Introduction and Background

The purpose of this procedure is to ensure that all PE water mains laid in Scotland have been constructed and laid correctly with both types of warning marker tape and detectable tape / mesh have been used, installed and checked.

Water mains and all other underground buried pipes and cables for other utilities etc should be clearly marked with a specific colour coded warning tape / mesh, designed to provide a visible warning to excavators for minimising the potential damage to the main and services below.

PE water mains and communication pipes (MDPE / HPPE & Barrier Pipes etc) cannot be located using standard cable avoidance tools.

Detectable underground warning tape / mesh must be now used on all new PE Polyethylene Water Mains laid and commissioned in Scotland to allow Scottish Water in future, full traceability of the buried water mains laid.

This warning system will provide an early warning to all staff both internal and eternally to SW and also any third parties who carry out excavations of the dangers below as mechanical excavators can easily damage utilities and cause unwanted interruption to SW customer's supplies.

Warning tape serves a dual purpose

(1) Allowing for the future location of water mains laid from above ground.

(2) Providing a visual warning to prevent third party damage to the water main below.

Both the standard warning tape and either a detectable warning tape or detectable mesh must now be installed (Standard Tape) above and (Detectable Tape / Mesh) below the new water main to avoid damage to any water mains laid and also to locate PE Polyethylene water mains for future repairs and maintenance.

Both types of Warning tape standards and detectable tape and mesh for water mains MUST be brightly coloured IE BLUE for potable water mains and have a central strip that has clear printed warning message water main below for easy recognition during excavation.

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Specification

All types of warning tape used must be manufactured and tested in compliance with **BS EN 12613:2009.Plastics warning devices for underground cables and pipelines with visual characteristics**. Underground warning mesh is manufactured to these European standards and must have been independently tested and approved.

Both types of warning tape standard and detectable tape or mesh for water mains in Scotland **MUST** be brightly coloured **BLUE** for potable water mains and have a central strip that has a clear printed warning message **(Water main below)** for easy recognition during excavation.

Standard Warning TAPE (non-detectable warning tape):

The 1st stage of identification and protection for water mains laid in Scotland shall be a buried non-detectable warning tape.

This tape shall provide an early warning to those carrying out any excavation within the vicinity of the water main. The tape shall be 150mm / 6" wide, and laid and buried approximately 100mm to 300mm above the water main.

The warning tape shall consist of multiple layers of polyethylene with an overall thickness of 3 to 5 mils. It shall be installed continuous from valve chamber to valve chamber and shall terminate just outside of valve box .The black coloured lettering on the warning tape shall be abrasion resistant and be imprinted on a colour coded BLUE background

Non Standard WARNING TAPE (detectable warning tape):

The 2nd stage of identification shall be a detectable warning tape or mesh.
This tape / mesh shall provide identification of the water main and be fully detectable from above ground.

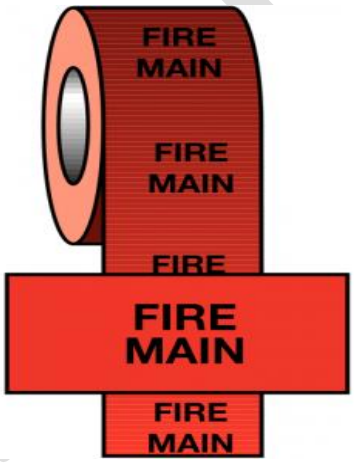
The tape shall be 150mm / 6" wide, and buried / laid approximately 100mm to 300mm above the water main. The detectable tap shall be installed directly below the water main and be permanently secured to the pipeline. The tape shall consist of aluminum foil core or stainless steel tracer wires laminated between multiple layers of polyethylene tape with an overall thickness of 4 to 6 mils. Detectable core or tracer wire "circuit" shall be continuous from valve box to valve box or manhole to manhole for complete pipeline detection and location. Tape manufacturers' approved splice kits shall be used for long runs. Warning tape shall terminate just inside of valve box cover or manhole ring cover and be easily accessible for "clip-on" type utility location meters. The black colored lettering on the warning tape shall be abrasion resistant and be imprinted on a color-coded background that conforms to APWA color code standards.

Fire Mains & Sprinkler Systems

Where blue MDPE/HDPE is used as a fire main, identification tape should be laid along with the pipe, preferably wrapped but laid between 200mm and 300mm above the main will be acceptable.

This is particularly important where a fire main and water supply main are laid in same track. Where this occurs, the fire main MUST have the warning identification tape wrapped around it rather than laid on top.

Fire mains warning tape is red and shall be wrapped around physically around the enitre length of the main.



Join the wires of rolls or cut be detected down to one metre. Please consult your locator supplier for further details of the exact depth your equipment can locate to.

JOINING : The wires are simply pulled from within the plastic tape and twisted together to maintain electrical continuity. A more secure join can be achieved by crimping the wires together.

Standard Underground Warning tape.

Underground warning tape for potable water mains in Scotland Must be coloured BLUE. The underground marker tape should be non-adhesive film that is manufactured from low density polyethylene which is resistant to most soil types including alkaline and acidic soils.

The warning marker tape must be printed with a clear message of Water Main Below or Water Pipe Below to warn of the presence of buried water main.

Underground warning tape is normally installed a specified distance directly above the main so that it provides an early visible warning to future excavators, so that any future excavators are aware of the water main below.

Once the warning tape has been found the main should only be hand excavated to minimise damage to the water main.

SW requires that the standard warning marker tape is laid at 300mm above the main.

The standard warning tape shall be a minimum width of 50mm and

SW preference is for 150mm wide warning tape with a minimum thickness 0.05mm (50um) (50µm)

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CAUTION CAUTION CAUTION
WATER PIPE BELOW

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Specifications		
Premium grade		
Length	**Width**	**Thickness**
365m	150mm	0.1mm (100µm)
Economy grade		
Length	**Width**	**Thickness**
365m	150mm	0.05mm (50µm)

Joining the mesh

It is essential that all joints in Locata are completed using joining crimps to enable a strong, corrosion resistant connection. The crimping tool has serrated jaws to ensure a good connection and prolonged security.
If the mesh wire is not connected correctly the signal may not pass from roll to roll.

1. Peel back the top tape at one end to expose the wire.

2. Insert the crimp over the wire on one of the mesh rolls.
Push the wire right through so that about 5mm protrudes from the end.

3. Insert the wire from the other mesh into the crimp.

4. Crimp the joint together using the crimping tool.

5. Check that you have a strong connection by pulling firmly on the two ends. If the wire comes out, make the connection again.

6. Locata detectable mesh can now be laid and the trench lengths using crimps. Optionally, a warning tape layer can be installed above the mesh.

Available In widths from 50mm – 300mm.

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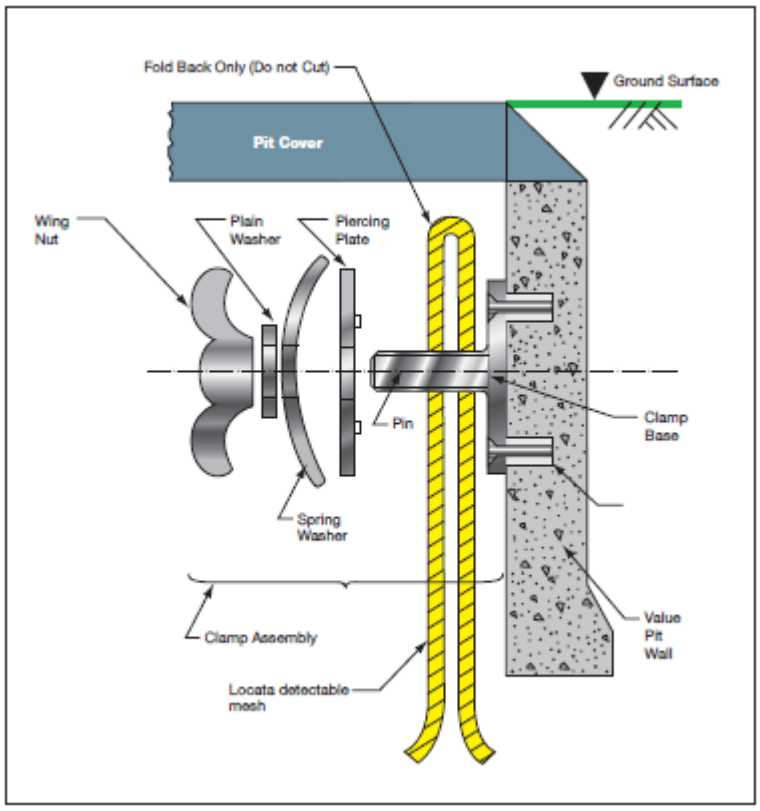


Locating detectable mesh

Locating detectable mesh

1. The Locata detectable mesh should have been earthed (grounded at the near and far ends) during installation.

2. Connect the red lead from the transmitter to Locata at an access point.
At this point disconnect the near end grounded mesh.

3. Connect the black lead from the transmitter to the ground rod.

4. Use the lowest frequency possible (eg: 577Hz or 8KHz). This will eliminate coupling to other grounded cables.

5. The far end of the mesh should be grounded, resulting in an improved return path to the earth spike and thus increasing the signal strength.

6. Ensure the ground rod is as far from the trace path as possible at a 90 degree angle.

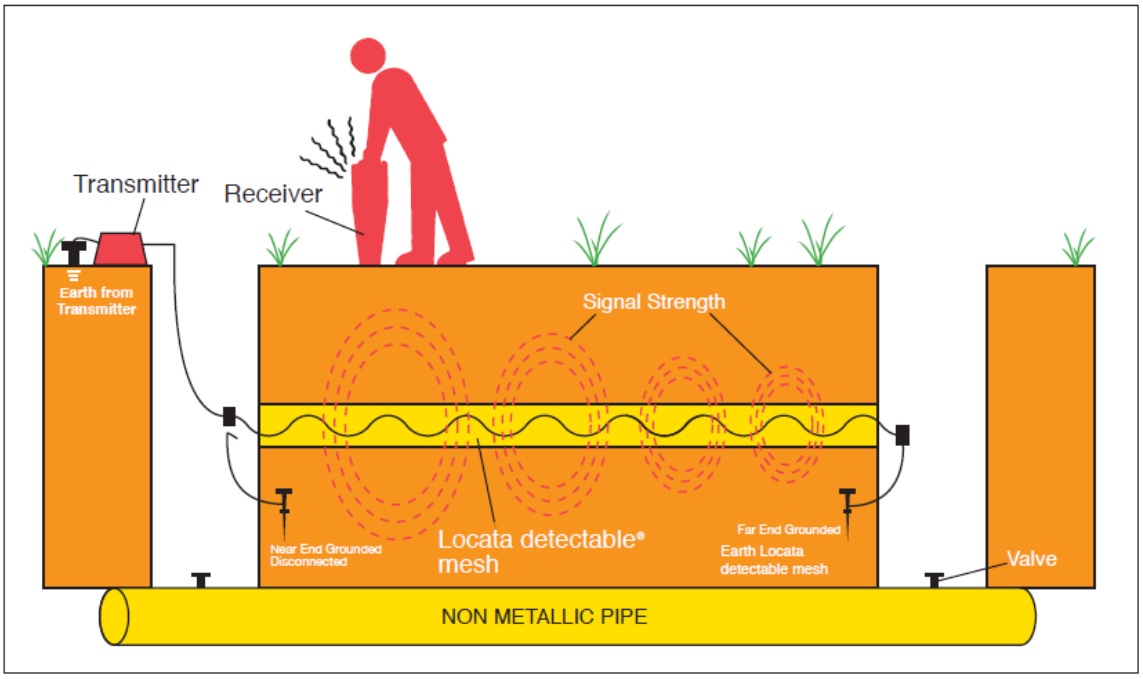
7. Use the receiver to follow the path of the mesh to locate the buried service.

8. Typical tracing range: Induced mode - 200m; Direct connected mode - 350m.

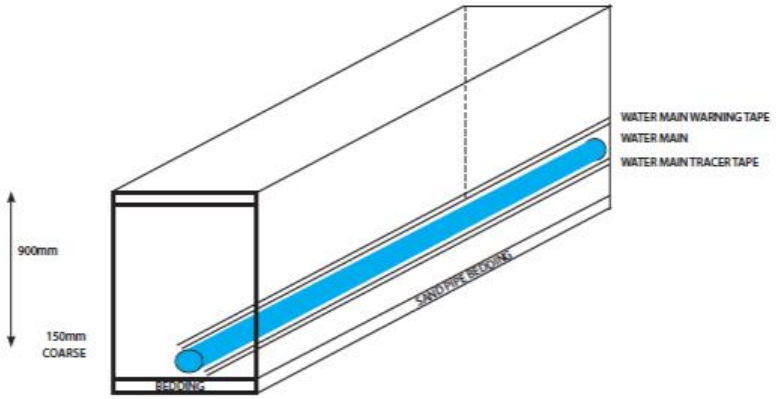
LOCATION : The tapes can be detected using even the least sophisticated pipe & cable location sets. Refer to the locator manual for precise details, but in principle, the Signal Generator needs to be connected to the wires within the tape and then Locator needs to be switched to the ‘Generator’ mode.

Testing of Tracer for continuity between beginning and end points.

- The testing for functionality will only be undertaken after confirmation from the Contractor that the installation has been completed in accordance with the installation process.
- The test will be organised by the Contractor and executed under supervision.
- Watercare Operations shall be notified of the outcome of the test.



CONSTRUCTION OF WATER MAIN



Join the wires of rolls or cut be detected down to one metre.

Please consult your locator supplier for further details of the exact depth your equipment can locate to.

Joining the mesh

It is essential that all joints that are made are completed using preferably crimps to enable a strong, corrosion resistant connection.

The crimping tool has serrated jaws to ensure a good connection and prolonged security. If the mesh wire is not connected correctly the signal may not pass from roll to roll.
Note: Joining wires by hand will lead to an incorrect jointing and loss of signal and traceability of the PE main

1. Peel back the top tape at one end to expose the wire.

2. Insert the crimp over the wire on one of the mesh rolls.

Push the wire right through so that about 5mm protrudes from the end.

3. Insert the wire from the other mesh into the crimp.

4. Crimp the joint together using the crimping tool.

5. Check that you have a strong connection by pulling connection again.

6. Locata detectable mesh can now be laid and the trench lengths using crimps. Optionally, a warning tape layer can be installed above the mesh.

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