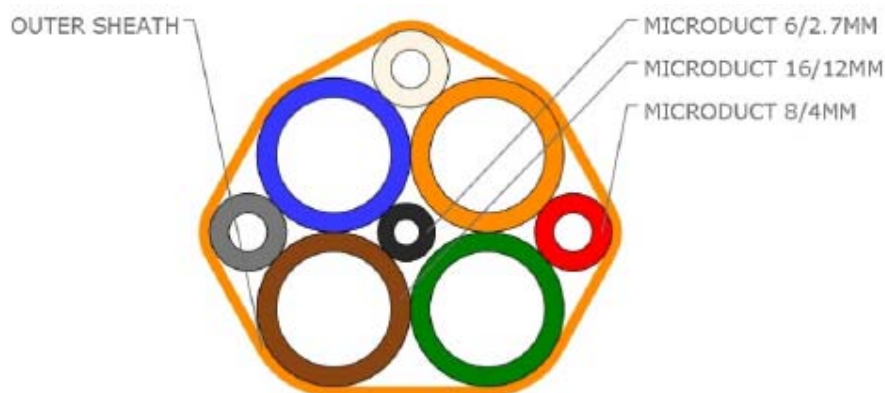


## **Emtelle Microduct Post-Installation Testing Procedure**

**(Gigaclear 16/12 mm + 8/4 mm Microduct Bundle combi & 8/4.5 mm Drop Duct)**



The bore (internal diameter) of each microduct is tested and verified as part of the Emtelle manufacturing process, and as part of a range of tests covering other performance parameters.

It must be borne in mind that changes and / or damage can, however, occur to the products not only during delivery and storage, but also during the installation process. Microducts should therefore be tested immediately after laying and reinstatement, in order to ensure that no performance parameter has been compromised, thus avoiding any possibility of expensive remedial dig & replacement.

The following three checks must be carried out in the sequence shown, on each microduct, immediately after installation, and prior to handover from civils teams to the client.

- 1. Microduct verification test.** This is a visual and airflow check to ensure that routes and connections are correct, and with connectors correctly fitted (see under "Primary Tube Installation" and elsewhere in the Emtelle Installation Guide), and with clean & dry bores. Microducts must be jointed in the correct sequence, i.e. blue to blue, orange to orange etc. Correct verification may prevent accidental injury caused by a calibrator bead or ball chain exiting the wrong (un-stoppered) microduct under pressure (see Continuity Test).
- 2. Pressure test.** This checks that there are no leaks in the route caused by poorly installed connectors, or punctures in the microduct. Leakage will not only compromise the airflow required for good blowing performance, but will, over time, also allow potentially damaging water ingress.
- 3. Continuity test.** This checks that the bore of the microduct is not restricted for any reason. Any deformation of the bore may impede fibre unit or minicable blown installation. "Continuity testing" is also referred to in various documents as "integrity testing" and "calibration". These terms are interchangeable.

**ALWAYS CARRY OUT THE 3 CHECKS IN SEQUENCE: MICRODUCT VERIFICATION, PRESSURE TESTING THEN CONTINUITY TESTING.**

## Procedures

### 1a. Microduct verification test (16/12 mm microducts).

Items required:

Air Compressor (Mini 7, Kaeser M17 / FM17...), air hose and any air coupling adaptors;  
Blowing machine (CBS Airstream with duct seal for 16 mm, and blank cable seal fitted)  
OR, in the absence of a blowing machine, use an in-line regulator / pressure gauge device e.g.  
Emtelle product code **72910** FLOW REGULATOR:



Emtelle **74319** microduct integrity tester 14mm 16mm 18mm:



Emtelle recommends that a piece of tube and connector is fitted to the end of the catcher as standard as the metal connector may be difficult to remove. Using a standard tube connector is easier to disconnect.

Emtelle product code **7063D** Cleaning Sponge 12-10mm (x10):



Emtelle product code **70036** Reducing connector 16-12 mm;  
Emtelle product code **71277** Reducing connector 12-8 mm;

Short off-cuts (stubs) of 16/12 mm and 12/8 mm microduct for connecting regulator/inflator hose to microduct under test;

Emtelle product code **70436** straight 16 mm compression connectors as necessary;

Emtelle product code **70768** thickwall microduct cutter:



**Process:**

- i. Couple compressed air via the Airstream machine or in-line flow regulator to the 16/12 microduct lead-in under test, using reducing connectors and short microduct stubs as necessary. Turn on the air lever and ask a colleague at the far end to record the number / colour of the microduct where flowing air is felt exiting, for purposes of later labelling. Switch off the air, and when flow has stopped, have the microduct at the far end cut square & rounded according to standard practice, and stoppered with the 74319 microduct integrity tester (MDIT) with 16mm adaptor fitted. Remove the lead-in microduct from the blowing machine or regulator.
- ii. If the sponge is dry, moisten with a little water then squeeze off any excess.
- iii. Push the sponge a few centimetres into the microduct lead-in using a pen, screwdriver or piece of minicable. It should be a snug fit if it has been moistened sufficiently.
- iv. Couple the lead-in microduct to the blowing machine or regulator.
- v. Switch on air (max 15 bar) and await confirmation that the sponge has hit the MDIT, usually accompanied by an impact sound and a slight jump of the MDIT. (The travel time could typically take between a few seconds and one minute depending on the length of the route).
- vi. If dirt managed to find its way into the microduct at some time, repeat the sponging until sponges emerge completely clean.

**1b. Microduct verification test (8/4 mm microducts and 8/4.5 mm universal drop ducts).**

Items required:

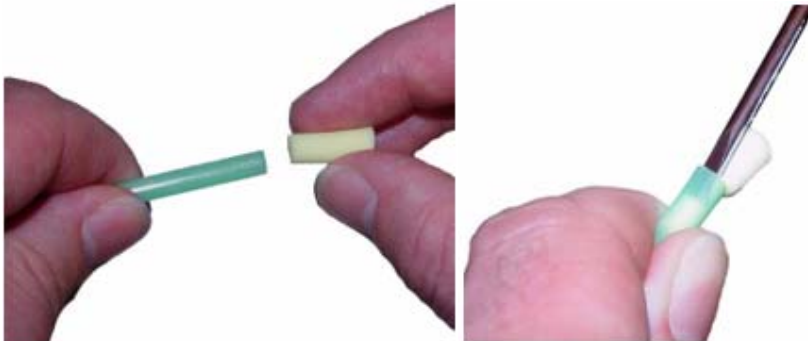
Air Compressor (Mini 7, Kaeser M17 / FM17...), air hose and any air coupling adaptors;  
Blowing machine (e.g. GS150 with duct pack for 8 mm microduct, and blank cable seal fitted) OR, in the absence of a blowing machine, use an in-line regulator / pressure gauge device e.g. Emtelle product code **72910** FLOW REGULATOR:



Emtelle product code **73230** Calibrator and catcher with 8 mm air hose attachment & 1.5 m of 8/4 mm microduct:



Emtelle product code **7063** blowing sponge 3.5 mm (x10):



Emtelle product code **70768** thickwall microduct cutter:



**Process:**

- i. Couple compressed air via the blowing machine or in-line flow regulator (using the air hose adaptor from product code 73230) to the 8 mm O/D microduct lead-in under test. Turn on the air lever and ask a colleague at the far end to record the number / colour of the microduct where flowing air is felt exiting, for purposes of later labelling. Switch off the air, and when flow has stopped, have the microduct at the far end cut square & rounded according to standard practice, and stoppered with the 73230 catcher. Remove the lead-in microduct from the blowing machine or regulator.
- ii. If the sponge is dry, moisten with a little water then squeeze off any excess.
- iii. Push the sponge a few centimetres into the microduct lead-in using a small terminal screwdriver. It should be a snug fit if it has been moistened sufficiently.
- iv. Couple the lead-in microduct to the blowing machine or regulator.
- v. Switch on air (max 15 bar) and await confirmation that the sponge has hit the catcher, usually accompanied by a slight jump of the catcher. (The travel time could typically take between a few seconds and one minute depending on the length of the route).
- vi. If dirt managed to find its way into the microduct at some time, repeat the sponging until sponges emerge completely clean.

## 2a. Microduct pressure test (16/12 mm microducts).

Items required:

Air Compressor (Mini 7, Kaeser M17 / FM17...), air hose and any air coupling adaptors;  
A microduct inflator e.g. Mills Tools product code **C00-6697**:



or in-line regulator / pressure gauge device e.g. Emtelle product code **72910**  
FLOW REGULATOR:



(The use of a blowing machine is *not* recommended for the pressure test, as even with seals in good condition, there is too much air leakage from the air block to allow for determination of microduct / connector leakage or otherwise);

Emtelle product code **70036** Reducing connector 16-12 mm;

Emtelle product code **71277** Reducing connector 12-8 mm;

Short off-cuts (stubs) of 16/12 mm and 12/8 mm microduct for connecting regulator/inflator hose to microduct under test;

Emtelle product code **71438** 16 mm end cap;

Emtelle product code **70436** straight 16 mm compression connectors as necessary;

Emtelle product code **70768** thickwall microduct cutter:



**Process:**

- i. Connect the end cap to the far end of the microduct after re-cutting square with the Entelle product code **70768** thickwall microduct cutter.
- ii. Couple the lead-in microduct to the inflator or airflow regulator.
- iii. Switch on air (max 15 bar) and inflate the microduct using the trigger on the inflator or the adjustment knob on the airflow regulator. Bear in mind that on long routes (e.g. 1 KM or more), it may take a few tens of seconds to fully inflate the microduct due to its elasticity. Just watch the gauge behaviour and keep re-inflating as necessary.
- iv. Release the trigger on the inflator or the turn off the adjustment knob on the airflow regulator.
- v. Observe the pressure gauge. The pressure test is good if the needle stays at a fixed pressure reading for 30 seconds.
- vi. Release the pressure from the microduct using the thumb-operated valve on the inflator, or the small screw at the bottom of the airflow regulator.
- vii. It is safe to remove the far-end end cap after the hissing stops and the gauge reaches zero (which is actually 1 bar (14.7 lb / sq in) ambient pressure).
- viii. NOTE: a 15 bar compressor does not have to be employed; anything which provides over 3 bar is adequate for the pressure test.



**2b. Microduct pressure test (8/4 microducts or 8/4.5 mm universal drop ducts).**

Items required:

Air Compressor (Mini 7, Kaeser M17 / FM17...), air hose and any air coupling adaptors;  
A microduct inflator e.g. Mills Tools product code **C00-6697**:



or in-line regulator / pressure gauge device e.g. Emtelle product code **72910**  
FLOW REGULATOR:



(The use of a blowing machine is *not* recommended for the pressure test, as even with seals in good condition, there is too much air leakage from the air block to allow for determination of microduct / connector leakage or otherwise);

Emtelle product code **72726** 8 mm end cap;

Emtelle product code **72725** straight 8 mm connectors as necessary;

Emtelle product code **70768** thickwall microduct cutter:





**Process:**

- i. Connect the end cap to the far end of the microduct after re-cutting square with the Entelle product code **70768** thickwall microduct cutter.
- ii. Couple the lead-in microduct to the inflator or airflow regulator.
- iii. Switch on air (max 15 bar) and inflate the microduct using the trigger on the inflator or the adjustment knob on the airflow regulator. Bear in mind that on long routes (e.g. 1 KM or more), it may take a few tens of seconds to fully inflate the microduct due to its elasticity. Just watch the gauge behaviour and keep re-inflating as necessary.
- iv. Release the trigger on the inflator or the turn off the adjustment knob on the airflow regulator.
- v. Observe the pressure gauge. The pressure test is good if the needle stays at a fixed pressure reading for ten seconds.
- vi. Release the pressure from the microduct using the thumb-operated valve on the inflator, or the small screw at the bottom of the airflow regulator.
- vii. It is safe to remove the far-end end cap after the hissing stops and the gauge reaches zero (which is actually 1 bar (14.7 lb / sq in) ambient pressure).
- viii. NOTE: a 15 bar compressor does not have to be employed; anything which provides over 3 bar is adequate for the pressure test.



Seal one end of the duct with a suitable air tight seal.



Use compressed air to increase the pressure in the micro duct



When the air is turned off the duct should hold the pressure.

### 3a. Microduct continuity test (16/12 mm microducts).

Items required:

Air Compressor (Mini 7, Kaeser M17 / FM17...), air hose and any air coupling adaptors;  
Blowing machine (CBS Airstream with duct seal for 16 mm, and blank cable seal fitted)  
OR, in the absence of a blowing machine, use an in-line regulator / pressure gauge device e.g.  
Emtelle product code **72910** FLOW REGULATOR:



Emtelle product code **74319** microduct integrity tester 14mm 16mm 18mm:



Emtelle recommends that a piece of tube and connector is fitted to the end of the catcher as standard as the metal connector may be difficult to remove. Using a standard tube connector is easier to disconnect.

Emtelle product code **70036** Reducing connector 16-12 mm;

Emtelle product code **71277** Reducing connector 12-8 mm;

Short off-cuts (stubs) of 16/12 mm and 12/8 mm microduct for connecting regulator/inflator hose to microduct under test;

Emtelle product code **70436** straight 16 mm compression connectors as necessary;

Emtelle product code **70768** thickwall microduct cutter:



Emtelle product code **71622** ball chain, 8.1 mm O/D 20 cm:



**Process:**

- i. Have the microduct at the far end cut square & rounded according to standard practice and stoppered with the 74319 microduct integrity tester (MDIT) with 16mm adaptor fitted.
- ii. Insert the ball chain into the lead-in tube at the near end.
- iii. Couple the blowing machine or in-line flow regulator to the 16/12 microduct lead-in under test, using reducing connectors and short microduct stubs as necessary.
- iv. Turn on air and ensure a colleague is watching the MDIT.
- v. There should be a loud impact sound and slight jump of the MDIT when the ball chain has arrived.
- vi. When the continuity test is concluded, switch off air and allow the microduct to de-pressurize through the airholes in the MDIT before detaching the MDIT and compressor etc.

### 3b. Microduct continuity test (8/4 microducts or 8/4.5 mm universal drop ducts).

Items required:

Air Compressor (Mini 7, Kaeser M17 / FM17...), air hose and any air coupling adaptors;

Blowing machine (e.g. GS150 with duct pack for 8 mm, and blank cable seal fitted)

OR, in the absence of a blowing machine, use an in-line regulator / pressure gauge device e.g.

Emtelle product code **72910** FLOW REGULATOR:



Emtelle product code **73230** Calibrator and catcher with 8 mm air hose attachment & 1.5 m of 8/4 mm microduct:



Emtelle product code **70768** thickwall microduct cutter:



Emtelle product code **73348** 2.65mm Calibrator - "Metal pellet":



**Process:**

- i. Have the microduct at the far end cut square & rounded according to standard practice and stoppered with the **73230** calibrator catcher.
- ii. Insert the calibrator (pellet) into the lead-in tube at the near end.
- iii. Couple the blowing machine or in-line flow regulator to the 8 mm microduct lead-in under test.
- iv. Turn on air and ensure a colleague is watching the calibrator catcher.
- v. There should be a slight jump of the catcher when the calibrator (pellet) has arrived.
- vi. When the continuity test is concluded, switch off air and allow the microduct to de-pressurize through the airholes in the catcher before detaching the catcher and compressor etc.

**Blocked microducts or universal drop ducts**

1. If the calibrator (pellet) gets stuck within the microduct, apply full air pressure (up to 15bar) from the far end of the microduct and blow the calibrator back out, following the reverse of the process above.
2. To locate the blockage, airflow permitting, blow a 2 or 12 fibre bundle into the microduct. Take a metre reading from the fibre cable at the start and finish. This will give a reasonably accurate estimate of the location of the blockage along the duct route.
3. Measure along the duct route using a surveyor measurement wheel.
4. Alternatively, airflow permitting, blow in a length of Emtelle product code **63423** TracerFi . This is a copper wire coated with Emtelle low-friction fibre unit sheath material, 1000 M standard drum. Once TracerFi has been installed to the point of blockage, it is traced using a standard cable locator. When the end of the TracerFi has been traced, this should identify the exact location of damage:



5. Carefully excavate in and around the damaged section and locate the damaged microduct.
6. Repair the micro-duct using a new length of micro-duct and two straight connectors, remove the damaged section only.

**Notes:**

**The maximum Air Pressure allowed for any operation on Emtelle microducts is 15 Bar.**

**Compressed air is hazardous. Never disconnect any part of a microduct a system under test if there is any chance or its remaining pressurised.**

*General arrangement example: Mini 7 compressor, air hose, airflow regulator, hose adaptor and lead-in microduct:*



**\* END \* PB 23.10.18**