System 300

NEWTON 302 INJECTION HOSE

Resin Injection Waterbar System

Rev 2.0 - 21 March 2019

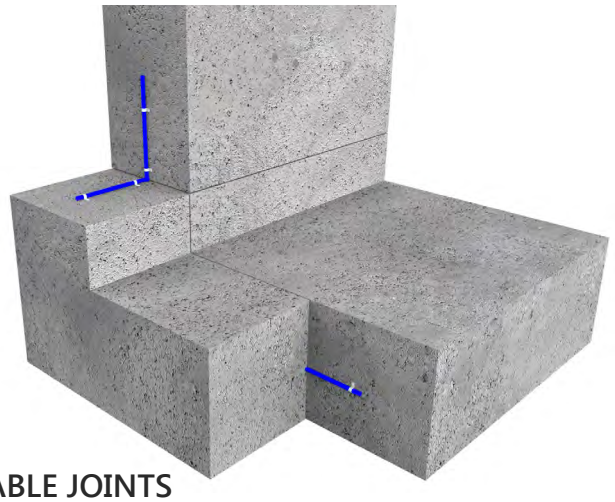
PRODUCT CODE - 302

INTRODUCTION

Newton 302 Injection Hose is a high-performance waterbar system used for the sealing of construction joints within earth retained and water retaining concrete structures. The system offers a number of benefits, especially its ability to seal the micro-cracks and capillaries to a much larger cross section through the joint than can be achieved with conventional waterbars, and where the concrete is poorly compacted, the ability to fully seal the voids that would allow water to bypass steel, uPVC or hydrophilic waterbars.

The injection hose features micro-ports equally spaced over its circumference. When the hose is pressure injected at 1-bar or higher, the microscopic ports open and the injected material penetrates deeply into the concrete surrounding the construction joint, to permanently and fully seal both the joint and any porosity within the concrete surrounding the joint. This results in a more secure and longer lasting seal of the construction joint than can be achieved with conventional waterbar systems.

Newton 302 Injection Hose improves the water-tightness of the 'Type B' watertight structure by not only sealing the joints but also by improving the quality of the concrete placement. If the concrete is correctly compacted, only the resin required to seal the joint can be injected. If more resin is required to fill the voids where the concrete should be, this focuses attention on the concrete placement and so improves the overall build quality of subsequent builds.



KEY BENEFITS

- Resistant to permanent water pressure of 2 bar
- Can be used with polyurethane and acrylic resins
- Hose is not displaced or damaged by the concrete compaction process
- No kicker or rebate required, reducing site labour costs
- The injection hose is unaffected by weather exposure and site works resulting from project delays
- Guaranteed continual flow of the injection material due to the star-shaped interior geometry, even if the hose follows sharp bends
- Quicker to install than conventional waterbars
- Seals the whole of the joint, not just the few mm around the joint and so prevents the water entering the joint and reaching the reinforcement steel
- Resistant to sewage, chlorine and sulphides
- Integrity is maintained throughout the building life and is not affected by continuous wet/dry cycles
- Can be used with or without a kicker
- Will not 'free-swell' into voids and be washed away as is the case with bentonite-based waterbars

TYPICAL APPLICATIONS

Post-construction sealing of construction joints within reinforced concrete earth retained structures.

Sealing voids and poorly compacted concrete at construction joints.

SUITABLE JOINTS

Construction joints:

- Concrete walls supported from a raft - with or without a kicker
- Within concrete walls
- Within concrete rafts or slabs
- Concrete slab to concrete or steel piled wall
- Concrete slab to brick/block wall

SUITABLE SUBSTRATE

- Reinforced concrete
- Steel piled walls - welded flange required
- Brick or concrete block walls

COLOUR

Hose - Blue

Delivery hoses - various colours

CONCRETE COVER

To provide a concrete that is water-resisting, concrete elements should be a minimum of 250 mm. The hose is placed at the centre of the joint and in all cases concrete cover should be a minimum of 100 mm.

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TECHNICAL DATA

Features	Result	Units
Material	Formulated closed-cell plastic	
Colour	Light blue	
Profile	Round with 4 x semi-circular notches	mm
External diameter	13.0	mm
Internal diameter	6.0	mm
Micro-port length	5.0	mm
Micro-port spacing	15	mm
Micro-port opening pressure	> 1	bar
Application temperature	-10 to +50	°C
Service temperature	-10 to +50	°C
Minimum required concrete cover	100	mm
Water resistance when sealed with Newton 322-SP	2	bar
Maximum installed hose length	10-12	m
Packaging - coils	120	m

SYSTEM PARTS & PACKAGING

Part	Packaged size	Purchase code	Requirement for each 10-12 m of hose
Newton 302 Injection Hose	Coils - 120 m	302	
PVC Delivery Hose - White	50 m	PVC1	5 - 10 metres of any colour*
PVC Delivery Hose - Green	50 m	PVC2	5 - 10 metres of any colour*
PVC Delivery Hose - Blue	50 m	PVC3	5 - 10 metres of any colour*
PVC Delivery Hose - Red	50 m	PVC4	5 - 10 metres of any colour*
Hose Clamps	Boxes - 100 pieces	HC2	95 -100
Injection Port	Box - 30 Pieces	SXA	1
Injection Nipple - M8 - 55 mm - Tapered-Head	Bag - 100 pieces	PN2	2 per Injection Port**
Injection Nipple - M8 - 55 mm - Flat-Head	Bag - 100 pieces	PN3	2 per Injection Port**
Hose Connector	Bag - 100 pieces	HC1	4
25 mm Heat-Shrink - Blue	1.0 m	HS25	0.1 metres

*5-10 metres in total. One, or a number of combinations of colours can be used. **2 per Inspection Port in total. Either Tapered or Flat Head Nipples can be used.

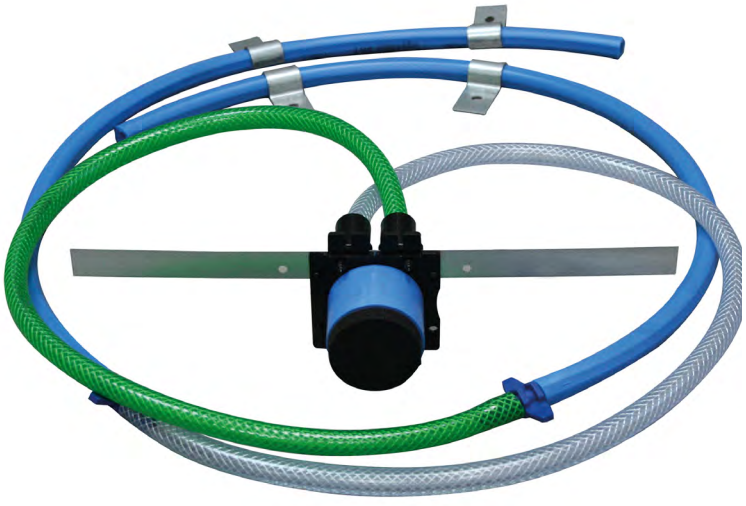
ORDERING GUIDE

Each 10-12 metres of hose requires:

- 95-100 Hose Clamps
- 5-10 metres of PVC Delivery Hose (any colour)
- 1 x Injection Port
- 2 x Injection Nipples (either Tapered or Flat Head)
- 4 x Hose Connectors
- 0.1 metres of 25 mm Heat Shrink

Each 120 metre reel of hose requires:

- 10-12 boxes of Hose Clamps
- 1-2 reels of PVC Delivery Hose (any colour)
- 10-12 x Injection Ports
- 20-24 x Injection Nipples (either Tapered or Flat Head)
- 40-48 x Hose Connectors
- 1 x reel of 25 mm Heat Shrink



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PERFORMANCE CHARACTERISTICS

The quality of the concrete at the joints will effect the ability of all waterbars. If the concrete is not as dense or as well compacted as it should be, the concrete surrounding the joint may include connected pathways that allow for water to pass through the wall. Sealing the joint by injecting resin into the Newton 302 Injection Hose ensures that the joint is full sealed by filling the capillaries, voids and pathways that conventional waterbars cannot seal.

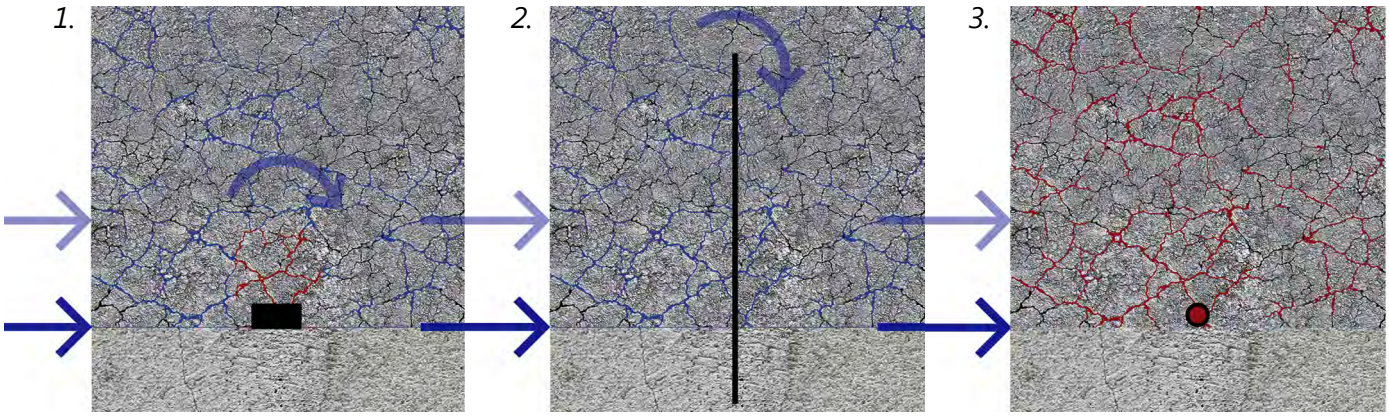

Fig 1. Hydrophilic waterbars are only able to swell and fill to a few millimetres around the joint. Any porosity allows water to bypass the waterbar and seep into the building.

Fig 2. Physical waterstops rely on coatings to promote grip to the concrete, or on complex shapes, to create a tortuous path for water. If the concrete includes any porosity, water will easily bypass the waterstop and enter the building.

Fig 3. Resins injected under high pressure into the Newton 302 Injection Hose will seal capillaries,voids and all water pathways to a large area surrounding the joint and surrounding concrete. Water is fully excluded, so cannot pass into the first half of the joint, to be in contact with the reinforcing steel, as is the case with conventional waterbars and waterstops.

SPECIALIST TOOLS REQUIRED

No specialist tools are required. A nail-gun can be used to quickly fix the hose.

METHOD OF INSTALLATION

Newton 302 Injection Hose is mechanically fixed with Hose Clamps to the in-place element, ready for concrete placement of the second element of the joint.

Injection Ports are fixed to the steel reinforcement bars, and are visible and accessible after the formwork has been removed.

Coloured PVC Delivery Hoses connect the Injection Ports to the Newton 302 Injection Hose to deliver the injected resin to the appropriate joint after the concrete has cured for a minimum of 28 days.

SPECIFICATION

Newton Waterproofing Systems are in partnership with RIBA NBS who publish details of our products and systems within their specification clause library to allow Architects ease of specification through their NBS Plus interface. NBS clauses can be accessed via the technical resources area of the web site where a live NBS Feed is available at NBS Plus Live Feed

Our website has a wide choice of downloadable Technical Drawings, and a large selection are also available either via FastrackCAD, or as BIM objects on the National BIM Library and/or BIMobject.com

TRAINING & COMPETENCY OF USER

The installation of Newton 302 Injection Hose and the injection of the resin should only be carried out by trained contractors, who have an understanding of the requirement to waterproof retained structures and the knowledge and training to use the product as part of a coordinated approach to the waterproofing of the structure. In many cases this will require further waterproofing products in order to achieve the required habitable grade as defined by BS 8102:2009.

LIFE EXPECTANCY

Undamaged Newton 302 Injection Hose, and the resin injected into the system, if specified and installed in accordance with the product data sheets, and only to those substrates confirmed within, have a service life that can be equal to the design life of the structure.

CONSTRUCTION

BS 8102:2009, Section 9.1 recommends that structures that are designed to be water excluding (Type B) should be designed in accordance with the relevant parts of BS EN 1992 or BS 1993 respectfully (formerly BS 8110 and BS 8007).

Concrete joint surfaces should have a surface finish that is uniform, dense and smooth.

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WATERPROOF CONCRETE

To be water excluding, the structural engineer will design the concrete to the relevant standards to ensure that crack widths are controlled, density is enhanced and porosity is reduced. A water resisting concrete design will include:

Reinforcement steel & designed concrete placement size
Crack widths within reinforced concrete are restricted by the size and fixing centres of the steel, together with the bay size and section thickness of the concrete. Crack widths are commonly restricted to 0.3 or 0.2 mm with concrete restricted to 0.2 mm crack width, as required by the NHBC for Type B water excluding structures.

Low water/cement ratio
Water that is not used by the hydration process will evaporate from the concrete, leaving behind small air spaces (capillaries). If too many of these capillaries exist, they can connect to form pathways for water. Reducing the amount of water in the concrete mix will ensure that the concrete is dense and with fewer capillaries and pathways, but simply lowering the water/cement ratio will result in a concrete that is too dry and unworkable.

To ensure the concrete is plastic enough to be workable, even with a low water/cement ratio, Plasticisers or Super Plasticisers are added to the concrete mix. This ensures a workable yet dense concrete with less capillaries and pathways to ensure that the concrete is water resisting.

Pozzolans
Pozzolans is a broad term for materials that are either naturally occurring, such as from volcanic materials, or man-made, such as fly-ash, a by-product of burning carbon based materials in power plants. As well as reducing the volume of cement by up to 40%, their use also reduces the water ratio of the concrete. Pozzolans react with the calcium hydroxide within hydrated concrete to form calcium silicate hydrate compounds that fill and plug any remaining capillary voids to form a denser, stronger concrete that has no pathways, resulting in a fully waterproof concrete.

Correctly designed concrete is waterproof by design. Additional 'waterproofing admixtures' are not required and are not mentioned as being required within BS 8102:2009, NHBC Chapter 5.4 and the Concrete Centre Concrete Design Guide on the Design of Liquid Retaining Structures. The only 'admixtures' that the concrete needs are already in the concrete.

CONCRETE THICKNESS

It is conventional wisdom that where the structure is designed to be water excluding or water retaining, a minimum section of 250 mm is required. BS 8102:2009 does not give a specific recommendations on this, but does reference that the concrete elements of a structure that is designed to be water excluding (Type B) should be designed in accordance with the relevant parts of BS EN 1992 or BS 1993 respectfully.

NHBC Chapter 5.4 recommends minimum concrete section 250 mm, as does the Concrete Centre paper on the design of water retaining structures.

PREPARATION

The substrate that the injection hose is to be fixed to should be uniform and free of dirt and debris. Surface irregularities should be taken out and surface damage, cracks, holes and depressions should be made good with a suitable repair product such as Newton 203-RM.

Concrete surfaces should be jet blasted to remove surface laitance and to expose the coarse aggregate in order to provide aggregate interlock as outlined in relevant standards/codes of practice.

Forming of rebates/chases is not required.

INSTALLATION - HOSE

The Injection Hose is simply fixed to one side of the construction joint prior to the pouring of the next placement of concrete and is positioned at the middle of the joint within the reinforcing steel but with a minimum distance of 100 mm to the outer edge of the joint.

It is recommended that each joint has a separate injection hose so that a leaking joint can be injected in isolation from the other joints.

The hose is fixed to the surface of the joint with Hose Clamps at between 100 mm and 150 mm centres. It is recommended that a nail-gun is used to fix the Hose Clamps.

The maximum run of hose to each Injection Port is between 10 m and 12 m.

Where hose ends overlap, the overlap must be parallel and of 150 mm with a 30-50 mm gap between the two parallel ends. Ensure that all of the injection hose is fixed to the whole of the joint.

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INSTALLATION - INJECTION PORT

The Inspection Port includes a flexible rubber plate that protects the two injection points from being filled by the liquid concrete. The Injection Port is designed to be placed hard to the inner face of the formwork so that when the formwork is removed, the position of the Inspection Port can easily be identified by a dark circle to the concrete surface.

The Injection Port is either nailed to the formwork, secured to the reinforcement steel with a metal strip or anchored with a mounting to the raft, ensuring that the rubber place will make hard contact with the inner face of the formwork.

One Inspection Port can either be split to form 2 injection points or multiple Inspection Ports can be clipped together in various ways to create different combinations. All combinations of installation set-ups are possible.

Use the PVC Delivery Hose to make connections between the Injection Hose and the Injection Ports using Hose Connections. Use Heat Shrink over the joints to ensure that they are not dislodged or damaged during concrete compaction.

INJECTION RESINS

Newton 302 Injection Hose can be injected with the following injection resins:

Newton 322-SP is a two-part, low-viscosity, MDI-based PU injection resin that has a very slow reaction time, making it ideal for injection into injection hoses.

The hose can only be injected once.

Newton 322-SP requires a standard two-component pump.

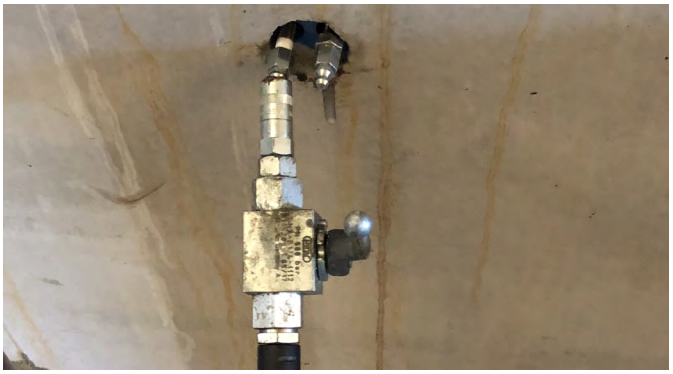
Newton 323-SA is a four-part, acrylic injection resin which has an extremely low viscosity and a slow and controllable linear reaction time.

The hose can be flushed with water after injection and re-injected if needed.

Newton 323-SA requires a stainless steel, two-component pump.

INJECTION PROCESS

The injection of the resins should be by trained contractors only. The following is for information only and is not designed to be an installation manual to be followed by those who have not been trained by Newton Waterproofing in the correct injection of the Newton injection resins.



The trained contractor will identify the correct resin and apply in accordance with the application procedures of the chosen resin.

1. Check the continuation of the hose by flushing with water or by pressurising with air
2. The injection pump is connected to the Injection Ports and the hose is injected until traces of the injected material are discharged from the open end. This end is closed by means of an Injection Nipple as soon as the injected material flows freely (without air pockets)
3. The flow and extent of the injection material in the concrete joints can be monitored during the injection process by means of the injection pump's pressure gauge
4. The injection process is continued until constant pressure has been reached
5. Constant pressure indicates that the concrete joint is taking no more material thus signalling the end of the process
6. If injected with Newton 322-SA, any injection material still within the injection hose can be flushed out by means of a water pump. Hardly any pressure is required. On completion of the flushing process, the injection hose is ready for further injection

With correctly designed and well compacted concrete, a typical construction joint of 250 mm section will receive approximately 0.25 litres of resin per linear metre of hose.

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CLEANING

Clean the pump and equipment as directed by the data sheet of the resin used.

STORAGE

Store the hose and ancillaries in dry conditions, not in contact with sunlight and protected by mechanical damage.

If these conditions are maintained the product has a shelf life of 5 years.

HEALTH & SAFETY

Product should only be used as directed within this data sheet.

Use PPE when fixing the hose and ancillaries.

Carefully read the Data Sheet and SDS of the injection resin before use.

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