

Trackside Drainage Channels

Supplied by Lineworx Limited







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Abbreviations

- Lineworx Lineworx Limited
- LU London Underground Limited
- SPCM SPCM Ltd Structural Coatings and Maintenance Ltd
- Drainage Concrete Perforated Drainage Channels
- APR Approved Products Register
- CDS Conceptual Design Statement
- DCC Design Check Certificate
- PO Purchase Order
- POD Proof of Delivery
- CoC Certificate of Conformity



Introduction

The 150, 300 & 600 Series Perforated Drainage Channels are available in three sizes: 150mm internal width, 300mm internal width & 600mm internal width. Each of these has three major components: a Base Unit, an Intermediate Unit, and a Cover Unit. There are also Half Riser Units and a Tapered Riser Units available too. All components are 750mm in length and are made of precast concrete with 10mm perforations.

Purpose

The removal of surface and sub-surface water from areas along the length of track. This is achieved by collecting water along the entire length and depth of the drainage channel through built in perforations and slots.

History

The 150 Series Perforated Drainage Channel was developed for London Underground in 2012 by SPCM Ltd with the 300 Series being introduced in 2014. SPCM Ltd changed its name to Lineworx Limited in 2016 and are the only owner of this product. Anderton Concrete Products are the sole licenced manufacturer of this product in the UK market. The 600 Series was developed by Lineworx in 2019 to extend the range and to offer more capacity. In 2022, Scott Parnell became our supply partner and are our only UK distributer.

Benefits

- No requirement for catchpits.
- Easier to inspect and maintain over perforated pipe.
- Modular system allowing versatility.
- Strong and robust.
- 60-year design life.
- Lightweight system.
- Narrow can be installed in areas of restricted width.
- Efficient at intercepting water.
- Ease of installation compared to other similar products.



No requirement for catchpits.

Typically, in the UK Rail network, there is a need to introduce a catchpit every 30 metres along a drainage pipe run. This is to mitigate the risk of blockage. If a pipe does get blocked, water can undermine the integrity of the track. With the Lineworx drainage system, it is possible to tell if and where a blockage has occurred because the drainage channels are visible, allowing you to rectify the issue by simply lifting a cover and remove debris. We supply GRP covers the same specification as ones used on catchpits to make maintenance even easier. It is also possible to design a dropped base unit, to act as a sump or catchpit, every 30 metres along a run, if necessary, in areas prone to high amounts silt.

Easier to inspect and maintain over perforated pipe.

As the entire run is visible, there is no guessing where a drainage run is or whether it is blocked. You can clearly see where a run is and where it goes. You can check anywhere along the drainage run to see how the water is running and whether there are any issues. Lineworx drainage channels, by there nature, aren't subject to the issues that perforated pipe has with blockages and becoming fractured or joints being popped.

Modular system allowing versatility.

With 3 different sizes, and 5 parts for each size. This versatile drainage system allows you to mix and match to whatever capacity is required as well as help overcome onsite challenges with space and ground conditions. There are parts that allow you to go as deep as you want. There are parts that allow you to change for different depths/capacities along one run. You can put multiple sizes next to each other. We also offer bespoke parts if required as well as transitions to pipe.

Strong and robust.

Made from C40 concrete, with 10mm aggregate. The system is strong and robust. An internal re-bar cage gives even more strength. All parts pass the specification for all networks associated with the UK Rail industry.

60-year design life.

Some UK Rail networks only require a 50-year design life, but we achieve 60-years with our current manufacturing and QA process. If a different design life is required, we are able to look at the ingredients of the mix of concrete to see if this can be achieved.



Lightweight system.

With most parts weighing less than 50kgs there isn't a need to have large plant on site to lift the drainage into place. We do offer specialised lifting grabs if you do choose to have plant on site.

Narrow - can be installed in areas of restricted width.

With the area along the track being typically so congested, the Lineworx drainage system allows you to achieve the drainage capacity you need, by going deeper, but remaining as little as 250mm wide.

Efficient at intercepting water.

With perforations along the entire length and on both side walls, on all parts, of the drainage channels as well as slots in the cover, this system is very efficient as collecting water. The system can also be specified without perforations and slots so it can be used as a main drainage carrying system if required.

Ease of installation compared to other similar products.

With its lightweight nature and simple stacking method the method of installation is relatively simple. For further details see pages 10-14.



Design and Performance

Cover Unit Tapered Riser Unit Half Riser Unit Intermediate Unit Base Unit

Material Specification

Material – Precast concrete Strength – C40 with 10mm aggregate



Surface Finish

Due to the manufacturing processes and the efficiency required to deliver this product at the best price, the Base Units, Intermediate Units and Cover Units are dry cast. Dry cast products tend to have a look that is less smooth than a wet cast product. Due to the shape of the Half Riser Units and Tapered Riser Units – these are manufactured using the wet cast method and therefore have a smoother look than the rest of the parts. All precautions are taken during the manufacturing process to achieve as smooth and cosmetically pleasing surface as possible.

Dimensions, Weights & Tolerances

Please refer to the drawings and table below for all dimensions and weights. Every precaution throughout our manufacturing process has been taken to provide all parts to the exact dimensions and weight as on the drawings. However, due to the nature of the material and the manufacturing process weights and tolerances may vary. These products are made to BS EN 13369.

150 Series Drainage (Length 750mm + 10mm Perforations)						
Product	Height (mm)	Ext. Width (mm)	Int. Width (mm)	Weight (kg)		
Base	220	252	150	49		
Intermediate	150	250	150	30		
Cover	44	255	N/A	22		
Half Riser	75	254	150	15		
Tapered Riser	N/A	250	150	22		
	300 Series Drainage	(Length 750mm + 10	Omm Perforations)			
Product	Height (mm)	Ext. Width (mm)	Int. Width (mm)	Weight (kg)		
Base	175	400	300	52		
Intermediate	150	395	300	33		
Cover	44	402	N/A	38		
Half Riser	75	395	300	16		
Tapered Riser	N/A	395	300	24		
600 Series Drainage (Length 750mm + 10mm Perforations)						
Product	Height (mm)	Ext. Width (mm)	Int. Width (mm)	Weight (kg)		
Base	175	700	600	74.5		
Intermediate	150	695	600	41		
Cover	44	702	600	70		
Half Riser	75	695	600	18		
Tapered Riser	N/A	695	600	29		



Water Ingress and Perforations

				Size of perforations		Total Area of		
Part	Part No	Length (mm)	Height or Width (mm)	Surface Area (m2)	No of perforations per unit	mm x mm	mm2	perforations per unit (mm2)
150 Series Base Unit	DCB 150		220	0.33	28	10	78.5	2198
150 Series Intermediate Unit	DCI 150		150	0.23	16	10	78.5	1256
150 Series Cover Unit	DCC 150	750	250	0.19	7	90 x 10	900	6300
150 Series Half Riser	DCR 150		75	0.11	16	10	78.5	1256
150 Series Tapered Riser	DCT 150		75-150	0.17	16	10	78.5	1256
300 Base Unit	DCB 300		175	0.26	28	10	78.5	2198
300 Intermediate Unit	DCI 300		150	0.23	16	10	78.5	1256
300 Cover Unit	DCC 300	750	400	0.30	7	90 x 12.5	1125	7875
300 Series Half Riser	DCR 300		75	0.11	16	10	78.5	1256
300 Series Tapered Riser	DCT 300		75-150	0.17	16	10	78.5	1256
	1	r			1	r		F
600 Base Unit	DCB 600		175	0.26	28	10	78.5	2198
600 Intermediate Unit	DCI 300		150	0.23	16	10	78.5	1256
600 Cover Unit	DCC 600	750	700	1.05	7	90 x 12.5	1125	7875
600 Series Half Riser	DCR 600		75	0.11	16	10	78.5	1256
600 Series Tapered Riser	DCT 600		75-150	0.17	16	10	78.5	1256

Please note that the surface area is calculated for both sides of each unit and the top surface of the cover unit.



Volume

Part	Part No	Length (mm)	Internal Height (mm)	Internal Width (mm)	Total Volume (mm3)
150 Series Base Unit	DCB 150		220	150	24750
150 Series Intermediate Unit	DCI 150		150	150	16875
150 Series Cover Unit	DCC 150	750	N/A	N/A	N/A
150 Series Half Riser	DCR 150		75	450	8438
150 Series Tapered Riser	DCT 150		75-150	150	12713
300 Base Unit	DCB 300		175	200	39375
300 Intermediate Unit	DCI 300	750	150	300	33750
300 Cover Unit	DCC 300		N/A	N/A	N/A
300 Series Half Riser	DCR 300		75	200	18875
300 Series Tapered Riser	DCT 300		75-150	300	25425
600 Base Unit	DCB 600		175	600	78750
600 Intermediate Unit	DCI 300		150	000	67500
600 Cover Unit	DCC 600	750	N/A	N/A	N/A
600 Series Half Riser	DCR 600		75	600	33750
600 Series Tapered Riser	DCT 600		75-150	000	50850



Quality Assurance

Our current QA procedure is available on request from Lineworx. Our QA procedures are constantly being updated with the introduction of new manufacturing processes and procedures.

Design Documentation

All design documentation is available on request from Lineworx including London Underground CDS and a Design Check Certificate (DCC). This information is also available from the LU APR.

Installation Methodology (guidance only)

The exact method to which the drainage channels are installed is entirely down to the design done by the project designers. This documentation is purely guidance on what has been typically designed and installed in the past. The 150, 300 and 600 Series perforated drainage channels are designed for linear, sub-surface runs trackside drainage.

Typically, a trench is dug along the length of the proposed drainage run. A geotextile membrane is then laid into the trench. 100mm of Type 1 aggregate or pea shingle is laid in the bottom of the trench. A run of base units is laid in line to the correct invert level.

If intermediate units are being used these should be offset halfway to the base units to provide stability throughout the installation. If installing multiple levels of intermediate units, these should be laid directly on top of each other to allow for the largest possible aperture for maintenance purposes. Cover units can then be laid on top of the intermediate units at ground level along the length of the drainage run.

If intermediate units are to be stacked directly on top of base units in line, then special care should be taken when backfilling to not misalign the run.

It is essential that each unit, regardless of what unit, is installed with all edges and corners exactly in line and touching with the adjacent unit whether it is above, below, or adjacent.

Due to the nature of the product and the material used to make it and the allowed tolerances set out in standards BS 13369, slight size differences can occur from one unit to another. All due care should be taken to keep the drainage run in line throughout its entire depth. All joints should be butted up to each other tightly. A maximum of 10mm gap in some places (as few as possible) is acceptable as this is the size of the perforations as water will hydrostatically run in and out of the drainage along its length and depth.

Any discrepancy in height along the way should be overcome using 316 stainless steel shims between the intermediate units. These are available from Lineworx along with more details.



Any back filling during the process should carried out equally from both sides and be done with care as not to take the units and run out of position. Pegs may be utilised to keep the base units in line with each other. If the installation process is not followed it will have a direct negative result on the look and the performance of the drainage run. The top of the cover units is designed to go level with ground level. Please see diagrams below.

All necessary care should be taken to not damage any of the drainage units during the installation process and moving them around site. All damaged parts should be replaced. Please note that all parts of the drainage channel system are not to be cut as this will expose or reduce the coverage over the re-bar cage and will drastically reduce the service life.

All care should be taken to lift the drainage parts in to position using the correct technique identified in the on-site documentation.

Specialised scissor grabs are available to hire from Lineworx along with a current LOLER certificate.







Halfway Offset Installation Method – 150 Series

Halfway Offset Installation Method – 300 Series





Straight Stacking Installation Method – 150 Series



Straight Stacking Installation Method – 300 Series





Specialised Scissor Grabs





Accessories

Bespoke 316 stainless steel parts are available to transition from channel to pipe or blank off an end of run. Lineworx will need site drawings and the internal measurement of the pipe being used for us to make the correct part.



Example of 150 Series Pipe Adaptor



Example of a 300 Series Blanking Plate



GRP Covers

GRP Covers are available in the same profile as the concrete covers in the same specification as ones used on catchpits.







Drawings

- 1. 150 Series Drainage Channel
- 2. 150 Series Base Unit
- 3. 150 Series Intermediate Unit
- 4. 150 Series Cover Unit
- 5. 150 Series Half Riser Unit
- 6. 150 Series Tapered Riser Unit
- 7. 150 Series Drainage Channel to Pipe Outlet
- 8. 150 Series Stainless Steel Blanking End
- 9. 300 Series Drainage Channel
- 10. 300 Series Base Unit
- 11. 300 Series Intermediate Unit
- 12. 300 Series Cover Unit
- 13. 300 Series Half Riser Unit
- 14. 300 Series Tapered Riser Unit
- 15. 300 Series Stainless Steel Channel Outlet
- 16. 300 Series Stainless Steel Blanking End
- 17. 600 Series Drainage Channel
- 18. 600 Series Base Unit
- 19. 600 Series Intermediate Unit
- 20. 600 Series Cover Unit
- 21. 600 Series Half Riser Unit
- 22. 600 Series Tapered Riser Unit

The drawings in this document are for representation purposes only. Please do not use them for specific information. Drawings are available on request.















































Drainage Weights and Pallet Detail

Part	Part No	Part Weight (kgs)	Pallet Quantity	Pallet Weight (kgs)
150 Series Base Unit	DCB 150	48.6	20	972
150 Series Intermediate Unit	DCI 150	29.9	20	598
150 Series Cover Unit	DCC 150	22.1	48	1060.8
150 Series Half Riser	DCR 150	14.8	48	710.4
150 Series Tapered Riser	DCT 150	22.1	20	442
300 Series Base Unit	DCB 300	51.7	18	930.6
300 Series Intermediate Unit	DCI 300	32.9	18	592.2
300 Series Cover Unit	DCC 300	38.1	36	1371.6
300 Series Half Riser	DCR 300	15.6	36	561.6
300 Series Tapered Riser	DCT 300	24.1	18	433.8
600 Series Base Unit	DCB 600	74.5	12	894
600 Series Intermediate Unit	DCI 300	40.6	12	487.2
600 Series Cover Unit	DCC 600	70.1	24	1682.4
600 Series Half Riser	DCR 600	18.2	24	436.8
600 Series Tapered Riser	DCT 600	29.1	12	349.2



Maintenance

The 150, 300 & 600 Series drainage are designed to remove surface and sub-surface water throughout its service life. For the best performance, it is recommended that the drainage channel is kept clear of debris and silt build up. Access to do this can be achieved by removing the cover units. There is not a requirement for any other process, other than that already mentioned, to keep the drainage serviceable for the duration of its life. Hydrophobic coatings, for added protection, can be applied if necessary and may extend the service life but may directly affect the performance of the drainage speed. It is recommended that Lineworx is consulted if any additional coatings or maintenance regimes, other than those that are stated, are to be used. If damage occurs during the service life of the drainage channels, please replace the damaged parts or consult Lineworx regarding a suitable method of repair.

Service Life

60 years.

Trouble Shooting

Albeit every effort will always be taken by Lineworx Limited to deliver goods in the correct size, weight, appearance, and condition, circumstances occur that prevent this from happening. It is recommended that goods are checked on delivery and PODs, delivery notes etc. are only signed with your complete satisfaction. If you, the client, are not completely satisfied with your goods then Lineworx Limited needs to be notified immediately and will not accept responsibility if the end user is dissatisfied with the finished product if notification does not occur.

Ordering & Documentation

All orders are to be placed with Scott Parnell. Lineworx can be consulted throughout the process for technical and site support.

Stock and Lead Times

Lineworx usually holds a good amount of stock in the 300 Series Base, Intermediate and Cover units and less stock of the 150 Series parts. The 600 Series drainage parts are currently being made to order. A few of the special parts are kept in stock. If items, you require are in stock we can normally deliver within 72 hrs notice. If parts are not in stock, then we can normally deliver within 2 – 3 weeks from receiving your PO. Please allow extra time during holiday periods especially Christmas, Easter and the summer period between mid-July and the start of September. Lead times will be supplied at the quotation stage.



Deliveries

Deliveries are typically made with either curtain side or flatbed lorries to roadside locations. The goods will be stacked on pallets appropriate to their size and weight and be wrapped accordingly. It is the client's responsibility to provide the appropriate lifting equipment for the unloading of the goods at the stated delivery address. Most special requirements can be catered for with as much notice as possible. We require you to fill in a delivery questionnaire at the point of quotation to allow us to deliver right first time.





Health and Safety Information

PRODUCT HEALTH & SAFETY DATA SHEET (C.O.S.H.H.)

1. Identification of Products

Precast Concrete Cable products, typically fence posts, gravel boards, copings, caps, walling and cable troughing and associated products.

Company:

Lineworx limited Unit 39, Hobbs Industrial Estate, Newchapel, Lingfield, Surrey, RH7 6HN

Tel: 01342 891387

2. Application

Precast concrete products are manufactured for the construction of structures, walls, and fenced areas in accordance with any relevant standards and local codes of practice.

3. Composition

Concrete products are manufactured by compacting a mixture of aggregates, cement and water into a mould to produce the required shape and strength. Some products may contain steel reinforcing. Admixtures may be added to improve production techniques or the properties of the finished product. Pigments may be added to colour the product as required.

4. Hazard Identification

- Hardened concrete products are inert and inherently non-hazardous to health.
- Cutting and surface treatment can create dust and flying fragments. The dust generated could contain particles of respirable size which may contain silica.
- Such dust, if inhaled in excessive quantities over extended periods can constitute a long-term health hazard.
- Edges and surfaces may be sharp and can cause cuts and abrasions. Surface dust could cause minor skin irritations. Industrial gloves should be worn when handling. (Refer to Section 9 – Exposure controls/Personal protection.)
- Concrete products are generally heavy (dependant on size and density). Incorrect lifting procedures can result in injury.
- Removal of steel/plastic strapping may spring away from the pack when cut with consequent risk of injury to head, face, hands etc.
- Improper handling of packs of Precast concrete products may result in products falling from the pack with consequent risk of injury.



5. First Aid Measures

• <u>Airborne dust:</u>

Inhalation - Removal from exposure to fresh air

Skin contact - Wash thoroughly with clean water

Eye contact - Irrigate immediately with copious amounts of clean water and seek medical attention.

Ingestion - Remove from exposure to fresh air. Wash out mouth and drink plenty of water. DO NOT INDUCE VOMITING! Seek medical attention if large amounts are swallowed.

• Cuts, abrasions, etc.:

Accidents where products strike or crush parts of the body should be treated using normal First Aid procedures.

In all cases of doubt, or where symptoms persist, medical advice should be obtained.

6. Fire Fighting Measures

Precast concrete products will not support combustion.

Burning of polythene wrapping is accompanied by the release of flaming molten droplets which can spread a fire. Packaging material may be extinguished by cooling with water spray, provided the fire is limited to the packaging materials (wooden pallets/bearers, plastic wrapping/strapping).

7. Accidental Release Measures

• Personal protection:

Where dust is created, avoid breathing in the dust. Wear dust ask/respirator and goggles as specified in Section 9 –Exposure controls/Personal protection.

• Environmental measures:

The release of dust into the atmosphere does not constitute a significant hazard. Waste material should be disposed of in accordance with local authority requirements.

8. Handling & Storage

When dust may be created:

Surface treatment and cutting should be minimised to avoid creation of airborne dust.

When this is not avoidable, engineering controls such as containment or local exhaust ventilation should be applied when airborne exposure levels are approached.



Products as delivered:

- i) Precast concrete product packs are either banded with strapping or covered with a shrink-wrapped polythene hood, or a combination of the two. Products are usually packaged on wooden pallets or bearers.
- ii) Packaging is only designed to allow safe delivery of the products to the site. If packs are to be moved on site, care must be taken to ensure the integrity of the pack prior to and during moving.
- iii) The preferred method of off-loading from vehicles is by mechanical means, ensuring all lifting equipment and vehicles are capable of lifting the packs and are within their safe working capacities. Care should be taken when placing packs into position to avoid banging or dropping of packs. Pack weights can vary up to 2400kg (approximately). Under no circumstances should any personnel stand under or near the pack during lifting.
- iv) Off-load and store packs on hard level surfaces and not on slopes or soft ground.
- v) Where lifting points are provided, the lifting points must be used.
- vi) Where lifting points are not provided, then suitable canvas/fabric slings should be used around the product.
- vii) Care should be taken when breaking down the packs either on the delivery vehicle or on site.
- viii) When removing banding and wrapping around packs, use the appropriate cutting tools and wear eye protection. Before removing banding and wrapping, ensure that the products are safe and will not fall over.
- ix) Where individual products are handled manually, personal injury due to strains or ruptures should be avoided if the requirements of the *Manual Handling Operations Regulations 1992* are implemented.

9. Exposure Controls/Personal Protection

Occupational exposure limits:

Personal exposure to airborne dust should be controlled to the minimum that is reasonably practicable. Avoid ingestion wherever possible.

	8 hr TWA	WEL (8hr TWA)
Total inhalable dust	10mg/m ³	/
Respirable dust	4mg/m ³	/
Respirable silica (crystalline)	/	0.1mg/m ³

TWA: Time Weighted Average

WEL: Workplace Exposure Limit



Personal Protection:

- Respiratory protection to HSE approved standards
- Hand protection abrasion resistant gloves
- Eye protection to HSE approved standard for dust goggles
- Skin protection overalls
- Foot protection to BSEN 345 safety footwear
- Head protection suitable protection should be worn where there is a risk of products falling from height.

10. Physical & Chemical Properties

Precast concrete products are dense, heavy, hard and abrasive products, which are chemically inert apart from some harmless soluble salts that may appear for a short period on the face of products.

11. Stability & Reactivity

Not applicable.

12. Toxicological Information

Airborne dust health effects:

- On eyes May cause transient irritation
- On skin Unlikely to cause harm on brief or occasional contact
- By inhalation Inhalation of large quantities of respirable silica may lead to progressive lung damage. This may cause permanent disability and in extreme cases, may be fatal.
- By ingestion Unlikely to cause harm.
- Chronic Exposure to high levels of silica may cause silicosis.

Precast concrete products will not give off any toxic fumes if subjected to heat or fire. Toxic gases and irritating smoke may form on combustion of polythene packaging or timber pallets/bearers.

13. Ecological Information

<u>Environmental assessment:</u> When used and disposed of as intended, no adverse environmental effects are foreseen.

14. Transport Information

Precast products and their associated packaging materials are not subject to hazardous substance conveyance regulations and vehicle labelling is not required. Good safe transport loading and tying down practises should be employed.

15. Regulatory Information

Hazard label data: Precast products are not classified as dangerous for supply in the UK.

Statutory instruments:



Health & Safety at Work Act 1974 Control of Substances Hazardous to Health (C.O.S.H.H.) 2002 Consumer Protection Act 1987 Manual Handling Operations Regulations 1992 The Personal Protective Equipment at Work Regulations 1992

Guidance notes:

HSE Guidance Note EH44 – Dust, General Principles of Protection HSE Guidance EH40 – Workplace Exposure Limits

16. Other Information

The data and advice given above apply when the products are used as intended.

If the products are re-distributed for sale, details of their hazards and recommendations for safe handling should be passed to all customers.

If you are an employer, it is your duty to tell your employees and others who may be affected of any hazards described in this sheet, and of any precautions which should be taken.

Information on Safety and Handling is continuously being updated and further advice, as it becomes available, can be given on request.

17. Legal Notice

The information contained in this Safety Data Sheet was considered the best available at the date of issue, However, no warranty is made or implied that the information is accurate or complete. It is the user's obligation to evaluate and use these products safely and to comply with all the applicable laws and regulations.

Information

Further information is available on request and available from our website - <u>www.lineworx.co.uk</u>

Please be sure to read our Terms and Conditions that apply to all products and transactions supplied and carried out by Lineworx Limited. These are available from our website or by request.

This document is subject to updates and changes. Please contact Lineworx for the most recent version.

Terms & Conditions

These are available from the Lineworx website or by request. Please make sure you read the most up to date version as all Lineworx documentation is subject to change.



Version Information

Information contained in this document has been available on request and issued at the appropriate times. This document has been compiled and issued in October 2023 and is Version 12. Please contact Lineworx for the most recent version.

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