

A comprehensive guide to railway infrastructure construction solutions

INNOVATION RIGHT DOWN THE LINE

INDUSTRIES















The history of Aqua

Agua Fabrications began in 1988 as the brainchild of Ian and Lynda Smith. Whilst working on a customers site lan saw a railway engineer digging a trench. Back then there was no real Health and Safety and Ian crossed over the track to ask the engineer what he was doing.

The engineer was installing clay pipe as a drainage system, from this lan decided to introduce plastic pipes to the rail industry as he knew they offered many benefits over clay, including ease of installation. So along with his wife Lynda they created Aqua, and from then on the company has grown in strength.

- Tracktex[®] sand blanket replacement geocomposite
- Thieel and SE HDPE Chambers
- Preformed GRP Sump Units
- Derby GRP Catch-pit Frames
- Belvedere Composite Headwalls

Social Values & Sustainability

Aqua is committed to providing a sustainable social strategy for the community and environment surrounding its location and beyond.

Employment

Aqua is committed to providing jobs for local people - in 2023 37 people were employed from the local Skelmersdale area, with a further 13 living within a 7 mile radius of the factory complex.

Our teams come from a variety of diverse backgrounds including social and special educational needs.

Aqua offers support to young people in the form of apprenticeships, following which, many apprentices go on to work full time within the company; with even their children then becoming apprentices. Training is in conjunction with local educational institutes, to ensure apprentices receive formally recognised qualifications in addition to on-the-job training.

Aqua is committed to providing a living wage for all it's employees and even increased wages to help cover the cost of living rises experienced between 2020 and 2023.

Local Businesses

Aqua consistently looks to use local businesses within its supply chain, wherever possible utilising companies in the local Skelmersdale area first, then those in the North West before looking further afield.

Environmental

Aqua is committed to reducing its carbon footprint and will reach net zero by 2050. In order to best achieve this, Aqua is working with an environmental consultancy to create and implement a strategy to achieve this whilst also advising on local schemes and projects which the business can assist with. Aqua has created a rural space within it's factory complex that includes trees and wildflower growth in an effort to provide a wildlife oasis within an industrial area.

Aqua has achieved a 'Zero Waste to Landfill' policy, through the introduction of a number of recycling initiatives including the recycling of all HDPE, GRP and cardboard waste generated by the business; in addition waste cans and bottles are also segregated and recycled, with staff members encouraged to use multi-use vessels wherever possible.



Wherever you see this symbol, the product is either manufactured with a recycled content base material or is fully recyclable.

The Aqua App

Designed as a companion to this brochure the AQUA App is driven by our website and functions as an enhanced electronic version of our handy, pocket sized "Railway Solutions Product List".

Optimised for mobile viewing, the AQUA App is your go to reference guide when querying product types, sizes and/or weights. Always accessible on your mobile device, and packed with useful information, the AQUA App makes confirming product suitability a quick and easy process, whether you are in the office or out on site.

Find out more about our products by visiting www.aquafab.co.uk

NEW

RQUA

Download the Aqua App here

RUQS

- Track Access Matting (TAMS & V-RAM)
- Aqualine Trough System
- Carlisle Composite Cascades
- Hi-pact DitchLinner

Giving Back

Aqua sponsor and donate to a variety of clubs and charities as we believe in giving something back to people who strive to help others.

Locally, we currently sponsor two children's football teams. Billinge Juniors and Clay Brow Juniors in addition to an amateur rugby team -Cutsyke Raiders/Raidettes ARLFC.

Rugby League and Children's football are known for being family orientated sports which bring communities and cultures closer together, through an all-inclusive approach.

Nationally, Aqua also organise a series of regional charity events throughout the year to help local charities such as Avrshire Hospice and Claire House Children's Hospice. These local charities help the communities surrounding them with some of the most serious and terminally ill.

Wellbeing

At the core of Aqua's ethos, is the desire to provide a happy environment for all employees, nurturing a positive mental wellbeing. The culture of inclusion, where everyone matters, is central to our beliefs; all members of staff are treated with respect and know they are welcomed as part of a team, with the ability to freely express themselves or their concerns.



Aqua operates a range of different delivery vehicle sizes, enabling the selection of the most economical vehicle for the delivery requirements.

All of Aqua's delivery fleet are now EURO 6 compliant; this has reduced particulate matter from 0.025g/km to 0.005 g/km; NOX from 0.25 to 0.08g/km, Hydrocarbons from 0.30 to 0.17.

Company drivers have undertaken courses in Economic Driving to increase fuel efficiency therefore further reducing CO² emissions.

We also monitor all vehicles through a tracking scheme, which provides detailed consumption and carbon footprint readings which can be examined and targeted for improvement.

Project Assistance

By working together, Aqua can save you time and money on site, working with you to undertake a materials take-off and construction sense check using the issued construction drawings.

Using the design drawings issued, a material take-off is generated itemising the materials required to build each individual pipe/ duct run, catch-pit or UTX chamber and cross referencing these against the size and type of pipe/ duct specified. Constructibility of each catch-pit or UTX chamber can then also be confirmed, with any constructibility concerns then raised and alternative solutions proposed for review and confirmation.

By conducting this review Agua can enable contractors and designers alike to make an informed decision on the best alternative approach, reducing time spent on problem solving or snagging.

Speak with our sales team today to discuss your project and how we can best assist you.



BIM Models

3D Models (BIM Models) are available for a wide range of products including our drainage pipes and ducting, catch-pit raising frames, sump units and Thieel cable management chambers.

Use the link below to access the download library or contact our sales team on 01695 51933 to discuss your requirements.



AQUA manufactures all of its products in accordance with ISO 9001:2015 Quality Management System accreditation. This assures that all of the products manufactured and fabricated at our Skelmersdale factory are made to the highest standard and are rigorously checked.

In addition to ISO 9001:2015 a number of other approvals and accreditations are held by the business including:

- Construction, Logistics & Community Safety CLOCS Champion
- Cyber Essentials Cyber attack defence suitability
- Logistics UK Road Operator Member
- Fleet Operator Recognition Scheme FORS Silver
- London Underground LU APR
- Network Rail Product Acceptance for all safety critical products
- Grandfathers Rights for all safety critical products in use prior to Railtrack.
- Railway Industry Supplier Qualification Scheme RISQS Verified

Safe, Every Day' safety vision, actively encouraging and enforcing the Life-saving rules set out by the initiative.







Download technical datasheets, approval certificates and CAD drawings by scanning the QR Code or visit www.aquafab.co.uk



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CAD Drawings

Most of AQUA's products are available as a 2D CAD drawing to aid with scheme design. Even bespoke solutions can be drawn up to provide customers with accurate representations of the solution proposed.

In addition, once an order has been placed, 2D fabrication drawings will be issued for any product that needs to be processed or manufactured. to ensure that the materials ordered are fit for purpose and to guard against design changes between quoting and order placement.

Once issued, drawings can be used as part of the design and/ or as part of the hand-back file.

Product Guide

RQUA

GEOTEXTILES & GEO

PAGE 08 **TRACK & OFF-TRACK DRAINAGE SYSTEMS**

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Track & Off Track Drainage Systems

AQUA offers a comprehensive range of Track and Off-Track Drainage products to enable designers and contractors to select the most appropriate product for the site specific conditions and requirements.

Lineside drainage has just two requirements; to collect and carry away from the tracks immediate vicinity, any water received from rainfall, springs and/ or run-off from adjacent land. Since the beginning, our product range hasbeen designed and developed in conjunction with railway engineers, to ensure the products we offer are specific to the rail industries unique criteria:



Track & Off Track Drainage Systems Contents

AQUALINE

DRAINAGE TROUGH

Track Drainage Pipe inc. Bends, Junctions & Rodding Eyes Pipe Selection Guide TDK TDE-H [®] TDE-E [®] TDE-U [®] TDX [®] , incl.special fabrications / attenuation Discharge Volumes & Flow Velocities Remote Drainage Installation	12 14 16 17 18 20 23 28
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HI-PACT HDPE DITCHLINNER®

SE CIRCULAR CATCH-PIT



Track Drainage Pipes

With over 30+ years of experience in track drainage we understand that a variety of situations and scenarios exist, resulting in the need for a choice of different drainage pipes to provide the most suitable product for the required application.

Network Rail standard detail drawing NR/CIV/SD/322 categorises pipe as either:

- P1 Standard Perforated Pipe
- P2 Stronger Perforated Pipe
- P3 Combined Pipe & Ditch

With this in mind, although our three main types of pipe are all manufactured from High Density Polyethylene (HDPE), and comply with BS EN 12666 or 13476, the differing manufacturing processes offer five distinct choices of pipe best suited for a variety of applications. These are:

NR/L2/CIV/005/09 clause 10.3 states

When pipes are used as collector drains, perforations shall be provided along the pipe lengths. Perforations shall be distributed all around the perimeter of the pipe provided that the perforations do not reduce the strength of the pipe structure to below the resistance required.

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TDE-E® and TDE-U®

• P2. P3 & P5 Classification

Off Track Drainage Pipe in different wall thicknesses

TDK

- Lighter weight than a solid wall pipe

TDE-H[®]

• P4 – Standard Non-Perforated Pipe

• P5 – Stronger Non-Perforated Pipe

PAGE

- Track & Off Track Drainage Pipe
- Ideally suited for carrier drain applications due to







Find out more about our products by visiting www.aquafab.co.uk



TDX[®]

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Pipe Selection

When selecting a suitable pipe for use as a collector drain (P1, P2 or P3) or carrier drain (P4 or P5) in the Cess or 6ft and/or an Under Track Crossing (UTX), as shown in Network Rail Standard Detail NR/CIV/SD/322, there are a number of factors that must be considered.

The following is for guidance only, it is the designer/ specifiers responsibility to check and confirm suitability.

The suitability of the pipes shown in the below diagram have been determined using the following assumptions:

Calculated in accordance with BS 9295:2020

All depths are shown in millimetres unless otherwise stated, from bottom of sleeper to top (crown) of pipe/ duct.



The above is for pipes running in the same direction as the track in the 'Cess' and pipes running transversely under the track as a UTX, NOT 4ft drains. Additionally, it is assumed that there is no additional load in the 'Cess', if additional load is expected, e.g. vehicular traffic, additional considerations may be required. Please contact our sales team on 01695 51933 to discuss.



Table 15 — Flexible pipe embedments



In addition, Aqua are able to provide alternative surcharge loading calculations for Cess, 6ft and UTX applications, using the Boussinesq Theory method of calculating surcharge pressure at a specific point a prescribed distance below/ away from the running edge/ bottom of sleeper.

For assistance with site specific calculations, please use this link to download our 'Request for Technical Guidance - Pipe Suitability Check' form. This document will enable you to capture and send us all of the relevant site specific information needed to calculate suitability in accordance with British Standard BS 9295

Suitability **Calculations**

To assist with selecting the correct pipe type, Aqua are able to provide theoretical deflection calculations in accordance with the latest version of BS 9295 - Guide to the structural design of buried pipelines.

These calculations take into account the following criteria:

- Backfill Class & Compaction

Table 13 — Guide values of Spangler modulus for native soils, E'_{2}

Soil type	Spangler mo	Spangler modulus for soils in various conditions (MN/m ²)							
	Very dense	Dense	Medium dense	Loose	Very loose				
Gravel	Over 40	15 to 40	9 to 15	5 to 9	3 to 5				
Sand	15 to 20	9 to 15	4 to 9	2 to 4	1 to 2				
Clayey, silty sand	10 to 15	6 to 10	2.5 to 6	1.5 to 2.5	0.5 to 1.5				
Clay	Very hard	11 to 14							
	Hard	10 to 11							
	Very stiff	6 to 10							
	Stiff	4 to 6							
	Firm	3 to 4							
	Soft	1.5 to 3							
	Very soft	0 to 1.5							
NOTE Further guida	nce on the use of lig	ghtweight agg	regates is given in <mark>A.1</mark>	1.4.					





TDK Track & Off-Track Drainage Pipe

AQUA TDK is a reinforced wall high density polyethylene (HDPE) pipe manufactured from a recycled content raw material.

Available in a range of sizes as either a fully perforated collector drain, $\frac{1}{2}$ perforated collector drain or solid carrier pipe, TDK has proven itself over the last 30+ years of use on the rail infrastructure.

The combination of corrugated outside wall reinforced with a smooth inner profile has resulted in a light but strong pipe with a ring stiffness of 6kN/m² (SN6) that can be used for a variety of rail applications.





TDK is:

- Compliant with P1, P3 & P4 Network Rail Classification
- Compliant with BS EN 13476.
- · Lighter weight than an equivalent sized solid wall pipe.
- Durable enough for use as a Cess, 6ft or UTX pipe*.
- Manufactured from two black polyethylene pipes extruded simultaneously one inside the other and heat welded together.
- Supplied in 6 m lengths, plain ended, except 4TDK and 6TDK which are supplied complete with coupler.

When ordering, please specify your preference for full or ½ perforated collector pipe or solid carrier pipe. Sealing rings are recommended with ½ perforated and solid pipe applications.

Product	Pipe ID	Pipe OD	Weight	PADs Code	Coupler	PADs Code	Sealing Ring ^{*3}	PADs Code		
4TDK*2	100 mm	118 mm	1.03 Kg / m	0057 / 101250	4TDK-C	0004 / 130306	4TDK-RS	0004 / 131211		
6TDK*2	150 mm	178 mm	1.8 Kg / m	0057 / 101251	6TDK-C	0004 / 130307	6TDK-RS	0004 / 131212		
8TDK	200 mm	230 mm	2.9 Kg / m	0057 / 101252	8TDK-C	0004 / 130308	8TDK-RS	0004 / 131213		
9TDK	225 mm	266 mm	3.5 Kg / m	0057 / 101253	9TDK-C	0004 / 130309	9TDK-RS	0004 / 131214		
12TDK	300 mm	354 mm	5.3 Kg / m	0057 / 101254	12TDK-C	0004 / 130310	12TDK-RS	0004 / 131215		
16TDK	375 mm	426 mm	12.5 Kg / m	0057 / 101255	16TDK-C	0004 / 130311	16TDK-RS	0004 / 131216		
18TDK	450 mm	510 mm	15.0 Kg / m	0057 / 101256	18TDK-C	0057 / 101258	18TDK-RS	0057 / 101260		
24TDK	600 mm	690 mm	18.6 Kg / m	0057 / 101257	24TDK-C	0057 / 101259	24TDK-RS	0057 / 101261		
30TDK	750 mm	852 mm	25.0 Kg / m	0057 / 100034	Pipe supplied complete with integrated Bell & Spigot joint.					

* Ground conditions dependant, see page 13 "Pipe Selection" for further info. *2 Supplied complete with coupler. *3 2no. Sealing Rings required per length of pipe/ connection.

Product	Pipe Size	PADs Code
4TDK-SB	100 mm ID	0004 / 100001
6TDK-SB	150 mm ID	0004 / 100002
8TDK-SB	200 mm ID	0004 / 100003
9TDK-SB	225 mm ID	0004 / 100004
12TDK-SB	300 mm ID	0004 / 100005

TDK Junctions

All sizes of TDK pipe can be ordered as either a Y or T junction and are manufactured to order to suit site specific requirements.

When ordering please specify the following:

• Y or T

Equal or Unequal – if Unequal please specify the Ø of the unequal leg.
Angle

Example: 150 mm ID 6TDK Y Junction, 30° Angle, Unequal 100 mm ID 4TDK Leg

NOTE: All Junctions are supplied plain ended.

TDK Rodding Eye Covers

All sizes of TDK pipe can be ordered as a Rodding Eye Cover and are manufactured to order to suit site specific requirements.

When ordering please specify the following:

- \cdot Cover Type GRP, HDPE or Steel
- \cdot Cover Frame Type HDPE or Steel
- Angle

Example: 100 mm ID 4TDK Rodding Eye, GRP Cover, HDPE Frame, 30°

Note: All Rodding Eyes are supplied plain ended.



TDK Bends

All sizes of TDK pipe can be ordered as a bend and are manufactured to order to suit site specific requirements.

4TDK to 12TDK Bends are single piece swept bends, plain ended. 14TDK to 30TDK are mitred bends, plain ended.

When ordering, please specify the angle of bend and radius required.





TDE[®] Track & Off Track Drainage Pipe

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AQUA TDE pipe is available in three different wall thicknesses to provide the widest range of choice to enable designers and specifiers to choose the optimum size and type to suit their site specific project requirements.



Network Rail Product Approved PA05/05825

Manufactured from recycled polymer the TDE® *2 range of pipes are suitable for a variety of applications including storm and foul water, and chemical transmission.

Download technical datasheets, approval certificates and CAD drawings by scanning the QR Code



TDE is:

- Compliant with P2, P3 & P5 Network Rail Classification (TDE-E & TDE-U).
- Off Track Drainage Pipe in different wall thicknesses
- (TDE-E & TDE-U).*

TDE-H[®] Track & Off Track Drainage Pipe

Product	Pipe ID	Pipe OD	Weight	PADs Code	Mitre Bend	PADs Code	Junction	PADs Code
4TDE-H	100 mm	110 mm	1.5 Kg / m	0057 / 101042	4TDE-H MB	0057 / 101080	4TDE-H YJ	0057 / 100667
6TDE-H	148 mm	160 mm	3.0 Kg / m	0057 / 101043	6TDE-H MB	0057 / 101081	6TDE-H YJ	0057 / 100668
7TDE-H	166 mm	180 mm	3.8 Kg / m	0057 / 101044	7TDE-H MB	0057 / 101082	7TDE-H YJ	0057 / 100669
8TDE-H	185 mm	200 mm	4.7 Kg / m	0057 / 101045	8TDE-H MB	0057 / 101083	8TDE-H YJ	0057 / 100670
9TDE-H	208 mm	225 mm	6.0 Kg / m	0057 / 101046	9TDE-H MD	0057 / 101084	9TDE-H YJ	0057 / 100671
10TDE-H	231 mm	250 mm	7.4 Kg / m	0057 / 101047	10TDE-H MB	0057 / 101085	10TDE-H YJ	0057 / 100672
11TDE-H	258 mm	280 mm	9.2 Kg / m	0057 / 101048	11TDE-H MB	0057 / 101086	11TDE-H YJ	0057 / 100673
12TDE-H	291 mm	315 mm	11.7 Kg / m	0057 / 101049	12TDE-H MB	0057 / 101087	12TDE-H YJ	0057 / 100674
14TDE-H	328 mm	355 mm	14.7 Kg / m	0057 / 101050	14TDE-H MB	0057 / 101088	14TDE-H YJ	0057 / 100675
16TDE-H	369 mm	400 mm	18.7 Kg / m	0057 / 101051	16TDE-H MB	0057 / 101089	16TDE-H YJ	0057 / 100676
18TDE-H	415 mm	450 mm	23.7 Kg / m	0057 / 101052	18TDE-H MB	0057 / 101090	18TDE-H YJ	0057 / 100677

 * Subject to confirmation of suitability through the process of theoretical calculations in line with BS 9295.

*2 PE100 virgin polymer pipe can be supplied if PE80 is not available.

TDE-E® Track & Off Track Drainage Pipe

Product	Pipe ID	Pipe OD	Weight	PADs Code	Mitre Bend	PADs Code	Junction	PADs Code
4TDE-E	97 mm	110 mm	2.1 Kg / m	0057 / 101053	4TDE-E MB	0057 / 101091	4TDE-E YJ	0057 / 100678
6TDE-E	141 mm	160 mm	4.4 Kg / m	0057 / 101054	6TDE-E MB	0057 / 101092	6TDE-E YJ	0057 / 100679
7TDE-E	159 mm	180 mm	5.5 Kg / m	0057 / 101055	7TDE-E MB	0057 / 101093	7TDE-E YJ	0057 / 100680
8TDE-E	176 mm	200 mm	6.8 Kg / m	0057 / 101056	8TDE-E MB	0057 / 101094	8TDE-E YJ	0057 / 100681
9TDE-E	199 mm	225 mm	8.6 Kg / m	0057 / 101057	9TDE-E MD	0057 / 101095	9TDE-E YJ	0057 / 100682
10TDE-E	221 mm	250 mm	10.7 Kg / m	0057 / 101058	10TDE-E MB	0057 / 101096	10TDE-E YJ	0057 / 100683
11TDE-E	247 mm	280 mm	13.2 Kg / m	0057 / 101059	11TDE-E MB	0057 / 101097	11TDE-E YJ	0057 / 100684
12TDE-E	278 mm	315 mm	16.7 Kg / m	0057 / 101060	12TDE-E MB	0057 / 101098	12TDE-E YJ	0057 / 100685
14TDE-E	313 mm	355 mm	21.2 Kg / m	0057 / 101061	14TDE-E MB	0057 / 101099	14TDE-E YJ	0057 / 100686
16TDE-E	353 mm	400 mm	26.9 Kg / m	0057 / 101062	16TDE-E MB	0057 / 101000	16TDE-E YJ	0057 / 100687
18TDE-E	397 mm	450 mm	34.0 Kg / m	0057 / 101063	18TDE-E MB	0057 / 100916	18TDE-E YJ	0057 / 100688
20TDE-E	443 mm	500 mm	44.3 Kg / m	TBC	20TDE-E MB	TBC	20TDE-E YJ	TBC
22TDE-E	496 mm	560 mm	55.5 Kg / m	TBC	22TDE-E MB	TBC	22TDE-E YJ	TBC
25TDE-E	558 mm	630 mm	70.3 Kg / m	TBC	25TDE-E MB	TBC	25TDE-E YJ	TBC
28TDE-E	626 mm	710 mm	89.3 Kg / m	TBC	28TDE-E MB	TBC	28TDE-E YJ	TBC
31TDE-E	706 mm	800 mm	113 Kg / m	TBC	31TDE-E MB	TBC	31TDE-E YJ	TBC
35TDE-E	794 mm	900 mm	143 Kg /m	TBC	35TDE-E MB	TBC	35TDE-E YJ	TBC
38TDE-E	882 mm	1000 mm	176 Kg / m	TBC	38TDE-E MB	TBC	38TDE-E YJ	TBC
47TDE-E	1059 mm	1200 mm	254 Kg / m	TBC	47TDE-E MB	TBC	47TDE-E YJ	TBC



Find out more about our products by visiting www.aquafab.co.uk



TDE-U[®] Track & Off-Track Drainage Pipe

Product	Pipe ID	Pipe OD	Weight	PADs Code	Mitre Bend	PADs Code	Junction	PADs Code
4TDE-U	90 mm	110 mm	3.1 Kg / m	0057 / 101064	4TDE-U MB	0057 / 100917	4TDE-U YJ	0057 / 100689
6TDE-U	131 mm	160 mm	6.7 Kg / m	0057 / 101065	6TDE-U MB	0057 / 100918	6TDE-U YJ	0057 / 100690
7TDE-U	147 mm	180 mm	8.4 Kg / m	0057 / 101066	7TDE-U MB	0057 / 100919	7TDE-U YJ	0057 / 100697
8TDE-U	164 mm	200 mm	10.4 Kg / m	0057 / 101067	8TDE-U MB	0057 / 100921	8TDE-U YJ	0057 / 100624
9TDE-U	184 mm	225 mm	13.1 Kg / m	0057 / 101068	9TDE-U MD	0057 / 100922	9TDE-U YJ	0057 / 100625
10TDE-U	205 mm	250 mm	16.2 Kg / m	0057 / 101069	10TDE-U MB	0057 / 100923	10TDE-U YJ	0057 / 100626
11TDE-U	229 mm	280 mm	20.3 Kg / m	0057 / 101070	11TDE-U MB	0057 / 100924	11TDE-U YJ	0057 / 100627
12TDE-U	258 mm	315 mm	25.7 Kg / m	0057 / 101071	12TDE-U MB	0057 / 100863	12TDE-U YJ	0057 / 100628
14TDE-U	290 mm	355 mm	32.6 Kg / m	0057 / 101072	14TDE-U MB	0057 / 100864	14TDE-U YJ	0057 / 100629
16TDE-U	327 mm	400 mm	41.4 Kg / m	0057 / 101073	16TDE-U MB	0057 / 100661	16TDE-U YJ	0057 / 100630
18TDE-U	368 mm	450 mm	52.4 Kg / m	0057 / 101074	18TDE-U MB	0057 / 100662	18TDE-U YJ	0057 / 100631
20TDE-U	409 mm	500 mm	65.3 Kg / m	TBC	20TDE-U MB	TBC	20TDE-U YJ	TBC
22TDE-U	458 mm	560 mm	81.80 Kg / m	TBC	22TDE-U MB	TBC	22TDE-U YJ	TBC
25TDE-U	515 mm	630 mm	103.6 Kg / m	TBC	25TDE-U MB	TBC	25TDE-U YJ	TBC
28TDE-U	581 mm	710 mm	131.9 Kg / m	TBC	28TDE-U MB	TBC	28TDE-U YJ	TBC
31TDE-U	655 mm	800 mm	167.0 Kg / m	TBC	31TDE-U MB	TBC	31TDE-U YJ	TBC
35TDE-U	736 mm	900 mm	211.0 Kg / m	TBC	35TDE-U MB	TBC	35TDE-U YJ	TBC

TDE[®] Couplers

All sizes of TDE pipe are compatible with the below coupler options:

- Slip Couplers Supplied loose, suitable for collector drains. Quickly and easily slides over
- Centre Ring Slip Couplers Supplied loose, suitable for collector drains. NOT SEALED. • Welded Slip Coupler – Supplied factory welded to collector pipe to create a male/ female
- Flexi-Seal SEALED flexible coupling ideal for carrier drains.

Slip / Centre Ring / Welded Slip	PADs Code	Flexi-Seal	PADs Code
4TDE SC / CR / WSC	0057 / 101212	4TDE FS	0057 / 100027
6TDE SC / CR / WSC	0057 / 101213	6TDE FS	0057 / 100028
7TDE SC / CR / WSC	0057 / 101215	7TDE FS	0057 / 100632
8TDE SC / CR / WSC	0057 / 101214	8TDE FS	0057 / 100029
9TDE SC / CR / WSC	0057 / 100023	9TDE FS	0057 / 100030
10TDE SC / CR / WSC	0057 / 100024	10TDE FS	0057 / 100031
11TDE SC / CR / WSC	0057 / 101216	11TDE FS	0057 / 100633
12TDE SC / CR / WSC	0057 / 100025	12TDE FS	0057 / 100032
14TDE SC / CR / WSC	0057 / 101217	14TDE FS	0057 / 100634
16TDE SC / CR / WSC	0057 / 101218	16TDE FS	0057 / 100033
18TDE SC / CR / WSC	0057 / 101218	18TDE FS	0057 / 100635

NOTE: Larger sizes of TDE are also available with the above coupler options. Speak to our Sales Team for further information.



Example: 180 mm OD 7TDE-E Rodding Eye, GRP Cover, HDPE Frame, 30° Note: All Rodding Eyes are supplied complete with a Flexi-Seal Coupler

Find out more about our products by visiting www.aquafab.co.uk

Flexi-Seal

TDE® Rodding Eye

All sizes of TDE pipe can be ordered as Rodding Eyes and are manufactured to order to suit site specific requirements.

When ordering please specify the following:



TDX[®] Large Diameter Drainage Pipe

Manufactured and certificated to meet the material and performance requirements of BS EN 13476, Plastic Piping Systems for Non-Pressure Underground Drainage and Sewerage. TDX is formed from PE100 HDPE with an up to 8kN Ring Stiffness, AQUA TDX is not actually pipe, rather an extruded box section spirally wound and welded together. This provides a strong, durable pipe in a wide range of diameters that can be used for track drainage or culvert applications.



TDX Special Fabrications

Our specialist HDPE fabricators are able to manufacture bespoke solutions to suite your site specific requirements.

TDX is:

- Compliant with P1, P3 & P4 Network Rail Classification.
- Typically used for applications requiring 400 mm ID or larger.
- 120 year design life below ground*.
- Is available in 6m lengths, plain ended; solid, ½ perf or fully perforated.
- Is available in over 20 different diameters, up to 3.5 m ID.

With considerable experience and utilising the latest manufacturing technologies TDX can be formed in the factory to provide bespoke solutions for a variety of situations.

400 mm	454 mm	13 Kg / m	0057 / 101262
450 mm	506 mm	16 Kg / m	0057 / 101263
500 mm	560 mm	17 Kg / m	0057 / 101264
600 mm	675 mm	26 Kg / m	0057 / 101265
750 mm	838 mm	36 Kg / m	0057 / 101266
900 mm	1,000 mm	48 Kg / m	0057 / 101267
1,050 mm	1,170 mm	54 Kg / m	0057 / 101268
1,200 mm	1,315 mm	90 Kg / m	-
1,350 mm	1,511 mm	120 Kg / m	-
1,500 mm	1,664 mm	140 Kg / m	-
1,650 mm	1,815 mm	150 Kg / m	-
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	450 mm 500 mm 600 mm 750 mm 900 mm 1,050 mm 1,200 mm 1,350 mm 1,500 mm 1,650 mm 0il conditions and of technical dat s and CAD dra r visit www.aqu	450 mm 506 mm 450 mm 506 mm 500 mm 560 mm 600 mm 675 mm 750 mm 838 mm 900 mm 1,000 mm 1,050 mm 1,170 mm 1,200 mm 1,315 mm 1,350 mm 1,511 mm 1,500 mm 1,664 mm 1,650 mm 1,815 mm oil conditions and can vary depending on the set of the s	450 mm 506 mm 16 Kg / m 450 mm 506 mm 16 Kg / m 500 mm 560 mm 17 Kg / m 600 mm 675 mm 26 Kg / m 750 mm 838 mm 36 Kg / m 900 mm 1,000 mm 48 Kg / m 1,050 mm 1,170 mm 54 Kg / m 1,200 mm 1,315 mm 90 Kg / m 1,350 mm 1,511 mm 120 Kg / m 1,500 mm 1,664 mm 140 Kg / m 1,650 mm 1,815 mm 150 Kg / m oll conditions and can vary depending on a number of factor technical datasheets, approval scanning the rvisit www.aquafab.co.uk

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- Short and Long Radius Bends.
- Y and T Junctions.
- Attenuation Tanks.





Crossrail, **Pudding Mill Lane, London**

The Proble

During the construction of Crossrail, the contractor for the North East spur, heading to Shenfield, was tasked with installing a track drainage attenuation system. This system had originally been designed using concrete pipe and manholes, however due to the weight of these products and the need for mechanical lifting equipment, construction would be nigh on impossible.

The Solution

Utilising our skills and capabilities, a solution was proposed using TDX and combining it with SE type circular manhole chambers. Through the use of these lighter weight materials and using off-site fabrication to manufacture the manifolds and legs of the attenuation chamber, construction time on site could be kept to a minimum.

Fully installed in just a few days, the whole assembly was positioned by hand with minimal mechanical assistance in a single day!

Savings to the project were in excess of £200,000.

Discharge Volumes & Flow Velocities

Discharge volumes and flow velocities are affected by the size and type of pipe being used as well as the gradient that the pipe is installed at. Network Rail's Railway Drainage System Manual (NR/L3/CIV/005/2C) states the methodology for calculating flow capacity along with additional parameters and considerations to be taken under advisement as part of the process of designing a drainage system

NR Standard NR/L2/CIV/005/09 states all pipes shall be designed to have a self-cleaning flow velocity. The flow velocity for self-cleaning pipes shall be a minimum of 0.8 metres/second. The maximum flow velocity shall not exceed 3.0 metre/second as this could cause scour damage to the drainage system.

TDK

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Gradient 1 in	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (I/s)	Discharge Velocity (m/s)	Flow Rate(m³/s)	Flow Rate (I/s)	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (I/s)	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (I/s)	
Pipe	100	mm ID 4TD	к	150	150 mm ID 6TDK			200 mm ID 8TDK			225 mm ID 9TDK		
1	11.63	0.091	91	15.02	0.265	265	18.00	0.565	565	19.39	0.771	771	
2	8.00	0.063	63	10.33	0.183	183	12.38	0.389	389	13.34	0.530	530	
5	4.88	0.038	38	6.30	0.111	111	7.55	0.237	237	8.13	0.323	323	
10	3.36	0.026	26	4.33	0.077	77	5.19	0.163	163	5.59	0.222	222	
20	2.31	0.018	18	2.98	0.053	53	3.57	0.112	112	3.85	0.153	153	
30	1.85	0.015	15	2.39	0.042	42	2.87	0.090	90	3.09	0.123	123	
40	1.59	0.012	12	2.05	0.036	36	2.46	0.077	77	2.65	0.105	105	
50	1.41	0.011	11	1.82	0.032	32	2.18	0.068	68	2.35	0.093	93	
100	0.97	0.008	8	1.25	0.022	22	1.50	0.047	47	1.61	0.064	64	
150	0.78	0.006	6	1.00	0.018	18	1.20	0.038	38	1.30	0.052	52	
200	0.67	0.005	5	0.86	0.015	15	1.03	0.032	32	1.11	0.044	44	
250	0.59	0.005	5	0.76	0.013	13	0.91	0.029	29	0.98	0.039	39	
300	0.53	0.004	4	0.69	0.012	12	0.83	0.026	26	0.89	0.035	35	
350	0.49	0.004	4	0.64	0.011	11	0.76	0.024	24	0.82	0.033	33	
400	0.46	0.004	4	0.59	0.010	10	0.71	0.022	22	0.76	0.030	30	
450	0.43	0.003	3	0.55	0.010	10	0.66	0.021	21	0.72	0.029	29	
500	0.41	0.003	3	0.52	0.009	9	0.63	0.020	20	0.68	0.027	27	
550	0.39	0.003	3	0.50	0.009	9	0.60	0.019	19	0.64	0.025	25	
600	0.37	0.003	3	0.47	0.008	8	0.57	0.018	18	0.61	0.024	24	
650	0.35	0.003	3	0.45	0.008	8	0.55	0.017	17	0.59	0.023	23	
700	0.34	0.003	3	0.44	0.008	8	0.52	0.016	16	0.56	0.022	22	
750	0.33	0.003	3	0.42	0.007	7	0.50	0.016	16	0.54	0.021	21	

Pipe	300	mm ID 12TD	к	375 mm ID 16TDK			450	450 mm ID 18TDK			600 mm ID 24TDK			
1	23.24	1.643	1643	26.75	2.954	2954	30.01	4.773	4773	35.97	10.170	10170		
2	15.99	1.130	1130	18.40	2.032	2032	20.64	3.283	3283	24.74	6.995	6995		
5	9.75	0.689	689	11.22	1.239	1239	12.58	2.001	2001	15.08	4.264	4264		
10	6.70	0.474	474	7.72	0.853	853	8.65	1.376	1376	10.37	2.932	2932		
20	4.61	0.326	326	5.31	0.586	586	5.95	0.946	946	7.14	2.019	2019		
30	3.70	0.262	262	4.26	0.471	471	4.78	0.760	760	5.73	1.620	1620		
40	3.17	0.224	224	3.65	0.403	403	4.09	0.650	650	4.91	1.388	1388		
50	2.81	0.199	199	3.24	0.358	358	3.63	0.577	577	4.35	1.230	1230		
100	1.93	0.136	136	2.23	0.246	246	2.50	0.398	398	2.99	0.845	845		
150	1.55	0.110	110	1.79	0.198	198	2.01	0.320	320	2.40	0.679	679		
200	1.33	0.094	94	1.53	0.169	169	1.72	0.274	274	2.06	0.582	582		
250	1.18	0.083	83	1.36	0.150	150	1.52	0.242	242	1.82	0.515	515		
300	1.07	0.076	76	1.23	0.136	136	1.38	0.219	219	1.65	0.467	467		
350	0.98	0.069	69	1.13	0.125	125	1.27	0.202	202	1.52	0.430	430		
400	0.91	0.064	64	1.05	0.116	116	1.18	0.188	188	1.42	0.401	401		
450	0.86	0.061	61	0.99	0.109	109	1.11	0.177	177	1.33	0.376	376		
500	0.81	0.057	57	0.93	0.103	103	1.05	0.167	167	1.25	0.353	353		
550	0.77	0.054	54	0.89	0.098	98	0.99	0.157	157	1.19	0.336	336		
600	0.73	0.052	52	0.85	0.094	94	0.95	0.151	151	1.14	0.322	322		
650	0.70	0.049	49	0.81	0.089	89	0.91	0.145	145	1.09	0.308	308		
700	0.68	0.048	48	0.78	0.086	86	0.87	0.138	138	1.05	0.297	297		
750	0.65	0.046	46	0.75	0.083	83	0.84	0.134	134	1.01	0.286	286		

Scour damage is likely to occur, maximum safe velocity exceeded (3m/s)

Find out more about our products by visiting www.aquafab.co.uk

Velocity less than that required to achieve a self-cleansing drainage system (0.8m/s)

TDE-H

Gradient 1 in	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (I/s)	Discharge Velocity (m/s)	Flow Rate(m³/s)	Flow Rate (I/s)	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (I/s)	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (I/s)
	All gradients less than 1:20 result in flow velocities exceeding the recommended maximum of 3 metres per second (m/s)											
Pipe	100 m	nm ID 4TDE	-Н	148 n	nm ID 6TDE-	н	166 r	nm ID 7TDE	·н	185	mm ID 8TDE	-H
20	2.33	0.019	19	2.95	0.051	51	3.18	0.069	69	3.40	0.091	91
30	1.87	0.015	15	2.37	0.041	41	2.55	0.055	55	2.73	0.073	73
40	1.60	0.013	13	2.03	0.035	35	2.19	0.047	47	2.34	0.063	63
50	1.42	0.011	11	1.80	0.031	31	1.94	0.042	42	2.07	0.055	55
100	0.98	0.008	8	1.24	0.021	21	1.33	0.029	29	1.42	0.038	38
150	0.78	0.006	6	0.99	0.017	17	1.07	0.023	23	1.14	0.031	31
200	0.67	0.005	5	0.85	0.015	15	0.92	0.020	20	0.98	0.026	26
250	0.60	0.005	5	0.75	0.013	13	0.81	0.018	18	0.87	0.023	23
300	0.54	0.004	4	0.68	0.012	12	0.74	0.016	16	0.79	0.021	21
350	0.50	0.004	4	0.63	0.011	11	0.68	0.015	15	0.72	0.019	19
400	0.46	0.004	4	0.59	0.010	10	0.63	0.014	14	0.67	0.018	18
450	0.43	0.003	3	0.55	0.009	9	0.59	0.013	13	0.63	0.017	17
500	0.41	0.003	3	0.52	0.009	9	0.56	0.012	12	0.60	0.016	16
550	0.39	0.003	3	0.49	0.008	8	0.53	0.011	11	0.57	0.015	15
600	0.37	0.003	3	0.47	0.008	8	0.51	0.011	11	0.54	0.014	14
650	0.36	0.003	3	0.45	0.008	8	0.48	0.010	10	0.52	0.014	14
700	0.34	0.003	3	0.43	0.007	7	0.47	0.010	10	0.50	0.013	13
750	0.33	0.003	3	0.42	0.007	7	0.45	0.010	10	0.48	0.013	13

Pipe	208 r	nm ID 9TDE	-н	231 m	m ID 10TDE	-Н	258	mm ID 11TDE	-н	291 1	nm ID 12TD	E-H
20	3.66	0.124	124	3.91	0.164	164	4.20	0.220	220	4.52	0.300	300
30	2.94	0.100	100	3.14	0.131	131	3.37	0.177	177	3.63	0.241	241
40	2.52	0.085	85	2.69	0.113	113	2.89	0.152	152	3.11	0.207	207
50	2.23	0.076	76	2.38	0.100	100	2.56	0.134	134	2.76	0.183	183
100	1.53	0.052	52	1.64	0.069	69	1.76	0.092	92	1.90	0.126	126
150	1.23	0.042	42	1.32	0.055	55	1.41	0.074	74	1.52	0.101	101
200	1.05	0.036	36	1.13	0.047	47	1.21	0.063	63	1.30	0.086	86
250	0.94	0.032	32	1.00	0.042	42	1.07	0.056	56	1.16	0.077	77
300	0.85	0.029	29	0.91	0.038	38	0.97	0.051	51	1.05	0.070	70
350	0.78	0.026	26	0.83	0.035	35	0.89	0.047	47	0.96	0.064	64
400	0.73	0.025	25	0.78	0.033	33	0.83	0.044	44	0.90	0.060	60
450	0.68	0.023	23	0.73	0.031	31	0.78	0.041	41	0.84	0.056	56
500	0.64	0.022	22	0.69	0.029	29	0.74	0.039	39	0.79	0.052	52
550	0.61	0.021	21	0.65	0.027	27	0.70	0.037	37	0.76	0.050	50
600	0.58	0.020	20	0.62	0.026	26	0.67	0.035	35	0.72	0.048	48
650	0.56	0.019	19	0.60	0.025	25	0.64	0.034	34	0.69	0.046	46
700	0.54	0.018	18	0.57	0.024	24	0.62	0.033	33	0.66	0.044	44
750	0.52	0.018	18	0.55	0.023	23	0.59	0.031	31	0.64	0.042	42

Pipe	328 mm ID 14TDE-H			369 mm ID 16TDE-H				415 mm ID 18TDE-H			
20	4.87	0.411	411		5.26	0.563	563		5.66	0.767	767
30	3.92	0.331	331		4.22	0.452	452		4.55	0.617	617
40	3.35	0.283	283		3.61	0.387	387		3.89	0.527	527
50	2.97	0.250	250		3.20	0.343	343		3.45	0.468	468
100	2.04	0.172	172		2.20	0.236	236		2.37	0.321	321
150	1.64	0.138	138		1.77	0.190	190		1.91	0.259	259
200	1.41	0.119	119		1.52	0.163	163		1.63	0.221	221
250	1.25	0.105	105		1.34	0.143	143		1.45	0.196	196
300	1.13	0.095	95		1.22	0.131	131		1.31	0.178	178
350	1.04	0.088	88		1.12	0.120	120		1.21	0.164	164
400	0.97	0.082	82		1.04	0.111	111		1.12	0.152	152
450	0.91	0.077	77		0.98	0.105	105		1.05	0.142	142
500	0.86	0.073	73		0.92	0.099	99		1.00	0.136	136
550	0.81	0.068	68		0.88	0.094	94		0.95	0.129	129
600	0.78	0.066	66		0.84	0.090	90		0.90	0.122	122
650	0.74	0.062	62		0.80	0.086	86		0.86	0.117	117
700	0.71	0.060	60		0.77	0.082	82		0.83	0.112	112
750	0.69	0.058	58		0.74	0.079	79		0.80	0.108	108

Scour damage is likely to occur, maximum safe velocity exceeded (3m/s)
Velocity less than that required to achieve a self-cleansing drainage system (0.8m/s)

TDE-E

Gradient 1 in	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (l/s)	Discharge Velocity (m/s)	Flow Rate(m³/s)	Flow Rate (I/s)	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (l/s)	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (l/s)
	All gradients less than 1:20 result in flow velocities exceeding the recommended maximum of 3 metres per second (m/s)											
Pipe	97 m	m ID 4TDE-	E	141 n	nm ID 6TDE-	E	159 n	nm ID 7TDE	-E	176	mm ID 8TDE	E-E
20	2.26	0.017	17	2.87	0.045	45	3.09	0.061	61	3.30	0.081	81
30	1.82	0.013	13	2.30	0.036	36	2.48	0.049	49	2.65	0.065	65
40	1.56	0.012	12	1.97	0.031	31	2.12	0.042	42	2.27	0.056	56
50	1.38	0.010	10	1.75	0.027	27	1.88	0.037	37	2.01	0.049	49
100	0.95	0.007	7	1.20	0.019	19	1.30	0.026	26	1.38	0.034	34
150	0.76	0.006	6	0.97	0.015	15	1.04	0.021	21	1.11	0.027	27
200	0.65	0.005	5	0.83	0.013	13	0.89	0.018	18	0.95	0.023	23
250	0.58	0.004	4	0.73	0.011	11	0.79	0.016	16	0.84	0.021	21
300	0.52	0.004	4	0.66	0.010	10	0.72	0.014	14	0.76	0.019	19
350	0.48	0.004	4	0.61	0.010	10	0.66	0.013	13	0.70	0.017	17
400	0.45	0.003	3	0.57	0.009	9	0.61	0.012	12	0.65	0.016	16
450	0.42	0.003	3	0.53	0.008	8	0.57	0.011	11	0.61	0.015	15
500	0.40	0.003	3	0.50	0.008	8	0.54	0.011	11	0.58	0.014	14
550	0.38	0.003	3	0.48	0.008	8	0.52	0.010	10	0.55	0.013	13
600	0.36	0.003	3	0.46	0.007	7	0.49	0.010	10	0.53	0.013	13
650	0.35	0.003	3	0.44	0.007	7	0.47	0.009	9	0.50	0.012	12
700	0.33	0.002	2	0.42	0.007	7	0.45	0.009	9	0.48	0.012	12
750	0.32	0.002	2	0.41	0.006	6	0.44	0.009	9	0.47	0.011	11
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Pipe	199 n	nm ID 9TDE	-Е	221m	m ID 10TDE·	E	247m	nm ID 11TDE	-E	278r	nm ID 12TD	E-E
20	3.55	0.110	110	3.80	0.145	145	4.08	0.196	196	4.39	0.266	266
30	2.86	0.089	89	3.05	0.117	117	3.28	0.157	157	3.53	0.214	214
40	2.44	0.076	76	2.61	0.100	100	2.81	0.135	135	3.02	0.183	183
50	2.17	0.067	67	2.32	0.089	89	2.49	0.119	119	2.68	0.163	163
100	1.49	0.046	46	1.59	0.061	61	1.71	0.082	82	1.84	0.112	112
150	1.20	0.037	37	1.28	0.049	49	1.37	0.066	66	1.48	0.090	90
200	1.03	0.032	32	1.10	0.042	42	1.18	0.057	57	1.27	0.077	77
250	0.91	0.028	28	0.97	0.037	37	1.04	0.050	50	1.12	0.068	68
300	0.82	0.025	25	0.88	0.034	34	0.95	0.046	46	1.02	0.062	62
350	0.76	0.024	24	0.81	0.031	31	0.87	0.042	42	0.94	0.057	57
400	0.71	0.022	22	0.75	0.029	29	0.81	0.039	39	0.87	0.053	53
450	0.66	0.020	20	0.71	0.027	27	0.76	0.036	36	0.82	0.050	50
500	0.63	0.020	20	0.67	0.026	26	0.72	0.035	35	0.77	0.047	47
550	0.59	0.018	18	0.63	0.024	24	0.68	0.033	33	0.73	0.044	44
600	0.57	0.018	18	0.61	0.023	23	0.65	0.031	31	0.70	0.042	42
650	0.54	0.017	17	0.58	0.022	22	0.62	0.030	30	0.67	0.041	41
700	0.52	0.016	16	0.56	0.021	21	0.60	0.029	29	0.64	0.039	39
750	0.50	0.015	15	0.54	0.021	21	0.58	0.028	28	0.62	0.038	38

Pipe	313 n	nm ID 14TDE	-E	353 m	nm ID 16TDE	-E	397 n	nm ID 18TDE	-E
20	4.74	0.365	365	5.11	0.500	500	5.50	0.681	681
30	3.81	0.294	294	4.10	0.401	401	4.42	0.547	547
40	3.26	0.251	251	3.51	0.343	343	3.78	0.468	468
50	2.89	0.223	223	3.11	0.304	304	3.35	0.415	415
100	1.99	0.153	153	2.14	0.209	209	2.31	0.286	286
150	1.60	0.123	123	1.72	0.168	168	1.85	0.229	229
200	1.37	0.106	106	1.47	0.144	144	1.59	0.197	197
250	1.21	0.093	93	1.31	0.128	128	1.41	0.175	175
300	1.10	0.085	85	1.18	0.115	115	1.27	0.157	157
350	1.01	0.078	78	1.09	0.107	107	1.17	0.145	145
400	0.94	0.072	72	1.01	0.099	99	1.09	0.135	135
450	0.88	0.068	68	0.95	0.093	93	1.02	0.126	126
500	0.83	0.064	64	0.90	0.088	88	0.97	0.120	120
550	0.79	0.061	61	0.85	0.083	83	0.92	0.114	114
600	0.75	0.058	58	0.81	0.079	79	0.88	0.109	109
650	0.72	0.055	55	0.78	0.076	76	0.84	0.104	104
700	0.69	0.053	53	0.75	0.073	73	0.81	0.100	100
750	0.67	0.052	52	0.72	0.070	70	0.78	0.097	97

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Scour damage is likely to occur, maximum safe velocity exceeded (3m/s)

Velocity less than that required to achieve a self-cleansing drainage system (0.8m/s)

TDE-U

Gradient 1 in	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (I/s)	Discharge Velocity (m/s)	Flow Rate(m³/s)	Flow Rate (I/s)	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (I/s)	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (I/s)
		AI	l gradients less	than 1:20 result in f	low velocities	exceeding the	recommended max	kimum of 3 me	tres per second	d (m/s)		
Pipe	90 m	m ID 4TDE-	U	131 m	nm ID 6TDE-	U	147 n	nm ID 7TDE-	U	164	mm ID 8TDE	-U
20	2.16	0.014	14	2.73	0.037	37	2.95	0.050	50	3.15	0.066	66
30	1.73	0.011	11	2.20	0.030	30	2.37	0.040	40	2.53	0.053	53
40	1.49	0.009	9	1.88	0.025	25	2.03	0.035	35	2.16	0.045	45
50	1.32	0.008	8	1.67	0.022	22	1.80	0.031	31	1.92	0.040	40
100	0.91	0.006	6	1.15	0.015	15	1.23	0.021	21	1.32	0.028	28
150	0.73	0.005	5	0.92	0.012	12	0.99	0.017	17	1.06	0.022	22
200	0.62	0.004	4	0.79	0.011	11	0.85	0.014	14	0.91	0.019	19
250	0.55	0.003	3	0.70	0.009	9	0.75	0.013	13	0.80	0.017	17
300	0.50	0.003	3	0.63	0.008	8	0.68	0.012	12	0.73	0.015	15
350	0.46	0.003	3	0.58	0.008	8	0.63	0.011	11	0.67	0.014	14
400	0.43	0.003	3	0.54	0.007	7	0.58	0.010	10	0.62	0.013	13
450	0.40	0.003	3	0.51	0.007	7	0.55	0.009	9	0.59	0.012	12
500	0.38	0.002	2	0.48	0.006	6	0.52	0.009	9	0.55	0.012	12
550	0.36	0.002	2	0.46	0.006	6	0.49	0.008	8	0.53	0.011	11
600	0.34	0.002	2	0.44	0.006	6	0.47	0.008	8	0.50	0.011	11
650	0.33	0.002	2	0.42	0.006	6	0.45	0.008	8	0.48	0.010	10
700	0.32	0.002	2	0.40	0.005	5	0.43	0.007	7	0.46	0.010	10
750	0.31	0.002	2	0.39	0.005	5	0.42	0.007	7	0.44	0.009	9

Pipe	184 n	nm ID 9TDE	-U	205 n	nm ID 10TDE	-U	229 r	nm ID 11TDE	-U	258 mm ID 12TDE-		E-U
20	3.39	0.090	90	3.62	0.119	119	3.89	0.160	160	4.19	0.219	219
30	2.72	0.072	72	2.91	0.096	96	3.13	0.129	129	3.37	0.176	176
40	2.33	0.062	62	2.49	0.082	82	2.68	0.110	110	2.88	0.150	150
50	2.07	0.055	55	2.21	0.073	73	2.37	0.098	98	2.55	0.133	133
100	1.42	0.038	38	1.52	0.050	50	1.63	0.067	67	1.76	0.092	92
150	1.14	0.030	30	1.22	0.040	40	1.31	0.054	54	1.41	0.074	74
200	0.98	0.026	26	1.04	0.034	34	1.12	0.046	46	1.21	0.063	63
250	0.87	0.023	23	0.93	0.031	31	0.99	0.041	41	1.07	0.056	56
300	0.79	0.021	21	0.84	0.028	28	0.90	0.037	37	0.97	0.051	51
350	0.72	0.019	19	0.77	0.025	25	0.83	0.034	34	0.89	0.046	46
400	0.67	0.018	18	0.72	0.024	24	0.77	0.032	32	0.83	0.043	43
450	0.63	0.017	17	0.67	0.022	22	0.72	0.030	30	0.78	0.041	41
500	0.60	0.016	16	0.64	0.021	21	0.68	0.028	28	0.74	0.039	39
550	0.57	0.015	15	0.60	0.020	20	0.65	0.027	27	0.70	0.037	37
600	0.54	0.014	14	0.58	0.019	19	0.62	0.026	26	0.67	0.035	35
650	0.52	0.014	14	0.55	0.018	18	0.59	0.024	24	0.64	0.033	33
700	0.50	0.013	13	0.53	0.017	17	0.57	0.023	23	0.61	0.032	32
750	0.48	0.013	13	0.51	0.017	17	0.55	0.023	23	0.59	0.031	31

Pipe	290 mm ID 14TDE-U			327 mm ID 16TDE-U				368 mm ID 18TDE-U			
20	4.52	0.299	299		4.87	0.410	410		5.25	0.559	559
30	3.63	0.241	241		3.91	0.329	329		4.21	0.448	448
40	3.11	0.206	206		3.35	0.282	282		3.61	0.384	384
50	2.75	0.182	182		2.97	0.250	250		3.20	0.341	341
100	1.89	0.125	125		2.04	0.172	172		2.20	0.234	234
150	1.52	0.101	101		1.64	0.138	138		1.77	0.188	188
200	1.30	0.086	86		1.40	0.118	118		1.51	0.161	161
250	1.16	0.077	77		1.25	0.105	105		1.34	0.143	143
300	1.05	0.070	70		1.13	0.095	95		1.22	0.130	130
350	0.96	0.064	64		1.04	0.087	87		1.12	0.119	119
400	0.90	0.060	60		0.97	0.082	82		1.04	0.111	111
450	0.84	0.056	56		0.91	0.077	77		0.98	0.104	104
500	0.79	0.052	52		0.86	0.072	72		0.92	0.098	98
550	0.75	0.050	50		0.81	0.068	68		0.88	0.094	94
600	0.72	0.048	48		0.78	0.066	66		0.84	0.089	89
650	0.69	0.046	46		0.74	0.062	62		0.80	0.085	85
700	0.66	0.044	44		0.71	0.060	60		0.77	0.082	82
750	0.64	0.042	42		0.69	0.058	58		0.74	0.079	79

Scour damage is likely to occur, maximum safe velocity exceeded (3m/s) Velocity less than that

required to achieve a self-cleansing drainage system (0.8m/s)

TDX

Gradient 1 in	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (I/s)	Discharge Velocity (m/s)	Flow Rate(m³/s)	Flow Rate (I/s)	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (I/s)	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (I/s)
Pipe	400 -	mm ID 16TD	х	450	mm ID 18TD>	(500	mm ID 20TD	x	600	mm ID 24T	X
1	27.86	3.501	3501	30.01	4.773	4773	32.07	6.297	6297	35.97	10.170	10170
2	19.16	2.408	2408	20.64	3.283	3283	22.06	4.331	4331	24.74	6.995	6995
5	11.68	1.468	1468	12.58	2.001	2001	13.45	2.641	2641	15.08	4.264	4264
10	8.04	1.010	1010	8.65	1.376	1376	9.25	1.816	1816	10.37	2.932	2932
20	5.53	0.695	695	5.95	0.946	946	6.36	1.249	1249	7.14	2.019	2019
30	4.44	0.558	558	4.78	0.760	760	5.11	1.003	1003	5.73	1.620	1620
40	3.80	0.478	478	4.09	0.650	650	4.37	0.858	858	4.91	1.388	1388
50	3.37	0.423	423	3.63	0.577	577	3.88	0.762	762	4.35	1.230	1230
100	2.32	0.292	292	2.50	0.398	398	2.67	0.524	524	2.99	0.845	845
150	1.86	0.234	234	2.01	0.320	320	2.14	0.420	420	2.40	0.679	679
200	1.59	0.200	200	1.72	0.274	274	1.83	0.359	359	2.06	0.582	582
250	1.41	0.177	177	1.52	0.242	242	1.63	0.320	320	1.82	0.515	515
300	1.28	0.161	161	1.38	0.219	219	1.47	0.289	289	1.65	0.467	467
350	1.18	0.148	148	1.27	0.202	202	1.36	0.267	267	1.52	0.430	430
400	1.10	0.138	138	1.18	0.188	188	1.26	0.247	247	1.42	0.401	401
450	1.03	0.129	129	1.11	0.177	177	1.18	0.232	232	1.33	0.376	376
500	0.97	0.122	122	1.05	0.167	167	1.12	0.220	220	1.25	0.353	353
550	0.92	0.116	116	0.99	0.157	157	1.06	0.208	208	1.19	0.336	336
600	0.88	0.111	111	0.95	0.151	151	1.01	0.198	198	1.14	0.322	322
650	0.84	0.106	106	0.91	0.145	145	0.97	0.190	190	1.09	0.308	308
700	0.81	0.102	102	0.87	0.138	138	0.93	0.183	183	1.05	0.297	297
750	0.78	0.098	98	0.84	0.134	134	0.90	0.177	177	1.01	0.286	286
Gradient 1 in	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (I/s)	Discharge Velocity (m/s)	Flow Rate(m³/s)	Flow Rate (I/s)	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (I/s)			

Gradient 1 in	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (I/s)	Discharge Velocity (m/s)	Flow Rate(m³/s)	Flow Rate (l/s)	Discharge Velocity (m/s)	Flow Rate (m³/s)	Flow Rate (I/s)
Pipe	750 r	nm ID 30TD	х	900	mm ID 35TD	x	1,050	mm ID 40TI	DX
1	41.40	18.290	18290	46.44	29.544	29544	51.18	44.317	44317
2	28.48	12.582	12582	31.94	20.319	20319	35.20	30.480	30480
5	17.36	7.669	7669	19.47	12.386	12386	21.46	18.582	18582
10	11.94	5.275	5275	13.39	8.518	8518	14.76	12.781	12781
20	8.21	3.627	3627	9.21	5.859	5859	10.15	8.789	8789
30	6.60	2.916	2916	7.40	4.708	4708	8.16	7.066	7066
40	5.65	2.496	2496	6.34	4.033	4033	6.98	6.044	6044
50	5.01	2.213	2213	5.62	3.575	3575	6.19	5.360	5360
100	3.44	1.520	1520	3.86	2.456	2456	4.26	3.689	3689
150	2.77	1.224	1224	3.10	1.972	1972	3.42	2.961	2961
200	2.37	1.047	1047	2.66	1.692	1692	2.93	2.537	2537
250	2.10	0.928	928	2.36	1.501	1501	2.60	2.251	2251
300	1.90	0.839	839	2.13	1.355	1355	2.35	2.035	2035
350	1.75	0.773	773	1.96	1.247	1247	2.16	1.870	1870
400	1.63	0.720	720	1.83	1.164	1164	2.01	1.740	1740
450	1.53	0.676	676	1.71	1.088	1088	1.89	1.637	1637
500	1.44	0.636	636	1.62	1.031	1031	1.79	1.550	1550
550	1.37	0.605	605	1.54	0.980	980	1.70	1.472	1472
600	1.31	0.579	579	1.47	0.935	935	1.62	1.403	1403
650	1.25	0.552	552	1.41	0.897	897	1.55	1.342	1342
700	1.20	0.530	530	1.35	0.859	859	1.49	1.290	1290
750	1.16	0.512	512	1.30	0.827	827	143	1,238	1238



Scour damage is likely to occur, maximum safe velocity exceeded (3m/s)

Velocity less than that required to achieve a self-cleansing drainage system (0.8m/s)

Remote Drainage Installation System

UK Patent No. - 2511821 ROI Patent No. - 86804

Aqua's unique Remote Drainage Installation System enables the installation of track drainage pipe and catch-pits from ground level, reducing the need for engineers to be in the drainage trench excavation.

System offers a number of additional benefits, including:

- 1. Speed of installation can be increased leading to greater productivity per possession.
- 2. Cost of hiring shoring / shuttering materials is reduced / no longer applicable.
- 3. Pipe levels are easily achieved as the pipe can be spot checked at the 'Trench Wheel' and adjusted accordingly.

The system itself comprises two main parts:

A moulded wheel which is used to facilitate the movement of a pipe from ground level to drainage trench, whilst providing support to the drainage pipe and holding it 150mm above the bottom of the trench bed.

As neither the pipe run or the catch-pit will be easily moveable once positioned, the Transfer Coupler provides the adjustability required to enable the connection of the pipe run to the catch-pit. Essentially a rocker pipe, the Transfer Coupler is installed in the catch-pit prior to it being lifted into position.

Pipe Installation

Pipe runs should be constructed at ground level, with a minimum of 2no. wheels per length of pipe (pipe size and weight dependent). Secure fixings should be used to joint each section of pipe.

Once the pipe run is constructed, it can then be rolled into the drainage trench, taking care to use appropriate equipment to control the speed of descent along the run.

Catch-pits

AQUA

Catch-pits can be constructed from any of the options shown on pages 30 to 57 of this brochure, including Preformed sump units, Derby units or Stafford units, which can be positioned within the drainage trench, adjacent to the pipe run. Once positioned, the Transfer Coupler is then pulled across, connecting with the drainage pipe.

Adjusting the Pipe Run

Once positioned in the drainage trench, the position of the pipe can be checked, and the levels adjusted at each of the wheels. The wheels have lifting points which will enable the pipe to be adjusted as necessary to achieve the correct level using the Telescopic Installation Pole.

If required TrenchBox (page 68) can be used to create a safe space within the drainage trench to allow engineers to make any necessary adjustments by hand.

Backfilling



Transfer Coupler

Wheel

Product ID	Product	Product Description	PADs Code
TDK-RDIS-W	Remote Drainage Installation System TDK Wheel	Wheel to suit up to 450mm TDK Pipe 2no. required per length of pipe, state diameter upon request.	TBC
TDE-RDIS-W	Remote Drainage Installation System TDE Wheel	Wheel to suit up to 450mm TDE Pipe MIN 2no. req'd per length of pipe, state type & diameter upon request.	TBC
TDK-RDIS-TC	RDIS TDK Transfer Coupler	TDK Transfer Coupler to suit up to 450mm TDK pipe, state diameter upon request.	TBC
TDE-RDIS-TC-WSC	RDIS TDE Transfer Coupler	TDE Transfer Coupler to suit up to 450mm TDE pipe, state type & diameter upon request.	TBC
RDIS-TIP	RDIS Telescopic Installation Pole	For adjusting/ manipulating wheels & transfer coupler's.	TBC





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Telescopic Pole

Preformed GRP Sump Units

Developed over the past 20+ years, our Glass Reinforced Plastic (GRP) range of catch-pit sumps, raising frames and covers represent a revolutionary development within the field of railway catch-pit design and construction.

Our range of GRP Catch-pit products are:

- 75 90% quicker to install than the equivalent concrete syste
- Available in three different sizes, 'Narrow' ('Matisa' equivalent), 'Luton' and 'Standard'.
- Both Narrow and Standard Sump's and Covers are compatible with concrete frames.



Range of sump unit sizes available to suit a variety of requirement

- Stirling
- Dumam
- Waliulu
- Mini-Stirling
- Luton





1 X Ashford GRP Lockable Lid, Page 48 7 X Narrow Derby GRP Frames, Page 41 1 X Mini-Stirling GRP Catch-pit Sump, Page 35



Width: **735mm** Length: **1,270mm** Total Depth: **1,500mm** 1X Ashford GRP Lockable Lid, Page 48 8 X Derby GRP Frames, Page 41 2 X Rodding Ledges, Page 36 1 X Watford GRP Catch-pit Sump, Page 34

Suggested Standard Installation Detail

All of our drainage catch-pits are intended to be installed as per Network Rail Standard Detail Drawing NR/CIV/SD/351, AQUA - PWD - 20221129 - 1109 - A00 - Typical Catch-pit Installation Detail and as per the below:



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1 X Ashford GRP Lockable Lid, Page 48

1 X Stirling GRP Catch-pit Sump, Page 33

6 X Derby GRP Frames, Page 41

Width: 735mm

Length: 1,270mm

Total Depth: 1,200mm

Lucideon Testing

In 2023 Agua appointed Lucideon to undertake a series of tests to determine the maximum load bearing capacity of each one of the preformed GRP sump units in addition to comparing the performance of the units when used with either a compacted or uncompacted granular fill material.









During this testing procedure we found that the units installed with a compacted fill deflected up to ½ the amount of those installed with an uncompacted fill material, thus proving the importance of properly installing the units as per our Installation Guidance Standard Detail and as per Network Rail Standard Detail NR/CIV/SD/351





To download a copy of the full test report use this QR code visit www.aquafab.co.uk

On removal of the test load, the deflection of the side-wall reduced to 2.82mm for the unit installed in the uncompacted fill. It was determined that this would be related to the fact that the granular surround had been compacted against the unit and was most likely causing this deformation.

Stirling & Durham GRP Sump Unit's

Patent No. - 2542850

- · Stirling: Typically installed as a catch-pit up to 1.2 m deep, sump invert to CL. MAX Inlet/ Outlet hole Ø 320 mm.
- when a larger diameter pipe is required as can accommodate a 450 mm ID TDK pipe (510 mm OD). MAX Inlet / Outlet hole Ø 510 mm.
- Suitable for use with either PCC Raising Frames or Derby GRP

Stirling GRP Sump Unit 0057 / 100740



Int. Depth*



Ext. Depth*

665 mm

*Dimensions are internal excluding wall thickness of unit.

545 mm





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Durham GRP Sump Unit



*Dimensions are internal excluding wall thickness of unit.

Bespoke fabrication such as benching available on request.



Watford & Extra-Deep Watford GRP Sump Unit's

Patent No. - 2542850

- invert to cover level.
- Suitable for use with either PCC Raising Frames or Derby GRP Raising Frames - See page 53 for PCC Raising Frames - See page 41 for Derby GRP Raising Frames.
- Watford: MAX Inlet / Outlet hole Ø 325 mm.
- Extra-Deep Watford: MAX Inlet / Outlet hole Ø 510 mm.
- Can be fitted with Rubber Stone Guards, see page 36, to prevent

Watford GRP Sump Unit 0057 / 100741



Extra Deep Watford GRP Sump Unit 0057 / 101365



*Dimensions are internal excluding wall thickness of unit.



Download Watford technical datasheets, approval certificates and CAD drawings by scanning the **QR Code** or visit www.aquafab.co.uk

Network Rail

Product Approved

PA05 / 04178



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Mini-Stirling & Luton GRP Sump Unit's Patent No. - 2542850

- sump invert to cover level.

- See page 41 for Derby GRP Raising Frames.

- · Luton: MAX Inlet/ Outlet hole Ø 360 mm.

Mini-Stirling Sump Unit 0004 / 103023



Luton GRP Sump Unit 0057 / 101364



*Dimensions are internal excluding wall thickness of unit.





Product Approved PA05 / 04178





Download Mini-Stirling technical datasheets, approval certificates and CAD drawings by scanning the **QR Code** or visit www.aquafab.co.uk





Rubber Stone Guards

Patent No. - 2542850

Factory fitted to suit TDK and TDE pipes, Rubber Stone Guards reduce the ability for the granular fill material to ingress the GRP preformed sump unit during installation. This reduces the time taken on site to install a catch-pit as no additional works are required to 'dig out' any fill material that has accumulated in the catch-pit sump.

		PA05 / 04178
Product	Pipe Size	PADs Code
225 RSG	<225 mm ID TDK Pipe <250 mm OD TDE Pipe	0057 / 101366
300 RSG	<300 mm ID TDK Pipe <355 mm OD TDE Pipe	0057 / 101367
450 RSG	<450 mm ID TDK Pipe <450 mm OD TDE Pipe	0057 / 101368

Network Rail

Product Approved



Rodding Ledges

For use with Watford and Extra-Deep Watford sump units and installed in pairs.

Rodding Ledges sit neatly in a recess either side and at the top of the preformed sump unit to provide a platform for operatives to stand on during installation or maintenance.

Can be used in conjunction with PCC or Derby GRP catch-pit frames.

Must be installed in Watford or Extra-Deep

Download technical datasheets, approval certificates and CAD drawings by scanning the QR Code



Rodding Ledge	PADs Code
Pre-Cast Concrete (PCC)	0004 / 013510
Derby GRP	0057 / 100656

Network Rail

Product Approved PA05 / 04178

Maximum Sump Depths

The following are guidance values only, it is the designers responsibility to check and confirm suitability. Sump depth is calculated as being the maximum depth from pipe invert to sump invert on the 'short end' of the catch-pit. For other pipe sizes or configurations please contact our sales team on 01695 51933 for additional information.

Catch-pit Type	4TDK	6TDK	8TDK	9TDK	12TDK	16TDK	18TDK
Stirling	415 mm	360 mm	309 mm	279 mm	197 mm	N/A	N/A
Durham	870 mm	815 mm	764 mm	734 mm	652 mm	579 mm	499 mm
Watford	400 mm	345 mm	294 mm	264 mm	182 mm	N/A	N/A
Extra-Deep Watford	570 mm	515 mm	464 mm	434 mm	352 mm	279 mm	199 mm
Mini-Stirling	520 mm	465 mm	414 mm	384 mm	302 mm	N/A	N/A
Luton	520 mm	465 mm	414 mm	384 mm	302 mm	N/A	N/A

Catch-pit Type	9TDE-H	10TDE-H	11TDE-H	12TDE-H	14TDE-H	16TDE-H	18TDE-H
Stirling	308 mm	284 mm	255 mm	221 mm	183 mm	N/A	N/A
Durham	763 mm	739 mm	710 mm	676 mm	638 mm	595 mm	547 mm
Watford	293 mm	269 mm	240 mm	206 mm	168 mm	N/A	N/A
Extra-Deep Watford	463 mm	439 mm	410 mm	376 mm	338 mm	295 mm	247 mm
Mini-Stirling	413 mm	389 mm	360 mm	326 mm	288 mm	N/A	N/A
Luton	413 mm	389 mm	360 mm	326 mm	288 mm	N/A	N/A

Catch-pit Type	9TDE-E	10TDE-E	11TDE-E	12TDE-E	14TDE-E	16TDE-E	18TDE-E
Stirling	312 mm	289 mm	261 mm	228 mm	190 mm	N/A	N/A
Durham	767 mm	744 mm	716 mm	683 mm	645 mm	603 mm	556 mm
Watford	297 mm	274 mm	246 mm	213 mm	175 mm	N/A	N/A
Extra-Deep Watford	467 mm	444 mm	416 mm	383 mm	345 mm	303 mm	256 mm
Mini-Stirling	417 mm	394 mm	366 mm	333 mm	295 mm	N/A	N/A
Luton	417 mm	394 mm	366 mm	333 mm	295 mm	N/A	N/A

Catch-pit Type	9TDE-U	10TDE-U	11TDE-U	12TDE-U	14TDE-U	16TDE-U	18TDE-U
Stirling	320 mm	297 mm	270 mm	238 mm	202 mm	N/A	N/A
Durham	775 mm	752 mm	725 mm	693 mm	657 mm	616 mm	570 mm
Watford	305 mm	282 mm	255 mm	223 mm	187 mm	N/A	N/A
Extra-Deep Watford	475 mm	452 mm	425 mm	393 mm	357 mm	316 mm	270 mm
Mini-Stirling	425 mm	402 mm	375 mm	343 mm	307 mm	N/A	N/A
Luton	425 mm	402 mm	375 mm	343 mm	307 mm	N/A	N/A

		RI

Derby GRP Catch-pit System

The Derby Catch-pit Frame (PA05 / 04178) was designed and developed to not only be used as an alternative to PCC catch-pit frames when being used with Aqua's preformed GRP sump units, but to be an alternative solution to the traditionally built PCC catch-pit system; this would typically comprise 3no. base slabs combined with a selection of raising frames, ½ frames and lid/ cover of some type, latterly blue grated GRP.

Derby GRP Catch-pit Frame Testing

Created as a lightweight, easy to handle alternative to Pre-Cast Concrete Catch-pit Frames, the Derby range of GRP Catch-pit Frames offers a stronger, quicker to install alternative to PCC frames, ideally suited for both maintenance and project use.

A series of tests have been undertaken including:

- Birmingham University School of Engineering test for the suitability of catch-pits constructed entirely of Derby GRP Frames.
- Exova, Lancaster Flexural Testing of Derby GRP Catch-pit Frames.
- Comparative Testing of Derby GRP frames vs. three alternative solutions:





The Derby system can either be installed comprising individual frames or with the lowest frames factory processed into a single piece (Deepdale) using a chopped glass fibre strand & polymer resin mix.

Derby Catch-pit Frames can be used in a variety of ways:

- 1. In combination with preformed sump units.
- 2. As a stand alone modular system Page 44.
- 3. As a factory manufactured formed sump unit with modular raising frames. - Page 46.
- 4. As a factory formed single piece chamber.

Manufactured to suit a range of applications, Derby profile is pultruded in two different depths (115 mm and 225 mm) in a maximum of 5m lengths to enable the construction of catch-pits and manholes quickly and easily.

Derby profiles are formed in to a variety of different sized frames (see page 41 for standard sizes or page 43 for BS EN 752 compliant sizes) or they can be used to manufacture bespoke sizes to suit project specific requirements.



Download technical datasheets, approval certificates and CAD drawings by scanning the QR Code







Derby Modular Chamber Testing

As the Derby system can also be used as a complete modular Catch-pit (see page 44) or as a factory manufactured base unit (Deepdale, see page 46), testing has also been undertaken of the units when configured in this way to give piece of mind when specifying.







Derby Deepdale Chamber Testing

Deepdale testing was undertaken by Lucideon, a UKAS accredited testing house, to determine the deflection sustained at 60KPa loading (c/w 200mm wide granular surround), for units with both 2no. and 4no. entries.

Additionally, an ultimate load test was undertaken to determine the maximum permissible load:



- York Adaptor, see page 52.



Prod. ID	Ext. Length (A)	Ext. Width (B)	Int. Length	Int. Width	Depth (C)	Weight	PADs Code
			Standard Derby	Catch-pit Frames			
SD115	1,270 mm	735 mm	1,140 mm	605 mm	115 mm	16 Kg	0057 / 100650
SD225	1,270 mm	735 mm	1,140 mm	605 mm	225 mm	24 Kg	0057 / 100651
			Narrow Derby C	atch-pit Frames			
ND115	1,035 mm	575 mm	905 mm	445 mm	115 mm	13 Kg	0057 / 100654
ND225	1,035 mm	575 mm	905 mm	445 mm	225 mm	19.5 Kg	0057 / 101359
			Luton Derby Ca	atch-pit Frames			
LD115	1,270 mm	575 mm	1,140 mm	445 mm	115 mm	15 Kg	0057 / 101360
LD225	1,270 mm	575 mm	1,140 mm	445 mm	225 mm	22 Kg	0057 / 101361
		Oxste	ead Derby Extra N	arrow Catch-pit Fr	ames		
OD115	1,035 mm	500 mm	905 mm	315 mm	115 mm	12 Kg	N/A
OD225	1,035 mm	500 mm	905 mm	315 mm	225 mm	18 Kg	N/A

NOTE: Oxstead Derby Extra Narrow Catch-pit frames do not posses full Product Approval as Network Rail consider all catch-pits with a smallest dimension less than 600mm to be 'non-standard' and therefore approval should be sort though inclusion in the formal scheme specific design as a site specific solution.





To download a copy of the full test report use this QR code or visit www.aquafab.co.uk





certificates and CAD drawings by scanning the QR Code or visit www.aquafab.co.uk

BS EN 752 Compliant Derby Catch-pits

As noted on Network Rail Standard Catch-pit Detail drawing NR/CIV/SD/351 sizes of manholes and openings should be in accordance with Table NA.23 'Recommended Dimensions for the Construction of Manholes (with personnel entry)' of British Standard BS EN 752:2008 (since updated to 752:2017) for safe work in confined spaces, where personnel entry is required.

Utilising the Derby GRP system, we can manufacture and offer the following sizes of frame which can be used to construct a modular, Deepdale or single piece chamber (see page 46).

<1.5				REGIGEED				>1.5			
DEEP		BS EN 752:2017 0	Catch-pit Frames –	Depth to pipe soffi	t from cover level <	1.5 m		DEEP		BS EN 752:2017 (Catch-pit Fram
Pipe Ø	Prod. ID	Ext. Length	Ext. Width	Int. Length	Int. Width	Depth	Weight	Pipe Ø	Prod. ID	Ext. Length	Ext. Widtl
	1,330 x 1,130 Base					127 mm	25 Kg		1,330 x 805 Base		
	1,330 x 1,130 D115					115 mm	20 Kg		1,330 x 805 D115		
<dn225< td=""><td>1,330 x 1,130 D225</td><td>1,330 mm</td><td>1,130 mm</td><td>1,200 mm</td><td>1,000 mm</td><td>225 mm</td><td>29 Kg</td><td><dn225< td=""><td>1,330 x 805 D225</td><td>1,330 mm</td><td>805 mm</td></dn225<></td></dn225<>	1,330 x 1,130 D225	1,330 mm	1,130 mm	1,200 mm	1,000 mm	225 mm	29 Kg	<dn225< td=""><td>1,330 x 805 D225</td><td>1,330 mm</td><td>805 mm</td></dn225<>	1,330 x 805 D225	1,330 mm	805 mm
	1,330 x 1,130 D450					450 mm	58 Kg		1,330 x 805 D450		
	1,330 x 1,130 D575					575 mm	100 Kg		1,330 x 805 D575		
	1,330 x 1,205 Base					127 mm	25 Kg		1,330 x 880 Base		
	1,330 x 1,205 D115					115 mm	20 Kg		1,330 x 880 D115		
<dn300< td=""><td>1,330 x 1,205 D225</td><td>1,330 mm</td><td>1,205 mm</td><td>1,200 mm</td><td>1,075 mm</td><td>225 mm</td><td>30 Kg</td><td><dn300< td=""><td>1,330 x 880 D225</td><td>1,330 mm</td><td>880 mm</td></dn300<></td></dn300<>	1,330 x 1,205 D225	1,330 mm	1,205 mm	1,200 mm	1,075 mm	225 mm	30 Kg	<dn300< td=""><td>1,330 x 880 D225</td><td>1,330 mm</td><td>880 mm</td></dn300<>	1,330 x 880 D225	1,330 mm	880 mm
	1,330 x 1,205 D450					450 mm	60 Kg		1,330 x 880 D450		
	1,330 x 1,205 D575					575 mm	100 Kg		1,330 x 880 D575		
	1,480 x 1,355 Base					127 mm	28 Kg		1,480 x 1,030 Base		
	1,480 x 1,355 D115					115 mm	23 Kg		1,480 x 1,030 D115		
<dn450< td=""><td>1,480 x 1,355 D225</td><td>1,480 mm</td><td>1,355 mm</td><td>1,350 mm</td><td>1,225 mm</td><td>225 mm</td><td>34 Kg</td><td><dn450< td=""><td>1,480 x 1,030 D225</td><td>1,480 mm</td><td>1,030 mm</td></dn450<></td></dn450<>	1,480 x 1,355 D225	1,480 mm	1,355 mm	1,350 mm	1,225 mm	225 mm	34 Kg	<dn450< td=""><td>1,480 x 1,030 D225</td><td>1,480 mm</td><td>1,030 mm</td></dn450<>	1,480 x 1,030 D225	1,480 mm	1,030 mm
	1,480 x 1,355 D450					450 mm	68 Kg		1,480 x 1,030 D450		
	1,480 x 1,355 D575					575 mm	115 Kg		1,480 x 1,030 D575		
	1,630 x 1,605 Base					127 mm	31 Kg		1,,630 x 1,280 Base		
	1,630 x 1,605 D115					115 mm	26 Kg		1,630 x 1,280 D115		
<dn700< td=""><td>1,630 x 1,605 D225</td><td>1,630 mm</td><td>1,605 mm</td><td>1,500 mm</td><td>1,475 mm</td><td>225 mm</td><td>39 Kg</td><td><dn700< td=""><td>1,630 x 1,280 D225</td><td>1,630 mm</td><td>1,280 mm</td></dn700<></td></dn700<>	1,630 x 1,605 D225	1,630 mm	1,605 mm	1,500 mm	1,475 mm	225 mm	39 Kg	<dn700< td=""><td>1,630 x 1,280 D225</td><td>1,630 mm</td><td>1,280 mm</td></dn700<>	1,630 x 1,280 D225	1,630 mm	1,280 mm
	1,630 x 1,605 D450					450 mm	78 Kg		1,630 x 1,280 D450		
	1,630 x 1,605 D575					575 mm	130 Kg		1,630 x 1,280 D575		

These chambers can be supplied with a variety of lid options, including grated or solid GRP. Please speak with our sales team on 01695 51933 to discuss your requirements.



es – Dept

to pipe soffi	from cover level >	1.5 m	
nt. Length	Int. Width	Depth	Weight
		127 mm	22 Kg
		115 mm	17 Kg
l,200 mm	675 mm	225 mm	26 Kg
		450 mm	52 Kg
		575 mm	85 Kg
		127 mm	23 Kg
1,200 mm		115 mm	18 Kg
	750 mm	225 mm	26 Kg
		450 mm	52 Kg
		575 mm	90 Kg
		127 mm	25 Kg
		115 mm	20 Kg
1,350 mm	900 mm	225 mm	30 Kg
		450 mm	60 Kg
		575 mm	100 Kg
		127 mm	28 Kg
		115 mm	23 Kg
1,500 mm	1,150 mm	225 mm	35 Kg
		450 mm	70 Kg
		575 mm	115 Kg



Modular Derby Chambers

Using the Patented Derby system, catch-pits can be easily constructed on site in a modular fashion utilising a pre-fabricated pipe entry section to facilitate the required inlet/outlet configuration, in combination with Derby raising frame and base sections.

Modular sections are:

- Suitable for use with 1no, 2no., 3no. Or 4no. Pipe entries.
- Suitable for use with Standard, Narrow, Luton or Oxstead Catch-pit Frames, see page 41.
- Suitable for use with TDK, TDE-H, TDE-E or TDE-U drainage pipe, see page 10.
- or Cardiff catch-pit lids, see page 48/49.

Network Rail

CONTACT **OUR SALES TEAM** TO DISCUSS YOUR REQUIREMENTS **IN DETAIL**

Product Approved

PA05 / 04178













Narrow Derby Modular Base Section



Prod. ID	Description	PADs Code	Weight
SD125	Standard Base	0057 / 100655	31 Kg
ND125	Narrow Base	TBC	23 Kg
LD125	Luton Base	TBC	26 Kg
OD125	Oxstead Base	TBC	20 Kg



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Deepdale Derby Chambers

Also utilising the Patented Derby system, Deepdale Derby Chambers are an evolution of the Modular Derby system, allowing the construction of single piece base units, incorporating the modular pipe entry and base sections seen on page 44, for an even simpler construction process.

Deepdale Derby Chambers can also be supplied as a complete, single piece chamber for ease of installation. These chambers are supplied complete with cover assemblies.

Deepdale Derby Chambers are available in all standard sizes -Standard, Narrow, Luton or Oxstead or can be manufactured from profile sections up to 5m long, to facilitate the manufacture of a site-specific size of chamber.

- Base units are typically supplied with pre-cut inlets & outlets & lifting lugs.
- Single piece chambers are typically supplied with pre-cut inlets & outlets, lid assemblies inc. seating frames and lifting lugs.

Units can be supplied complete with a variety of additional options including:

• Stone Guards, Adjustable Stone Guards or Pipe spigots

- False floors
- Standard or Anti-float Base

Download technical datasheets, approval certificates and CAD drawings by scanning the QR Code



CASE STUDY

Colchester Bespoke Chambers

In 2022 we were approached by the contractor working on the Colchester Depot upgrade to see if we could provide a chamber solution for the Fuel UTX that they needed to construct.

Utilising the Deepdale Derby system, a configuration was determined for the supply of 1no. 2m x 3m x 4m deep and 1no. 2m x 2m x 3.5m deep both complete with composite lids, ladders, false floors, sumps, and pre-cut inlets for various services.

Ashford GRP Catch-pit Lids

Patent No. - 2446401

Manufactured from 38 mm x 38 mm GRP grating in Sky Blue (RAL5015), Ashford GRP catch-pit lids offer a highly visible and extremely durable catch-pit lid solution.

Ashford GRP Catch-pit Lids are:

- · 'L' Brackets for use with Precast Concrete (PCC) Frames, see page 53.

Maximum sustained uniformly distributed load:

Grated GRP Lid 25mm deep, 38x38mm square mesh, gritted anti-slip surface

		Load (kN/m)					
	2.5	3	5	10	25		
Span (mm)		Def	lection (r	nm)			
300	0	0.1	0.2	0.8	1		
400	0	0.1	0.2	0.4	1.1		
500	0	0.1	0.1	0.4	1.6		
600	0.1	0.1	0.5	1.3	3.3		
700	0.1	0.2	0.7	2	5.4		
800	0.2	0.4	1.1	2.6	8.7		
900	0.5	0.6	1.8	4.4	12.8		
1000	0.4	0.7	2.4	5.9	18.2		

Grated GRP Lid 38mm deep, 38x38mm square mesh, gritted anti-slip surface

	Load (kN/m)				
	2.5	3	5	10	25
Span (mm)		Def	lection (I	nm)	
300	0	0	0.1	0.1	0.3
400	0	0	0.1	0.3	0.5
500	0	0	0.1	0.2	0.7
600	0	0	0.1	0.1	1.2
700	0	0	0.3	0.7	2.7
800	0	0	0.1	0.9	3.2
900	0.1	0.6	0.4	1.7	4.9
1000	0.1	0.7	0.2	1.7	6.8
1100	0.1	0.8	0.8	2.8	10.3
1200	0.3	0.7	1.6	4.1	14.6
1300	0.7	1.1	2.1	5.7	18.8
1400	0.1	0.5	2	6.7	23.8

suitable for use as deflection is less than span divided by 200

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FLAT BRACKET

'L' BRACKET

Replacement locking brackets			
Product Description		PADs Code	
ASH25-LLB	Pair, L Brackets & fixings to suit 25 mm thk. lid	0057 / 100855	
ASH25-FLB	Pair, Flat Brackets & fixings to suit 25 mm thk. lid	0057 / 100862	
ASH38-LLB	Pair, L Brackets & fixings to suit 38 mm thk. lid	0057 / 100858	
ASH38-FLB	Pair, Flat Brackets & fixings to suit 38 mm thk. lid	0057 / 100861	

Network Rail

• Solid top gritted or Durbar effect lids are also available on request.

Product Approved

PA05 / 04178

Standard – to suit 1,270 x 735 mm Ext. Raising Frames			
Product	Weight		
STDASH25-LLB	25 mm thick & 'L' Brackets	0057 / 100834	
STDASH25-FLB	25 mm thick & 'Flat' Brackets	0057 / 100860	12 Kg
STDASH25	25 mm thick, NO Brackets	0057 / 100854	
STDASH38-LLB	38 mm thick & 'L' Brackets	0057 / 100856	
STDASH38-FLB	38 mm thick & 'Flat' Brackets	0057 / 100859	20 Kg
STDASH38	38 mm thick, NO Brackets	0057 / 100857	

Narrow – to suit 1,035 x 575 mm Ext. Raising Frames				
Product	Weight			
NARASH25-LLB	25 mm thick & 'L' Brackets	0057 / 100853		
NARASH25-FLB	25 mm thick & 'Flat' Brackets	0057 / 101350	8 Kg	
NARASH25	25 mm thick, NO Brackets	0057 / 101351		
NARASH38-LLB	38 mm thick & 'L' Brackets	0057 / 101352		
NARASH38-FLB	38 mm thick & 'Flat' Brackets	0057 / 101353	12 Kg	
NARASH38	38 mm thick, NO Brackets	0057 / 101354		

Luton – to suit 1,270 x 575 mm Ext. Luton Derby Frames ONLY			
Product	Weight		
LUTASH25-FLB	25 mm thick & 'Flat' Brackets	0057 / 101355	10 1/-
LUTASH25	25 mm thick, NO Brackets	0057 / 101356	IU Kg
LUTASH38-FLB	38 mm thick & 'Flat' Brackets	0057 / 101357	141/-
LUTASH38	38 mm thick, NO Brackets	0057 / 101358	14 Kg

Cardiff Hinged Catch-pit Lid

Specially developed at the request of Network Rail, the Cardiff Hinged Catch-pit Lid offers a considerable increase in ease of access for inspection and maintenance, coupled with a safety improvement over the standard Ashford type catch-pit lid. Incorporating heavy duty stainless steel hinges

and a secure clasp system for locking the lid sections in place, Cardiff lids are ideal for use in the Cess - with lid opening away from track.





Standard – to suit 1,270 x 735 mm Ext. Raising Frames				
Description	Weight			
25 mm thick to suit GRP (Derby) Catch-pit	thick to suit GRP (Derby) Catch-pit 0057 / 101433			
25 mm thick to suit Concrete (PCC) Catch-pit	0057 / 101434	ZONY		
38 mm thick to suit GRP (Derby) Catch-pit	0057 / 101435	461/~		
38 mm thick to suit Concrete (PCC) Catch-pit	0057 / 101436	40 Kg		

Luton – to suit 1,270 x 575 mm Ext. Raising Frames				
Description PADs Code Weigh				
25 mm thick to suit GRP (Derby) Catch-pit	0057 / 101441	25 Kg		
38 mm thick to suit GRP (Derby) Catch-pit	0057 / 101442	29 Kg		



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Cardiff Lids are:

- Narrow & Luton Catch-pits.
- Supplied complete with a suitable

Narrow – to suit 1,035 x 575 mm Ext. Raising Frames				
Description	Weight			
25 mm thick to suit GRP (Derby) Catch-pit	0057 / 101437	011/2		
25 mm thick to suit Concrete (PCC) Catch-pit	0057 / 101438	ZINY		
38 mm thick to suit GRP (Derby) Catch-pit	0057 / 101439	0E Ka		
38 mm thick to suit Concrete (PCC) Catch-pit	0057 / 101440	25 Kg		

Coming Soon

diff Lids for 6

Replacement locking brackets			
Description	PADs Code		
Pair, Brackets & fixings to suit 25 mm thk. lid & GRP Frames	0057 / 101443		
Pair, Brackets & fixings to suit 25 mm thk. lid & PCC Frames	0057 / 101444		
Pair, Brackets & fixings to suit 38 mm thk. lid & GRP Frames	0057 / 101445		
Pair, Brackets & fixings to suit 38 mm thk. lid & PCC Frames	0057 / 101446		

Galvanised Steel Anti-vandal Lids

Manufactured from 5mm thick flat bar or Durbar sheet, Aqua Anti-vandal Catch-pit lids have been in use since prior to Railtrack and Network Rail's formulation. All lids are galvanised in accordance with EN ISO 1461:2009.

Although designed for use with precast concrete (PCC) catch-pit frames, Anti-vandal lids can be fitted to Derby GRP frames by removing the 'L' bracket and using 1no. M8 x 25 mm bolt instead.

AQUA



Product	Description	Dimensions	PADs Code	Weight
	Standard – to suit 1,270 x 7	'35 mm Ext. Rais	ing Frames	
Grated A-V	Grated Galvanised Steel Anti-vandal Catch-pit Lid complete with Locking Bracket assembly	1,290 mm Long 745 mm Wide 25 mm Thick	0057 / 100742	28 Kg
Solid A-V	Solid Galvanised Steel Anti-vandal Catch-pit Lid complete with Locking Bracket assembly	1290 mm Long 750 mm Wide 50 mm Thick	0057 / 100743	38 Kg

Matisa – to suit 1,050 x 735 mm Ext. Raising Frames

MAT A-V	Grated Galvanised Steel Anti-vandal Catch-pit Lid complete with Locking Bracket assembly	1,032 mm Long 580 mm Wide 25 mm Thick	0057 / 100833	20 Kg
Half A-V	Grated ½ Size Galvanised Steel Anti-vandal Catch-pit Lid complete with Locking Bracket assembly (2no. required per chamber)	510 mm Long 580 mm Wide 25 mm Thick	0057 / 100832	11 Kg

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Crewe Adaptor

Designed to enable the transition from a Standard (PCC or GRP) catch-pit to Narrow (Matisa PCC or Narrow Derby GRP), Crewe adaptors are ideally suited for locations where obstructions are experienced at ground level, such as a trough route, resulting in the need to reduce the footprint of the catch-pit chamber.

Crewe Adaptors are:

- Suitable for use with lightweight Derby GRP catch-pit
- same catch-pit.

Product	Description Dimensions		PADs Code
CA-CON	Concentric (Centralised)	175 mm deep upper sleeve 235 mm deep lower sleeve	0057 / 100640
CA-ECC	Eccentric (Offset)	175 mm deep upper sleeve 235 mm deep lower sleeve	0057 / 100640

NOTE: Crewe Adaptors must NOT be used to facilitate the installation of track over catch-pits/ catch-pits under track

Bespoke Crewe Adaptors

As with most things railway related, 'standard' isn't always the same from region to region depending on when the infrastructure was first constructed, what subsequent maintenance has involved and the current requirements for the infrastructure.

As such, we are able to offer a range of bespoke solutions using the standard premise of a Crewe Adaptor to facilitate the provision of site specific solutions.

Bespoke solutions have been supplied to a number of schemes including Kings Cross Remodelling, Castle Cary and Sevenoaks Tunnel to name but a few.

Bespoke solutions can be fabricated in Steel, GRP or HDPE.



To discuss your specific requirements please contact our sales team on 01695 51933.

Find out more about our products by visiting www.aquafab.co.uk





Liverpool Lime Street Off-set Reducing Crewe A







Lightweight Derby frames (see page 41) can then be used to rebuild the catch-pit to its desired height and the lid re-instated

Replacement Lid Locking Brackets will be required as the PCC frames use an 'L' bracket whilst Derby GRP frames use a 'Flat' bracket:

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Pi
ASI
ASI

Replacement Ashford grp catch-pit lid locking brackets							
Product	Description	PADs Code					
ASH25-FLB	Pair, Flat Brackets & fixings to suit 25 mm thk. lid	0057 / 100862					
ASH38-FLB	Pair, Flat Brackets & fixings to suit 38 mm thk. lid	0057 / 100861					

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Matisa

Matisa

Catch-pit Base

0004 / 104511

Catch-nit Frame

0004 / 131230

53

Replacement ashford grp catch-pit lid locking brackets									
Description	Length	Width	Depth	PADs Code	Weight				
Narrow Lid Section 2no. required per pit	520 mm	575 mm	47 mm	0004 / 104512	36 Kg				
Narrow Raising Frame	1,035 mm	575 mm	115 mm	0004 / 131230	54 Kg				
Narrow ½ Raising Frame	1,035 mm	115 mm	115 mm	0004 / 104513	35 Kg				
Narrow Base Section 2no. required per pit	520 mm	575 mm	75 mm	0004 / 104511	56 Kg				

*This applies to pipe entries on the short end only, for catch-pits constructed using the appropriate sized ½ Frame



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Stafford Hybrid Catch-pits

Although rectangular catch-pits are the 'norm' they aren't always the most effective or efficient solution.

Stafford Hybrid Catch-pits are the most flexible catch-pit system available, combining the benefits of a modular construction with the ease of a bespoke manufactured solution, delivered in 'off-the-shelf' timescales.





Through the use of the circular base unit, Stafford Hybrid Catch-pits can accommodate larger diameter pipes than traditional rectangular catch-pits, larger variations in invert levels for incoming and outgoing pipes and unlike rectangular chambers, which can only accept pipes on their four flat faces, Stafford's can be manufactured to suit incoming and outgoing pipes at any angle!

Typically available in three different diameters, Stafford base units are manufactured from a strong and durable, yet light, High Density Polyethylene (HDPE) Tubular section with exceptional chemical and UV resistance.

All units supplied for installation with Derby GRP frames are complete with a 5mm thick steel transition frame, allowing for quick and easy adjustment of the base unit height on site.

All units supplied for installation with PCC frames are 'notched' in the factory to allow the first frame to be installed flush with the top of the base unit.

All Stafford's, regardless of frame type, are 4 kN Ring Stiffness and are supplied complete with HDPE stone guards to prevent ingress of granular material at the point of transition from circular to rectangular form.

Stafford units can also be supplied with:

- Anti-floatation skirts for increased stability/ ease of installation.

	Description	Standard Concrete	Narrow Concrete	Standard GRP	Na G
S60	600 mm ID / 675 mm OD	×	✓	×	
S80	750 mm ID / 838 mm OD	~	~	~	
S100	900 mm ID / 1000 mm OD	v	×	v	

Somerton Hybrid Catch-pits

Stafford units can:

25 15

- Be installed in the 'Cess' or '6ft'.
- Be manufactured to virtually any depth to suit
- Be constructed with precast concrete (PCC)

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In addition to the standard Stafford Hybrid Catch-pits, Aqua can also manufacture 'Ultra Duty' versions of this same chamber, using a much stronger solid wall raw material.

The Somerton is ideally suited to much more onerous ground conditions/ installation locations as it utilises a much higher ring stiffness value - 66 kN instead of 4 kN.

Suitable for use with PCC and GRP raising frames, diameters available include:



Product	ID	OD
SHC-60	458 mm	560 mm
SHC-65	515 mm	630 mm
SHC-70	581 mm	710 mm
SHC-80	655 mm	800 mm
SHC-90	736 mm	900 mm





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SE Circular Catch-pit

A fabricated double skinned tubular section catch-pit/ manhole unit manufactured to suit site specific depth requirements and typically supplied complete with lid & frame assembly, precut inlet/ outlet holes and standard or Anti-floatation Base.

Manufactured from 4 kN Ring Stiffness PE100 HDPE, these units are suitable for use as both track and off-track drainage catch-pits and manholes and offer a lightweight, quicker and easier to install alternative to traditional concrete chambers.

SE Circular catch-pits...

Vetwork Rail **Product Approved** PA05 / 06247

Chamber Sizes and Lid options

AQUA

Prod ID	ID	OD	PADs Code	Solid Steel	Grated Steel	Solid GRP	Grated GRP	C250 [#]	D400 [#]	Weight* ²
SE40	400 mm	450 mm	-	~	~	~	~	~	~	13 Kg / m
SE45	450 mm	500 mm	-	~	~	~	~	~	~	16 Kg / m
SE50	500 mm	560 mm	-	~	~	~	~	~	~	22 Kg / m
SE60	600 mm	680 mm	0057 / 100754	0057 / 100817*	0057/025060	~	0057 / 025061	~	~	26 Kg / m
SE80	750 mm	838 mm	0057 / 100748	✓*	~	~	~	~	~	36 Kg / m
SE100	900 mm	1,000 mm	-	✓*	~	~	~	~	~	48 Kg / m
SE1050	1,050 mm	1,169 mm	-	✓*	~	~	~	~	~	56 Kg / m
SE1200	1,200 mm	1,315 mm	-	✓*	~	~	~	~	~	90 Kg / m
SE1350	1,350 mm	1,510 mm	-	✓*	~	~	~	~	~	94 Kg / m
SE1500	1,500 mm	1,660 mm	-	~	~	~	~	~	~	140 Kg / m

*Typically supplied complete with a PCC Cover Slab and the chosen lid type. *B125 Rated. *2 Chamber body only excluding lid, base or spigots

Typical SE Lid / Cover Options



Alternative Lid / Cover Assemblies

A variety of alternative lid options are available including multiple material types and shapes, depending on the installation location requirements. Options include steel and composite products in either a square or circular form, including recessed

options for tactiles/ block paving. To discuss, your specific requirements please get



Hydrobrakes & Benching

SE Circular Catch-pits can be factory fitted with Hydrobrakes and/ or benching to suit site specific requirements.

All fabrication work is undertaken in house with design drawings issued for customer sign-off prior to any fabrication work taking place.

To discuss your specific requirements please get in touch with our sales team on 01695 51933.



in touch with our sales team on 01695 51933.

Find out more about our products by visiting www.aquafab.co.uk



Bespoke Manufacturing

Our capabilities include pump, soakaway, and restricted access chambers in addition to being able to manufacture a range of chambers larger in diameter than those shown opposite, incl.:

1,650 mm ID / 1,815 mm OD 1,800 mm ID / 1,981 mm OD 2,000 mm ID / 2,200 mm OD 2,100 mm ID / 2,320 mm OD 2,200 mm ID / 2,445 mm OD

2,400 mm ID / 2,669 mm OD 2,500 mm ID / 2,769 mm OD 2,600 mm ID / 2,869 mm OD 2,800 mm ID / 3,069 mm OD 3,000 mm ID / 3,323 mm OD

To discuss, your specific requirements please get in touch with our sales team on 01695 51933.



Replacement Lids for Non-SE Chambers

As a manufacturer, it is possible for us to supply lid options for non-SE chambers. To discuss, your specific requirements please get in touch with our sales team on 01695 51933.

Description	PADs Code
695 mm Ø Circular HDPE Catch-pit Lid	0057 / 101430
720 mm Ø Circular HDPE Catch-pit Lid	0057 / 101432

Above Ground Drainage Materials

Although typically known for our below ground drainage products, a wide range of above ground drainage materials are now available from Aqua.



We are proud to introduce three innovative alternatives to traditional concrete products:

Aqualine Drainage Trough

Lighter, easier to manhandle and install than their concrete contemporaries and therefore safer and more environmentally friendly to use.

These new, innovative composite products utilise the latest composite materials and manufacturing techniques to provide designers and engineers with the tools they need to address commonly experienced drainage issues nationwide.

Additionally, solutions are now available for lining and protecting drainage outfall's and ditches (see Erosion Control & Soil Stabilisation on Page 116 onwards) using new and innovative materials and techniques.



GRP Gratings for PCC Channel Drains

Channel drains can be the most effective means of dealing with surface water run off, especially in cuttings, as water can be quickly and efficiently collected and diverted to an outfall, without the need for the penetration of a granular layer, which during periods of intense rainfall can become quickly overwhelmed.

PCC channel drain is a common site on the rail network, however over the years the concrete cover sections have been broken or misplaced. Should the channel drain itself be structurally sound, Aqua's range of GRP gratings can be a cost effective solution to remediate the existing asset without the timely and costly expense of renewing the entire system.



• Manufactured from 38 x 38 mm (30 x 30 mm Clear Opening) GRP grating, these concrete lid traditionally employed.



Colour	Length	PADs Code	Weight
Light Grey Sky Blue	600 mm Long	0111 / 120862	2 Kg
Light Grey Sky Blue	1,200 mm Long	0111 / 120863	4 Kg









Aqualine Drainage Trough

An innovative alternative to traditional concrete drainage channel/trough, Aqualine is manufactured from approx. 7 mm thick chopped strand Glass Fibre and a polymer resin, which is manufactured by one of the worlds leading suppliers and has been sufficiently tested to achieve Lloyd's Register Shipping Approval for all marine and boat applications and WRAS (Water Regulations Advisory Scheme) Approval (suitable for use with potable water) and is used extensively in water tank construction and water treatment applications.

Aqualine Dimensions

letwork Rail

Product Approved

Pending

	Width	Depth	Length	Solid GRP Cover	Grated GRP Cover	PADs Code	
AL15	150 mm	150 mm	2,000 mm	~	~	TBC	
AL25	250 mm	250 mm	2,000 mm	~	~	TBC	
AL35	350 mm	300 mm	2,000 mm	~	~	TBC	
AL60	600 mm	600 mm	2,000 mm	~	~	TBC	

Aqualine Bend Dimensions

	Angle	Length	Solid GRP Cover	Grated GRP Cover	PADs Code	v
AL15	10°	~450 mm	~	~	TBC	
AL25	10°	~450 mm	~	~	TBC	
AL35	10°	~450 mm	~	~	TBC	
AL60	10°	~450 mm	~	~	TBC	

Typical Installation Detail, as per NR/CIV/SD/322







Base As per NR/CIV/SD/322, and

Additional Fire Testing Summary

Multiple fire tests were conducted on the Aqualine trough at the premises of Aqua Fabrications to ascertain the degree of resistance of the product. There were three tests completed on the trough and four on the lid. The tests consisted of a flash fire, a slow burn low heat/flame and a high heat high flame intense burn. These were completed on both sections of the product. The fourth test consisted of a sustained intense fire to the underside of the lid.

Additionally, Aqualine is...

- and BS EN ISO 11925-2:2020.
- · Load tested in accordance with BS EN 124 and subsequently A15 rated.

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AQUA

AR AR AR 101



Additional Options Perforations: Perforated to order, on both or either side with 10 mm Ø perforations as per the below perforation pattern. Wall Bracket AS REQUIRED

THREADED HOLE TO SUIT M8 SPACER BAR

4no. FIXINGS HOLES TO SUIT M10 BOLTS. SUITABLE BOLTS TO BE SUPPLIED BY OTHERS.

TBC TBC

TBC

TBC

Ground Level Erosion Control/ Protection Membrane

As per NR/CIV/SD/322, and/or as determined suitable by Design Engineer or Network Rail Engineer.

or as determined by Design Engineer or determined by Design Engineer or Network Rail Engineer to enable installation at correct level/ fall & to prevent undermining during flood events.



In conclusion, after subjecting the Aqualine trough and lid to a series of fire tests it can be concluded that a flammable liquid which has a fast burn rate has very little effect on the material. The slow burn and moderate heat test resulted in some slight damage, and scorch marking. The prolonged high heat and temperature test on the trough produced damage to the unit as the flame ignited part of the trough, this then moved in an upward direction as the trough needed sustained heat and flame to continue to burn. When this sustained period was no longer achievable the material failed to continue to burn and eventually the fire was extinguished.

A full copy of the test report can be found on our website.

Hi-Pact HDPE DitchLinner®

Manufactured from UV stabilised 5 mm thick high impact high density polyethylene (HDPE), Hi-Pact DitchLinner is the ideal product to remediate lineside drainage ditches, embankment toe and crest drains or anywhere else a drainage ditch is employed.



Network Rall

Product Accepted

Preventing the drainage ditch from becoming clogged with detritus and vegetation, Hi-Pact DitchLinner ensures a full flow of water which in turn means constant drainage of the surrounding catchment. It also prevents in-ditch erosion; protecting the banks of the ditch and stopping silt build up along the course. The fact that the area is properly drained also prevents rainfall and surface water from undermining the integrity of railway especially in cuttings or as part of an embankment drainage system.

The product is supplied as either a smooth or corrugated section, the former provides a clear flowing channel which ensures fast drainage for sodden areas, whilst the latter reduces the velocity to attenuate the flow thus preventing bottleneck build-up.







Ifield Cess Drainage Ditch - Before, During & After Installation

Typical Installation Detail:

- as Gripple TL-A3 or similar.



Registered Design - 002596080-0001 & 0002 Patent No. - 2523112



Prod. ID	Description	DIM A	DIM B	DIM C	PADs Code	Weight
DL-RB-S	Corrugated Profile, 2m Length c/w Fixing Screws	1,200 mm	600 mm	300 mm	0111 / 109644	14 Kg
DL-SM-S	Smooth Profile, 2m Length c/w Fixing Screws	1,200 mm	600 mm	300 mm	0111 / 109650	12 Kg
DL-LB	Fixing Screws, 3no. Per Set	-	-	-	0111 / 109656	N/A
DL-SSLC	GRP Securing Stake c/w S/S Locking Clamp	8 mm Ø x 1,000 mm Long			0111 / 109658	1 Kg
DL-STAKE	GRP Securing Stake, Single	8 m	nm Ø x 1,000 mm Lo	ong	0111 / 109658	1 kg
DL-CLAMP	Stainless Steel Locking Clamp for use with 8 $\mathrm{mm}\varnothing$ Stake	-	-	-	0111 / 109659	N/A

Specifying Hi-Pact DitchLinner

Depending on the installation location, it may be necessary to complete flow calculations to determine suitability, if these are required please contact our Sales Team on 01695 51933 for assistance.

In addition to straight sections, bends and junctions are also available if required.

Hi-Pact DitchLinner Bespoke Manufacturing

In addition to the 'Standard' DitchLinner, the product is also available as bespoke sizes/versions to suit site specific requirements.

Bespoke options include site specific sizing and Swales, as shown below:





Bespoke Swale

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Corrugation profile:









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Carlisle Cascade System

Manufactured from innovative, robust G-Plast composite material, the Carlisle Cascade sections can easily be manhandled by one or two people, simply stack together and fix in place using a Stainless Steel Pin system[#].

Designed as a composite alternative to the traditional Network Rail Cascade Standard Detail (NR/CIV/SD/324/E; Drainage Systems (Track & Off-Track) - Cascade Drain Standard Detail CD1 Benched Slope), the Carlisle Cascade System offers many benefits over the traditional slab and block construction:

· Single piece, stackable unit desigi

- Simple overlapping design for ease of constructio
- Three sizes to suit incoming flow volumes Small, Medium & Large.
- · Easily manhandled, no need for mechanical lifting.
- Simply step the slope as required and bed on a suitable medium.
- · No need to concrete/mortar sections together.
- Typically reduces flow velocity from around 3.5 to 1.5 m/second.

The Carlisle Cascade system incorporates a range of differently sized sections to allow for varying incoming flows (Small, Medium, Large) and slope angles (25°, 35° & 45°). Although Small, Medium and Large sections can not be interconnected, multiple angle sections can be used in a single cascade, therefore allowing a structure to be constructed which follows the slope profile as accurately as possible.

A fireproof erosion control matting (seeded or unseeded) is available, see page 116.

Benchmarking Against the NR Standard Detail

Initially, it was not possible to obtain information regarding the volume of water that the standard detail cascade had been designed to cope with, therefore we approached a 3rd party engineering firm to conduct Computational Fluid Dynamic modelling to understand what the typical solution could and couldn't do:

By constructing a 3D model of the typical detail, we learnt that the peak contained flow was 109 litres per second, travelling at a speed of 3.45 metres per second. At this volume and velocity, flow was 'skipping' multiple steps within the cascade, preventing the system from dissipating the energy contained within the flow, resulting in a fast moving uncontrolled flow exiting the cascade and leading to overtopping of the lineside drainage system that the cascade was intended to feed.

AQUA

Based on this information, we realised that if we were going to produce a viable alternative then we had to ensure that the incoming flow was better controlled.

During the development of the product range, we investigated the height at which overtopping would likely occur given various flow and slope parameters and determined the optimum sectional wall heights to ensure that the flow was contained.





Patent No. - Pending



Prod. ID	MAX Slope Angle	Maximum Incoming Flow	DIM A	DIM B	DIM C	DIM D	DIM E	DIM F	Weight
CCS-S25	25°		745 mm	350 mm		805 mm	765 mm	395 mm	35 Kg
CCS-S35	35°	40 litres / second	745 mm	350 mm	395 mm	600 mm	765 mm	395 mm	30 Kg
CCS-S45	45°		1,060 mm	665 mm		600 mm	1,000 mm	600 mm	51 Kg
CCS-M25	25°		845 mm	450 mm	395 mm	805 mm	865 mm	395 mm	37 Kg
CCS-M35	35°	80 litres / second	845 mm	450 mm		600 mm	865 mm	395 mm	31 Kg
CCS-M45	45°		1,130 mm	735 mm		600 mm	1,070 mm	600 mm	53 Kg
CCS-L25	25°		995 mm	600 mm		805 mm	1,015 mm	395 mm	40 Kg
CCS-L35	35°	115 litres / second	995 mm	600 mm	395 mm	600 mm	1,015 mm	395 mm	33 Kg
CCS-L45	45°		1,280 mm	885 mm		600 mm	1,220 mm	600 mm	57 Kg

In addition to the stepped cascade sections, a range of channels and bends are available to allow flow to be contained prior to entering or exiting the cascade section.

These sections are sized to match the Small (S), Medium (M) and Large (L) cascade sections.





Easily connect using Derby GRP Catch-pit frames c/w flume inlets, speak to our **sales team on 01695 51933** to discuss your requirements, suitable for use with Derby or PCC Catch-pit frames (using a York Adaptor, see Page 52).





Connecting to Lineside Drainage

Belvedere Composite Headwalls

Like the Carlisle Cascade, Belvedere Headwalls are manufactured from an innovative, robust G-Plast composite material, to provide excellent strength. weathering and durability characteristics whilst being a lightweight alternative to traditional precast concrete (PCC) products.

Available in three 'standard' sizes and able to be manufactured in bespoke sizes to suit site specific requirements, Belvedere headwalls are the ideal option for providing formalised inlets & outlets and reducing scour damage.







	DIM A	DIM B	DIM C	DIM D	Тое	Weight
Belvedere	1,244 mm	819 mm	800 mm	480 mm		60 Kg
Belvedere XL	1,664 mm	1,232 mm	1,000 mm	900 mm	312 mm	75 Kg
Belvedere XXL	2,720 mm	1,612 mm	1,500 mm	1,800 mm		120 Kg

*Excludes trash screen or any other options



Erosion Control & Soil Stabilisation FREC 550 - Page 116 FREC 800 - Page 118 Geoweb Slope & Channel Protection - Page 120 Geoweb Earth Wall Retention -Page 121



Drainage Outfall Scour Control Rock Roll - Page 122 Gabion Mattresses - Page 123



Choice of inlet or outlet grates available.

Sediment Entrapment River Matting - Page 125



650 mm long Ground Anchors offer a quick & easy installation method providing 9.6 kN (978 Kg) of pull out force, ground conditions dependant. See page 69 for installation tool information. 500 & 900mm anchors also available on request.

Headwall Installation

A full set of installation guidance notes are available for download from our website, in summary:

A capping layer, no more than 50 mm thk. consisting of local spoil can be installed at ground level behind the headwall if desired for aesthetic reasons. Once the headwall has been positioned, an additional layer of ST1, ST4 or suitable granular fill can be used to anchor the headwall in place; this should be positioned uppermost on the headwall base as a minimum of 100 mm thk. layer. If so desired, rebar or similar can be installed between the upper

and lower layers, using the preformed cut outs in the headwall base. Alternatively, ground anchors can be used should the ground beneath the foundation be suitable enough. These can include but are not limited to, spiral anchors, arrowhead anchors or plate anchors depending on around conditions.

Pipe Nominal Size (DN)	Aggregate to BS 12620
<140 mm	10 mm Nominal Single Size
140 to 400 mm	10, 14 or 20 mm Nominal Single Size or 14 to 5 mm / 20 to 5 mm Graded
>400 mm	As 140 to 400, above or 40 mm Nominal Single Size or 40 to 5 mm Graded

A suitable base for the headwall to sit on is required, with consideration being given to the site-specific ground conditions.

As a minimum this should consist of a 100 mm thick ST1 blinding layer as per NR/CIV/329/C "Drainage Systems (Track & Off Track) - Headwall Standard Detail H2 Long Life / Large Dia Culvert".

An ST4 concrete or suitably compacted granular material can be used to create a solid, stable foundation, at the discretion of the designer.

NOTE: If using a ground anchor, these will need to be anchored through the pre-formed openings in the Headwall Base and installed such that the top plate/ anchor plate is fully in contact with the Headwall Base

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- All types of Belvedere Composite Headwall are to be installed outside of locations which may be subject to surcharge loading.



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approval certificates and CAD drawings by scanning the QR Code

TrenchBox

The Trench Safety System – A composite alternative to traditional steel trench support products, TrenchBox is a simple, robust, fixed length, fixed width earth retaining structure designed to protect personnel working in a trench environment. TrenchBox enables quick and easy ingress and egress of the trench to fix couplers, check and adjust pipe levels, etc. safe in the knowledge that operatives are well protected should the trench walls collapse.

Independently tested by an external materials assurance company, TrenchBox, surpassed all expectations - A 2.0 m long box withstood an incredible 6,656 kN/m2 UDL on its longest side.

Drainage Installation Tools

The below range of tools are intended to make installation of various drainage products, quicker and/ or simpler on site.

All images for illustrative purposes only.

GRP Catch-pit Survey/ Setting Out Tool A lightweight innovative tool designed specifically for surveying/ setting out catchpits which are to be constructed using the Derby GRP catch-pit frames system.

Prod. ID	Derby Frame	Length	Width	Depth	Weight
SSOT-ST	Standard	1,270 mm	735 mm	120 mm	5Kg
SSOT-NA	Narrow	1,035 mm	575 mm	120 mm	4.3Kg
SSOT-LU	Luton	1,270 mm	575 mm	120 mm	4.7Kg

Each Survey/ Setting Out Tool is supplied complete with 5 no. 20 mm Survey Point Nails.

Flexi-Seal Nut Spinner

A 'T' handle, fixed socket nut spinner for guick and easy installation of Flexi-Seal Couplings on site. Unlike traditional mechanical means of fastening, these nut spinners are a low cost simple solution.

Belvedere Headwall Anchor Drive Tool

The yellow powder coated manual Anchor Drive Tool allows the Belvedere inserted quickly and efficiently. The manual driver can also be used to retr The centre column has three slot locations, for a central bar to be position allowing maximum down force to be created on each rotation. Can be used to help insert 500 mm, 650 mm and 900 mm long anchors.



TrenchBox is:

- · Supplied complete with access pole and step irons for ease of entry/exit.



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Prod. ID	Length	Width	Depth	Weight	МАХ	Load
TBS1350	1,320 mm	880 mm	1,497 mm	204 Kg	3,530 kN/m²	3.53 N/mm²
TBS2000	2,000 mm	880 mm	1,497 mm	264 Kg	6,656 kN/m²	6.66 N/mm²



In 2018, Lucideon Ltd, a UKAS accredited testing house undertook load testing to ascertain the structural performance of TrenchBox. Maximum permissible uniformly distributed load (UDL), point load and line load were all tested for.

- A maximum deflection limit of 3-5 mm was set for the testing.
- The full test report is available on our website.







F	-lexi-Seal Size	Product ID
<62	20 mm Ø Couplings	FSNT1
	Nut sizes for seals great speak to our sales team	er than 620 mm Ø vary, I for further information
	achara ta ba	
eve the anc	hors where required.	
ed at a com	fortable height,	
		-

SE Chamber CAM Lock Keys & Lid Lifting Keys

For use with all SE chambers supplied with Solid Steel and Grated Steel Lid and frame assemblies, not single piece lids, the CAM Lock Keys and Lid Lifting keys make the process of removing and replacing the lid section quick and easy:

Product Name	Product ID
CAM Lock Key, Single	SE/Thieel CLK
Lid Lifting Keys, Pair	SE/Thieel LLK

Aquatex Trenchliner[®]

Aquatex Trenchliner is a needle punched non-woven geotextile manufactured from continuous virgin filament UV stabilised Polypropylene and ideally suited for use in track drainage applications as a filtration membrane; offering high resistance to installation damage, high water permeability and excellent UV resistance.

As per Network Rail Standard NR/L3/CIV/005/2A, track drainage geotextiles should conform with RT/CE/S/010:

Property	RT/CE/S/010/02	Aquatex
Permeability	≥40 litres/second/m²	100 litres/second/m ²
Breaking Load	10 kN/m	10 kN/m
Apparent Pore Size	>30 µm - <180 µm	100 µm
Puncture Resistance	1500 N	1500 N

Needle punched non-woven geotextiles offer many benefits over traditional heat bonded alternatives – see page 95 for further information. Aquatex is available in a range of different width's to suit site specific requirements.

Width	Length	PADs Code	Weight
1.9 m		0057 / 101022	45 Kg
2.2 m	450	0057 / 100998	52 Kg
3.8 m	150 m	0057 / 101021	90 Kg
4.4 m		0057 / 101020	104 Kg

Aquatex is suitable for use as per P1, P2 and P3 of Network Rail Standard Detail NR/CIV/SD/322 and is typically installed with the top of the trench open and any track drainage geotextiles lapped over the Trenchliner.







Download technical datasheets, approval certificates and CAD drawings by scanning the QR Code or visit www.aquafab.co.uk Aquatex 1000 is also a needle thus giving a reduced tensile s This product is ideal for locatio

Roll Size	Mass	Thickness	Tensile Strength	Tensile Elongation	Static Puncture Resistance	Apparent Pore Size	Permeability
4.5 x 100 m	0.1 Kg/m²	0.8 mm	8 kN/m	45%	217 N	100 µm	130 l/s/m²

Aquatex[®] Geogrid 30/30

A smaller aperture size than Railgrid Geogrid (see Page 112) makes Aquatex Geogrid 30/30 the ideal choice for smaller particle size applications, such as walkways or hardstanding's. Aquatex Geogrid 20/20 is also available on request. Aquatex Geogrid 30/30 is a laid geogrid made of stretched, monolithic polypropylene (PP) flat bars with welded junctions for reinforcement.

Property	Test Method	Unit	Value
Max Tensile Strength (md & cd)	BS EN ISO 10319	kN/m	≥30
Elongation at Nominal Strength (md & cd)	BS EN ISO 10319	%	≤7
Tensile Strength at 5% Elongation	BS EN ISO 10319	kN/m	24
Aperture Size	-	mm x mm	32 x 32
UV Resistance (remaining Tensile Strength)	BS EN ISO 12224	%	95.0
Mass per unit area	BS EN ISO 9864	Kg/m²	0.2
Roll Size	-	m	4.75 x 100

Aquatex[®] Impermeable Membrane

Occasionally it is necessary to install an impermeable membrane, such as to the bottom and side of a crest drain, which should have a minimum thickness of 250 μ m as per NR/CIV/SD/322.

In these instances, Aquatex Impermeable Membrane is available; AIM is a extruded Polyethylene sheet, for use as a waterproof barrier; suitable for providing an impermeable barrier for drainage or bridge deck applications when combined with an adequate protection layer(s).

Protection layer suggestion





Roll Size	Mass	Thickness	Tens
4 x 25 m	0.28 Kg/m²	300 µm	

Aquatex[®] 1000

Aquatex 1000 is also a needle punched non-woven geotextile however it is manufactured from UV stabilised Polypropylene staple fibres, thus giving a reduced tensile strength but increased permeability.

This product is ideal for locations which require a highly permeable separation geotextile, such as a base for a walkway:

- 1					
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Find out more about our products by visiting **www.aquafab.co.uk**

6		71
•		
in S		0
ing suggestion		
quatex Impermeable me 4 x 25 m	Double-sided butyl tape 75 mm Jointing Tape embrane 150 mm overlap Aquatex Impermeable membrane - 4 x 25 m	
nsile Elongation	Static Puncture Resistance	
>450%	217 N	

Cable Management Systems

AQUA offers a comprehensive range of Cable Management products to enable designers and contractors to select the most appropriate product for the site specific conditions and requirements.

Since the beginning, our product range has been designed and developed in conjunction with railway engineers, to ensure the products we offer are specific to the rail industries unique criteria:

> AQUALINE **GRP TROUGH**



CONCRETE TROUGHING

THIEEL® CABLE MANAGEMENT CHAMBERS



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History of Thieel® Cable Chambers

During the 1990's in conjunction with British Rail, Aqua developed a range of large diameter chambers for use in the modernisation of Mersey Rail. At the time, EEC directives stated that all 240 volt cables must be buried for track crossings and the subsequent need for chambers to facilitate this led to the development of Aqua's range of UTX and URX suitable chambers.

Performance Evaluation

In 2009 University of Birmingham School of Engineering undertook load testing of Round Chambers Adjacent to Railway Sleepers, with the objective of examining the presence of deformation when a wheel load was applied at rail level at the point closest to a chamber.

The test chamber was installed in a 3.0 m x 2.3 m x 1.8 m deep test pit with sleeper end positioned 85mm from the chamber edge. In conclusion UoB noted that no signs of deformation were present at cover level and the chamber showed no signs of any damage being sustained within such close proximity of the track.

Through the use of lightweight yet durable High Density Polyethylene (HDPE) chambers, Aqua were successful in revolutionising the installation of Under Track Crossings (UTX's), with the system guickly becoming the de rigueur choice for the discerning Railway Engineer.



Since its first introduction, Aqua have worked tirelessly with designers and engineers to improve the Thieel Chamber product offering, improving the available options for lid assemblies and duct connections and working with installation teams on numerous improvements and factory fitted options, resulting in todays comprehensive range of proven products.

Fit for Purpose

To ensure the confidence of Network Rail and designers alike, over the years a number of physical tests have been conducted to confirm the performance of the unit. Additionally. Scientifics of Derby were commissioned to examine the product and confirmed its suitability for use in a rail environment - which they subsequently did.

Proven Performance

An independent engineering company, Gabitas Gill Partnership (GGP) were commissioned to undertake a desktop study of the Thieel cable chamber to provide theoretical confirmation of suitability based on a number of different configurations and anticipated loadings.

- The following conclusions were reached:
- 1. None of the 1200UTX chambers exhibited any significant

In addition to physical testing and the inspection of installed chambers, over the years a number of mathematical model tests have been undertaken, proving the performance of a variety of chamber diameters and depths including up to 2.20m diameter and up to 4.0m depth in a variety of installation locations including 1m from the running edge in a 'Cess' and chambers positioned within a 6ft application.





When conducting these theoretical tests, Load Model 71, as per 6.3.2 of BS EN 1991-2 (Eurocode; Actions on Structures) is used to determine loading values. Poisson's ration of the soil is taken as 0.3 and 0.5 as the worst case values. Pressures are taken at three points along the front face of the chamber and using Simpson's rule the force is calculated.

To download copies of the full test reports use this QR code or visit www.aquafab.co.uk



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Following initial development of the Thieel UTX Chamber System in the late 90's, during July and December 2000 site inspections were undertaken by Stuart Smith B.A. Hons, M.Sc. and Scientifics Ltd to evaluate the performance of 1200UTX chambers installed on the Norwich to Cromer line.

A total of 13no. installations were evaluated across 3no. Automatic Half Barrier (AHB) Level Crossing sites, with offsets varying from 0.63m to 2.4m from chamber to running edge.

Typically these mathematical models are undertaken evaluating two load cases for rail surcharge:

1. Case A where the chamber is in line with an axial load.



Thieel[®] Cable Management Chambers

Compliant with Network Rail Standard Detail NR/CIV/SD/610 and NR/L2/CIV/044 Thieel Chambers are available in 20+ different diameters (1200 mm ID being the typical choice) and manufactured to depths to suit site specific requirements, representing the straightforward choice when it comes to installing cable turning chambers.



Thieel chambers are:

Manufactured to order & typically delivered to site within 3-5 working days.

Internal Ø

Product

- Available with Anti-Floatation skirts for high water table applications.
- Able to accommodate various different duct types inc. TDK, TDE,



PADs Code

Thieel Chamber Options

When specifying/ ordering your Thieel chamber, the following options must be selected:



1. Chamber Lid

- B125 Rated Steel Cover & Frame³
- <25kN Solid Gritted GRP^{*4}
- Composite Cover < D400 Size Dependant
- · B125, C250, D400, E600 or F900 DI Cover
- & Frame c/w PCC Cover Slab



2. Removable Sections / Restricted Access

- 400mm Removable Top Section.
- · Reduced diameter restricted access top section.

3. Chamber Step Irons & Pulling Eyes

- · BS EN 1247 Steel Step Irons, Galvanised to BS 545493. · Composite Step Irons.
- · Cable Pulling Eyes, typically M10 with 20 mm Ø eye opening.

4. Duct Connection Type

- Pre-cut Inlets & Outlets to suit any duct.
- TDK or TDE Factory Fitted Spigots
- MEGAduct Spigot or Sleeve
- MultiDuct Spigot or Sleeve

Standard Base c/w Internal Sump

Anti-Float Base c/w Internal Sump

5. Base Type

Standard Base

Anti-Float Base

Network Rail Istore ONLY: 4-Way TDK / TDE Spigot - 0057 / 101028 6-Way TDK / TDE Spigot - 0057 / 101029 9-Way TDK / TDE Spigot - 0057 / 101030 12-Way TDK / TDE Spigot - 0057 / 101031

Network Rail Istore ONLY:

800UTX Anti-Float - 0057 / 101032 1000UTX Anti-Float - 0057 / 101033 1200UTX Anti-Float - 0057 / 101034



Standard Base

Anti-Float Base



450UTX	400 mm	454 mm	13 Kg/m	7 Kg	0057 / 100639
500UTX	450 mm	511 mm	20 Kg/m	8 Kg	Network Rail considers these
550UTX	500 mm	560 mm	22 Kg/m	10 Kg	sizes to be project specific and therefore subject to
700UTX	600 mm	680 mm	26 Kg/m	30 Kg	design process.
800UTX	750 mm	835 mm	36 Kg/m	43 Kg	<1.5 m 0057 / 100748 <2.0 m 0057 / 101036 <2.5 m 0057 / 101037
1000UTX	900 mm	1,000 mm	48 Kg/m	62 Kg	<1.5 m 0057 / 100772 <2.0 m 0057 / 101023 <2.5 m 0057 / 101024
1200UTX	1,050 mm	1,169 mm	56 Kg/m	76 Kg	<1.5 m 0057 / 100773 <2.0 m 0057 / 101026 <2.5 m 0057 / 101027
1350UTX	1,200 mm	1,315 mm	90 Kg/m	92 Kg	<1.5 m 0057 / 100641 <2.0 m 0057 / 100642 <2.5 m 0057 / 100643
1500UTX	1,350 mm	1,511 mm	94 Kg/m	131 Kg	Network Rail considers these sizes to be project specific
1650UTX	1,500 mm	1,664 mm	140 Kg/m	200 Kg	and therefore subject to approval through the formal design process.
1800UTX	1,650 mm	1,815 mm	150 Kg/m	250 Kg	0057 / 101447
2000UTX	1,800 mm	1,981 mm	164 Kg/m	300 Kg	As per 1650UTX

External Ø Chamber Weight⁻¹ Lid Weight⁻²

NOTE: Additional larger sizes, up to 3m ID, are also available. Please speak with our sales team to discuss your requirement. *1 Excluding base, step irons & spigots.

*2 450UTX-700UTX includes a single piece steel lid ONLY. 800UTX and larger includes a two-piece steel lid and seating frame assembly.

*3 800UTX to 1500UTX ONLY

*4 Span dependent. May require additional bracing.



Standard Steel Lid Load Testing

Lucideon were commissioned to undertake load testing in accordance with BS EN 1433:2002 and subsequently determined that our standard steel lid and frame assemblies for 800UTX to 1500UTX all achieved class B125 loading.



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Assistance/ calculations are available to determine the requirement for an Anti-Float Base and/ or its sizing. Speak with our Sales Team on 01695 51933 to discuss your requirement.



Subterra R-411 Cable Chambers

SubTerra is the perfect balance between high end technical performance and cost saving materials engineering.

Available in two, totally compatible and interchangeable materials, offering their own advantages when used to construct a single material chamber, the chamber sections can also be combined as a Hybrid unit; offering the perfect balance of strength and cost.

Which Chamber is right for you?

Subterra Green R-411

Excellent

Can be - Special Order

Stable

Very Good

Medium

Yes

	S
17	
N N	
Network Rail Product Approved TBC	

Subterra Green R-411

Chemical Resistance

Fire Resistance

Temperature Stability

UV Stability

Stiffness

Recyclable

Manufactured from a foamed Polypropylene (PP), Subterra Green R-411 Chambers use a twin wall design to provide a low cost solution that whilst not as strong as Subterra Optima R-411 Chambers, still offers a strong, durable and easier to manhandle alternative to traditional concrete or GRP offerings with a 40 tonne unsupported vertical loading capability.

Constructed in a modular fashion from 150mm deep sections, Subterra Green R-411 Chambers are available in the following sizes:

Internal Length	Internal Width	Frame Weight	Composite Cover	DI Cover	Steel Cover	Concrete Infill Cover
900 mm	900 mm	12.79 Kg	~		~	
1,200 mm	675 mm	13 Kg	~		~	
1,200 mm	750 mm	13.44 Kg	~		~	
1,200 mm	1,000 mm	15.27 Kg	~	0	~	0
1,200 mm	1,200mm	16.83 Kg	~	Speak to our sales	~	Speak to our sales
1,350 mm	900 mm	15.7 Kg	~	team for	~	team for
1,350 mm	1,350 mm	18.8 Kg	~	details	~	details
1,500 mm	1,200 mm	18.59 Kg	~		~	
1,500 mm	1,350 mm	19.7 Kg	~		~	
1,500 mm	1,500 mm	20.35 Kg	~		~	
Bespok	e sizes are als	so available: o	contact our sales	s team to disc	cuss vour rec	puirements

Construction

Each sidewall has a male & female end that slide together to form a strong connection.

Corners are always female, requiring a single connector to create a strong joint on each sidewall, reducing material costs & CO2e values.



N-Force Chamber Reinforcement



Produced from continuous Glass Fibre reinforced Polyester; the N-Force profile beams can be used on any chamber to provide un-paralleled lateral loading capabilities, where site conditions require an enhancement in sidewall resistance.

Designed to interlock with the castellation at either the top or bottom of the ring sections; the profile is coloured to draw the attention of installers as to their location so as to avoid drilling for duct entries or wall furniture. An added feature of the N-Force beam is that it can be used to attach a base unit or alternatively; at the top of the chamber it offers a means of increasing depth in small increments.

Subterra Optima R-411

Manufactured from a Glass Reinforced Polyester Resin (GRP), Subterra Optima R-411 Chambers improve on the loading capabilities offered by the Subterra Green R-411 Chambers. These chambers are ideal for scenarios requiring from 1m² clear opening up to 4m sidewall length and provide a minimum

of 40 Tonne vertical loading (up to 90 Tonne) without necessarily the need for a concrete surround.

Lateral load resistance of this chamber is excellent, having been designed to support 50kN/m² and higher; this represents heavy surface surcharge loadings and surrounding ground weight.

Constructed in a modular fashion from 150mm deep sections, Subterra Optima R-411 chambers are available in the following sizes:

Internal Length	Internal Width	Frame Weight	Composite Cover	DI Cover	Steel Infi Cover
900 mm	900 mm	19.96 Kg	~		~
1,200 mm	675 mm	70.7 Kg	~		~
1,200 mm	750 mm	21.48 Kg	~		~
1,200 mm	1,000 mm	24.2 Kg	~	Speak to our sales team for details	~
1,200 mm	1,200 mm	25.92 Kg	~		~
1,350 mm	900 mm	23.4 Kg	~		~
1,350 mm	1,350 mm	28.2 Kg	~		~
1,500 mm	1,200 mm	29.1 Kg	~		~
1,500 mm	1,350 mm	30.5 Kg	~		~
1,500 mm	1,500 mm	31.92 Kg	~		~
De					

Bespoke sizes are also available; contact our sales team to discuss your requirements

Subterra Green R-411 & Optima R-411 Cover Options



Subterra Green R-411 & Optima R-411 Duct Connections

the choice of duct connection type is varied, including:

- MEGAduct Spigot or Sleeve



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Subterra Optima R-41

Excellent

Yes

Highly Stable

Fxcellent

Very High

Yes

Find out more about our products by visiting **www.aguafab.co.uk**



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Steel Infill



Concrete Infill



Selecting your Individual Duct Type

When selecting a suitable duct for use as an Under Track Crossing (UTX), as shown in Network Rail Standard Detail NR/CIV/SD/610, there are a number of factors that must be considered. The following is for guidance only, it is the designer/ specifiers responsibility to check and confirm suitability.

Calculated in accordance with BS 9295:2020





For further assistance, please see Suitability Calculations guidance on pages 12-13.



For assistance with site specific calculations, please use this link to download our 'Request for Technical Guidance – Pipe Suitability Check' form. This document will enable you to capture and send us all of the relevant site specific information needed to calculate suitability in accordance with British Standard BS 9295:2020 or visit www.aquafab.co.uk

TDK Individual Duct Ducting

AQUA TDK is a reinforced wall high density polyethylene (HDPE) duct manufactured from a recycled content raw material.

The combination of corrugated outside wall reinforced with a smooth inner profile has resulted in a light but strong duct capable of being installed up to 6m's deep and used for a variety of rail applications.

Manufactured from two black polyethylene pipes extruded simultaneously one inside the other and heat welded together, TDK has proven itself over the last 30+ years of use on the rail infrastructure. Supplied in 6m lengths. Additional sizes available, see page 14.

Product	Duct ID	D	uct OD	Weigh	ıt	PADs Cod	e
4TDK*	100 mm	1	18 mm	1.03 Kg/	'n	0057 / 1012	50
6TDK*	150 mm	1	78 mm	1.8 Kg/r	n	0057 / 1012	51
Couplar	PADe Code		Soaling	Dina**		PA Do Codo	
Couplei	PADS COUR	;	Seanny	J KIIIY		PADS Coue	
4TDK-C	0004 / 13030	6	4TDI	K-RS	(0004 / 131211	
6TDK-C	0004 / 13030)7	6TDI	<-RS	C	0004 / 131212	

*supplied complete with coupler **2no. required per length of duct

TDE Individual Duct Ducting

AQUA TDE duct is available in three different wall thicknesses to provide the wideset range of choice to enable designers and specifiers to choose the optimum size and type to suit their site specific project requirements.

To reduce our carbon footprint the TDE range is manufactured from 100% recycled polymers and is suitable for a variety of ground conditions/ installation depths. Other sizes available see page 16.

Product	Pipe ID	Pipe OD	Weight	PADs Code
4TDE-H	100 mm	110 mm	1.5 Kg/m	0057 / 101042
6TDE-H	148 mm	160 mm	3.0 Kg/m	0057 / 101043
7TDE-H	166 mm	180 mm	3.8 Kg/m	0057 / 101044

4TDE-E	97 mm	110 mm	2.1 Kg/m	0057 / 101053
6TDE-E	141 mm	160 mm	4.4 Kg/m	0057 / 101054
7TDE-E	159 mm	180 mm	5.5 Kg/m	0057 / 101055



Download TDE-E technical datasheets, approval certificates and CAD drawings by scanning the **QR Code** or visit www.aquafab.co.uk

TDE-H technical

s, approval certificates

rawings by scanning the visit www.aquafab.co.uk

4TDE-U	90 mm	110 mm	3.1 Kg/m	0057 / 101064
6TDE-U	131 mm	160 mm	6.7 Kg/m	0057 / 101065
7TDE-U	147 mm	180 mm	8.4 Kg/m	0057 / 101066

NOTE: All ducts are supplied in 3 or 6m lengths, plain ended. Larger sizes are also available, contact our sales team to discuss. If recycled TDE is not available then virigin material could be offered.

Find out more about our products by visiting www.aquafab.co.uk





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Flexi-Seal Couplings

Provide a simple to use, easy to install, water-tight connection between adjoining ducts. See page 69 for an easy to use installation tool.

Flexi-Seal Coupling	PADs Code
4TDE FS	0057 / 100027
6TDE FS	0057 / 100028
7TDE FS	0057 / 100632



MEGAduct R-411

MEGAduct R-411 is a high strength next generation multiple duct system ideally suited for use with our Thieel and Subterra R-411 Cable Chambers. Strategically ribbed and with thicker walls than traditional ducting, MEGAduct R-411 has a much higher mechanical resistance to crushing, potentially enabling shallower installations without the need for structural backfill.

Providing 25% more capacity than a circular bore duct and manufactured in 1m lengths complete with a unique clasp connecting system, MEGAduct R-411 is supplied in a variety of sizes to suit site specific requirements.



Product	No. Bores	Bore Size (a)	ZxY	Weight	PADs Code
4 Way	4	110 x 110 mm	248 x 248 mm	4 Kg	TBC
4 Way XL	4	160 x 160 mm	354 x 354 mm	16 Kg	TBC
6 Way	6	110 x 110 mm	354 x 248 mm	11 Kg	TBC
9 Way	9	110 x 110 mm	354 x 354 mm	17 Kg	TBC



Network Rail

Product Approved





Adaptors

To supplement MEGAduct R-411, a range of adaptors are also available to aid installation and/ or provide additional connection options:



Double Spigot for jointing two female ends of MEGAduct R-411.





Individual Duct Converter for bends and/ or splitting off ducts in different directions.

Download technical datasheets, approval certificates and CAD drawings by scanning the QR Code or visit www.aquafab.co.uk





Flexi-Duct Flexible Ducting

High Density Polyethylene (HDPE) coiled flexible ducting manufactured with a corrugated outside wall and smooth inner bore, ideally suited for the installation of buried cables in locations were 'sticks' are unsuitable.

All sizes of Flexi-Duct are manufactured in accordance with BS EN 50086.2.4

With increased flexibility comes reduced Ring Stiffness, resulting in a duct that although light and highly flexible, does require a more considered approach to installation to ensure the correct support is provided by the surround.

Flexi-Duct has:

- External markings denoting 'Electrical Cable Duct'

Product	Int. Ø	Length	Weight	PADs Code
63 mm	50 mm		14 Kg	0111 / 120470
110 mm	94 mm	50 m Coil c/w Coupler	28 Kg	0111 / 109912
160 mm	137 mm	o, ii coupioi	48 Kg	0111 / 120365

Type K Split Ducting

Type-K Split Duct is a 100% recycled high density polyethylene duct manufactured from two black polyethylene pipes extruded simultaneously one inside the other and heat welded together. Available as either single or double split duct, each 6m length is supplied complete with a split coupler, location pegs and cable ties. Shorter lengths and alternative diameters are available upon request.

Product	Duct ID	Duct OD	Weight	PADs Code
4TDK Single Split	100 mm	118 mm	1.03 Kg/m	0050 / 559546
4TDK Double Split	100 mm	118 mm	1.03 Kg/m	0111 / 120368
6TDK	150 mm	178 mm	1.8 Kg/m	0111 / 109910
8TDK	200 mm	230 mm	2.9 Kg/m	_



Find out more about our products by visiting www.aquafab.co.uk





Divisible Cable Protection

Manufactured from 100% recycled high quality PP-EPDM plastic, Aqua's new range of engineered divisible cable protection products are unlike anything else on the market.

Available as a range of three different products and a variety of diameters. Quicklock. Hardlock and Panzar can be quickly and easily installed around exposed services, enabling temporary cable/ service protection to be installed without delay.

All divisible cable protection products have the following benefits over traditional split ducting:

· Quick and easy to install without any specialist tools.



in any direction – 22.5° for Quicklock

Hardlock

Suitable for use above ground (<24 months) and buried as a permanent solution. Hardlock is the original divisible pipe cable protection system and has been in use for over 20 years throughout the Nordic Regions, Europe and beyond.

Hardlock's moulded sleeve and three pre-mounted locking clamps provide an un-rivalled pull resistant cable protection system. Each section is profiled with a male and female end to enable adjoining sections to be securely jointed creating a safe and secure structure.

Additional benefits of Hardlock over traditional split ducting:

- Crush Resistance of SN8 8 kN/m² rated ring stiffness.
- Locking clamps and hinges are simple and easy to use, even with gloves on.

All Hardlock ducts are available in 1.0m long sections, with a choice of 4no. diameters:

Product Name	int. Ø	Ext.Ø	Weight	PADs Code
Hardlock 60	50 mm	110 mm	1.2 Kg	TBC
Hardlock 110	99 mm	120 mm	2.8 Kg	TBC
Hardlock 160	144 mm	120 mm	4.5 Kg	TBC
Hardlock 220	200 mm	120 mm	6.7 Kg	TBC
H-Adaptor 110	To suit 110 n	nm OD Duct	0.3 Kg	TBC
H-Adaptor 160	To suit 160 r	nm OD Duct	0.8 Kg	TBC

Panzar

Suitable for permanent use above and below ground, Panzar is ideally suited for use in areas were it is expected to be exposed to harsh environmental conditions or increased loading. Additionally, this product would be ideally suited for use as an alternative to traditional above ground troughing.

The innovative design of Panzar's integrated connection system allows for a guick and convenient installation without any tools - however due to the added security, an unlocking tool is required to open the duct once final installation has been achieved.

Panzar ducts are available with a choice of 3no. diameters:

Product Name	Int. Ø	Ext.Ø	Length	Weight	PADs C
Panzar 70	50 mm	70 mm	1.0 m	3.4 Kg	TBC
Panzar 110	90 mm	110 mm	1.0 m	4.7 Kg	TBC
Panzar 110-30	90 mm	110 mm	0.3 m	1.7 Kg	TBC
Panzar 160	140 mm	160 mm	1.0 m	6.0 Kg	TBC

Quicklock

Suitable for use above ground temporarily (<6 months) and buried as a permanent solution, the innovative design of Quicklock allows the 'top' and 'bottom' section to be simply positioned and locked together with a sliding motion. Each section can then be further secured with a bolt or cable tie for added security if desired.

Quicklock's 'base' section is profiled to provide 'feet' to prevent the temporary duct solution from moving or rolling during installation. Each section is profiled with a male and female end to enable adjoining sections to be securely jointed creating a safe and secure structure.

Additional benefits of Quicklock over traditional split ducting:





Product Name	Int. Ø	Ext.Ø	Weight	PADs Code
Quicklock 110	102 mm	110 mm	1.85 Kg	TBC
Quicklock 120	110 mm	120 mm	2.85 Kg	TBC
Quicklock 160	150 mm	160 mm	3.20 Kg	TBC

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Quicklock is compatible with Hardlock and Panzar Split Ducting Systems and can be used in conjunction with Multibox, Thieel and Derby Cable Management Chambers to enable the spurring off or jointing of other duct/split duct routes.



Benefits of Panzar over traditional split ducting:

Buried Route Duct Systems

Cable theft can be a major and on going problem for Network Rail and the wider public who are effected by the consequences which can include great expense and timetable disruption resulting in passenger delays. Lincoln Buried Route Chambers and Clover Duct, when combined, provide a simple yet effective buried route duct system that can reduce the number of cable theft related incidents.

This system is...

- Quicker to install, with narrower and shallower trenches
- to be buried for additional security.

Lincoln Buried Route Chambers 0057/100495



Clover Duct

Buried Route Ducting

Clover duct is an innovative method of installing multiple ducts in formations of 4,6 or 9-way configurations, utilising 100mm or 150mm ID ducts.

Clover Duct is...

- Easily split apart to enable installation around or over/ under an

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in state							
Product Name	No. Ducts	Int. Ø	Ext.Ø	Weight*	PADs Code		
100 mm Duct	4, 6 or 9	100 mm	118 mm	1.03 Kg/m	0057 / 101250		
150 mm Duct	4, 6 or 9	150 mm	178 mm	1.8 Kg/m	0057 / 101251		

AQUA

etwork Rail

Product Approve **Grandfathers Rights**

Concrete Troughing

Steel reinforced, pre-cast concrete troughing and lid sections conforming to NR/L2/ TEL/00013 providing fire proof protection for signalling, telecoms and power cables.

Ideally suited for installing lineside cable trough systems either as a replacement for existing infrastructure or as a new route, the following sections are available:

Trough	Length DIM A	Internal Width DIM B	Internal Depth DIM C	Trough PADs Code	Weight	Lid PADs Code	Weight
C/1/6	1.0 m	100 mm	90 mm	0004 / 105351	37 Kg	0004 / 105282	22 Kg
C/1/7	1.0 m	130 mm	130 mm	0004 / 105353	49 Kg	0004 / 105285	27 Kg
C/1/8	1.0 m	150 mm	200 mm	0004 / 105355	71 Kg	0004 / 105288	29 Kg
C/1/9	1.0 m	190 mm	130 mm	0004 / 105357	54 Kg	0004 / 105291	34 Kg
C/1/10	1.0 m	250 mm	130 mm	0004 / 105359	60 Kg	0004 / 105294	42 Kg
C/1/29	1.0 m	350 mm	130 mm	0004 / 105361	42 Kg	0004 / 105297	66 Kg
C/1/43	1.0 m	350 mm	300 mm	0004 / 105363	115 Kg	0004 / 105297	66 Kg

Concrete Troughing GRP Replacement Lids

Ideally suited for replacing lost or damaged concrete lid sections, Aqua's range of GRP replacement lids can be quickly and easily installed on pre-existing trough routes.

GRP Replacement Lids are...

- · Available to suit all sizes of PCC troughing.
- Supplied with 'L' Bracket locating arms to





Find out more about our products by visiting www.aquafab.co.uk





Product Approved Grandfathers Rights

Trough Bridges

Manufactured bespoke from galvanised mild steel or stainless steel or from GRP (Glass Reinforced Polymer), our skilled in-house fabrication teams can assist you with your specific project requirements.

Contact our sales team on 01695 51933 to discuss further.











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Find out more about our products by visiting www.aquafab.co.uk

Aqualine Cable Trough

Using our innovative Aqualine Drainage Trough (see page 60) as the starting point, it is possible to also fit Aqualine Trough with a solid 'Durbar' effect or silica carbide gritted cover for use as a cable trough. Bespoke sizes can be manufactured on request, speak with our sales team on 01695 51933 to discuss your requirements.

Aqualine is...

- Quick and easy to install.
- Can be supplied with optional with 8mm Ø Stainless Steel spacer bars

Туре	Width	Depth	Length	Durbar Cover	Gritted Cover	PADs Code	Weight
AL15	150 mm	150 mm	2,000 mm	~	~	TBC	TBC
AL25	250 mm	250 mm	2,000 mm	~	~	TBC	TBC
AL35	350 mm	300 mm	2,000 mm	~	~	TBC	TBC
AL60	600 mm	600 mm	2,000 mm	~	~	TBC	TBC

Typical Installation Detail, as per NR/CIV/SD/322

to reduce liklihood of uplift/ undermining during a flood event. SUPPLIED BY OTHERS MS600 or similar flexible waterproofing sealant

can be used to seal these holes if required.



Protection Membrane to be installed if required As per NR/CIV/SD/322, and/or as determined suitable by Design Engineer or Network Rail Engineer.

AQUA

Base As per NR/CIV/SD/322, and or as determined by Design Engineer or determined by Design Engineer or Network Rail Engineer to enable installation at correct level/ fall & to prevent undermining during flood events.



TEL/00013/04 and BS EN ISO 11925-2:2020.

Network Rail

roduct App Pending

Download technical datasheets, approval certificates and CAD drawings by scanning the QR Code or visit

Additional Fire Testing Summary

Multiple fire tests were conducted on the Aqualine trough at the premises of Aqua Fabrications to ascertain the degree of resistance of the product. There were three tests completed on the trough and four on the lid. The tests consisted of a flash fire, a slow burn low heat/flame and a high heat high flame intense burn. These were completed on both sections of the product. The fourth test consisted of a sustained intense fire to the underside of the lid.

In conclusion, after subjecting the Aqualine trough and lid to a series of fire tests it can be concluded that a flammable liquid which has a fast burn rate has very little effect on the material. The slow burn and moderate heat test resulted in some slight damage, and scorch marking. The prolonged high heat and temperature test on the trough produced damage to the unit as the flame ignited part of the trough, this then moved in an upward direction as the trough needed sustained heat and flame to continue to burn. When this sustained period was no longer achievable the material failed to continue to burn and eventually the fire was extinguished. A full copy of the test report can be found on our website.

Lightweight GRP Troughing

Manufactured from 100% glass reinforced polymer (GRP) our range of lightweight GRP troughing solutions offer a suitable solution for raised or suspended cable containment.

Available in a range of sizes, this product can be supported between stanchions, wall brackets or mounted to hand rail.

Туре	Width	Depth	Length	PADs Code	Weight
LGT1	110 mm	90 mm	3000 mm	TBC	TBC
LGT2	166 mm	250 mm	3000 mm	TBC	TBC
LGT3	190 mm	130 mm	3000 mm	TBC	TBC
LGT4	280 mm	130 mm	3000 mm	TBC	TBC
LGT5	300 mm	110 mm	3000 mm	TBC	TBC

GRP Platform Troughing

Glass Reinforced Polymer (GRP) trough system complete with sealed, lockable anti-slip lids and internal dividers to provide cable separation, GRP Platform Trough was developed as a solution for installing cabling along platforms and/ or pedestrianised areas. Designed to sit in the surface layer of the platform or walkway construction, GRP Platform Trough offers a shallow form factor which is quicker and easier to install than traditional buried route systems, greatly reducing the likelihood of unearthing unknown services or structures:

Туре	Int. Width	Int. Depth	Ext. Width	Ext. Depth	Length	Weight*	Config.
320 mm	320 mm	100 mm	398 mm	134 mm	1,220 mm	22 Kg	3 x 100 mm 2 x 150 mm
420 mm	420 mm	100 mm	498 mm	134 mm	1,220 mm	29 Kg	4 x 100 mm 2 x 150 mm
640 mm	640 mm	100 mm	744 mm	134 mm	1,220 mm	38 Kg	6 x 100 mm 4 x 150 mm

Platform trough is supplied complete with internal dividers, manufactured from 100 x 100 x 8mm thk GRP angle sections, weighing 1.14 Kg/m, each trough can be configured to suit site specific requirements.

All troughs are supplied as either straight trough or T pieces with a black or grey silica carbide gritted cover, neoprene seals, jointing brackets and fixings. *Excluding Dividers.

Bespoke GRP Troughing

In addition to our other GRP troughs, Aqua are able to offer a bespoke manufacturing service for 100% GRP or G-Plast trough units. This facility enables the manufacture/ procurement of a trough system ideally suited to your specific project. Speak to our sales team on 01695 51933 to discuss your specific requirements.



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Mast Chambers

Developed as part of the works undertaken at Wimbledon Station. Agua were asked to provide a solution that would enable the installation of vertical columns in a trip hazard free pedestrianised area, whilst retaining the ability for the maintainer (Network Rail) to access the base plates for all necessary inspections.

Mast chambers now come in four forms, circular base units with covers, square/ rectangular base units with covers, covers only for use with cast in-situ or blockwork chambers and above ground units...





Circular Mast Chambers

Manufactured from the same high performance HDPE material as our Thieel UTX and SE Chambers, these units are typically supplied with a flange at the base to enable quick and easy installation.

A wide range of diameters can be supplied (from 400 mm ID to 3,500 mm ID) with the depth of the chamber variable by the millimeter up to a maximum of 12m's as a single piece.

Lid options include Silica Carbide Gritted GRP, Durbar Effect GRP or Steel.

Square/Rectangular Mast Chambers

Manufactured from the same profile system as our Derby GRP catch-pit frames, these units can theoretically be supplied up to a maximum of 5 m x 5 m with the depth variable in multiples of 115 mm or 225 mm sections.

These units can be supplied modular for ease of handling on site or as a single piece unit for speed of installation.

Lid options include Silica Carbide Gritted GRP, Durbar Effect GRP or Steel.



Cover Assembly Only

Ideally suited for scenario's where it is easier to construct a surround from brick or blockwork, or atop a concrete plinth with minimal surface treatment depth.

Manufactured with either a steel or composite seating frame, these units can be supplied with the same lid options as the other units - options include Silica Carbide Gritted GRP, Durbar Effect GRP or Steel.

Above Ground Units

Suitable for use around pre-existing structures which have been installed with their base plates at ground level and have now been deemed a trip hazard.

Each unit is manufactured to order using a steel or composite internal frame clad with an anti-vandal composite outer shell.

Units are supplied complete with lockable toggle latches to secure each $\frac{1}{2}$.

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Preformed Bases - Quick Eco Base

The Quick Eco Base range is manufactured from 100% recycled high quality PP-EPDM plastic, and is suitable for use as an alternative to traditional concrete bases during the installation of structures, posts, lighting, EV chargers, signs, street furniture and bollards. With excellent resistance to adverse weather, temperature, UV light, salts and chemicals, the Quick Eco Base range offers a simplistic, time and material saving alternative to traditional construction methods.

Available in two sizes, the Quick Eco Base is designed to prevent the base and structure from tilting or turning through the use of the innovative 'winged' design which utilises the surrounding fill material to withstand applied forces.

Product Name	Pole / Post Ø	Base Height	Base Dims	Insertion Depth	
QEB 60	60 mm	520 mm	300 x 300 mm	350 mm	
QEB 108	108 mm	900 mm	400 x 350 mm	600 mm	

Quick Eco Base's...

- Are quick and easy to install.
- Offer up to 60% environmental savings compared to concrete.
- Provide an additional layer of protection for the post where it enters the ground.

Preformed Bases - 1Base

1Base is a universal base designed specifically for use in the construction of Electric Vehicle charging infrastructure. By installing several 1Base's at a time, it is possible to future proof the capacity requirement of your charging infrastructure, as 1Base can be installed in the ground without the need to install the actual charging equipment. When demand is sufficient, a charger can be installed quickly and easily due to the 'adaptor' lid design of the 1Base. In addition, the use of the unique 'adaptor' lid design enables all current and future charging stations to be installed, future-proofing the in-ground infrastructure, saving the time and expense of digging up and replacing older/life expired technology.

Product	Pole /	Base	Weight	CO² eq.	Oil eo
Name	Post Ø	Height		Savings	Savin
1Base	602 mm	400 mm	19 Kg	44.0 Kg	29.0 Lit

1Base is...

- · Lightweight and easily carried by hand.
- Manufactured from 100% recycled high quality PP-EPDM Plastic.

Find out more about our products by visiting www.aquafab.co.uk

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UTX Tools & Sundry Items

The below range of accessories and tools are intended to make installation of various cable management systems quicker and/ or simpler on site. All images for illustrative purposes only:

Thieel Chamber CAM Lock Keys & Lid Lifting Keys

For use with all Thieel chambers supplied with Solid Steel Lid and frame assemblies, not single piece lids, the CAM Lock Keys and Lid Lifting keys make the process of removing and replacing the lid section quick and easy.

CAUTION CAUTION ELECTRIC CAUTION

6 mm X 220 m blue polypropylene draw cord for installation in

Detectable Warning Tape

A detectable underground warning tape used to mark underground cables/ UTX's containing two stainless steel wires, ensuring it can be located from ground level.

The tape is a bright yellow colour. A highly visible solution coupled with a thick, durable material for clear detection. It also has rot resistance to maintain its quality of use throughout the maintenance or construction project term.

150 mm x 100 m Roll

ducting to facilitate cable pulling as required.

Duct Bungs

A range of centre locking pipe/ duct test plugs/ bungs with steel plates, brass wing nuts & plastic blanking caps. Suitable for air or water testing of drains & sewers or blanking off unused ducts to prevent rodent ingress.

Wide range of diameters available.

Marker Posts & Signs

Draw Cord

Hazard Sign in accordance with GI/RT7033 (Sign Detail to BD01, GI/GN7634) as specified by Network Rail Standard Detail Drawing NR/CIV/SD/610 for correctly marking the positioning of an undertrack crossing; 1no. sign should be positioned next to each chamber facing oncoming traffic.

Also available as a generic "DANGER Buried Cables" sign or with site specific information.

All signs are supplied as a 420 x 280 mm Aluminium sign, factory fitted to a $50 \times 50 \times 1500$ mm GRP Post.

GRP Handrail

A modular round tube GRP handrail system complete with a wide range of fittings tested and approved in accordance with BS EN ISO 14122-3:2001 and BS6399-1:1996 loading requirements.

Available in high visibility safety yellow or steel grey, GRP Handrail provides all of the advantages of low unit weight, high strength and durability coupled with a corrosion resistance, maintenance free 20+ year lifespan.

Designed as a cost effective alternative to expensive stainless and galvanised steel, the system combines polyester resin pultruded tubes (to EN 13706-3 E23) with cast GRP fittings.

GRP Handrail is...

- Warm to touch
- · Electrically & thermally non-conductive
- Chemical & corrosion resis
- Fire Retardant
- Transparent to electromagnetic and radio frequencies.
- Maintenance free, no scraping, shot-blasting or painting required.
- Capable of a wide operating temperature range: -50°C to +100°C.

Product	PADs Code
Handrail Tube, 50mm Ø 3.3mm thk x 6m Length	0111 / 109484
3-Way Cross (T) Coupler	0111 / 109485
2-Socket Cross Coupler	0111 / 109486
90° Elbow Coupler	0111 / 109488
3-Way Corner Coupler	0111 / 120652
4-Way Corner Coupler	0111 / 120651
4-Way Cross (X) Coupler	0111 / 120650
Floor Socket Base Plate	0111 / 120653
Wall Socket Base Plate	-
Fixings: M5 x 65mm Socket Capscrew, A2 Stainless Steel	0111 / 109489

Typical Installation Detail

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ibility 1. anised -3 E23)

Weight 5.4 Kg 0.235 Kg

0.325 Kg 0.370 Kg 0.550 Kg 0.660 Kg 0.290 Kg 0.250 Kg 0.01 Kg

Geotextiles & Geocomposites

Traditionally, trackbed renovation has involved the use of granular materials to improve bearing capacity, protect a moisture sensitive subgrade and separate ballast from underlying fine grained soils. While granular treatments were very effective, installing them required long possessions which were expensive and typically only relatively short in length.

Since the early 90's, geosynthetic engineering has evolved to replace almost all of the functions of the granular material below the ballast. This has greatly reduced the time and cost involved in completing a track renewal by speeding up installation times and increasing productivity.

Aqua's full range of products incorporate the four Network Rail specific product groupings, 'Separator', 'Robust Separator', 'Anti-pumping Geocomposite' and 'Geogrid and Geocells' as well as providing hybrid solutions, combining multiple products for increased benefits versus a traditional multi-lavered approach:

Geotextiles & Geocomposites Contents

Separator's	
Terratex [®] 70	96
Terratex [®] 4050	98
Robust Separator's	
TED2 [®]	100
TED10 [®]	102
Anti-pumping Geocomposite	
Tracktex®	104
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Contaminated Ground Impermeable Membranes	
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Formation Treatment Definitions

As defined by Network Rail Standard NR/L2/TRK/4239 the following terminology is used to describe the various types of Geotextile & Geocomposite products that are available:

Geotextile Separators

Aqua Terratex[®] geotextile separator is a non-woven needle punched product designed to separate the sand or soil layer from the ballast.

Terratex 4050 and Terratex 70 offer enhanced abrasion and puncture resistance properties when compared to a heat-bonded separator.

"Permeable geosynthetic used to prevent intermixing between blanket materials and the ballast."

Robust Separators

TED 2° has been the standard robust separator for rail applications since 2003. TED 10° is a more recent addition to this particular type of geosynthetic. These should be used when the particle size of the formation contains a significant amount which is greater than 14mm.

"Heavy duty geotextile/ geocomposite used to separate ballast and a course grained formation materials."

Anti-Pumping Geocomposite

This type of geocomposite was developed to replace the need to install a sand blanket on "wet bed's" and sites where there is a high proportion of clay soils and water present.

When train's pass over such areas the clay can be pumped into the ballast under hydrostatic pressure causing ballast slippage and deterioration to the track quality. Tracktex® allows the water in the formation to pass through its unique micro-porous core whilst preventing small clay fines from passing. This product can be used as a standard solution no.3.

"Geosynthetic material which can be used as an alternative to a sand blanket dependent on existing drainage and formation/ sub-grade condition."

Needle Punched – How and Why?

Loose staple fibres are fed through rollers, compressing them before the Needle Punch machine meshes fibres together. The resultant fabric is highly flexible with excellent elongation, puncture and permeability characteristics compared with heat-bonded products.

Heat bonded geosynthetics tend to be relatively thin, less flexible and more susceptible to tearing / ripping, whilst needle punched fabrics are better able to resist the abrasion caused by the reciprocating movement of the ballast. Ballast can 'dog tooth' into needle punched fabrics without causing damage or puncturing the material, enabling ballast to 'key in' to the subsoil, restricting lateral movement. Needle punched fabrics are far more likely to stretch than tear when compared to heat-bonded products. Even when combined with a grid, such as TED 4, needle punched fabrics remain flexible enough to enable pockets to form, encouraging interlock between the ballast and grid layer.

GeoCut The Handheld Geotextile Cutting Tool

GeoCut is a safe and easy to use, non-mechanical cutting tool, for simpl trimming geotextiles around obstructions or to suit site specific conditic Safer by design than a traditional open bladed knife, GeoCut, uses a plastic moulded handle combined with an SK5 steel blade, mounted within the body of the cutter to prevent accidental injury.

1no. Reversible, double-sided blade included.

Suitable for use with: Aquatex, Aquatex 100, Terratex 70, Terratex 4050, TED 10 & Tracktex.

Not suitable for use with: TED 2 & TED 4, or G+ Geocomposites.

condition."

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Geogrids and Cellular Confinement Systems

Used to help stiffen the track especially in areas of soft ground. This stiffness increases the life span of the rail and train components whilst also reducing the maintenance time regime. These can also be used with geotextiles to further enhance the formation.

"Plastic mesh with high tensile stiffness and used as reinforcement at the base of a ballast layer or, within the ballast layer itself."

"Expandable honeycomb structure which is filled with granular material to create a more resilient formation layer that can better distribute the stresses, generated by traffic, on the subgrade."

Combination Geocomposites

These materials provide a versatile solution to problematic areas. In the case of TED 4, by combining a separator with a grid the product provides filtration and separation combined with ballast reinforcement, therefore helping to stiffen the trackbed.

Another advantage, over separate rolls, is their ease of installation due to the lengths of the products involved. Being 25m long it is much easier to align the product to the track than separate 50m long rolls.

Find out more about our products by visiting www.aquafab.co.uk

Terratex[®] 70

Terratex 70 is a needle punched, non-woven, continuous fibre geotextile manufactured from virgin polypropylene fibres with 1% Carbon Black to give outstanding flexibility, puncture, abrasion and permeability properties. Terratex 70 is a lower abrasion resistant alternative to Terratex 4050, however it still provides superior performance when compared to a heat-bonded geotextile and is a separator and filtration geotextile for use between the track ballast and a sand layer or granular subgrade.

It is advised Terratex 70 is selected where the formation has a low percentage of coarse particles >14mm AND where there is a low abrasion risk.

Criteria for Use					
Network	Rail Solution No.		2 an	d 3	
Ab	orasion Risk		Lo	W	
Drainage Condition			Satisfa	actory	
Depth of	Track Bed Layers	Adequate			
Contamination of Ballast			No cohesive material present		
Existin	g Blanket Layer		Yes		
Percentage of pa	rticles greater tha	n 14mm	Low		
Product Name	Width	Length	Weight*	PADs Code	
T , T 0	2.0 m	50 m	33 Kg	0057 / 100920	
renatex 70	4.0 m	50 m	66 Kg	0057 / 100821	

Performance Considerations

The filter/separator placed between the subgrade and ballast has to overcome a number of obstacles to remain efficient. There is a possibility the sharp ballast could tear the geotextile. The geotextile might also become highly tensioned under the load of the ballast.

Material Properties

Property	Test Method*	Unit	Value				
	Mechanical Properties						
Tensile Strength (md)	BS EN ISO 10319	kN/m	22				
Tensile Strength (cd)	BS EN ISO 10319	kN/m	22				
Tensile Elongation at maximum load (md)	BS EN ISO 10319	%	95				
Tensile Elongation at maximum load (cd)	BS EN ISO 10319	%	46				
Static Puncture Resistance (CBR)	BS EN ISO 12236	Ν	3300				
Dynamic Perforation Resistance (Cone Drop) - hole Ø	BS EN ISO 13433	mm	17				
	Hydraulic Properties						
Apparent Pore Size ${\rm O}_{\rm _{90}}$	BS EN ISO 12956	μm	95				
Permeability; Vertical (dh=50mm)	BS EN ISO 11058	l/m²s	60				
	Durability						
Weathering (UV)	BS EN ISO 12956	%	>90				
Microbiological	BS EN 12225	%	100				
Resistance to Liquids	BS EN 14030	%	90				
Oxidation	BS EN 12226	Years	150				

Property	Test Method*	Unit	Value			
Mechanical Properties						
Tensile Strength (md)	BS EN ISO 10319	kN/m	22			
Tensile Strength (cd)	BS EN ISO 10319	kN/m	22			
Tensile Elongation at maximum load (md)	BS EN ISO 10319	%	95			
Tensile Elongation at maximum load (cd)	BS EN ISO 10319	%	46			
Static Puncture Resistance (CBR)	BS EN ISO 12236	Ν	3300			
Dynamic Perforation Resistance (Cone Drop) - hole \varnothing	BS EN ISO 13433	mm	17			
	Hydraulic Properties					
Apparent Pore Size O ₉₀	BS EN ISO 12956	μm	95			
Permeability; Vertical (dh=50mm)	BS EN ISO 11058	l/m²s	60			
	Durability					
Weathering (UV)	BS EN ISO 12956	%	>90			
Microbiological	BS EN 12225	%	100			
Resistance to Liquids	BS EN 14030	%	90			
Oxidation	BS EN 12226	Years	150			

	Identification Properties		
Colour	-	-	Black
Thickness (2kPa)	BS EN ISO 9863-1	mm	2.5

*based on, **md = machine direction, cd = cross machine direction The listed technical values are guiding values, achieved in the manufacturer's test laboratory and/ or independent testing institutes. The right is reserved to make changes without notice at any time.

Typical Installation

Terratex 70 should be laid directly on to a prepared formation prior to re-ballasting commencing. It can simply be overlapped by a minimum of 500mm between rolls to provide a continuous layer of robust, low abrasion resistant geotextile separator.

Permeability

Needle punched geotextiles will operate at zero head of water unlike heat-bonded geotextiles which may need up to 50 mm head of water before working, leading to water ponding on the geotextiles in certain situations. Terratex 70 allows drainage at a high rate of 60 litres/m²/second, thereby relieving pore pressure from low permeability soils beneath the track.

For required ballast depth see NR/L2/TRK/2102

Elongation

Due to the ballast compacting onto the geotextile and causing elongation it is therefore necessary to include strain and elongation enhancing properties.

Find out more about our products by visiting **www.aquafab.co.uk**

Find out more about our products by visiting www.aquafab.co.uk

The figure shows a simple mathematical model of a series of ballast stones across a metre strip of track bed. The worst case scenario is a 58% elongation and the best case is 15%. With a 100% elongation at the break, Terratex® handles even the worst case.

Terratex[®] 4050

Terratex 4050 is a needle punched, non-woven, staple fibre geotextile manufactured from virgin polypropylene fibres with 1% Carbon Black to give outstanding puncture, abrasion and permeability properties. Terratex 4050 is a higher abrasion resistant alternative to Terratex 70, providing even more superior performance when compared to a heatbonded geotextile and is a separator and filtration geotextile for use between the track ballast and a sand layer or granular subgrade.

It is advised Terratex 4050 is selected where the formation has a medium percentage of coarse particles >14mm AND where there is a medium abrasion risk.

Criteria for Use					
Network Rail Solution No.			2 and 3		
Ab	orasion Risk		М	edium	
Draina	age Condition		Sati	sfactory	
Depth of	Track Bed Layers		Ad	equate	
Contam	ination of Ballast		No cohesive	material present	
Existin	g Blanket Layer			Yes	
Percentage of particles greater than 14mm		an 14mm	Medium		
Product Name	Width	Length	Weight*	PADs Code	
	2 m	50 m	28 Kg	0057 / 100493	
	3 m	50 m	41 Kg	0057 / 100481	
Tauratau 4050	4 m	50 m	55 Kg	0057 / 100733	
Terratex 4050	5 m	50 m	69 Kg	0057 / 000958	
	6 m	50 m	83 Kg	0057 / 000959	
	London U	Inderground Ap	proval ID	1552	

Network Rail

Product App PA05/00059

Abrasion Resistance Testing

In 2004 accelerated abrasion assessment testing was carried out and presented as a paper during the "Railway Engineering 2004 Conference". This is a brief extract. Geotextiles were tested in a 4.5 x 1.5m test rig to investigate the damage caused by ballast to a geotextile in poor subgrade conditions.

The subgrade constructed for the test consisted of a compacted clay and 75mm of poorly graded coarse blanket material.

All tests simulated the continuous running of high-speed trains, in total 1-million load cycles, representing a year of traffic on a typical main line track.

Testing compared the performance of two needle punched materials against a heatbonded product.

Material Properties

Property	Test Method*	Unit	Value
	Mechanical Properties		
Tensile Strength (md)	BS EN ISO 10319	kN/m	22
Tensile Strength (cd)	BS EN ISO 10319	kN/m	22
Tensile Elongation at maximum load (md)	BS EN ISO 10319	%	80
Tensile Elongation at maximum load (cd)	BS EN ISO 10319	%	80
Static Puncture Resistance (CBR)	BS EN ISO 12236	Ν	3300
Dynamic Perforation Resistance (Cone Drop) - hole \varnothing	BS EN ISO 13433	mm	13

Hydraulic Properties					
Apparent Pore Size O_{90}	BS EN ISO 12956	μm	60		
Permeability; Vertical (dh=50mm)	BS EN ISO 11058	l/m²s	85		
	Durability				
Weathering 50MJ/m² (1 month)	BS EN ISO 12224	>90% Retained Strength			
Microbiological	BS EN 12225	BS EN 12225 No loss in strength			
Resistance to Liquids	Resistance to Liquids BS EN 14030 No loss in strength				
Oxidation at 112 days (100 years) BS EN 13438 >90% Retained Strength					
Identification Properties					

Identification Properties				
Colour	-	-	Black	
Thickness (2kPa)	BS EN ISO 9863-1	mm	3	

*based on, **md = machine direction, cd = cross machine direction

The listed technical values are guiding values, achieved in the manufacturer's test laboratory and/ or independent testing institutes. The right is reserved to make changes without notice at any time.

Typical Installation

Terratex 4050 should be laid directly on to a prepared formation prior to re-ballasting commencing.

It can simply be overlapped by a minimum of 500mm between rolls to provide a continuous layer of robust, medium abrasion resistant geotextile separator.

Elongation

Just like Terratex 70, due to the needle punched method of manufacture, Terratex 4050 has a far superior elongation factor to that of a heat-bonded product.

Compared with Terratex 70, Terratex 4050 offers a superior cross machine (cd) elongation factor.

Find out more about our products by visiting www.aquafab.co.uk

Permeability

Needle punched geotextiles will operate at zero head of water unlike heat-bonded geotextiles which may need up to 50mm head of water before working, leading to water ponding on the geotextiles in certain situations. Terratex 4050 still allows drainage at a high rate of 85 litres/m²/sec, thereby relieving pore pressure from low permeability soils beneath the track.

TED 2[®]

TED 2 is a filtration and drainage geocomposite that was developed to address existing track bed formation installations that have a significantly reduced natural ground drainage capability.

This is a problem accentuated by years of active rail traffic usage on the infrastructure, including factors such as historic ash discharge from steam engines.

In addition to providing improved lateral drainage, TED 2 also acts as a robust separator, especially useful when the subgrade contains a high percentage of particles greater than 14mm.

TED 2 can also be used when there is concern that the existing blanket layer is very thin and it is important to maintain its integrity.

TED 2 consists of a multi-layered construction combining the proven performance of Terratex 4050 to encapsulate an extruded polyethylene drainage mesh for improved lateral drainage flows.

This multi-layered approach also provides TED 2 with a significantly increased puncture resistance capability ->50% increase over Terratex 4050.

Criteria for Use				
Network Rail Solution No.	2 and 3			
Abrasion Risk	Medium-High			
Drainage Condition	Satisfactory			
Depth of Track Bed Layers	Adequate			
Contamination of Ballast	No cohesive material present			
Existing Blanket Layer	Yes			
ercentage of particles greater than 14mm	High			

Product Name	Width	Length	Weight*	PADs Code
TED 2	1.95 m	25 m	63 Kg	0057 / 100498
	3.90 m	25 m	125 Kg	0057 / 100813
	London	1549		

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Material Properties

Property	Test Method*	Unit	Value
Mecl	e		
Tensile Strength (md)	BS EN ISO 10319	kN/m	30
Tensile Strength (cd)	BS EN ISO 10319	kN/m	30
Tensile Elongation at maximum load (md)	BS EN ISO 10319	%	70
Tensile Elongation at maximum load (cd)	BS EN ISO 10319	%	70
Static Puncture Resistance (CBR)	BS EN ISO 12236	Ν	7000
Dynamic Perforation Resistance (Cone Drop) - hole Ø	BS EN ISO 13433	mm	13

Mechanical Properties – HDPE Mesh Core				
Tensile Strength (md)	BS EN ISO 10319	kN/m	4	
Tensile Strength (cd) BS EN ISO 10319		kN/m	4	
Hydraulic Properties - Geotextile				
Apparent Pore Size O90	BS EN ISO 12956	μm	60	
Permeability; Vertical (dh=50mm)	BS EN ISO 11058	I/m²s	85	

Hyd	Iraulic Properties - Composite		
In plane flow capacity I = 1 @ 20kPA In plane flow capacity I = 1 @ 200kPa In plane flow capacity I = 1 @ 300kPa	EN ISO 12958	l/m²s	0.026 0.014 0.007

	Durability	
Weathering 50MJ/m ² (1 month)	BS EN ISO 12224	>90% Retained Strength
Microbiological	BS EN 12225	No loss in strength
Resistance to Liquids	BS EN 14030	No loss in strength
Oxidation at 112 days (100 years)	BS EN 13438	>90% Retained Strength

Identification Properties				
Colour	-	-	Black	
Thickness (2kPa) – Composite	BS EN ISO 9863-1	mm	4	
Thickness – HDPE Mesh Core	BS EN ISO 9863-2	mm	3.4	

*based on, **md = machine direction, cd = cross machine direction The listed technical values are guiding values, achieved in the manufacturer's test laboratory and/ or independent testing institutes. The right is reserved to make changes without notice at any time.

Typical Installation

TED 2 should be laid directly on to a prepared formation prior to re-ballasting commencing. It can simply be overlapped by a minimum of 500mm between rolls to provide a continuous layer of robust, medium-high abrasion resistant geotextile separator.

Permeability

By combining the drainage mesh core, the geocomposite envelop possesses an extremely high flow through characteristic, allowing subsurface water to either pass straight through and drain away naturally or be channelled across the formation to the lineside drainage system.

Find out more about our products by visiting www.aquafab.co.uk

TED 10[®]

TED 10 is a needle punched, non-woven, staple fibre geotextile manufactured from virgin polypropylene fibres with 1% Carbon Black to give even more outstanding puncture and abrasion properties compared to Terratex 4050.

Acting as a robust separator, especially useful when the subgrade contains a high percentage of particles greater than 14mm, but without the inclusion of TED 2's drainage mesh core, TED 10 can be a quicker and more cost-effective robust separator solution.

TED 10 can also be used when there is concern that the existing blanket layer is very thin and it is important to maintain its integrity.

Network Rail

Product Approved PA05/06133

Criteria for Use		Product Name	Width	Length	Weight*	PADs Code
Network Rail Solution No.	2		2.0m	25 m	50 Kg	0057 / 101428
Abrasion Risk	High		3.0m	25 m	75 Kg	0057 / 101427
Drainage Condition	Satisfactory		4.0m	25 m	100 Kg	0057 / 101426
Depth of Track Bed Layers	Adequate	TED 10	2.0m	50 m	100 Kg	0057 / 101425
Contamination of Ballast	No cohesive material present		3.0m	50 m	150 Kg	0057 / 101424
Existing Blanket Laver	Ves		4.0m	50 m	200 Kg	0057 / 101423
Percentage of particles greater than 14mm	High		London	Underground A	Approval ID	2 x 25m - 5156 3 x 25m - 5157 4 x 25m - 5158

Material Properties

Property	Test Method*	Unit	Value		
Mechanical Properties					
Tensile Strength (md)	BS EN ISO 10319	kN/m	55		
Tensile Strength (cd)	BS EN ISO 10319	kN/m	55		
Tensile Elongation at maximum load (md)	BS EN ISO 10319	%	80		
Tensile Elongation at maximum load (cd)	BS EN ISO 10319	%	80		
Static Puncture Resistance (CBR)	BS EN ISO 12236	Ν	10,000		
Dynamic Perforation Resistance (Cone Drop) - hole ${\mathcal O}$	BS EN ISO 13433	mm	2		

Hydraulic Properties				
Apparent Pore Size O90	BS EN ISO 12956	μm	70	
Permeability; Vertical (dh=50mm)	BS EN ISO 11058	l/m²s	35	

Durability				
Weathering 50MJ/m² (1 month)	BS EN ISO 12224	>90% Retained Strength		
Microbiological	BS EN 12225	No loss in strength		
Resistance to Liquids	BS EN 14030	No loss in strength		
Oxidation at 112 days (100 years)	BS EN 13438	>90% Retained Strength		

Identification Properties				
Colour	-	_	Black	
Thickness (2kPa)	BS EN ISO 9863-1	mm	6	

*based on, **md = machine direction, cd = cross machine direction The listed technical values are guiding values, achieved in the manufacturer's test laboratory and/ or independent testing institutes. The right is reserved to make changes without notice at any time.

For required

ballast depth see NR/I 2/TRK/2102

Typical Installation

TED 10 should be laid directly on to a prepared formation prior to re-ballasting commencing. It can simply be overlapped by a minimum of 500mm between rolls to provide a continuous layer of robust, high abrasion resistant geotextile separator.

Permeability

Although reduced compared to Terratex and TED2, TED10's permeability meets the requirements of NR/SP/TRK/010 Geotextiles (formerly RT/CE/S/010) clause 4.

Tracktex[®]

Tracktex is a multi-layered geocomposite consisting of a specialist microporous filtration layer sandwiched between two thick layers of protective non-woven geotextile. When deployed below ballast, Tracktex prevents rainwater penetrating through to the underlying formation but allows upward movement of water whilst filtering any fine soil particles.

The migration of fine-grained material from formation subgrade into the overlying ballast layer, under the action of repeated train loading (pumping), has historically been a problem for railway engineers.

Traditionally the treatment method for this occurrence would be the installation of a 50-100mm thick 'sand blanket' with a geotextile separation layer; this method is time consuming and can be difficult to construct depending on weather conditions and/ or accessibility. Tracktex is an effective treatment for the repair and prevention of areas of trackbed suffering from severe subgrade erosion as a result of 'pumping failure', providing both the filtration capabilities of the sand layer and the separating geotextile in an easy to install singular product.

Download technical datasheets, approval certificates and CAD drawings by scanning the QR Code or visit www.aquafab.co.uk

AQUA

Criteria for Use		Product Name	Width	Length	Weight*	PADs Code
Network Rail Solution No.	3		1.95 m	25 m	80 Kg	0057 / 100492
Abrasion Risk	High		3.0 m	25 m	123 Kg	0057 / 100912
Drainage Condition	Satisfactory	Tracktex	3.5 m	25 m	144 Kg	0057 / 100913
Depth of Track Bed Layers	Inadequate		3.7 m	25 m	152 Kg	0057 / 100914
Contamination of Ballast	Yes		3.9 m	25 m	160 Kg	0057 / 100820
Alternative to bulk sand installation	Yes		London	Underground A	Approval ID	1551

Features and Benefits

- No requirement for specialist equipment

Application Suitability

The specification of Tracktex should be undertaken in accordance with Network Rail PAN Form (NR/L3/INI/CP0074/ F0019) and as detailed here.

Drainage Definitions

Good Drainage

No history of drainage problems and surcharging of the drainage system does not occur on average, more than one occasion in ten years.

Satisfactory Drainage

Water is maintained at 0.5m below base of sleeper or lower except during heavy rainfall when surcharging of the drainage system may occur.

Poor Drainage

A history of drainage problems e.g. where standing water is frequently found within 0.5m of the base of the sleeper, wet beds, water standing in the cess, track quality problems.

Erosion/abrasion susceptible subgrade soft to stiff Erosion/ abrasion susceptible subgrade organic & hard

Formation

Silty or clayey, coarse

granular

Granular, Slurried

Erosion/ abrasion

susceptible subgrade -

soft to stiff

Erosion/ abrasion

susceptible subgrade -

organic & hard

Silty or clayey, coarse

granular

Granular, Slurried

Drawing Title - NR/L2/TRK/4239/02 - 5.6.4 Standard Solution No. 3

Typical Sand Blanket Installation Detail

Find out more about our products by visiting www.aquafab.co.uk

Material Code*	Good Drainage	Satisfactory Drainage	Poor Drainage
Major Routes	– Track Category	1, 1A and 2	
5, 9, 10, 14, 18, 22, 26 & 36	Separator	Separator	Tracktex
6, 7, 8, 15, 19, 23, 27 & 28	Tracktex	Tracktex	Sand Blanket Only
32, 33, 34 & 35	Tracktex	Sand Blanket Only	Sand Blanket Only
30, 31, 37 & 38	Sand Blanket Only	Sand Blanket Only	Sand Blanket Only

Minor Routes ·	– Track Category 3	3, 4, 5 and 6	
5, 9, 10, 14, 18, 22, 26 & 36	Separator	Separator	Tracktex
6, 7, 8, 15, 19, 23, 27 & 28	Tracktex	Tracktex	Tracktex
32, 33, 34 & 35	Tracktex	Tracktex	Tracktex
30, 31, 37 & 38	Sand Blanket Only	Sand Blanket Only	Sand Blanket Only

Typical Installation

Tracktex should be laid directly on the prepared formation / sub-grade with no lapping up the sides of the excavation. Tracktex should be trimmed wherever necessary

Typically installed at 3.9m wides, where this is not achievable Tracktex should extend 0.5m beyond each end of the sleeper (3.7m minimum width).

Tracktex can be used through platforms or tunnels where the excavation width is further reduced providing it is lapped up on the platform/ tunnel wall side only, there is existing working track drainage on the opposite side and the Tracktex is installed up to the edge of the drain.

Material Properties

Property	Test Method*	Unit	Value		
Mechanical Properties					
Tensile Strength (md)	BS EN ISO 10319	kN/m	90		
Tensile Strength (cd)	BS EN ISO 10319	kN/m	90		
Tensile Elongation at maximum load (md)	BS EN ISO 10319	%	80		
Tensile Elongation at maximum load (cd)	BS EN ISO 10319	%	80		
Static Puncture Resistance (CBR)	BS EN ISO 12236	Ν	17,000		
Dynamic Perforation Resistance (Cone Drop) - hole Ø	BS EN ISO 13433	mm	0		

	Hydraulic Properties		
Apparent Pore Size O90	BS EN ISO 12956	μm	<10
Permeability; Vertical (dh=50mm)	BS EN ISO 11058	l/m²s	0

	Durability	
Weathering 50MJ/m²(1 month)	BS EN ISO 12224	>90% Retained Strength
Microbiological	BS EN 12225	No loss in strength
Resistance to Liquids	BS EN 14030	No loss in strength
Oxidation at 112 days (100 years)	BS EN 13438	>90% Retained Strength

	Identification Properties		
Colour	_	_	Black
Thickness (2kPa)	BS EN ISO 9863-1	mm	9

*based on, **md = machine direction, cd = cross machine direction

The listed technical values are guiding values, achieved in the manufacturer's test laboratory and/ or independent testing institutes. The right is reserved to make changes without notice at any time.

Product Development & Testing

Undertaken using specialist testing equipment and with input from leading Railway Geotechnical Engineers, Tracktex was specifically developed as a geocomposite alternative to traditional sand blankets.

- Testing recreated the conditions of a failed clay subgrade in a ½ sleeper rig.
- Water applied throughout from spray nozzles simulating rain.
- Sleeper, rail, ballast and old geo then removed & Tracktex applied directly to the failed subgrade.

reinstated formation.

After testing the sleeper, rail, etc. removed for evaluation. No penetration of clay slurry visibly present.
On further inspection, water previously present in the subgrade has been completely removed resulting in a dry & firm subgrade.

Tracktex[®] G+

A development of the Tracktex Geocomposite, Tracktex G+ offers the same protection to subgrade erosion as Tracktex by preventing water from entering the formation by laterally draining towards the cess and 6ft drains. Tracktex G+ is reinforced with a layer of Railgrid which is a biaxial geogrid which improves the track geometry and the ballast layer stiffness. Heat lamination between the two geocomposites ensures a good connection and allows the behaviours to work together.

Product Name	Width	Length	Weight*	PADs Code
Tracktex G+	1.95 m	25 m	100 Kg	TBC
	3.0 m	25 m	153 Kg	TBC
	3.5 m	25 m	180 Kg	TBC
	3.7 m	25 m	190 Kg	TBC
	3.9 m	25 m	200 Kg	TBC

Property	Test Method*	Unit	Value
Mec	0		
Tensile Strength (md / cd)	BS EN ISO 10319	kN/m	90 / 90
Tensile Elongation at maximum load (md / cd)	BS EN ISO 10319	%	80 / 80
Static Puncture Resistance (CBR)	BS EN ISO 12236	Ν	17,000
Dynamic Perforation Resistance (Cone Drop) - hole \varnothing	BS EN ISO 13433	mm	0

Mechanical Properties – 65mm Aperture Bi-axial Geogrid					
Tensile Strength (md / cd)	BS EN ISO 10319	kN/m	11 / 12		
Peak Tensile Strength (md / cd)	BS EN ISO 10319	kN/m	30 / 30		
Yield Point Elongation (md / cd)	BS EN ISO 10319	%	12 / 12		
Junction Strength (md / cd)	GRI GG2	kN/m	29 / 29		
Resistance to Abrasion	BS EN ISO 13427	%	>94		

Hydraulic Properties					
Apparent Pore Size O ₉₀	BS EN ISO 12956	μm	<10		
Permeability; Vertical (dh=50mm)	BS EN ISO 11058	I/m²s	0		
	Durability				
Weathering 50MJ/m² (1 month)	BS EN ISO 12224	>90% Retair	ned Strength		
Microbiological	BS EN 12225	No loss in strength			
Resistance to Liquids BS EN 14030 No loss in strength			atropath		
	BS EN 14030	INO IOSS II	strengtn		
Oxidation at 112 days (100 years)	BS EN 13438	>90% Retain	ned Strength		

	Identification Properties			
Colour	-	-	Black	
Thickness (2kPa)	BS EN ISO 9863-1	mm	9***	
***Tracktex Geocomposite ONLY.				
*based on, **md = machine direction, cd = cross machine direction		lload technical datasheet	s. approval	

The listed technical values are guiding values, achieved in the manufacturer's test laboratory and/ or independent testing institutes. The right is reserved to make changes without notice at any time.

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TED 4[®]

TED 4 is a needle punched, non-woven, staple fibre geocomposite manufactured from virgin polypropylene fibres with 1% Carbon Black to give outstanding puncture and abrasion properties bonded with a 65mm aperture biaxial Railgrid Geogrid to improve geometry and enhance the track bed layers dynamic sleeper support stiffness.

TED 4 provides superior performance when compared to a heat-bonded geocomposite and is a reinforcing separator and filtration geotextile for use between the track ballast and a sand layer or granular subgrade.

It is advised TED 4 is selected where the formation has a medium percentage of coarse particles >14mm AND where there is a medium abrasion risk.

	Network Rail Product Approved PA05/02772	「二、二、二、二、二、二、二、二、二、二、二、二、二、二、二、二、二、二、二、
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TED 10[®] G+

TED 10 G+ is a needle punched, non-woven, staple fibre geotextile manufactured from virgin polypropylene fibres with 1% Carbon Black to give even more outstanding puncture and abrasion properties compared to TED 4.

Acting as a robust separator, especially useful when the subgrade contains a higher percentage of particles greater than 14mm but still incorporating a 65mm biaxial Railgrid Geogrid for improved track geometry and dynamic sleeper support stiffness.

It is advised TED 10 G+ is selected where the formation has a high percentage of coarse particles >14mm AND where there is a high abrasion risk.

Criteria for Use			Product Name	Width	Length	Weight*	PADs Code
Network Rail Solution No.	2 and 3			105		00.1/	0057 / 100 107
Abrasion Risk	Medium			1.95 m	25 m	30 Kg	0057/100497
Drainage Condition	Satisfactory			3.75 m	25 m	58 Kg	0057 / 101483
Depth of Track Bed Layers	Insufficient		TED 4				
Contamination of Ballast	No cohesive material present			3.9 m	25 m	60 Kg	0057 / 101429
Existing Blanket Layer	Yes						
Percentage of particles greater than 14mm	Medium	London Underground Approval ID 15		1550			

Criteria for Use		Product Name	Width	Length	Weight*	PADs Code
Network Rail Solution No.	2 and 3		105	0.5	70.17	75.0
Abrasion Risk	Abrasion Risk High		1.95 m	25 m	/0 Kg	IBC
Drainage Condition	Satisfactory		3.75 m	25 m	132 Kg	TBC
Depth of Track Bed Layers	Insufficient	TED 10 G +				
Contamination of Ballast	No cohesive material present		4.0 m	25 m	140 Kg	TBC
Existing Blanket Layer Yes						
Percentage of particles greater than 14mm	High		London	Underground A	Approval ID	TBC

Material Properties

Property	Test Method*	Unit	Value			
Mechanical Properties – Terratex 4040						
Tensile Strength (md / cd)	BS EN ISO 10319	kN/m	22 / 22			
Tensile Elongation at maximum load (md / cd)	BS EN ISO 10319	%	80 / 80			
Static Puncture Resistance (CBR)	BS EN ISO 12236	Ν	3,300			
Dynamic Perforation Resistance (Cone Drop) - hole \varnothing	BS EN ISO 13433	mm	13			

Mechanical Properties – 65mm Aperture Bi-axial Geogrid				
Tensile Strength (md / cd)	BS EN ISO 10319	kN/m	11 / 12	
Peak Tensile Strength (md / cd)	BS EN ISO 10319	kN/m	30/30	
Yield Point Elongation (md / cd)	BS EN ISO 10319	%	12 / 12	
Junction Strength (md / cd)	GRI GG2	kN/m	29/29	
Resistance to Abrasion	BS EN ISO 13427	%	>94	

Hydraulic and Durability properties as per Terratex 4050, see page 98.

Download technical datasheets, approval certificates and CAD drawings by scanning the QR Code

*based on, **md = machine direction, cd = cross machine direction The listed technical values are guiding values, achieved in the manufacturer's test laboratory and/ or independent testing institutes. The right is reserved to make changes without notice at any time.

Material Properties

Property	Test Method*	Unit	Value		
Mechanical Properties – TED 10					
Tensile Strength (md / cd)	BS EN ISO 10319	kN/m	55 / 55		
Tensile Elongation at maximum load (md / cd)	BS EN ISO 10319	%	80 / 80		
Static Puncture Resistance (CBR)	BS EN ISO 12236	Ν	10,000		
Dynamic Perforation Resistance (Cone Drop) - hole \varnothing	BS EN ISO 13433	mm	2		

Mechanical Properties – 65mm Aperture Bi-axial Geogrid					
Tensile Strength (md / cd)	BS EN ISO 10319	kN/m	11 / 12		
Peak Tensile Strength (md / cd)	BS EN ISO 10319	kN/m	30 / 30		
Yield Point Elongation (md / cd)	BS EN ISO 10319	%	12 / 12		
Junction Strength (md / cd)	GRI GG2	kN/m	29 / 29		
Resistance to Abrasion	BS EN ISO 13427	%	>94		

Hydraulic and Durability properties as per TED 10, see page 102.

*based on, **md = machine direction, cd = cross machine direction The listed technical values are guiding values, achieved in the manufacturer's test laboratory and/ or independent testing institutes. The right is reserved to make changes without notice at any time.

Download technical datasheets, approval certificates and CAD drawings by scanning the QR Code

Geoweb[®] Geocell

Geoweb Geocell is an expandable 'honeycomb' structure which can be filled with granular material to create a more resilient formation layer that can better distribute the stresses acting on the subgrade. If the required depth of the formation construction can not be achieved Geoweb Geocells can be used to reduce the required depth; Geoweb layers should be designed using a system approach with consideration given to any future requirement to install drainage, structures or civils planned work etc.

For the purposes of track bed reinforcement the existing subgrade should have a modulus of between 5MN/m² and 15MN/m². Geoweb can also be used on existing subgrades with a modulus above 15MN/m² for erosion control purposes in areas with poor drainage.

For the purposes of track bed reinforcement, the maximum depth of each individual layer of Geoweb should be 200mm. Multiple layers of Geoweb can be installed to achieve the desired track bed construction, see Figure 6 of NR/L2/TRK/4239 for further information. Any reduction in construction depth should be in accordance with Figure 5 of NR/L2/TRK/4239.

Geoweb, when used in the formation, should be filled with a clean, non-cohesive, granular material which meets the filtration requirements of section 5.4 of NR/L2/TRK/4239.

Site specific calculations / solutions can be provided, please speak with our sales team on 01695 51933 for more information.

	Criteria for Use
	Can be combined with NR Solution 2 & 3
	Reducing deflection in the subgrade and ballast
Ir	ncreasing trackbed stiffness over very soft subgrades
	Reducing of ballast settlement
	Reduction of track quality deterioration
Tra	ansitions on/ off very hard structures, e.g. Bridge Deck
	Percentage of particles greater than 14mm

Product Name	Width	Length	Weight*	PADs Code	
	100 mm	8.3 x 2.6 m	22 Kg	0057 / 100723	
	150 mm	8.3 x 2.6 m	33 Kg	0057 / 100602	
	150 mm XL	16.6 x 3.9 m	99 Kg	0057 / 100606	
	200 mm	8.3 x 2.6 m	44 Kg	0057 / 100722	
	200 mm XL	16.6 x 3.9 m	132 Kg	0057 / 000112	
Geoweb Geocell	250 mm	8.3 x 2.6 m	55 Kg	0057 / 101289	
	300 mm	8.3 x 2.6 m	66 Kg	0057 / 101297	
	Geoweb Fixing Pack Includes: 16 No. Pre Filled Hessian Sacks, 8 No. 3.9m Retaining Bars & 24 No. Atra®Key Connection Device				
	Londo	London Underground Approval ID			

work Rail

Material Properties

Test Method*	Unit	Value			
Base Material					
ASTM D 1505	Polyet	hylene			
ASTM D 1505	g/cm³	0.935 – 0.965			
-	_	Black			
By weight	%	1.5 – 2.0			
ASTM D 1693	Hours 5000				
	Test Method* ASTM D 1505 ASTM D 1505 ASTM D 1505 By weight ASTM D 1693	Test Method*UnitBase MaterialASTM D 1505PolyetASTM D 1505g/cm³By weight%ASTM D 1693Hours			

		Mechanical Pr
Sheet Thickness	ASTM D 5199	mm
Surface Treatment Performance	GRI GG2	The polyethylene strips shall b the textured / perforated plast friction angle of the silica
Surface Treatment Material	BS EN ISO 13427	The polyethylene strips sha rhomboidal indentations shall shall be perforated with horiz 0.75 in (19 mm) on-center. Ho centers. The edge of strip to th the weld to the nearest edge of 3/8 in (10 mm x 35 mm) is st

Cell & Seam Properties					
Percentage Cell Wall Open Area	-	%	16.8 ±1		
Length / Width	-	mm	287 / 320		
Nominal Area	-	Cm ²	460		
Short Term Peel Strength	100mm Deep	Ν	1420		
	150mm Deep	Ν	2130		
	200mm Deep	Ν	2840		
Long Term Peel Strength	-	Long-term seam peel strength test shall be performed on all resin or pre-manufactured sheet or strips. A 4.0 in (100 mm) wide seam sample shall support a 160 lb (72.5 kg) load for a period of 168 hours (7 days) minimum in a temperature-controlled environment undergoing a temperature change on a 1-hour cycle from ambient room to 130%F (54%C). Ambient room temperature is per ASTM E 41			

Typical Installation

A Geotextile Separator, such as Terratex 4050, should be installed between the subgrade and the Geoweb and between ballast and Geoweb, as detailed. A high strength Geolon PP60R geotextile is available if required.

Geoweb Geocells should be installed with all adjoining panels connected using 'Atra Keys'. Stakes or retaining bars can be used to hold the cell structure open for ease of filling.

Each separate Geoweb laver should be adequately compacted.

Fill material should extend at least 50mm above the Geoweb before any vehicle movement takes place over the installed product.

(as per

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operties

50 (-5% /+10%)

e textured and perforated such that the peak friction angle between the surface of tic and #40 silica sand at 100% relative density shall be no less than 85% of the peak a sand in isolation when tested by the direct shear method per ASTM D 5321.

Il be textured with a multitude of rhomboidal (diamond shape) indentations. The have a surface density of 140 – 200 per in² (22 – 31 per cm²). In addition, the strips contal rows of 0.4 in (10 mm) diameter holes. Perforations within each row shall be prizontal rows shall be staggered and separated 0.5 in (12 mm) relative to the hole ne nearest edge of perforation shall be 0.3 in (8 mm) minimum and the centerline of of perforation shall be 0.7 in (18 mm) minimum. A slot with a dimension of 3/8 in x 1 andard in the center of the non-perforated areas and at the center of each weld.

Railgrid[®] Geogrid

Railgrid Geogrid is a 65 mm extruded biaxial polypropylene geogrid, which possesses a high tensile stiffness for use as a reinforcement at the base of the ballast layer, within the ballast layer itself and where ballast layers exceed 300 mm depth, e.g., adverse cant curves.

Installation of Railgrid Geogrid will reduce ballast settlement and therefore reduce the rate of deterioration of track quality by providing reinforcement to the ballast layer when the formation is soft.

Criteria for Use	Product	Width	Length	Weight*	PADs Code
Can be combined with NR Solution 2 & 3	Name				
Track bed reinforcement		2.0 m	50 m	41 Kg	0057 / 100494
Enhance dynamic sleeper support stiffness		3.0 m	50 m	60 Kg	0057 / 100491
Reinforcement of granular layers in the lower track bed	Railgrid Geogrid	3.7 m	50 m	75 Kg	0057 / 100645
Reducing ballast settlement & track quality detenoration Under all S&C to limit permanent ballast settlement		3.8 m	50 m	77 Kg	0057 / 100646
Download technical datasheets,		3.9 m	50 m	79 Kg	0057 / 100490
approval certificates and CAD drawings by scanning the QR Code		4.0 m	50 m	81 Kg	0057 / 100852
or visit www.aguafab.co.uk					

Network Rail Standard NR/L2/TRK/4239 states "Where the absolute minimum value of K can be achieved throughout a site on an existing line where the "Existing Main Line" value is required, a geogrid shall be used to compensate for low stiffness, placed directly below the ballast, i.e., on top of the formation or any geotextile.".

o te se

Geogrid can be specified with separators (Terratex, TED2, TED10) and anti-pumping geocomposites (Tracktex) where required to improve the stiffness of the track bed, or supplied as a bonded product - TED 4, TED 10 G+ or Tracktex G+.

Typical Installation

Railgrid Geogrid can be laid directly on to a prepared formation prior to reballasting commencing. It can simply be overlapped by a minimum of 500mm between rolls to provide a continuous layer of ballast reinforcement. Railgrid can be laid directly on top of a pre-installed geotextile or geocomposite layer above a prepared formation.

1553

London Underground Approval ID

Material Properties

Property	Test Method*	Unit	Value			
	Construction Properties					
Polymer	Polyp	ropylene with 2% Carbon Black co	ntent			
Structure		Bi-axial / bi-orientated geogrid				
Mesh Type and Size	Square Aperture, 65mm x 65mm					
	Mechanical Properties					
Tensile Strength (md / cd)	ISO 10319	kN/m	11 / 12			
Peak Tensile Strength (md / cd)	ISO 10319	kN/m	30/30			
Yield Point Elongation (md / cd)	ISO 10319	%	12 / 12			
Junction Strength (md / cd)	GRI GG2	kN/m	29 / 29			
Resistance to Abrasion	ISO 13427	%	>94			

Property	Test Method*	Unit	Value		
Construction Properties					
Polymer	Polyp	propylene with 2% Carbon Black co	ntent		
Structure		Bi-axial / bi-orientated geogrid			
Mesh Type and Size		Square Aperture, 65mm x 65mm			
	Mechanical Properties				
Tensile Strength (md / cd)	ISO 10319	kN/m	11 / 12		
Peak Tensile Strength (md / cd)	ISO 10319	kN/m	30/30		
Yield Point Elongation (md / cd)	ISO 10319	%	12 / 12		
Junction Strength (md / cd)	GRI GG2	kN/m	29 / 29		
Resistance to Abrasion	ISO 13427	%	>94		

*based on, **md = machine direction, cd = cross machine direction

The listed technical values are guiding values, achieved in the manufacturer's test laboratory and/ or independent testing institutes. The right is reserved to make changes without notice at any time.

University Testing

The 65mm aperture size of Railgrid Geogrid is perfectly suited to interlocking with rail ballast, providing the optimum installation solution - this size determination is based on a number of pieces of research undertaken at Nottingham University.

A number of factors were considered and investigated including: a review of previously published literature, ballast specifications, behaviour of a grid reinforced granular layer, Grid and Ballast Interaction, Composite Element Testing, Full Scale Rig Testing and a live site trial.

- The following aspects were found to be of greatest importance:
- 1. Optimum grid aperture for railway ballast was found to be 60-70mm, ideally 1.40 times larger than the ballast dimension (typically 50mm).
- 2. Geogrid stiffness in bending is important.
- 3. Effectiveness of the geogrid was almost independent of the depth of installation within the ballast (subject to further study).

The dimension of the aperture has a strong effect in the pull-out behaviour as well; as shown below right, a grid with an aperture of 90% of the ballast size (that is 45 mm) has a pull-out resistance that is dramatically lower than the one of a grid with 65 mm aperture.

Conclusions

- 1. Results from CET testing indicated that a 65mm aperture size was the most effective in reducing settlement for a 50mm nominal size aggragate.
- 2. Railway facility testing findings confirmed the reduction of permanent settlement when a 65mm aperture geogrid is installed.
- 3. Geogrid reinforcement can increase maintance interventions through the reduction of track settlement.
- 4. Field trials concluded that track deterioration is reduced when a geogrid is installed, even when compared to a stiffer subgrade without geogrid.

Forcen (kN) 0.5

Reforme[®]

Reforme is an impermeable double cuspated core wrapped in a needle punched, non-woven geotextile ideal for installation over contaminated subgrades as a preventative barrier membrane.

Dynamic loading and fatigue testing of the product has proven that it is capable of withstanding typical rail forces and is excellent at preventing subgrade fines from migrating into the ballast.

Product Approved

Grandfathers Rights

Track Access Matting System (TAMS)

Patent No. - 2435284 / 2478676

After decades of testing Aqua finally engineered the perfect product for road/rail units to enter and exit digs without causing damage to the rail head and therefore leading to costly repairs.

TAMS can be easily installed by hand, is easily transported and requires minimum time to install, all these advantages make it perfect for possession timed works.

Part No.	Description	PADs Code
AQUATAMS/RS	1no. Track Access Matting System comprising of 2no. Upper & 2no. Lower Ramp Sections	0069 / 100054
AQUATAMS/RSFSE	1no. T.A.M.S as per AQUATAMS/RS complete with 1no. FSE Expansion Pack (AQUATAMS/RSEXP)	0069 / 100055
AQUATAMS/RSEXP	FSE Expansion Pack Comprising 2no. 2m Platform Sections for plant unable to raise/ lower rail bogies independently	0069 / 100056
AQUATAMS/3M	1no. T.A.M.S Upper Ramp Section	0069 / 100057
AQUATAMS/2M	1no. T.A.M.S Lower Ramp Section	0069 / 100058
AQUATAMS/FSE	1no. T.A.M.S Expansion Platform Section	0069 / 100059

Evolving from the TAMS units, two new solutions were developed to help road/rail vehicles negotiate the rail environment with ease and speed whilst ensuring minimum detrimental effect to the rail, clips, sleepers, etc.

V-RAM was developed as a portable RRAP to help road/rail vehicles access the rail at remote locations, as the system can be moved quickly to site and installed by hand.

TAMS XL was designed to take the MSX heavy duty plant machine, enabling it to on and off track, quickly and safely.

Ρ

AQUA/TAN AQUA/TAN AQUA/1 AQUA/TA AQUA/

*based on, **md = machine direction, cd = cross machine direction

The listed technical values are guiding values, achieved in the manufacturer's test laboratory and/ or independent testing institutes. The right is reserved to make changes without notice at any time.

Product Name **Criteria for Use** Width Weight* PADs Code Length Requirement for an impermeable membrane 3.0 m 12.5 m N/A 54 Kg 3.0 m 15 m 60 Kg N/A Contamination of subgrade Download technical datasheets, approval certificates and CAD

drawings by scanning the QR Code or visit www.aquafab.co.uk

		3.0 m	25 m	90 Kg	N/A
	Reforme	4.0 m	12.5 m	60 Kg	N/A
	4.0 m	15 m	72 Kg	N/A	
	4.0 m	25 m	120 Kg	N/A	
		Londor	n Underground App	roval ID	632

Material Properties

Property	Test Method*	Unit	Value
	Mechanical Properties		
Tensile Strength (md / cd)	BS EN ISO 10319	kN/m	24 / 24
Tensile Elongation at maximum load (md / cd)	BS EN ISO 10319	%	77 / 63
Static Puncture Resistance (CBR)	BS EN ISO 12236	Ν	4,632
Dynamic Perforation Resistance (Cone Drop) - hole \varnothing	BS EN ISO 13433	mm	1

Hydraulic Properties				
In Plane Flow, 2.4kPa	BS 6906	l/s/m	1.4	
In Plane Flow, 20kPa	BS 6906	l/s/m	1.2	
In Plane Flow, 200kPa	BS 6906	l/s/m	0.67	
Permeability (Right Angle flow)	BS 6906	l/s/m	100.6	

Part No.	Description	PADs Code
UA/TAMS/XL Ramp 01	TAMS XL Ramp 01	0069 / 010038
UA/TAMS/XL Ramp 02	TAMS XL Ramp 02	0069 / 010039
AQUA/TAMS/XL 401	TAMS XL 401 4FT Support Section	0069 / 010040
QUA/TAMS/XL 6C01	TAMS XL 6FT Support Section	0069 / 010041
AQUA/VRAM/6C01	VRAM XL 6FT Ramp Section	0069 / 010042
AQUA/VRAM/ 401	VRAM XL 4FT Support Section	0069 / 010043

Erosion Control & Soil Stabilisation

AQUA offers a comprehensive range of Erosion Control and Soil Stabilisation products to enable designers and contractors to select the most appropriate product for the site specific conditions and requirements.

Hand picked to provide railway engineers with solutions to commonly encountered problems, from how to prevent site run off contaminating watercourses, scour protection for track drainage outfalls, providing environmentally friendly and sustainable solutions for erosion control, to simple, cost effective site compound hard-standing set up, Aqua's continued commitment to product and material innovation has lead to the curation of the following products:

Erosion Control & Soil Stabilisation Contents

Erosion Control & Soil Stabilisation	
FREC 550 Unseeded Matting	116
FREC 800 Pre-seeded Matting	118
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of an upper and lower polypropylene mesh layer sandwiching biodegradable fibres, with the added benefit of fire protection to DIN 4102-1, especially pertinent in prolonged hot and dry periods. FREC 550 unseeded erosion control matting, offers significant benefits to the traditional solutions, due to its unique grass fibre construction, specially treated according to environmental best practices so that these fire free fibres are 100% biodegradable within 36 to 60 months.

All natural fibre blankets, typically coir products, can present a significant potential fire hazard, be that from a discarded cigarette, sunlight refracted through a discarded glass object or an electrical spark from OHLE. FREC 550 has been specially designed to be used in locations where there is a potential for fire risk, such as railway embankments, around station complexes or any other vulnerable area.

Product Name	Width	Length	Weight*	Coverage
FREC 550	1.2 m	42 m	25 Kg	50.4 m²
	2.4 m	42 m	50 Kg	100.8 m²

*Approx. when dry.

Can also be supplied as a pre-seeded product - FREC 800, see page 118.

Material Properties

Property	Test Method*	Unit	Value
	Mechanical Properties		
Tensile Strength, matting	ISO 10319	Kg-force/20cm	2.8
Tensile Strength, stitching thread	-	Cn/dtex	6.5
Elongation	D4595	Kg/m²	1.1

Hydraulic Properties				
In Plane Flow, 2.4kPa	D4491	m/s	4.26	
Permeability (Right Angle flow)	-	Ν	0.0014	

Durability Criteria				
Functional Longevity	_	Months	36-60	
Fire Resistance	DIN 4102-1	Accredited		

*based on, **md = machine direction, cd = cross machine direction The listed technical values are guiding values, achieved in the manufacturer's test laboratory and/ or independent testing institutes. The right is reserved to make changes without notice at any time.

FREC 800 Pre-Seeded Matting

A 100% natural European grass fibre erosion control blanket consisting of an upper and lower polypropylene mesh layer sandwiching biodegradable fibres, with the added benefit of fire protection to DIN 4102-1, especially pertinent in prolonged hot and dry periods.

Offering all the benefits of FREC 550, the seed, fertiliser and dry micro-organism combination of FREC 800 helps to guarantee the best possible germination results for the grass seed within, as once laid and irrigated, the dehydrated and granulated (fertiliser) material serves as a natural slow-release nutrient source.

Geoweb[®] Load Support

The Geoweb Load Support system is a proven cost-effective solution for challenging soil stability problems. In load support applications, Geoweb can reduce the excavation and fill requirements by up to 50%. The system is easy to deploy for roads and tracks supporting heavy plant machinery and vehicles in difficult to access locations.

Product Name	Width	Length	Weight*	Coverage
	1.2 m	25 m	25 Kg	30 m²
FREC 800	2.4 m	25 m	50 Kg	60 m²

FREC 800 can...

- Provide superior protection for freshly soiled slopes and new cuttings.

- Good for embankments, swales & coastal applications.
- shade tolerant. Use in better quality soils, ideal for drainage ditches.

*Approx. weight when dry. **Material Properties**

Property	Test Method*	Unit	Value	
Construction Properties				
Micro-organisms	Bacillus Subtillis	g/m²	1	
Organic Fertiliser Type	SOF-A-100	g/m²	~100	

	Mechanical Properties		
Tensile Strength, matting	ISO 10319	Kg-force/20 cm	2.8
Tensile Strength, stitching thread	-	Cn/dtex	6.5
Elongation	D4595	Kg/m²	1.1

	Hydraulic Properties		
Flow velocities, short term	D4491	m/s	4.26
Roughness Coefficient	-	Ν	0.0014

Durability Criteria				
Functional Longevity	-	Months	36-60	
Fire Resistance	DIN 4102-1	Accredited		

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Specifying a Load Support System

granular infill and surface type.

subsoils, the greater the required cell depth.

Integral System Components

Geoweb sections; significantly reduce contractor installation time and provide 3x stronger connection.

Atra Tendons - may be required for providing additional holddown and stability if traffic loading on a grade, wet or saturated soil conditions on trails or access roads through wetlands, ramps or low-water-crossings.

Atra Anchors – typically not part of the permanent design requirement for load support, but used to aid construction. Easier to drive than J hook stakes, improving installation productivity.

Find out more about our products by visiting www.aquafab.co.uk

Using Geoweb provides significant on-site benefits. It reduces the thickness and weight of the structural support element by 50% or more; it allows use of lower quality or less costly site won infill materials; it allows the subgrade material to withstand more than 10 times the number of cyclic load applications before accumulating the same rate of permanent deflection.

The Geoweb Load Support system uses Atra Keys to form connections between adjacent panels. Atra Keys are up to three times stronger than staples and are significantly quicker to install.

Geoweb[®] Slope & **Channel Protection**

Geoweb Slope and Channel Protection system stabilises and protects against sliding forces and erosive conditions of all types. It can be designed with appropriate infill types to withstand even the highest water velocities in channel applications.

Typical uses for Geoweb Slope and Channel Protection are:

- Stormwater basins and wastewater lagoons

Note: Project specific advice and guidance can be provided. Please contact our sales team to discuss your requirement in greater detail and for supporting calculations.

The Geoweb system can be filled with concrete to form hard-armoured protection to slopes and channels. Concrete is poured into the structure on site, creating an easy to install, flexible, yet hard-armoured system that is less costly than pre-formed concrete equivalents.

Geoweb can also be layered to create a multi-layered vegetated channel that can withstand high flows for short durations. This system can tolerate differential settlement while maintaining its structural integrity and is guicker and easier to install than typical block systems.

The benefits of using this system are:

- The 3D cellular confinement structure confines selected infill material, minimising the movement and migration of embankment materials by functioning as anchored containers in the upper soil layer.
- The system delivers excellent resistance to sheet flow—preventing severe erosion and controlling rill and gully formation, especially in areas of concentrated flow and over erosive soils.
- Stabilisation of the slope surface materials allows embankments to be constructed steeper, with less horizontal footprint and use of land space.

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Geoweb slope protection can be designed with a variety of infill materials to meet project specific requirements for aesthetics, stability, environmental impact, material availability and erosion control. Applications can include:

1. Ditches and Channels

As an alternative to plastic or concrete lining systems

2. Vegetated Slopes

Stabilising topsoil for sustainable vegetation growth on slopes up to 45° and higher.

3. Permeable Aggregate Slopes

Significantly improving stability and erosion resistance of granular materials, making them far more stable than when unconfined.

4. Hard-armour Concrete Slopes

Concrete infilling provides an economical, hard-armoured protection to exposed slopes experiencing severe hydraulic or mechanical stresses.

5. Geomembrane Protection

As a protective cover over impervious geomembranes to prevent damage and degradation.

Geoweb® Earth Wall Retention

Geoweb Retaining Wall system creates economical and structurally sound retaining walls that meet all design requirements and aesthetics through a terraced vegetated face.

The Geoweb system's open-celled horizontal terraces create a natural environment for sustainable vegetation. The vegetated system also allows rainwater to collect through the cell wall, maximising stormwater collection and minimising runoff. Soil-filled front cells allow grasses to establish and flourish, creating a green wall.

Walls can be designed in a variety of configurations to meet specific site and reinforcement requirements:

1 Steepened Stones

2 Reinforced Walls

3 Gravity Walls

4 Multi-layered Channels Walls

121

Walls may be designed as steepened slopes when simple fascia protection is required over a structurally-stable soil embankment. The tiered wall structure is designed without the need for additional earth reinforcement.

Reinforced retaining walls are designed when geogrid or other materials (geotextile or soil nails) are included for earthreinforcement. The reinforced wall system creates a fully-confined wall facing that is united with the backfill using the selected tie-back system at defined design intervals-typical of MSE wall systems. Geoweb wall sections form the wall fascia with a minimum of 3-cells deep, creating a deep integrated section resistant to movement.

Gravity retaining walls are effective when space constraints prevent the use of earth reinforcement materials. The system is constructed as a layered gravity wall that resists lateral pressures and maintains structural integrity evenwhen subgrade deformations occur.

Channel side slopes with vegetative infill offer a natural appearance, stability and protection to channels exposed to erosive conditions ranging from low-to medium flowsintermittent or continuous.

Geoweb multi-layered channels tolerate differential settlement without loss of system integrity and can provide a near-vertical profile, reducing valuable land use. When applied in areas of anticipated high-energy water impact, Geoweb wall sections can be filled with aggregate or concrete, or wrapped with FREC 550 or 800 to reduce soil loss potential in the outer face while vegetation is being established.

Geoweb Retaining Wall system uses less expensive on-site infill materials and has a faster construction time, saving site costs. The compact and lightweight sections are easier to handle, deploy and construct even in difficult to access or remote locations.

Rock Rolls & Mattresses

Rock Rolls provide a permanent cost-effective alternative to rip-rap and gabions in turbulent and fast flowing watercourses – up to 8m/s maximum permissible flow.

Suitable for use at drainage outfalls in combination with or without a Headwall, to line embankment slopes or drainage ditches and channels, around lakes, reservoir edges, shorelines, high-flow riverbanks and streams, Rock Rolls provide a flexible solution with immediate scour protection, particularly in applications below water level.

Rock Rolls can be used on their own to provide erosion protection, or when combined in a bioengineering solution they provide a solid foundation to sit FREC 550 or 800 upon. This will provide erosion protection along with bank support and habitat creation.

Rock Rolls are manufactured from a 3 mm high strength synthetic polyethylene braided knotted net, formed into tubular bags and typically filled with weather and frost resistant 40-75mm granite stone.

Typically supplied filled or unfilled in sizes of 200 mm, 300 mm or 400 mm Ø x 2 m long.

Product Name	Width	Length	Mesh Size	Weight*
Rock Roll	200 mm 300 mm 400 mm	2.0 m	45 x 45 mm	~175-225 Kg ~200-250 Kg ~275-325 Kg
Rock Mattress	1 x 0.25 m	2.0 m	30 x 30 mm	~450-500 Kg

*Approx. weights when filled given as guidance ONLY .

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Rock Roll Mattresses can also be supplied for ease of installation for larger areas. Manufactured from 4no. 250 mm Ø 2.5 mm

thick high strength synthetic polyethylene braided knotted netting, Rock Rolls are factory formed as a single mattress, thus providing an instant high-performance erosion protection system.

Typically supplied either filled or unfilled in sizes of 2 m x 1 m x 0.25 m.

Material Properties

Property	Test Method*	Unit	Value				
Netting Specification							
Reinforced, UV treated	-	Kly	350				
Colour	-	-	Black				
Mechanical Properties							
Breaking Strength, 1 Single Square Mesh	-	Kg	125.4				
-	-	kN	1.495				
Breaking Strength, Mesh	-	kN/m	29.091				
	Durability Criteria						
Resistance to Heat	Soften at 140 to 160°C, melts at 165 to 173°C						
Resistance to Sunlight	Substant	ially unaffected after prolonged e	exposure				

Resistance to Acids Resistance to Alkalis *based on, **md = machine direction, cd = cross machine direction

The listed technical values are guiding values, achieved in the manufacturer's test laboratory and/ or independent testing institutes. The right is reserved to make changes without notice at any time.

Steel Gabion Baskets & Mattresses

Gabion baskets are used in many situations, including the stabilisation of earth movement and erosion, river control, reservoirs, canal refurbishment, landscaping and retaining walls. Gabion mattresses are useful when trying to avoid erosion in streams, river beds, reservoir beds and canal beds.

Typically supplied as 3" x 3" (76.2 mm x 76.2 mm) x 3 mm Galfan coated (95% Zinc 5% Aluminium for up to 4 times the life of a galvanised finish) welded mesh, as per EN 10218-2. All mesh panels used to produce the baskets are European sourced and conform to EN10244-2 with a tensile range of 540-770 N/mm², steel grade 0.10% Carbon max, Weld sheer strength minimum 75% of the tensile strength of the wire. Units can be supplied with tonne bags of stone on request.

Туре	Width	Length	Height	Diaphragms	Capacity
	0.5 m	0.5 m	0.5 m	0	0.125 m²
	1.0 m	0.5 m	0.5 m	0	0.25 m²
	1.0 m	1.0 m	0.5 m	0	0.5 m²
	1.0 m	1.0 m	1.0 m	0	1 m²
Doolvot	1.5 m	0.5 m	0.5 m	0	0.325 m²
Baskel	1.5 m	1.0 m	0.5 m	0	0.75 m²
	1.5 m	1.0 m	1.0 m	0	1.5 m²
	2.0 m	0.5 m	0.5 m	1	0.5 m²
	2.0 m	1.0 m	0.5 m	1	1.0 m²
	2.0 m	1.0 m	1.0 m	1	2.0 m²
Mattress	3.0 m	2.0 m	0.3 m	3	1.8 m²

Other sizes available on request. Speak with our sales team on 01695 51933 for further inforamtion.

Find out more about our products by visiting www.aquafab.co.uk

Good resistance to conc. Sulfuric and Hydrochloric Acids

Good resistance to conc. Sodium Hydroxide

Silt Fencing

Silt Fencing provides superior tensile strength and low elongation. The rolls are also resistant to UV deterioration, rotting, biological degradation, naturally encountered bases and acids.

Ideally suited for use as a temporary sediment control barrier on construction sites to protect water quality in nearby streams, rivers, and lakes, from ingress by loose soils and sediment caused by surface water runoff.

Disruption of the ground during any form of construction can potentially cause silt run off. This can easily mix with other material on site, resulting in a risk of pollution. Contamination of surrounding land and habitats including streams, lakes, or rivers can lead to fines as well as environmental damage.

Silt Fencing is...

ACT NOW

In 2017 The Environment Agency published Pollution Prevention Guideline 5 (PPG5) on 'Works and maintenance in or near water'. This is becoming increasingly enforced and will in time become legislation.

River Matting

Manufactured from a 100% Straw and Excelsior mix sandwiched between burlap layers, River Matting can help with the control of sediment pollution problems caused during civil engineering works such as drainage or flood alleviation. It reduces the effect on wildlife and plant habitats caused by the sediment, and prevents sediment blocking drains, culverts and headwalls.

River Matting is suitable for use in natural and artificial channels and can potentially collect up to 20 Kg of sediment per m² of material.

Secured to the bed of the watercourse and placed downstream of the disturbed area, River Matting lies flat and traps sediment borne along the bed on the current. Being flat, the River Mat does not cause disruption to the water flow or affect the current.

Once works are completed, the filled River Mats can be reused as a nutrient-rich biodegradable embankment stabilisation mat.

Material Properties

Property	Test Method*	Unit	Value		
Construction Properties					
Roll Size	-	m	1.2 x 3.0		
Roll Weight	-	Kg	5		
Top Netting	_	Natura	al Jute		
Top Netting Weight	-	g/m²	500		
Top Netting Size	_	mm	18 x 12		
Bottom & Side Netting	Bottom & Side Netting – Natural Jute				
Bottom & Side Netting Weight	-	g/m²	255		
Bottom & Side Netting Size	-	mm	2×2		
I	Mechanical Properties				
Tensile Strength, Outer layer (md / cd)	DIN 53857	daN/m	750 / 450		
	Hydraulic Properties				
Flow velocities, short term	D4491	m/s	4.26		
Roughness Coefficient	-	N	0.0014		
	Durability Criteria				
Functional Longevity	-	Months	6-12		

*based on, **md = machine direction, cd = cross machine direction The listed technical values are guiding values, achieved in the manufacturer's test laboratory and/ or independent testing institutes. The right is reserved to make changes without notice at any time.

Material Properties

Property	Unit	Value		
Construction Properties				
Roll Size	915 mm x 30.5 m			
Stake Size	50.8 mm x 50.8 mm x 1,060 mm			
Stake Placement	3.0 m Sections			
Colour Black				

Mechanical Properties			
Elongation	Lbs	75	

Hydraulic Properties			
Permeability	gpm/ sq ft	9	
Durability Criteria			
UV Resistance, 500 Hours	90% Retain	ed Strength	

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y Criteria		
-	Months	6-12
	Download technica certificates and C/ the OP Code or visit	al datasheets, approval AD drawings by scanning

Permeable & Impermeable Root Barriers

To prevent vegetation growth around structures such as signals, to improve signal sighting, a range of permeable and impermeable root barrier membranes are available to suit site specific requirements.

Permeable Root Barrier

Manufactured from a permeable non-woven polypropylene, this product is ideal for preventing root ingress from lifting concrete, tarmac or other types of paving or can be installed vertically as a trench lining, or wherever else permeability is crucial.

Double-sided Root Barrier tape required when installing mutliple rolls.

Material Properties

Property	Test Method*	Unit	Value	
Mechanical Properties				
Tensile Strength (MD / CD)	EN ISO 10319	kN/m	22 / 22 (-2.9)	
Elongation at Maximum Load (MD / CD)	EN ISO 10319	%	50 (±11.5) / 60 (±13.8)	
Static Puncture Resistance (CBR)	EN ISO 12236	kN	4 (-0.8)	
Dynamic Perforation Resistance (Cone Drop) - hole Ø	EN ISO 13433	mm	12 (+3)	

Hydraulic Properties			
Water Permeability normal to the plane (vh50)	EN ISO 11058	l/m²/s	60 (-18)
Waterflow in plane @ 20 kPa	EN ISO 12958	m²/s	3.0 x 10-6 (-9x10-7)
Charecteristic Opening Size (O90)	EN ISO 12956	μm	90 (±27)

			/
I NICKNESS (@ 2KPa E	N ISO 9863-1	mm	2.4 (±0.48)
Roll Size	-	m	2.6 x 25 2.6 x 100 5.25 x 100
Weight	EN ISO 9864	g/m²	300 (±30)

Durability Criteria			
Predicted durability, in natural soils (pH 4-9 @ 25°C)	_	Years	100
Maximum time between install and covering	EN 12224	Month	1

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Impermeable Root Barrier

Impermeable Root Barrier is a woven HDPE root barrier coated with a triple layer of film LDPE ideal for use wherever mature tree roots could cause extensive damage to pipework, structures or hard standings.

Tree roots need oxygen, water and a soil density low enough to penetrate and in urban areas in particular, tree roots often struggle to find a suitable route through the ground, so the disturbed soil around cables, pipework and paved areas is ideal.

Double-sided Root Barrier tape required when installing mutliple rolls.

Material Properties

Property	Test Method*	Unit	Value	
Mechanical Properties				
Strip Tensile Strength (MD / CD)	ASTM D7003	N/5cm	1199 / 1154	
Grab Tensile (MD / CD)	ASTM D 7004	Ν	932 / 844	
Static Puncture Resistance (CBR)	ASTM D6241	Ν	4094	
Puncture Resistance	ASTM D4833	Ν	502	

Hydraulic Properties			
Hydrostatic Resistance	ASTM D751	kPa	668

Physical Properties			
Carbon Black Content	ASTM D 751	%	3
Roll Size	-	m	1.83 x 50 <25 x 300 Panel
Weight	ASTM D5261	g/m²	244

Durability Criteria			
Resistance to Roots	EN 14416	-	Pass
Resistance to Light Penetration	ASTM D6567	%	0 (Pass)
Accelerated UV Weathering, 2000 Hrs @ 0.77w/m²/nm	ASTM G151 ASTM G154	%	>90
Accelerated UV Weathering, 1200 Hrs @ 1.35w/m²/nm	ASTM G151 ASTM G154	%	>90

*based on, **md = machine direction, cd = cross machine direction The listed technical values are guiding values, achieved in the manufacturer's test laboratory and/ or independent testing institutes. The right is reserved to make changes without notice at any time.

Impermeable Knotweed Barrier

Knotweed Barrier consists of a woven HDPE (High Density Polyethylene) base material which is reinforced and coated with a triple layer film of LDPE (Low Density Polyethylene) and is designed to contain the invasive Japanese Knotweed.

This product has a design life of 25 years once buried and conforms to the Environment Agency's 'Knotweed code of Practice'.

An amendment to the Anti-social Behaviour, Crime and Policing Act 2014 includes Japanese Knotweed and other invasive non native plants.

The risk posed to structures and underground services from invasive weeds, and in particular Japanese Knotweed, makes it essential for modern day construction and remediation contractors to implement effective and fit for purpose root barrier provisions.

Installation of this product should strictly follow the installation guidance document, available on request, to ensure the best performance.

Knotweed Barrier can be installed vertically around the perimeter of a location to prevent lateral ingress of roots, or horizontally over the location to protect roads, paved surfaces, floored areas, structures and buildings Double-sided Knotbarrier jointing tape required when installing multiple rolls/ panels.

Material Properties

Durantu	To as \$4 as by a lit	11.4	Volue		
Property	lest Method*	Unit	Value		
Mechanical Properties					
Strip Tensile Strength (MD / CD)	ASTM D7003	N/5cm	2131 / 2398		
Grab Tensile (MD / CD)	ASTM D 7004	Ν	1305 / 1074		
Static Puncture Resistance (CBR)	ASTM D6241	Ν	4409		
Puncture Resistance	ASTM D4833	Ν	666		
	Mechanical Properties				
Hydrostatic Resistance	ASTM D751	kPa	1805		
	Physical Properties				
Roll Size	-	m	1.83 x 50 Roll <25 x 300 Panel		
Weight	ASTM D5261	g/m²	309		
	Daniela III in Oritzania				
	Durability Criteria				
Resistance to Roots	EN 14416	-	Pass		
Resistance to Light Penetration	ASTM D6567	%	0 (Pass)		
Accelerated UV Weathering, 10,000 Hrs	ASTM G151	%	1.83 x 50 Roll		

*based on, **md = machine direction, cd = cross machine direction The listed technical values are guiding values, achieved in the manufacturer's test laboratory and/ or independent testing institutes. The right is reserved to make changes without notice at any time.

Root Barrier X

A permeable geocomposite root barrier system consisting of a specially formulated copper core mechanically encapsulated between two high strength geotextiles which can prevent the occurrence of wet side/ dry side issues that can be encountered with impermeable solutions. By safely releasing Cu2+ ions to inhibit root growth, the copper ions create a localised zone of inhibition which when approached by root tips causes them to undergo a progressive collapse, however surface water/ ground water is freely able to move through the geocomposite layer.

Root Barrier X acts not only as a physical barrier, incorporating strong and durable geotextiles, but also as a chemical barrier, by acting as a signal layer that all plants avert their growth from, resulting in a particularly useful solution when it comes to dealing with invasive species such as Japanese Knotweed in environments such as utilities and drainage infrastructure or building or signal foundations.

Product ID	Width	Length	Weight
	2.6 m	25 m	39 Kg
Doot Dorrior V	5.2 m 25	25 m	77 Kg
Root Barrier X	2.6 m	50 m	77 Kg
	5.2 m 50 m	154 Kg	

Download technical datasheet approval certificates and CAD drawings by scanning the QR Co or visit www.aquafab.co.uk

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Leeds University Testing

Independent assessment of the product to determine effectiveness as a root barrier against Japanese Knotweed and other invasive species determined the following:

Is root Growth inhibited? YES

Testing in a sterile culture using Arabidopsis Thaliana demonstrated how a 'zone of inhibition' was created, whereby roots grew towards the zone, but then ceased at a distance of approximately 1.5cm. Even when seedlings were established at different distances, all roots stopped at this zone.

Does the effectiveness increase with time? YES

As Cu2+ ions diffuse into the soil, a chemical barrier is formed. It was hypothesised that the effectiveness of Root Barrier X would increase with time.

To test this hypothesis, Root Barrier X was incubated in an agar media for a period of 4 weeks following which seeds were sown. The plates where the barrier had been allowed to incubate indicated a much stronger and larger zone of inhibition, abolishing the growth of the seeds.

Is the product safe? YES

The bio-safety of Root Barrier X was tested by assessing how it affects the overall health and growth of plants. Whilst Root Barrier X prevents plants from growing through the composite and within the zone of inhibition, the effects were shown to be relatively localised with no evidence of negative affect on the biomass of surrounding plants.

Tensile Strength (MD / CD)	EN ISO 10319	kN/m	20/20			
Elongation at Maximum Load	EN ISO 10319	%	35			
Static Puncture Resistance (CBR)	EN ISO 12236	kN	2.5			
Hydraulic Properties						
ater Permeability normal to the plane (vh50)	EN ISO 11058	l/m²/s	3.10-4			
Physical Properties						
Copper Thickness	EN ISO 9863-1	μ	18			
Carbon Black Content	-	%	1			
Durability Criteria						
Weathering 50J/m ²	EN 12224	>90% Retair	ned Strength			

Mechanical Properties

Property

Test Method*

Unit

Value

Zone of Inhibitior

Weathering 50J/m ²	EN 12224	>90% Retained Strength
Microbiological Resistance	EN 12225	No loss in strength
Resistance to Acids & Alkalis	EN 14030	No loss in strength
Oxidation at 85 days (100 years)	EN 13438	>90% Retained Strength

Control Strip

Root Barrier X Strip

Aqua Pave Range

Aqua Pave units are manufactured from recycled plastic. while also being 100% recyclable, making them environmentally sympathetic and cost effective.

There are three unit types available depending on project requirements:

Aqua Pave is available in a choice of 40 and

50 mm deep cells to suit a variety of applications:

- · Helipads.
- Footpaths.
- Bridleways.
- Verge Reinforcement
- · Wheelchair Access.
- · Porous Paving.

The 40 mm panels come pre-connected in 1m² sections to make installation more efficient.

40 mm - 333mm x 333mm Weight - 0.5 Kg Each 50 mm - 1,200mm x 800mm Weight - 4.1 Kg Each

The units may be filled with soil and grass seed or turf for an attractive, durable grass finish or your choice of gravels for a hardwearing, aesthetically pleasing gravel finish.

Note: All Aqua Pave units are SUDs compliant for both infiltration and attenuation applications

Download technical datasheets, approval certificates and CAD drawings by scanning the QR Code or visit www.aquafab.co.uk

Aqua Pave Gravel

- Dimensions 1.2 m x 0.8 m panel Weight 1.5Kg Each 42 mm Ø honeycomb openings designed for 6 mm
- pre-assembled with a geotextile backing to speed up installation.
- Adjoining panels simply 'clip' together for ease of installation.

Aqua Pave Truck is a 50 mm deep cell, high strength, durable paving solution for heavily trafficked

areas or high load bearing situations such as site compounds. Other applications include:

- HGV Access Roads
- Fire & Emergency Access Roads
- Truck parks & Coach Parking
- Temporary Site Compounds & Access Roads.

Suitable for both grass and gravel infill, the systems drainage channels allow lateral & vertical water flow. The easy to install units clip together to create a heavy-duty raft capable of withstanding all types of vehicular loadings, in conjunction with the correct base material.

Max loading - 500 tonnes / m²

400mm x 600 mm Weight - 2.4 Kg Each Aquatex 1000, see page 71, can be used as a geotextile separator layer between the subgrade and Aqua Pave or Aqua Pave Truck.

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