigned to the cable. If the cable is not added to the object, these parameters cannot be defined.

The cable allowance parameters are: length of the allowance in the selected object, the number of welds in the joint and its symbol. The types of the cable allowance container and joint casing are defined in the object in which this container and allowance are to be installed.

If the object has no cable allowance or joint, the selection window for the object shall be left disabled.

If the object contains a cable joint, by clicking such an object you may select the option *Insert list of object joints* and edit this list in the form of a table in the drawing (the joint list is described in the cable chamber object).

If the object contains a cable allowance, the graphical symbol of the allowance appears in the drawing. Additionally, if the cable joint is present, also its graphical symbol appears:



If more than one cable allowance is used in the object, and their lengths are different, the graphical symbol will be extended with the string "different". Assignment of the allowances to the cable addresses is visible in a table with the list of object joints, in which the particular allowance is assigned to the particular cable address.

The cable joint and cable allowance shall always be defined on the designed cable segment. If the joint is required on the existing cable, the materials used for the joint are defined in the additional equipment of the object.

When the weld quantity parameter is set, the item "weld casing" will be added to the BoM and its quantity will be equal to the quantity of the welds used.

## Working with the Application

If the cable is terminated in the distribution frame, the window defining the cable terminal type used in the distribution frame will appear in the description of the object elements. This window will include the quantity of the welds, pigtail types and lengths:

The style parameters include the cable type, optic fibre quantity and type. Similarly to other objects, you may also add a custom (your own) type of cable to the project library or global library.

In order to perform cable analysis, describe the cable route, generate a diagram of the installed cable and a list of the cable segments, it is required to select the start object. Click on the object, the following window will be displayed:

Name	Length [m]
<input checked="" type="checkbox"/> ST5-OZL2	19.04
<input type="checkbox"/> ST5-SZ1	105.54
<input type="checkbox"/> ST5-OZL1	169.81
<input type="checkbox"/> ST5-OZL3	49.49

Selection of the route for analysis may be restricted by choosing the end element. Choose a cable route and select the desired cable to generate a report. Generation of reports is described in the sections *Generation of lists* and *Generation of calculation reports*.

For the selected cable link you may also automatically generate a fibre optic cable diagram in a separate View in the drawing. The drawing generation procedure is described in the section *Diagram generation*.


The description appearance, graphical symbol and item list are presented in the drawing as follows:



### 3.4.15 Telecommunications cable

**Telecommunications cable** – a flexible bunch of mutually insulated metal conductors (cores), usually made of copper (or optic fibres) protected against ambient conditions by common protective layers, used to transmit telecommunications signals.

The telecommunications cables shall be designed in the primary duct (it is also possible to put them in the primary and secondary duct, cable subway) in the form of overhead or underground cables.



The cable may be defined directly from the cable profile object (  ) or from the primary cable duct, cable subway, overhead line objects, in which, after definition of these objects, the cable appears as an option. The telecommunications cable definition procedure using the objects mentioned above is the same.

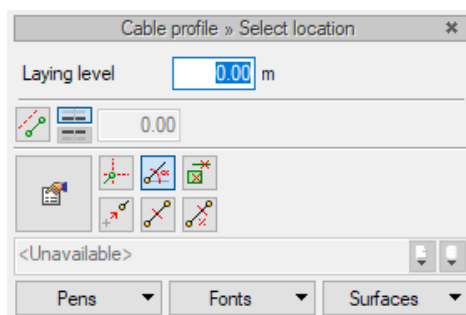
A single project may include different types of the designed cable routes, i.e. routes only in the primary ducts or, for example, in a cable subway, and then on overhead poles. Irrespectively of the arrangement of the network being designed, the designer is able to generate a summary for the whole cable route being designed and on the basis of the results achieved (total cable length, lengths of individual segments) create desired reports.


The telecommunications cable, when laid in ducts or subways, is always in coincidence with these object routes.

The cable shall be designed along the existing or designed duct routes. The telecommunications cable cannot be split. It runs across cable chambers, poles, characteristic points such as: the distribution frame, outdoor cabinet, cable post, line terminal casing, cable joints.

Due to the coincidence of the primary cable duct, secondary cable duct, cable subway and cable, the cable object should be defined in a separate layer of the drawing.

The telecommunications cable laid directly in the ground is defined in the properties window displayed after clicking on the  icon. After selecting the  icon you are able to add an element to the project. Click on the added object, the following window will be displayed:



When the  icon is selected, select the button or double click on the element inserted into the project to open the window for defining the cable profile element properties.

## Working with the Application

This window is used to define the cable profile, i.e. the quantity of cables laid down in a trench and their arrangements (the number of layers and cables per each layer is just a reference value). The Application, as it is assumed, may also be used to define each cable individually and, during designing of a cable extension it enables part of the cables to be set as existing objects, or, if the only aim is to develop a detailed design of e.g. cable inventory, it enables the complete profile to be set as existing.

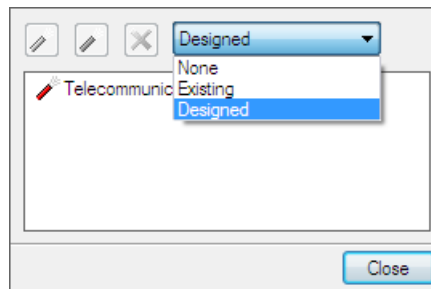
It is represented graphically in the form of an editable cable profile showed in the window below, in which a broken line indicates the cables being designed and a continuous line indicates the existing ones.

Cable profile properties window

When defining a consecutive number of the cable as existing or designed, click on the telecommunications cable icon in the selection window:

The selection must be made for each cable individually, using the selection list in the window:

## Working with the Application



Set the properties and then define the cable type (fibre optic, telecommunications). Defining of the fibre optic and telecommunications cables is similar and is carried out in the same window after selection of the cable type. It is also possible to define a combined type of the cable, i.e. a profile combining the fibre optic and telecommunications cable.

After selection of one of the methods for cable insertion into the project (from the primary duct, cable subway, cable profile or overhead line object), parameters of the cable being designed or defined as existing are to be set in the window:

Telecommunications cable properties window

In the following order, specify for the telecommunications cable: the cable status in the project (*existing/designed*), cable address: a characteristic cable symbol which, in majority of cases, is the cable number assigned by the network investor/user. This number will be included in the project, reports, calculations and dialogue boxes. The cable analysis and its route description will be based on the cable address. The default address separator is set in the application general options.

Cable allowance/cable joint: the cable allowance is defined in such objects as the chamber, cable container, outdoor cabinet, cable post. The allowance and cable joint parameters are assigned to the cable. If the cable is not added to the object, these parameters cannot be defined.



## Working with the Application

Using the drop-down editable list define the allowance length in the object for the cable allowance and cable joint and, in case of the joint, define the core connector types used in the joint, their quantity and additional symbol. Define the cable allowance container type and joint casing type in the properties of the object into which this allowance/joint is inserted.

The first dialog box shows a 'Reserve length' field with the value '5 m' and a 'Close' button.

The second dialog box shows the following fields: 'Core connector' (Single), 'Type name' (UY2), 'Quantity' (20), 'Marking' (ZP1), and a 'Close' button.

If the object has no cable allowance or joint, the selection window for the object shall be left disabled.

If the object contains a cable joint, by clicking such an object you may select the option *Insert list of object joints* and edit this list in the form of a table in the drawing (the joint list is described in the cable chamber object).

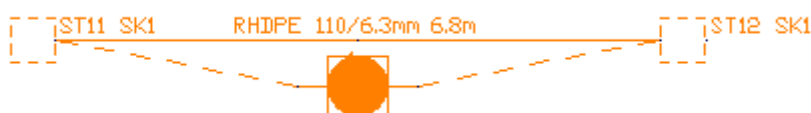
If the object contains a cable allowance, the graphical symbol of the allowance appears in the drawing. Additionally, if the cable joint is present, also its graphical symbol appears.

The cable joint and cable allowance shall always be defined on the designed cable segment. If the joint is required on the existing cable, the materials used for the joint are defined in the additional equipment of the object.

The style parameters include the cable type, cable structure, core diameter and, for the calculation report purposes, the attenuation and impedance constants for the selected cable. Similarly to other objects you may also add a custom (your own) type of the cable to the project library or global library.

The cable analysis, cable route describing, cable diagram generation, cable segment summarizing are executed in the same manner as for fibre optic cables.

The description appearance, graphical symbol and item list are presented in the drawing as follows:



## Working with the Application

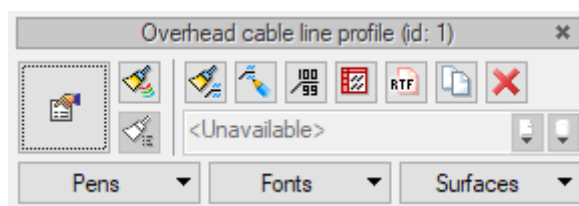
**3.4.16 Overhead line**

**Overhead line** – the line consisting of overhead telecommunications cable (fibre optic cable) lines installed over the ground, on poles (existing or designed).

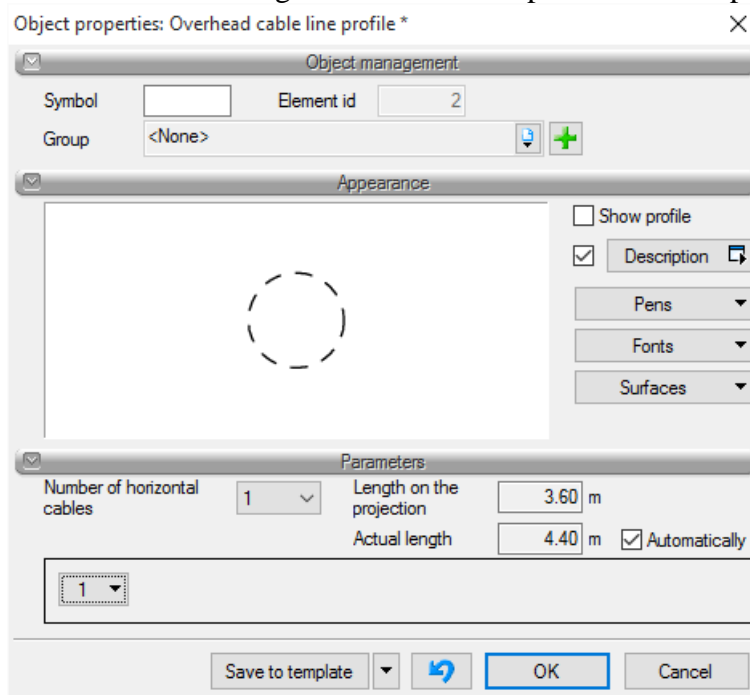
The user will be able to design a line using the required cable with all the accessories necessary to suspend it.



After clicking on the icon and inserting a line in the drawing, the following window is opened:



When the icon is selected, select the button or double click on the element inserted into the project to open the window for defining the overhead line profile element properties:



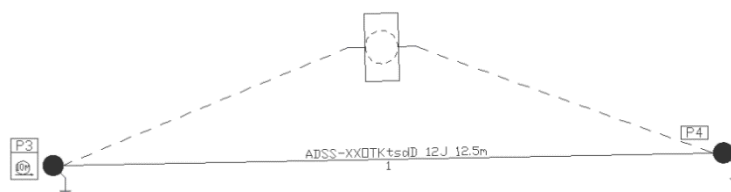
Overhead line properties window

For the overhead line cable profile you shall specify (in the order of appearance): the quantity of cables suspended to the pole substructure, the cable status in the project and cable type: fibre optic/telecommunications. For the selected cable specify the following parameters in the cable properties window: the cable address, cable allowance/cable joint and style parameters, i.e. the cable type, optic fibre quantity and type.

## Working with the Application

If the object has no cable allowance or joint, the selection window for the object shall be left disabled. If the object (pole) contains a cable joint, by clicking such an object you may select the option Insert list of object joints and edit this list in the form of a table in the drawing. The definition procedure for the above parameters is similar to the one for the cable profile object. If the object contains a cable allowance, the graphical symbol of the allowance appears in the drawing. Additionally, along with the cable joint also its graphical symbol appears (the same as for the cable profile object). If the cable joint is used and the weld quantity parameter is set, the item "weld casing" will be added to the BoM and its quantity will be equal to the quantity of the welds used.

The description appearance, graphical symbol and item list are presented in the drawing as follows:

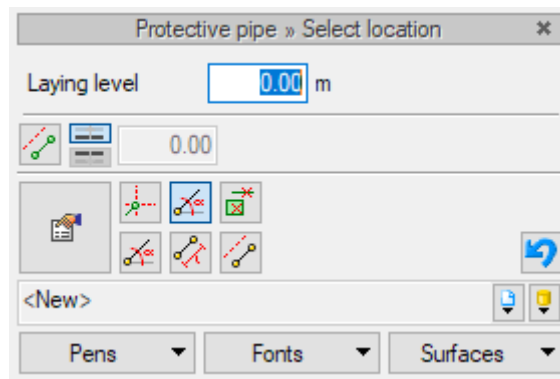


### 3.4.17 Conduit


**Conduit - ArCADia-TELECOMMUNICATIONS NETWORKS** allows introducing conduits into the design. Conduits are used to protect pipes and cables against ambient conditions.

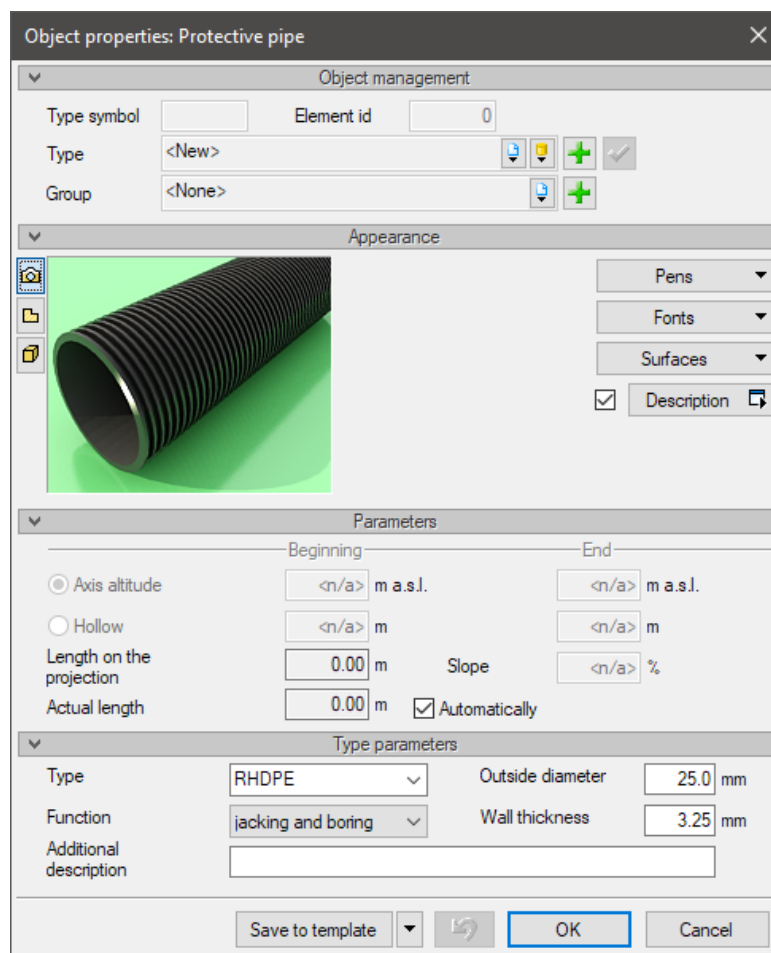
Click on the  icon, the following window will be displayed:

## Working with the Application



The user specifies the conduit's initial and end point.

When the  icon is selected, select the button or double click on the element inserted into the project to open the window for defining the conduit properties:



Conduit window properties


Specify the conduit diameter and its function. Conduits are used in the route of the primary cable duct, cable subway or fibre optic cable. If more than one conduit is used to protect the route segment, the conduit length may be determined automatically. In order to insert the conduit on the desired segment, select this segment's initial and end point.


## Working with the Application

The description appearance, graphical symbol and item list are presented in the drawing as follows:




### 3.4.18 Object (object group) status change

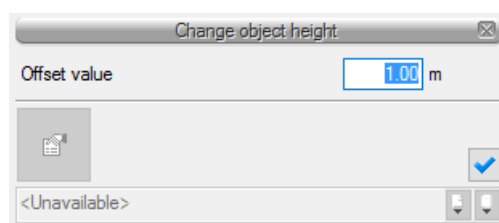
After selection of the  icon you will be able to quickly change the status of the object (object group) used in the project. Select the desired object (or object group) in the drawing

and click on the  icon - the object status will be changed to existing. Click again on the desired object and the icon, the status will be changed to the opposite.

By pointing at the objects and adding them to the selection group, the statuses of these objects are changed.

### 3.4.19 Network altitude change

After selection of the  icon you are able to quickly change the defined foundation altitude of the elements of the network (or selected objects) designed and used in the project being designed. Select the icon mentioned above and define the altitude offset in the box shown below:



By pointing at the objects and adding them to the selection group, the foundation altitudes of these objects are changed. This operation is represented in the 3D View in the form of a generated View and selected network profiles.


## Working with the Application

### 3.4.20 Generation of lists

**ArCADia-TELECOMMUNICATIONS NETWORKS** offers the function of list generation:

- Bill of Materials for the project
- List of items for the project
- Specification of a selected object or group of objects
- List of cable chambers
- List of primary cable duct segments
- List of survey point coordinates
- Description of optical-fibre cable
- List of optical-fibre cable segments
- Analysis of optical-fibre cable attenuation
- Description of optical-fibre cable route
- List of telecommunications cable segments
- Cable path attenuation or impedance analysis

The Application saves the above lists in an RTF file which may be opened with any version of Word or OpenOffice software.

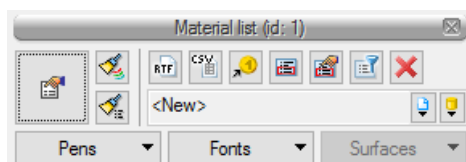
**Bill of Materials for the project** is generated after clicking on the  icon on the Application toolbar. The following window will be opened:

**Material list for the elements selected in the projection** is generated after pressing the




icon

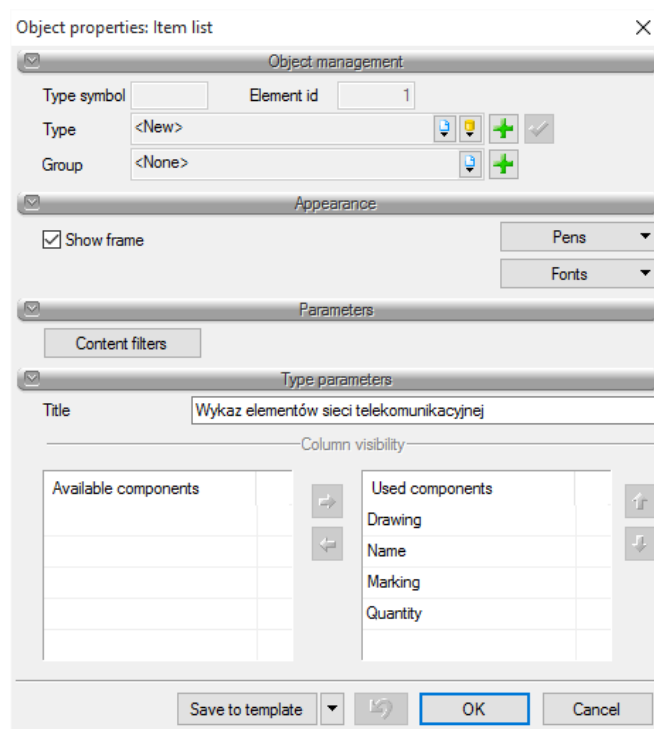
After selecting an icon, a window will appear:



The BoM for a telecommunications network may be inserted into the drawing in the form of an editable table or may be saved to an .rtf file.

When the  icon is selected, click on the button to open the window for defining the list element properties:

## Working with the Application



The dialog box 'Object properties: Item list' is divided into several sections:

- Object management:** Contains 'Type symbol' and 'Element id' (set to 1). Below are 'Type' (set to '<New>') and 'Group' (set to '<None>') with icons for adding and removing items.
- Appearance:** Includes a checked 'Show frame' option, a 'Pens' dropdown, and a 'Fonts' dropdown.
- Parameters:** Contains a 'Content filters' button.
- Type parameters:** Includes a 'Title' field with the text 'Wykaz elementów sieci telekomunikacyjnej'.
- Column visibility:** Features two tables:
 

Available components	

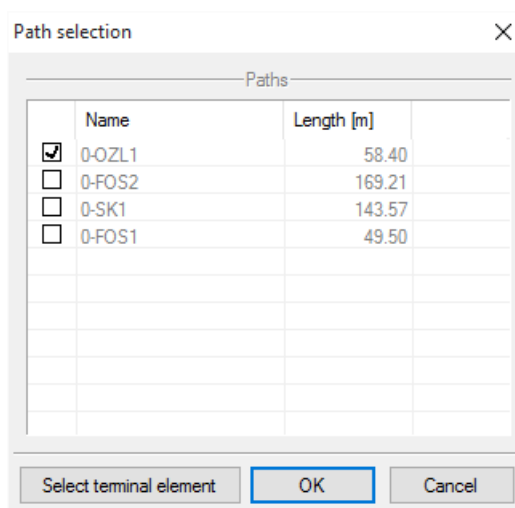
 and
 

Used components	
Drawing	
Name	
Marking	
Quantity	

 with arrows between them and up/down arrows on the right.

At the bottom are buttons for 'Save to template', 'OK', and 'Cancel'.

The editable table inserted into the drawing or saved to an .rtf can be edited by choosing the options available in the setting properties window. Define the title of the list being edited, and, by choosing the sorting by groups option or setting the contents filter you may create your custom list, e.g. only for cables or cable chambers. In the following windows, by choosing the options available (type filter, path filter) you may define the contents of the list being edited.



The 'Path selection' dialog box contains a table with the following data:

	Name	Length [m]
<input checked="" type="checkbox"/>	0-OZL1	58.40
<input type="checkbox"/>	0-FOS2	169.21
<input type="checkbox"/>	0-SK1	143.57
<input type="checkbox"/>	0-FOS1	49.50

At the bottom are buttons for 'Select terminal element', 'OK', and 'Cancel'.


You may also edit the list for the selected group of materials or the BoM for the selected cable link by pointing at the start and end point of this route.

No.	Name	Unit	Quantity
1.	Cable allowance rack	pcs	1
2.	Pigtail SC/PC - 2m	pcs	8
3.	Weld casing	pcs	8

## Working with the Application

4.	Reinforced concrete cable chamber SK2, two-piece, heavy, standard B125	pcs	3
5.	Reinforced concrete cable chamber SKR1, two-piece, heavy, increased strength D400	pcs	1
6.	Fiberliner 19" 3U distribution frame	pcs	2
7.	Adapter SC/PC 50/62.5	pcs	8
8.	Fiberliner matching housing	set	2
9.	Container for 6 weld casings	pcs	2
10.	Z-XOTKtsdD 4G62.5	m	248
11.	RHDPE 110/6.3 mm	m	191.1


The example of the BoM for the project

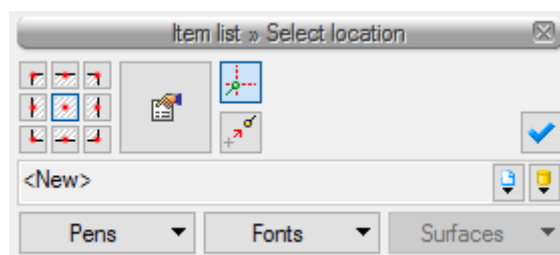
**In order to generate the specification for a single object** click on the  icon in the properties window for the object. Only the materials with the *designed* status will be editable. Only in case of additional equipment defined, the lists will include all the items entered.

## ST1 ELEMENT SPECIFICATION


No.	Name	Unit	Quantit
1.	Cable chamber SKR1 made of reinforced concrete, single-piece, light, single, A15 complete	pcs	y 1
2.	Cable support	pcs	2
3.	Marking label	pcs	1
4.	Additional cover with anti-theft protection	set	1
5.	Combination lock	pcs	1

The object specification example (cable chamber No. ST1)

**List of items for the project** is generated after clicking on  icon on the Application toolbar. The following window will be opened:



The list of items for a telecommunications network may be inserted into the drawing in the form of an editable table or may be saved to an .rtf file.

When the  icon is selected, click on the button to open the window for defining the list element properties:



## Working with the Application

The editable table inserted into the drawing or saved to an .rtf file can be edited by choosing the options available in the setting properties window.

Drawing	Name	Symbol	Quantity
	UniRack 19/2U distribution frame, designed	FOS1 FOS2	2 pcs
	SSc 40A wall box, existing	OZL1	1 pcs
	Straight line spun concrete pole, single L=10.50 m, designed	P1 P2	2 pcs
	SRP 900-AT/TSK cable post, designed	SK1	1 pcs
	Cable chamber SK1 made of reinforced concrete, single-piece, light, single, A15 designed	ST6 ST7	2 pcs
	Reinforced concrete cable chamber SK2, two-piece, heavy, increased strength D400, designed	ST5	1 pcs
	Reinforced concrete cable chamber SK2, two-piece, heavy, standard B125, designed	ST1-ST4	4 pcs

The example of the list of items for the project

### General reports

**ArCADia-TELECOMMUNICATIONS NETWORKS** Add-on adds to the menu toolbars for report generation:

## Working with the Application



The functions of **General reports** toolbar

Icon	Option	Description
	<i>List of cable chambers</i>	Generates a list of cable chambers used in the project
	<i>List of primary cable duct segments</i>	Generates a table summarizing the primary cable duct segments used in the project
	<i>List of survey point coordinates</i>	Generates a table summarizing the survey point coordinates for objects used in the project and the points indicated

The Application automatically generates a **list of cable chamber** when you click on the icon from the Application toolbar. When the icon is selected and after choosing a start and end element (the route of cable chambers), the Application generates the list in the form of a table in an RTF file.

List of cable chambers			
No.	Cable chamber type	Cable chamber No.	Specification
1	SK1	B 8-10	reinforced concrete, single-piece, light, single, A15
2	SKR1	B 7	reinforced concrete, single-piece, light, single, A15
3	SKR1	B 11	reinforced concrete, single-piece, light, single, B125
4	SKR2	B 2/3/5	reinforced concrete, single-piece, light, single, A15
5	SKR2	B 1	reinforced concrete, single-piece, light, single, B125

#### The example of list of cable chambers

The list of the selected cable chambers includes the chamber type, number assigned in the project and its style. Due to the fact that the file is editable, you may freely add required elements to the list or make annotations to the particular items.

The Application also automatically generates a **list of primary cable duct segments** when

you click on the icon from the Application toolbar. When the icon is selected and after choosing a start and end element, the Application generates the list in the form of a table in an RTF file.


No.	Segment	No. of	Segment	Scope	Conduit type
-----	---------	--------	---------	-------	--------------

## Working with the Application

		openings	length [km]	[km/ opening]	
1	ST6 => ST8	1	0.008	0.008	RPP 110/3.7mm
2	ST8 => ST9	2	0.016	0.032	RHDPE 110/6.3mm
3	ST9 => ST10	2	0.012	0.024	RHDPE 110/6.3mm
4	ST10 => ST11	2	0.018	0.036	RHDPE 110/6.3mm
5	ST11 => ST12	1	0.029	0.029	RPP 110/3.7mm
		Tot.	0.083	0.129	

The example of list of segments  
for the designed primary cable duct

The list of primary cable duct segments generated by the Application includes the segment lengths, scope of the construction works defined in km/openings and the type of conduits used for construction of the duct, in the view of individual segments. If the primary cable duct profile for one of the duct segments (between neighbouring cable chambers) is constructed of various type of conduits, such conduits are separated by semicolons in the column *conduit type*.

The **list of survey point coordinates**, after selection of the  icon from the Application toolbar is enriched with list of survey points specified manually and with coordinates of every object used in the Application, added automatically to the main list. When the icon is selected and after choosing a start and end element (the route of cable chambers), the Application generates the list in the form of a table in an RTF file.

List of coordinates

No.	Symbol	X	Y
1	B1	5555340.70	4538943.65
2	B2	5555351.40	4538945.60
3	B3	5555350.50	4538951.03
4	B4	5555349.40	4538957.30
5	B5	5555380.00	4538962.80
6	B6	5555381.80	4538951.30
7	B7	5555387.68	4538949.85
8	FOS1	5555428.38	4539009.12
9	GEO1	5555458.32	4538910.83
10	GEO2	5555469.24	4538912.61
11	GEO3	5555481.93	4538908.98
12	GEO4	5555478.31	4538937.30

The example of list of survey point coordinates




## Working with the Application

**Fibre optic reports**


**ArCADia-TELECOMMUNICATIONS NETWORKS** Add-on adds to the menu toolbars for report generation:



The functions of **Fibre optic reports** toolbar panel:

Icon	Option	Description
	<i>Description of optical-fibre cable</i>	Generates a table summarizing descriptions of the selected optical-fibre cable link
	<i>List of optical-fibre cable segments</i>	Generates a table summarizing optical-fibre cable segments
	<i>Analysis of optical-fibre cable attenuation</i>	Generates a table in the form of a report with attenuation calculations for the selected optical-fibre cable

The Application automatically generates a **description of fibre optic cable route** when you

click on the  icon on the Application toolbar. When the icon is selected and after choosing a start and end element, the Application generates the list in the form of a table in an RTF file.

No.	Object	Distance from the last object [m]	Route length [m]	Cable allowance [m]	Optical path	Description	Cable joint	Distance to the last joint [m]	Secondary conduit type	Secondary conduit length [m]
1	FOS2			30	30	PS 19/12/1U		30		
2	B9	13	13	0	43	SK1		43		
3	C1	176	190	10	230	Cable container	FRBU 1314	230	RHDPE 32/2.9	180
4	B8	497	687	30	757	SK1		527	RHDPE 32/2.9	507
5	B7	52	739	0	809	SK1		580	RHDPE 32/2.9	53
6	B6	34	773	0	843	SK1		613	RHDPE 32/2.9	35
7	B5	27	800	0	870	SK1		641	RHDPE 32/2.9	28
8	B4	35	835	0	905	SK1		676	RHDPE 32/2.9	36
9	B3	31	867	0	937	SK1		707	RHDPE 32/2.9	32
10	B2	23	890	0	960	SK1		730	RHDPE 32/2.9	23
11	B1	31	921	0	991	SK1		761	RHDPE 32/2.9	32
12	FOS1	12	933	10	1013	PS 19/12/1U		783		
	Tot.		933		1013					926

The example of a description of the cable route, address OKD 944

## Working with the Application

The Application, in the cable route description for the selected link, generates cable segment lengths for every segment on the route from the last object, the route length, cable allowance in the object, optical path with length factors defined in the Application general options taken into account, description with characteristic point specified (cable chamber, distribution frame, container, joint), length between neighbouring joints, the type and length of secondary conduit defined along the route.

The Application also automatically generates a **list of fibre optic cable segments** when you



click on the icon on the Application toolbar. When the icon is selected and after choosing a start and end element, the Application generates the list of cable segments in the project. The list of cables is generated for the cable segments located between neighbouring joints assigned to the particular cable address or, if no joint is used, for the length between optic distribution frames or to the selected end object.

This list is helpful during designing of cable installation segments with a view to making an order for materials and allocating the fibre optic cables. The list is saved in an RTF file, similarly to other lists described above.

The list of OKD 224 cable segments

No.	Cable type	Installation segment length [m]	Allocation of drum segment [m]
1	Z-XOTKtsd 12J	700	0-700
2	Z-XOTKtsd 12J	1923	700-2623
	Tot.	2623	

The example of a list of the cable segments, address OKD 224

The report from attenuation analysis for the fibre optic cable is described in the section *Generation of calculation reports*.




### Telecommunications reports

**ArCADia-TELECOMMUNICATIONS NETWORKS** Add-on adds to the menu toolbars for report generation:




## Working with the Application

The functions of **Telecommunications reports** toolbar:

Icon	Option	Description
	<i>Description of optical-fibre cable route</i>	Generates a table summarizing descriptions of the selected optical-fibre cable link
	<i>List of telecommunications cable segments</i>	Generates a table summarizing telecommunications cable segments
	<i>Attenuation and impedance analysis for cable paths</i>	Generates a table in the form of a report with attenuation calculations for the selected cable path

The Application automatically generates a **description of telecommunications cable route**

when you click on the  icon on the Application toolbar. When the icon is selected and after choosing a start and end element, the Application generates the list in the form of a table in an RTF file.


Description of KR 12 cable route

No.	Object	Distance from the last object [m]	Route length [m]	Cable allowance [m]	Electrical path [m]	Description	Cable joint
1	SK1			0	0	Cable post	
2	ST1	32	32	0	33	SK1	
3	ST2	55	87	15	105	SK1	
4	ST3	46	133	0	153	SK1	
5	OZL1	27	160	0	182	Cable box	
	Tot.		160		182		

The example of a description of the cable route, address KR 12

The Application, in the cable route description for the selected link, generates cable segment lengths for every segment on the route from the last object, route length, cable allowance in the object, electrical path with length factors defined in the Application general options taken into account, the description with characteristic point specified (cable chamber, cable post, cable box) and, if the cable joint is used - its characteristic symbol along with the location.

The Application also automatically generates a **list of telecommunications cable segments**

when you click on the  icon on the Application toolbar. When the icon is selected and after choosing a start and end element, the Application generates the list of cable segments in the project. The list of cables is generated for the cable segments located between

## Working with the Application

neighbouring joints assigned to the particular cable address or, if no joint is used, for the length between the object selected to the end object. This list is helpful during designing of cable installation segments, e.g. with a view to making an order for materials. The list is saved in an RTF file, similarly to other lists described above.

List of cable segments, addresses KR 12 – KR 12.1


No.	Segment	No. of pairs	Segment length [km]	Material scope [km/pairs]	Cable address	Cable type
1	SK2 => ZK1	20	0.128	2.561	KR 12	XzTKMXpw 10x4x0.5
2	ZK1 => OZL2	10	0.215	2.147	KR 12.1	XzTKMXpw 5x4x0.5
		Tot.	0.343	4.708		

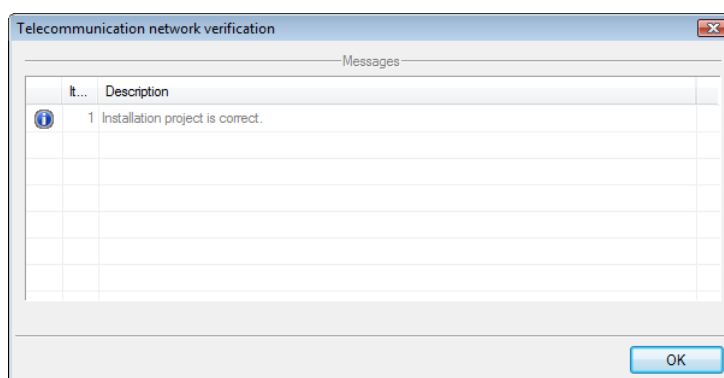
The example of a list of the cable segments, addresses KR 12 – KR 12.1

The report from attenuation and impedance analysis for the telecommunications cable paths is described in the section *Generation of calculation reports*.

When the technical calculations are performed and necessary parameters are determined, the **ArCADia-TELECOMMUNICATIONS NETWORKS** Application reports to the user the correctness of the network segments designed, i.e. checks the connections, continuity of the cables designed based on their addresses and checks if other network components have been selected properly.



In order to perform the checks click on the  icon on the Application toolbar. The Application generates reports from such inspections with a list of errors detected for the network designed. These editable reports also suggest the reasons and locations of the errors.



The example of an inspection report for the telecommunications network with the errors detected in the project indicated

The user is able to review partial calculations, i.e. the Application will provide technical information (values of the parameters being evaluated) about every segment designed (see cable route description, list of cable segments, list of primary cable duct segments, attenuation analysis). The report also contains the so called Bill of Materials necessary for the construction of the network designed.

## Working with the Application

In case of primary cable ducts, the Application sets the defined length of the duct profile as a distance between the cable chambers being designed.

The reports are generated in RTF files and include all the information required from professional technical documentations.


### ***3.4.21 Calculation report generation***

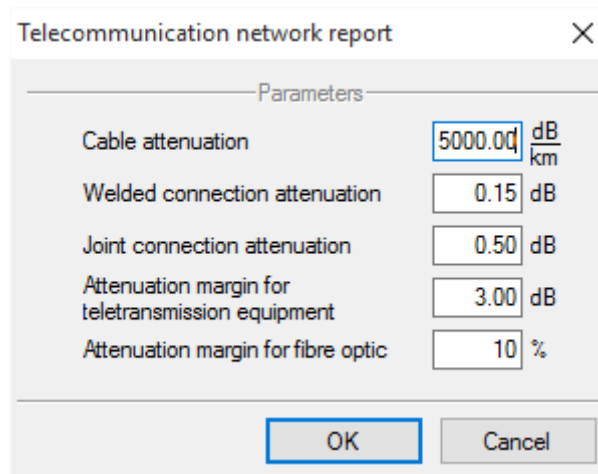
**ArCADia-TELECOMMUNICATIONS NETWORKS** enables the user to generate the following calculation reports:

- Analysis of optical-fibre cable attenuation
- Cable path attenuation or impedance analysis



**Analysis of optical-fibre cable attenuation**

Click on the  icon on the Application toolbar (fibre-optic cable reports), the following box will be displayed:



Telecommunication network report

Parameters

Cable attenuation	5000.00 dB/km
Welded connection attenuation	0.15 dB
Joint connection attenuation	0.50 dB
Attenuation margin for teletransmission equipment	3.00 dB
Attenuation margin for fibre optic	10 %

OK Cancel

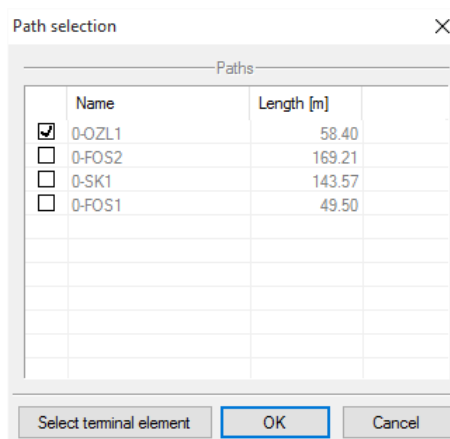
Window of fibre optic network report

In this window you may define the parameters necessary for the analysis, such as: the cable attenuation, weld joint attenuation, attenuation margin for tele transmission equipment, attenuation margin for fibre optic. These parameters are determined on the basis of the cables and equipment designed and added to the project, and the transmission window for which the analysis is to be performed.

Fibre optic transmission uses the so-called windows. Attenuation, i.e. signal loss depends on the wavelength. Three transmission windows of the lower attenuation value may be distinguished:

**1st transmission window** – covers the wavelengths of 0.85  $\mu\text{m}$ , quite high attenuation of 1 dB/km, **2nd transmission window** – the wavelength of 1.3  $\mu\text{m}$ , attenuation approx. 0.4 dB/km, **3rd transmission window** – the wavelength of 1.55  $\mu\text{m}$ , attenuation lower than 0.2 dB/km.

When the above mentioned parameters are set, select the beginning and end of the segment and the cable address which is to be analysed. Use the following window:



Path selection

Paths

Name	Length [m]
<input checked="" type="checkbox"/> 0-OZL1	58.40
<input type="checkbox"/> 0-FOS2	169.21
<input type="checkbox"/> 0-SK1	143.57
<input type="checkbox"/> 0-FOS1	49.50

Select terminal element OK Cancel

You may also select the end element by clicking on the *Select end element* button or by selecting the desired route and clicking on the *OK* button.

## Working with the Application

Attenuation analysis for OKD 944 cable


Element	Location [m]	Cable length (m)	Max. attenuation of element [dB]	Max. growing attenuation of element [dB]	Description
Connector			0.50	0.50	FOS1 distribution frame
Pigtail		2.0	0.00	0.50	
Spaw (pigtail)	2.0		0.15	0.65	
Cable		23.6	0.01	0.66	
Cable		1.9	0.00	0.66	
Cable		19.8	0.00	0.66	
Cable		40.5	0.01	0.67	
Cable		24.5	0.01	0.68	
Cable		3.8	0.00	0.68	
Cable		33.9	0.01	0.69	
Spaw (pigtail)	150.0		0.15	0.84	
Pigtail		2.0	0.00	0.84	
Connector	152.0		0.50	1.34	FOS2 distribution frame
Max. line attenuation				1.34	
Margin for teletransmission equipment				3.00	
Margin for fibre optic cable 10%				0.13	
Total maximum attenuation of built line				4.47	

The example of an attenuation analysis for the cable of OKD 944 address

The report generated includes an attenuation analysis for the selected fibre optic cable, based on the specified attenuation parameters.

### **Cable path attenuation or impedance analysis**



Click on the  icon on the Application toolbar (telecommunications reports), the following box will be displayed:

## Working with the Application

Window of telecommunications network report

In this window you may define the parameters necessary for the analysis, such as: the additional joint attenuation and additional joint impedance. These parameters are determined on the basis of the cables and equipment designed and added to the project. The Application allows the additional joint attenuation and impedance of any value other than zero to be added,.

When the above mentioned parameters are set, select the beginning and end of the segment, and the cable address which is to be analysed. Use the following window:

You may also select the end element by clicking on the *Select end element* button or by selecting the desired route and clicking on the *OK* button.

Attenuation and impedance analysis for the KR 12-KR 12.1 cable

Cable	Cable length (m)	Max. attenuation of segment [dB]	Max. growing attenuation of element [dB]	Impedance [ $\Omega$ ]	Growing impedance [ $\Omega$ ]	Description
XzTKMXpw 10x4x0.5	128.0	0.19	0.19	24.56	24.56	Cable post
XzTKMXpw 5x4x0.5	214.7	0.33	0.52	41.19	65.75	Branch joint on cable KR 12
XzTKMXpw 5x4x0.5	18.3	0.03	0.55	3.51	69.26	Underground cable

## Working with the Application

XzTKMXpw 5x4x0.5	30.1	0.05	0.60	5.78	75.04	Duct cable
XzTKMXpw 5x4x0.5	22.0	0.03	0.63	4.22	79.26	Duct cable
XzTKMXpw 5x4x0.5	55.8	0.08	0.71	10.70	89.96	Duct cable
XzTKMXpw 5x4x0.5	24.0	0.04	0.75	4.61	94.57	Cable box
Cable attenuation/impedance			0.75		94.57	
Additional joint attenuation/impedance			0.00		0.00	
Total line attenuation/impedance			0.75		94.57	

The example of an attenuation and impedance analysis for the KR 12-KR 12.1 cable

The report generated includes an attenuation and impedance analysis for the cable selected, based on the predefined parameters.

### 3.4.22 Diagram generation



ArCADia-TELECOMMUNICATIONS NETWORKS offers the function of diagram generation:

- Optical-fibre cable diagram
- Telecommunications cable diagram
- Primary cable duct diagram
- Cable subway diagram

### ArCADia-TELECOMMUNICATIONS NETWORKS toolbar: Cable diagrams





The functions of **Cable diagrams** toolbar:

Icon	Option	Description
	<i>Generate optical-fibre cable diagram</i>	Inserts and edits a selected diagram for the selected optical-fibre cable link designed in the project
	<i>Generate telecommunications cable diagram</i>	Inserts and edits a selected diagram for the selected telecommunications cable link designed in the project

**ArCADia-TELECOMMUNICATIONS NETWORKS toolbar: Cable duct diagrams**

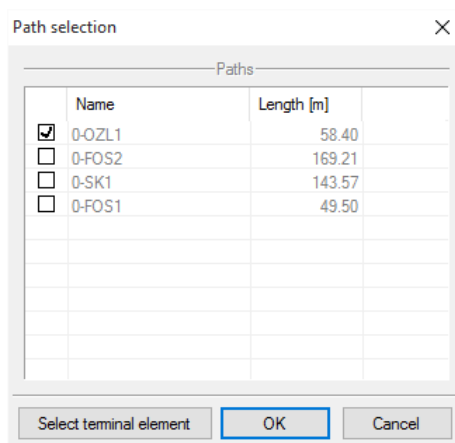
The functions of **Cable duct diagrams** toolbar:

Icon	Option	Description
	<i>Generate primary cable duct diagram</i>	Inserts and edits a selected diagram for the selected primary cable duct route segment designed in the project
	<i>Generate cable subway diagram</i>	Inserts and edits a selected diagram for the selected cable subway route segment designed in the project

When the objects required for the diagram generation are inserted and the objects related to the fibre optic cable, telecommunications cable, cable subway are defined, you may generate a diagram for the selected link or cable address specified.

**Optical-fibre cable diagram**

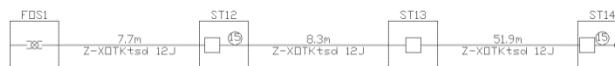
After choosing the icon on the Application toolbar, select the start element, cable and route for which the diagram is to be generated, from the following window:



You may also select the end element by clicking on the *Select end element* button or by selecting the desired route and clicking on the *OK* button.

A new View of the selected fibre optic cable route segment is inserted into the drawing:

## Working with the Application

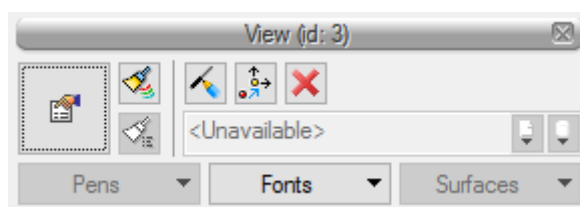


It includes an extension and graphical representation of the objects used in the project along the route of the cable selected. The objects are generated in the form of squares containing the symbols which defined the cable route specification (joint, allowance, distribution frame, chamber).

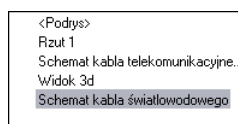
Depending on the object status in the project (*existing/designed*), the symbols in the diagram change their appearance as well.

The diagram may be edited and its parameters may be changed, i.e. the length, height, symbol scale, description parameters for plotting purposes as well as for adding in the selected form to the project.

The selection is made in the box:

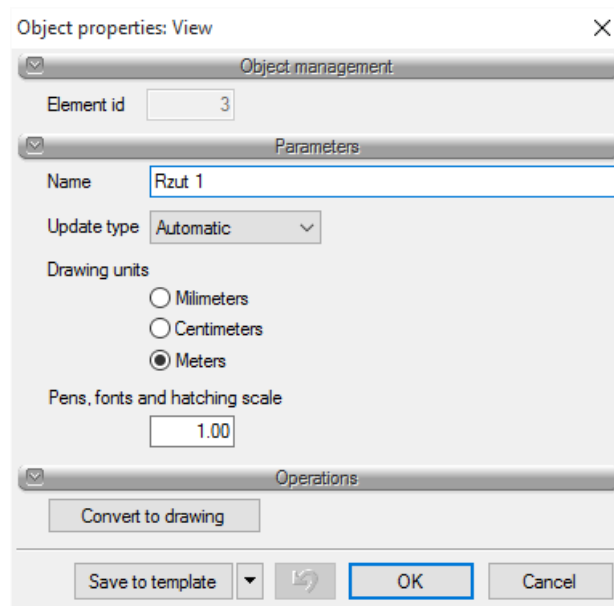


Change the description form for the element selected in the diagram. The diagram also allows the object parameters to be changed. In order to switch to the main View, go to the Project Manager and to the window:



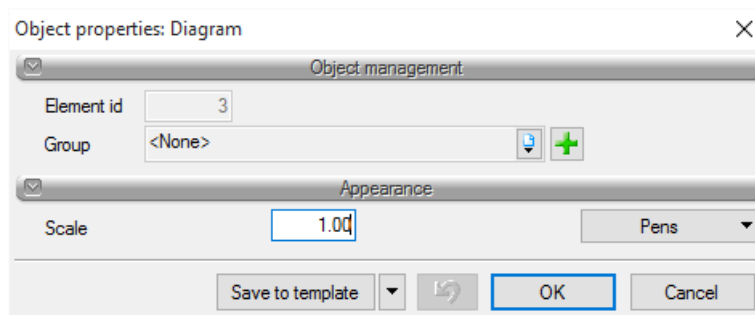
By double clicking on the arrow in the active View you will be able to (in the windows):

## Working with the Application



set any name for the diagram or convert it into a drawing.

Click on the diagram View frame in the window shown below in order to edit the symbol scale. Also the diagram frame may be freely changed in order to match its format to the plotting requirements. In this case the diagram is "wrapped" in order to match automatically to the specified View height.

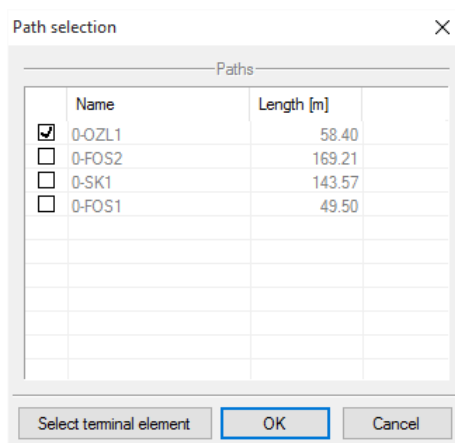


### Telecommunications cable diagram



After choosing the icon on the Application toolbar, select the start element, cable and route for which the diagram is to be generated, from the following window:

## Working with the Application



You may also select the end element by clicking on the *Select end element* button or by selecting the desired route and clicking on the *OK* button.

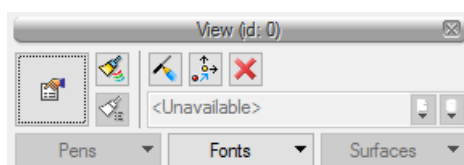
A new View of the selected fibre optic cable route segment is inserted into the drawing:



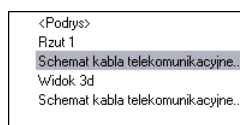
It includes an extension and graphical representation of the objects used in the project along the route of the cable selected. The objects are generated in the form of squares containing the symbols which defined the cable route specification (joint, allowance, post, chamber). Depending on the object status in the project (*existing/designed*) the symbols in the diagram change their appearance as well.

The diagram may be edited and its parameters may be changed, i.e. the length, height, symbol scale, description parameters for plotting purposes as well as for adding in the selected form to the project.

The selection is made in the box:



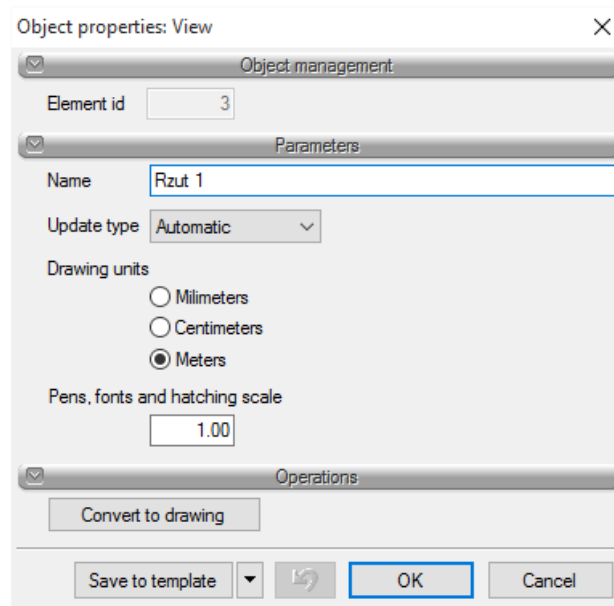
Change the description form for the element selected in the diagram. The diagram also allows the object parameters to be changed. In order to switch to the main View, go to the Project Manager and to the window:





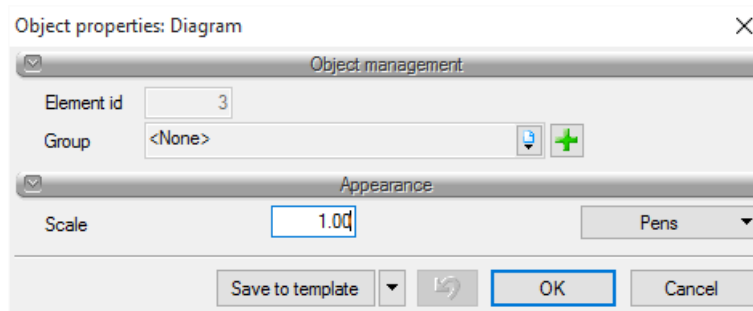
## Working with the Application

By double clicking on the arrow in the active View you will be able to (in the window):



set any name for the diagram or convert it into a drawing.

Click on the diagram View frame in the window shown below in order to edit the symbol scale. Also the diagram frame may be freely changed in order to match its format to the plotting requirements. In this case the diagram is "wrapped" in order to match automatically to the specified View height.



### **Primary cable duct diagram**

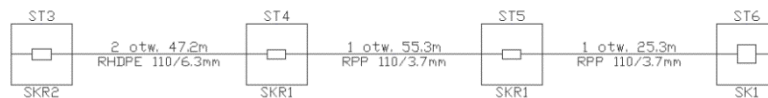


After choosing the icon on the Application toolbar, select the start element, primary cable duct route for which the diagram is to be generated, from the following window:

You may also select the end element by clicking on the *Select end element* button or by selecting the desired route and clicking on the *OK* button.

## Working with the Application

A new View of the selected cable duct route segment is inserted into the drawing:

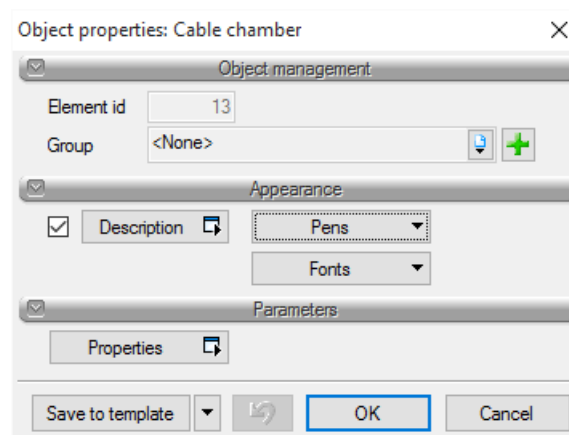


It includes an extension and graphical representation of the objects used in the project along the route of the cable selected. The objects are generated in the form of squares containing the symbols which defined the cable route specification (joint, allowance, post, chamber).

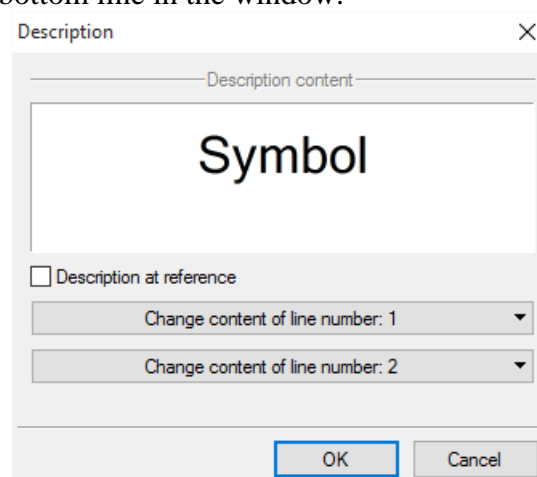
Depending on the object status in the project (*existing/designed*) the symbols in the diagram change their appearance as well.

The diagram may be edited and its parameters may be changed, i.e. the length, height, symbol scale, description parameters for plotting purposes as well as for adding in the selected form to the project.

Similarly to other diagrams, the appearance and descriptions of the object (cable chamber, in this case) may be modified in the window:



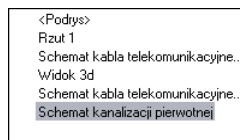
In order to modify the description appearance for the selected element in the diagram, you must modify the top and bottom line in the window:



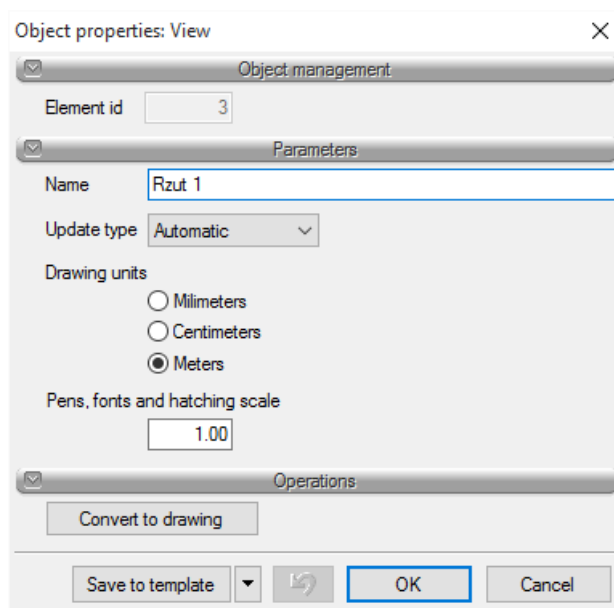
## Working with the Application

The diagram also allows the object parameters to be changed.

In order to switch to the main View, go to the Project Manager and to the window:

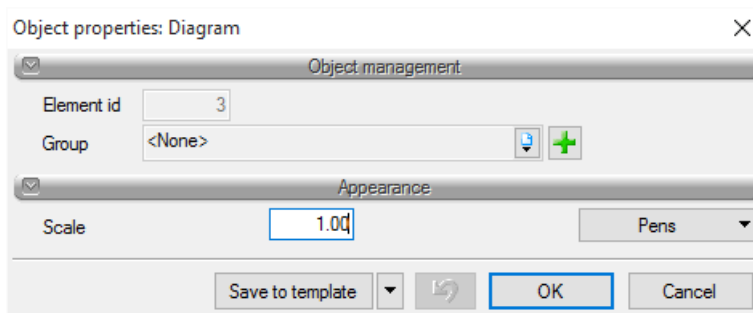


By double clicking on the arrow in the active View you will be able to (in the window):



set any name for the diagram or convert it into a drawing.

Click on the diagram View frame in the window shown below in order to edit the symbol scale. Also the diagram frame may be freely changed in order to match its format to the plotting requirements. In this case the diagram is "wrapped" in order to match automatically to the specified View height.



## Working with the Application

**Cable subway diagram**

After choosing the icon on the Application toolbar, select the start element, cable subway route for which the diagram is to be generated, from the following window:

Path selection

Paths	
Name	Length [m]
<input checked="" type="checkbox"/> 0-OZL1	58.40
<input type="checkbox"/> 0-FOS2	169.21
<input type="checkbox"/> 0-SK1	143.57
<input type="checkbox"/> 0-FOS1	49.50

Select terminal element OK Cancel

You may also select the end element by clicking on the *Select end element* button or by selecting the desired route and clicking on the *OK* button.

A new View presenting the selected cable subway route diagram is inserted into the drawing:



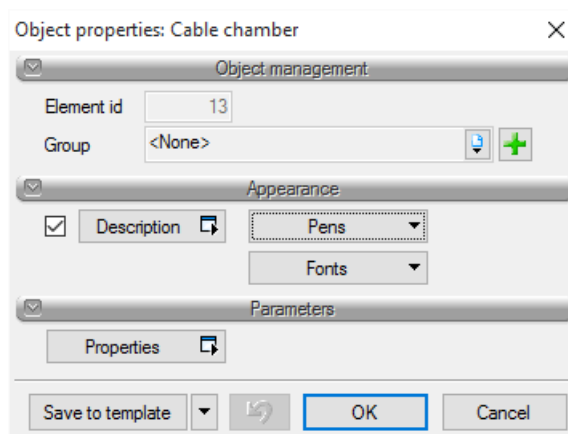
It includes an extension and graphical representation of the objects used in the project along the route of the cable selected. The objects are generated in the form of squares containing the symbols which defined the cable route specification (joint, allowance, post, chamber).

Depending on the object status in the project (*existing/designed*) the symbols in the diagram change their appearance as well.

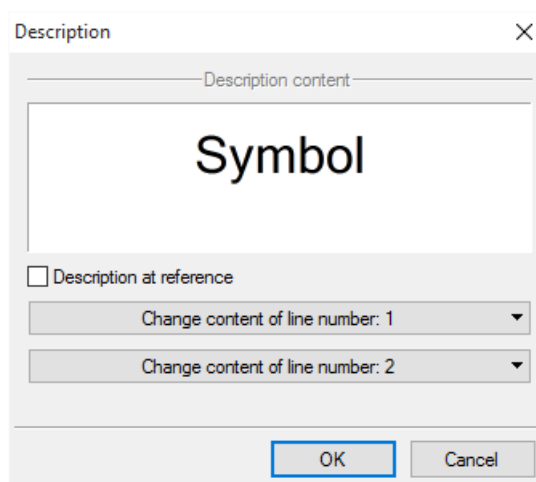
The diagram may be edited and its parameters may be changed, i.e. the length, height, symbol scale, description parameters for plotting purposes as well as for adding in the selected form to the project.

Similarly to other diagrams, the object description appearance (cable subway, in this case) may be modified in the window:

## Working with the Application

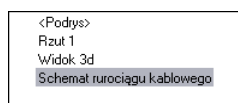


In order to modify the description appearance for the selected element in the diagram, you must modify the top and bottom line in the window:



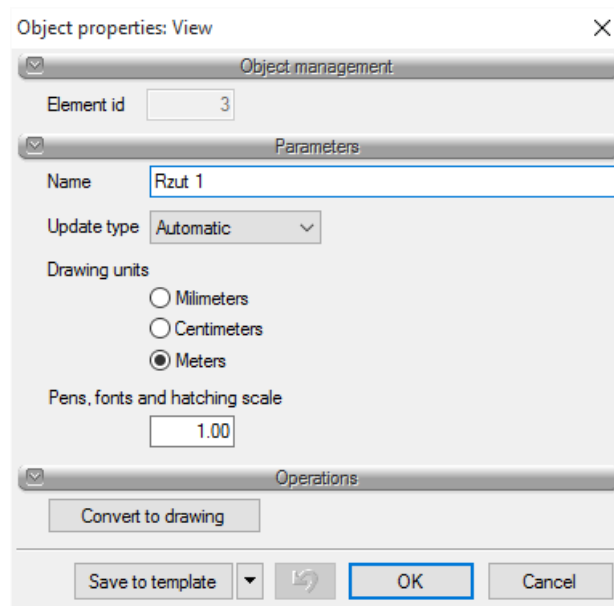
The diagram also allows the object parameters to be changed.

In order to switch to the main View, go to the Project Manager and to the window:



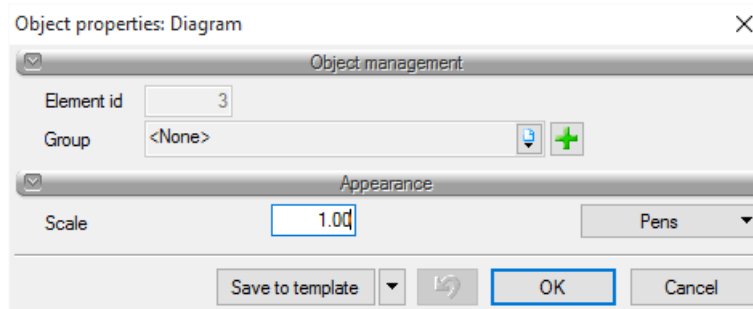
By double clicking on the arrow in the active View you will be able to (in the window):

## Working with the Application




set any name for the diagram or convert it into a drawing.

Click on the diagram View frame in the window shown below in order to edit the symbol scale. Also the diagram frame may be freely changed in order to match its format to the plotting requirements. In this case the diagram is "wrapped" in order to match automatically to the specified View height.

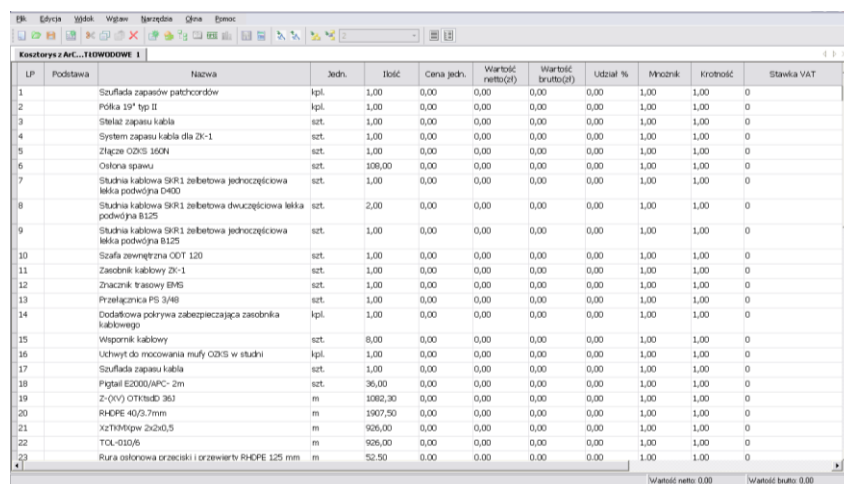


### 3.4.23 Export of Bill of Materials to Ceninwest

The Application shares the database used for cost estimation on the basis of a comprehensive bill of basic materials used for construction of telecommunications networks, including cables and equipment for termination of cables in the target buildings. These bills, generated with a single mouse-button click, may be transferred to cost estimation applications, such as Ceninwest and Norma.

In order to export the Bill of Materials used in the project to Ceninwest, click on the  icon *Export to Ceninwest* (provided that Ceninwest is installed on the PC), which is available from the ActionBar of Bill of Materials function. The Bill of Materials will be opened automatically (along with the cost estimation record – *cost estimation from ArCADia-TELECOMMUNICATIONS NETWORKS*). Export is possible only with Ceninwest preinstalled.

## Working with the Application





LP	Podstawa	Nazwa	Jedn.	Ilość	Cena jedn.	Wartość netto(ł)	Wartość brutto(ł)	Udział %	Mnożnik	Krotność	Stawka VAT
1		Szuflada zapasów patchcordów	kpl.	1,00	0,00	0,00	0,00	0,00	1,00	1,00	0
2		Półka 19" typ II	kpl.	1,00	0,00	0,00	0,00	0,00	1,00	1,00	0
3		Stelaż zapasu kabla	szt.	1,00	0,00	0,00	0,00	0,00	1,00	1,00	0
4		System zapasu kabla dla 2K-1	szt.	1,00	0,00	0,00	0,00	0,00	1,00	1,00	0
5		Złącze ODYS 160N	szt.	1,00	0,00	0,00	0,00	0,00	1,00	1,00	0
6		Ochrona spawu	szt.	106,00	0,00	0,00	0,00	0,00	1,00	1,00	0
7		Studnia kablowa SR11 zełbetowa jednoczęściowa lekka podwójna D400	szt.	1,00	0,00	0,00	0,00	0,00	1,00	1,00	0
8		Studnia kablowa SR11 zełbetowa dwuczściowa lekka podwójna S125	szt.	2,00	0,00	0,00	0,00	0,00	1,00	1,00	0
9		Studnia kablowa SR11 zełbetowa jednoczęściowa lekka podwójna S125	szt.	1,00	0,00	0,00	0,00	0,00	1,00	1,00	0
10		Szafa zewnętrzna COT 120	szt.	1,00	0,00	0,00	0,00	0,00	1,00	1,00	0
11		Zasobnik kablowy 2K-1	szt.	1,00	0,00	0,00	0,00	0,00	1,00	1,00	0
12		Znacznik trasowy EMS	szt.	1,00	0,00	0,00	0,00	0,00	1,00	1,00	0
13		Przełącznica PS 3/48	szt.	1,00	0,00	0,00	0,00	0,00	1,00	1,00	0
14		Dodatekowa pokrywa zabezpieczająca zasobnika kablowego	kpl.	1,00	0,00	0,00	0,00	0,00	1,00	1,00	0
15		Wspornik kablowy	szt.	8,00	0,00	0,00	0,00	0,00	1,00	1,00	0
16		Uchwyty do mocowania mufy ODYS w studni	kpl.	1,00	0,00	0,00	0,00	0,00	1,00	1,00	0
17		Szuflada zapasu kabla	szt.	1,00	0,00	0,00	0,00	0,00	1,00	1,00	0
18		Profil E2000/APC- 2m	szt.	36,00	0,00	0,00	0,00	0,00	1,00	1,00	0
19		Z-(IV) OTK150D 363	m	1082,30	0,00	0,00	0,00	0,00	1,00	1,00	0
20		RHDPE 40/5,7mm	m	1907,50	0,00	0,00	0,00	0,00	1,00	1,00	0
21		X2THMgw 2x2x0,5	m	906,00	0,00	0,00	0,00	0,00	1,00	1,00	0
22		TOL-G10/6	m	906,00	0,00	0,00	0,00	0,00	1,00	1,00	0
23		Rura ochronowa orzeźbiona i orzeźbiony RHDPE 125 mm	m	52,50	0,00	0,00	0,00	0,00	1,00	1,00	0
						Wartość netto: 0,00	Wartość brutto: 0,00				

Bill of materials window in Ceninwest

## 3.4.24 MINI version limitations

The functionality of the **ArCADia-TELECOMMUNICATIONS NETWORKS MINI** version is restricted. These limitations are described below.

- Commands for generation of calculation reports and lists are unavailable:
  - List of cable chambers
  - List of primary cable duct segments
  - List of survey point coordinates
  - Description of optical-fibre cable
  - List of optical-fibre cable segments
  - Analysis of optical-fibre cable attenuation
  - Description of optical-fibre cable route
  - List of telecommunications cable segments
  - Cable path attenuation or impedance analysis
- Unavailable insertion of profile contents lists and lists of joints used in the objects:
  -  - Insert list of object joints. If designed optical cable or telecommunications (copper) cable joints are defined in the particular object, an editable list of these joints is available in the form of a table. For the description, appearance and edit method of such a table see below.
  -  - *Insert item list.* If a few components are defined in the object, the list of such components is displayed in the form of an editable table. It applies to the following objects: the primary cable duct profile, cable subway profile, telecommunications cable profile. For the description, appearance and edit method of such a table see the "primary cable duct profile" object.
- Unavailable 3D View representation of module objects.
- Disabled detection of collisions with module objects.