Installation Instructions

Installation of Microduct Assemblies in Existing Conduits

Contents

1 Introduction

This document is a description of the methods used for Duct Installation (DI) of microduct assemblies (multi-ducts). These methods describe how to install microduct assemblies in existing conduits, by pulling and blowing them, and how to prepare and handle ducts.

1.1 Scope

This document covers the methods for installation of microduct assemblies for direct installation into existing conduits.

1.2 Target Group

This document is primarily targeted at installation technicians. Hexatronic recommends that personnel have an adequate professional background and have attended product training arranged by Hexatronic.

1.3 Prerequisites

In this document, it is assumed that the reader is familiar with concepts, terminology, and abbreviations, concerning the Fiber Optic deployment.

2 Overview

Deployment of Micronet DI-ducts is mainly done using one of the following methods:

- Pulling– manually or by winch
- Blowing micro ducts into existing ducts
- Floating ducts using water, (out of the scope of this document)

3 Pulling Ducts

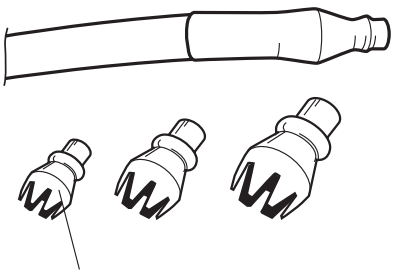
Pulling ducts can be done manually by hand, or by winch.

3.1 Preparing Duct

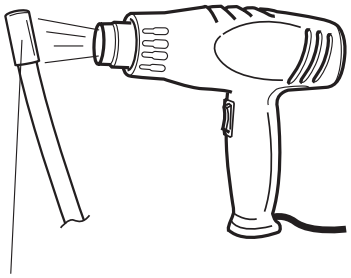
To prepare a duct, perform the following steps:

1. Before starting to install any DI-duct, make sure the ends of the duct are sealed. This could be done by using a cold type duct seal, or a heat method by using a shrink end cap.

Note: Use an appropriate end cap, and secure it with tape to make sure it does not come off while pulling the duct.

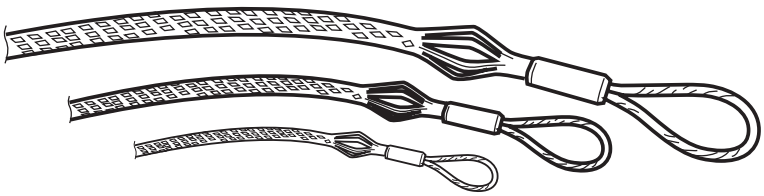


End Cap



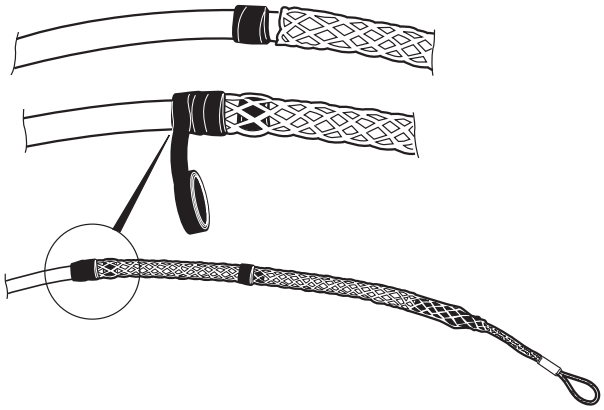
Shrink End Cap

2. Select the correct size of the pulling grip.

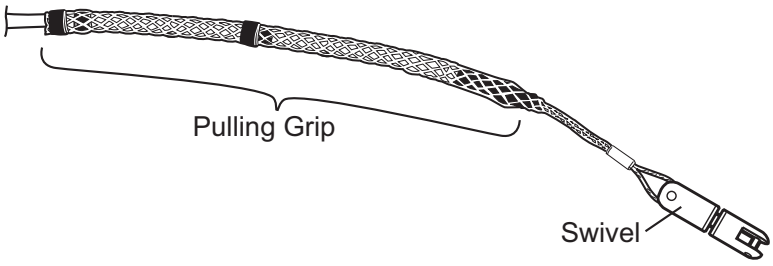


3. Put on the pulling grip, slide it back a few centimeters, and build up the diameter of the duct with some layers of tape. This is to make the grip hold better.

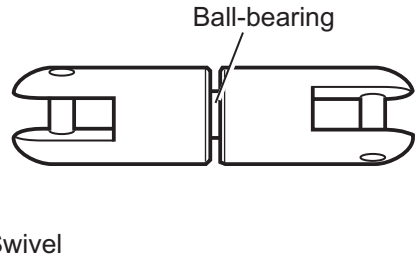
4. Slide the pulling grip forwards again, all the way onto the duct, and tape on top. Stretch the tape while taping. Also, tape on the middle of the grip.



5. Attach the swivel to the pulling grip.



6. Tie the pulling rope to the swivel on the pulling grip with a strong knot.



7. After the duct has been pulled through, cut away the front part of the duct, see Figure 1. The length of the cutoff must be twice the length of the pulling grip. This is due to the extra stress on that part of the duct.

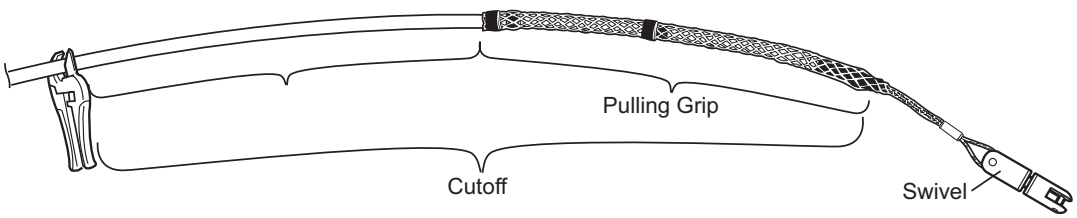


Figure 1 – Cutting the Pulling Grip

3.2 Pulling Duct Assemblies by Winch

When pulling the duct assemblies by winch, see Figure 2, or if the manhole is a bit narrow, it is crucial to use the bend radius limiter to prevent the duct from being damaged during installation.

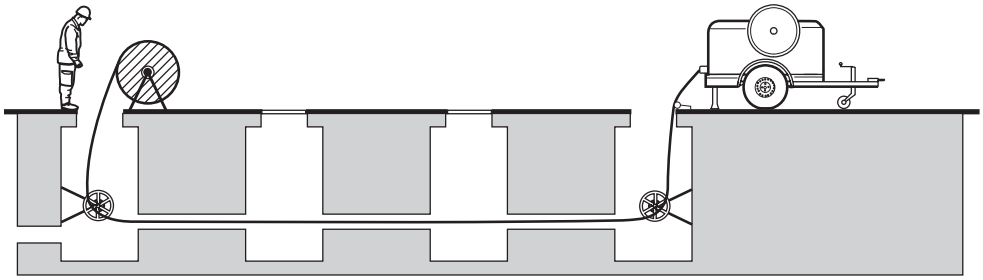


Figure 2 – Pulling Duct Assemblies by Winch

Caution!
Never use a vehicle to pull the duct through.

If too much tension is used, the duct will be damaged, and will also retract after the installation, see Figure 3. The maximum tension limits are specified in the product data sheets for corresponding ducts.

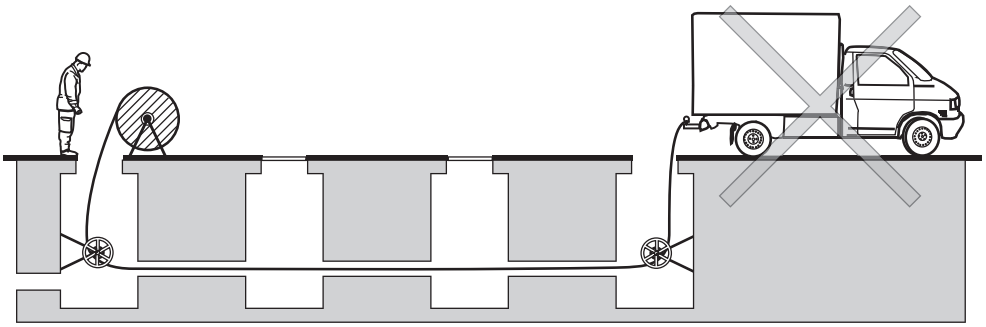


Figure 3 – Example of Incorrect Duct Pulling

3.3 Pushing Individual Duct Short Distances

For short distances, approximately 100 meters, the duct may be pushed through. To facilitate installation of single microducts, the ducts may be pressurized to increase the stiffness. This will make them stiffer and straighten them out.

Use a pressure proof end stop connector in the front end, see Figure 4. Make sure to tape down the back end of the cap to the micro duct in order to create a smooth transition between the duct and the cap. The taping of the end stop connector is especially important if problems occur when pushing the duct through, and the duct has to be pulled back.

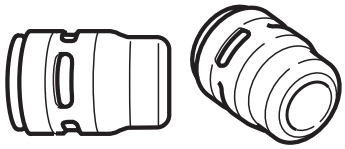


Figure 4 – End Stop Connector

Use an air valve end stop, see Figure 5, at the inner end of the duct, and pressurize it to approximately 7 bars with a compressor.

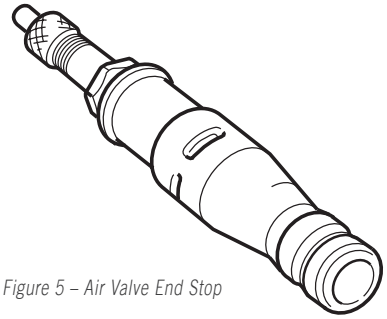


Figure 5 – Air Valve End Stop

3.4 Installation with Caterpillar Cable Feeders

When using more than one cable feeder, communication and synchronization is vital. This is a push and pull solution, and one person is needed at the drum, one at each cable feeder, and one at the far end receiving the duct, see Figure 6.

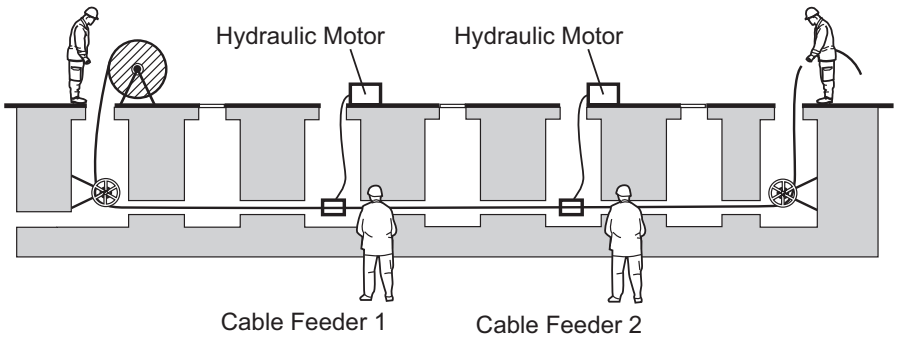


Figure 6 – Multiple Cable Feeders

Keep the duct path clear, and ensure that the duct is handled correctly. For more information about duct handling, see Section 5 on page 9.

4 Blowing Microducts into Existing Conduits

To be able to blow microducts into an existing duct, it must be pressure proof.

Note: If the duct cannot be pressurized, this method is not applicable.

To blow the micro ducts into existing ducts, the following equipment is needed:

- A bundle jetting machine, such as SuperJet from Plumettaz, see Figure 7.
- A compressor with high airflow, typically 10,000 liters per minute at minimum 8 Bar of pressure. With higher pressure comes longer blowing lengths.
- A drum stand that can handle as many drums as the number of micro ducts that are to be installed.

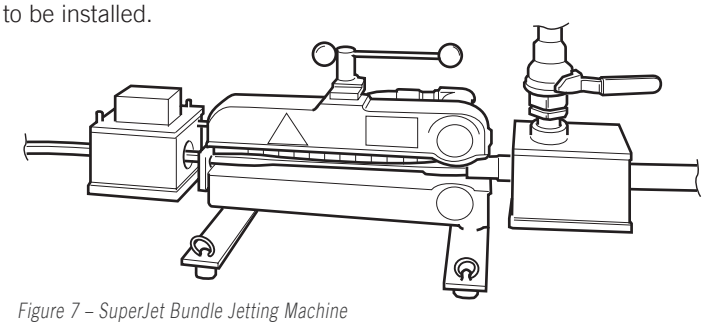


Figure 7 – SuperJet Bundle Jetting Machine

Note: In order for the micro ducts to be installed smoothly, check that the installation setup is installed in a straight line, see Figure 8.

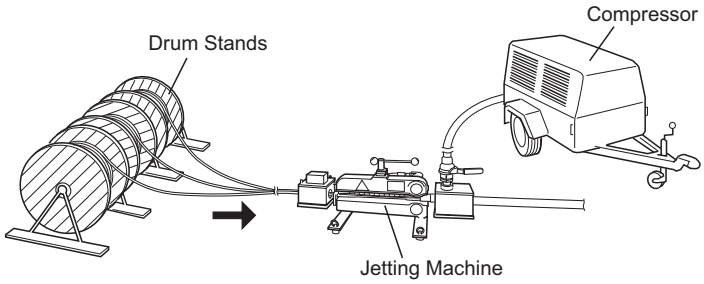


Figure 8 – Installation Setup for Blowing Micro Ducts into Existing Duct

Since the existing ducts are being pressurized, the micro ducts need to be pressurized as well. Otherwise, they will collapse. This is accomplished by blocking the inner end of the duct on the drum while adding an air valve and an end cap on each micro duct in the front end, see Figure 9. The air valve is automatic and will let air in but not out.

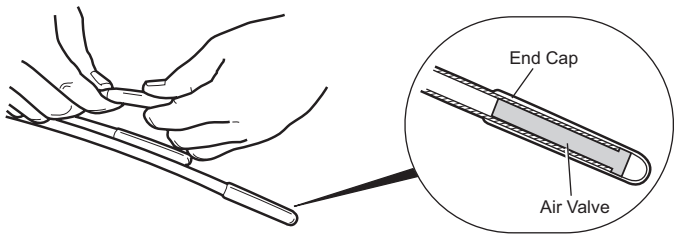


Figure 9 – Adding an Air Valve and an End Cap on Each Micro Duct

It is also of great importance that a proper communication between the members of the installation team is established. If a problem occurs it is important to reach the team members. It is also important to get a confirmation on when the cleaning sponges, lubrication sponges, and so on, have reached the other end.

5 Handling DI-Ducts

This section describes how to handle ducts and specifies the minimum duct bending radiuses.

5.1 Duct Bending Radiuses

The duct can easily get a kink or a knee. In all manholes there is a risk of damaging the duct when you handle it, bend it, or joint it. See an example of a risk situation when handling the duct in a manhole in Figure 10.

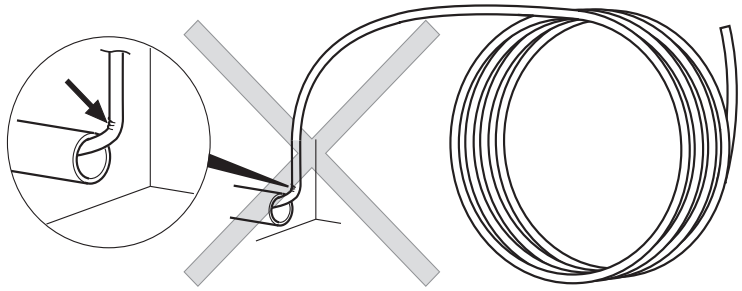


Figure 10 – Example of a Risk Situation in a Manhole

Caution!
The bends must be very smooth and the minimum bending radiuses must be respected at any time.

The minimum bending radius specified in the product data sheet defines the radius to which the duct may safely be bent during installation, and for the long term.

However, in order to reach longest possible blowing lengths, it is recommended to use a minimum bending radius according to the Table 1. As a rule of thumb, the bending radius is approximately 30 times the outer diameter of the multi duct, and approximately 25 times the outer diameter of the single duct.

Table 1 – Minimum Ducts Bending Radiuses

Duct type	10/8 mm	12/9.6 mm
1-way	400 mm	450 mm
4-way	900 mm	1100 mm
7-way	1200 mm	1300 mm

5.2 Avoiding Sharp Edges

It is also of great importance that the duct path is kept clear and smooth. Otherwise, the duct will be damaged due to a shaving effect between the outer duct and the duct that is installed, see Figure 11.

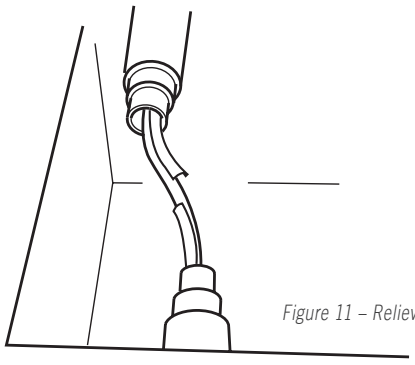


Figure 11 – Relieving Pressure at the Sharp Duct Edges

Caution!
Make sure the entrance and the exit edges of the duct are smooth and there are no sharp angles.

6 Reference List

Hexatronic Documents

[1] Personal Health and Safety Information
PERSONAL HEALTH AND SAFETY INFORMATION, 124 46-2885

[2] System Safety Information
SYSTEM SAFETY INFORMATION, 124 46-2886

[3] Duct Joint Closure NDE 451 25+
INSTALLATION INSTRUCTION, 1531-NDE 451 25+

[4] Duct Joint NDE 451 15/5; /6
INSTALLATION INSTRUCTION, 1531-NDE 451 15/5

[5] Duct Joint NDE 451 15/4
INSTALLATION INSTRUCTION, 1531-NDE 451 15/4

[6] Micronet Direct Install Duct Assembly
MICRODUCT ASSEMBLIES FOR MICRO CABLES, 28701-MPB30290