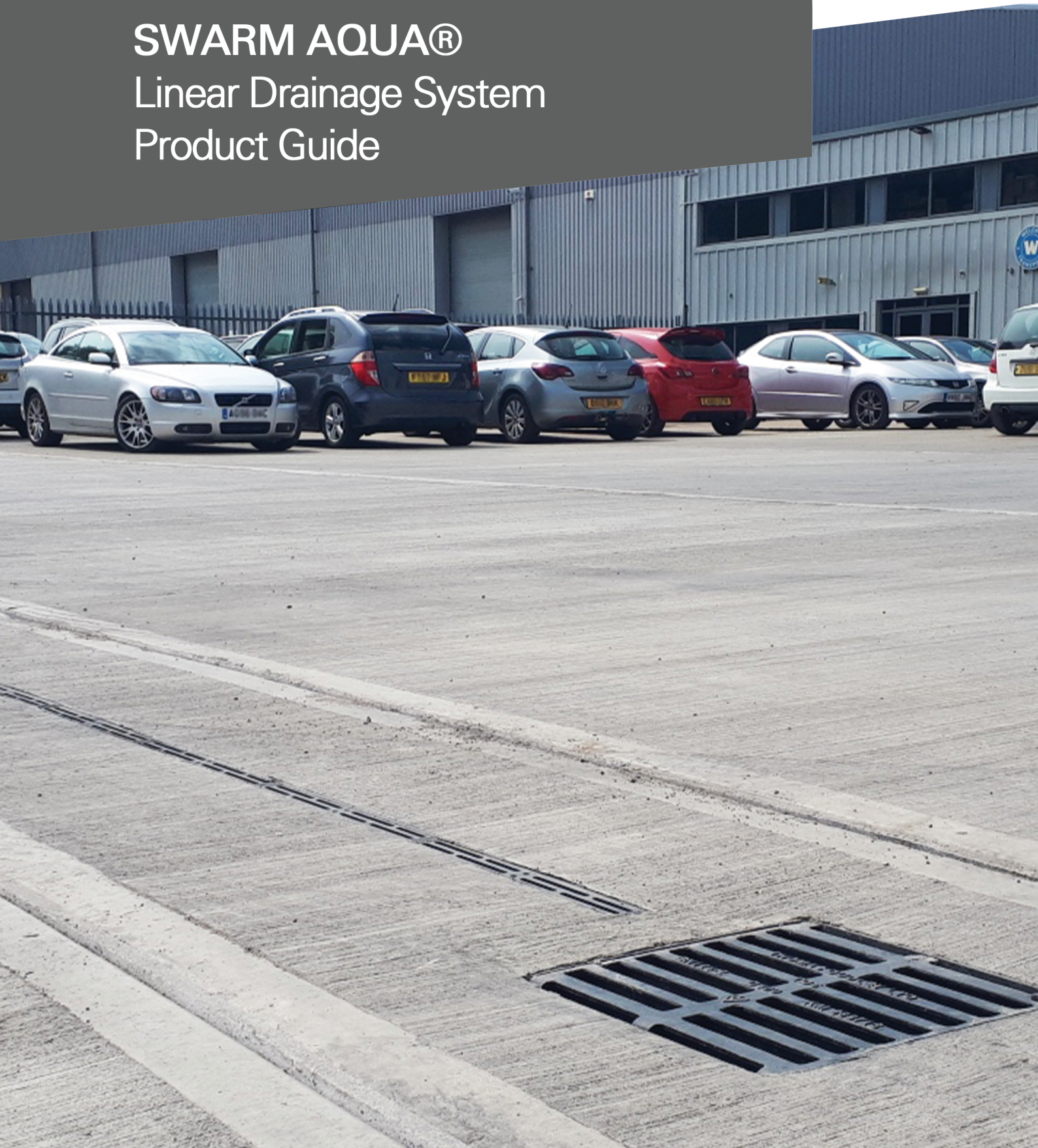




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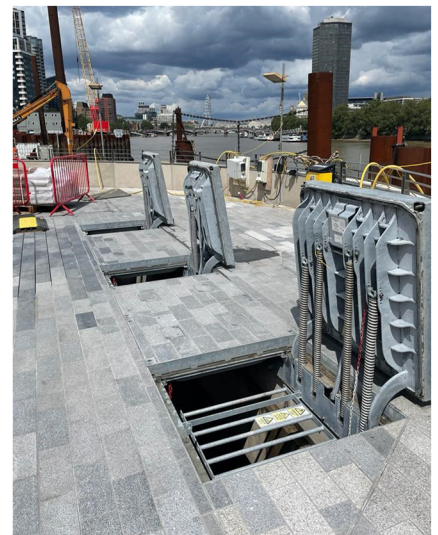
**SWARM AQUA®**  
Linear Drainage System  
Product Guide



# EJ, since 1883 we have been providing expertise to service your needs

By adopting a strategy of continuous investment in our production sites, we confirm our commitment to remain a world leader in infrastructure access solutions.

**Access solutions to underground networks and asset security specialist,** EJ is able to offer you the most appropriate solutions with the most relevant material to suit your needs.



**We Create Exceptional Solutions.** EJ is the world leader in the design, manufacture and distribution of access solutions for water, sewer, drainage, telecommunications and utility networks worldwide.

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# Ensure the well-being and safety of your fellow citizens

**EJ**, are global leaders in the design, manufacture and distribution of infrastructure access solutions.

Covering water and sewerage networks, rainwater harvesting, telecommunications and other public utility networks has been **EJ** expertise for decades.

Access your underground infrastructure in cities, railway stations, industries, water & wastewater treatment plants, airports, ports, exhibition halls, tunnels with EJ **access covers and drainage solutions**.

The group's strengths: achieving the highest quality standards, guaranteed safety and respect for the environment.

Its resources: qualified and committed employees.



## EJ, your partner from design to completion

We operate worldwide and distinguish ourselves by providing services to our customers to offer that leverage both our global and local strengths.



To ensure every customer benefits from our global knowledge, we work together across sectors: from engineering to manufacturing, from research to customer service - from North America to Europe, from Australia to Ireland - we share facts, data and developments across all steps.



This expertise encompasses the cultural background we have acquired through internal research, road testing and participation in standardization bodies around the world.

Our research and our spirit, in targeted collaboration, have allowed us to develop the best available solutions in the field of infrastructure. Solutions that drive industry, set benchmarks for excellence and meet customers' highest expectations.

Our distribution network, manufacturing facilities and sophisticated understanding of local cultures and quality standards put us in the ideal position to offer our customers relevant and dynamic services alongside our solutions.

Our modern local production capacities and warehouses ensure fast product availability for our customers. The result: Our customers have unrivalled local access to innovations, inventories and services.

# Citizen group, eco-responsible

Our approach to social and environmental responsibility has been rewarded with a gold medal by EcoVadis. Our production site in Picardie ranks in the top 5% of the most efficient companies across all sectors.



Picardie - France, the Saint Crépin Ibouvillers foundry in Oise, 723 employees, production capacity of 100,000 tonnes, 42 hectares. Management systems certified ISO 9001, ISO 14001, ISO 45001 and ISO 50001 for the management of quality, environment, hygiene, safety and energy.

**To be "Eco-Responsible" is not simply an expression but a guiding principle that features predominantly in our daily activities:**

- **Quantity and nature of materials used**

Our innovative products require the use of less material, while maintaining structural integrity and load capacity. In addition, our cast iron products are made from at least **92% recycled materials**.



- **Reducing and controlling our emissions**

We ensure the use of the best available pollution control techniques to **reduce** and **control our emissions**.

- **Waste reduction, sorting and recovery**

Our sites have set up waste sorting at source. EJ favours treatment and recovery channels for waste specific to the activity as well as for other waste.

- **Third-party control and commitment to continual improvement**

Our plants use processes and management systems to minimise their impact on the environment. For example, with ISO 50001 certification, the Picardie foundry is committed to reducing its energy consumption.





**Ardennes - France**, our manufacturing site for galvanized or stainless steel products, 71 employees. Management systems certified ISO 9001, ISO 14001, OHSAS 18001 for the management of quality, environment, health and safety.



**Birr -Ireland**, with both a composite production site and a fabricated steel facility. Management system certification includes ISO 9001, ISO 14001 and ISO 45001 for quality management, environment, health and safety.



**Boppard - Germany**- Our production on the Rhine, Germany: a total of 70 employees - development and production of steel and stainless steel solutions. Management system certified according to ISO 9001 for quality management.



**Nuneaton - UK** - This is our UK distribution & manufacturing facility for galvanized and stainless steel products. Our UK facility is certified to ISO 9001 for quality management and ISO 14001 for environmental management.

## Our certifications



\*To check the validity of these certificates you can call:  
 Bureau Veritas Certification + 33 (0) 1 41 97 00 60 -  
 BSI, Kitemark Court, Davy Avenue, Knowlhill, Milton Keynes MK5 8PP.  
 + 44 345 080 9000  
 DNV GL Business Assurance Certification & Environmental Verifier GmbH  
 +49 201 7296-555

### **Boppard\* and Nuneaton**

ISO 9001: Quality Management System  
 ISO 14001 : Environmental Management System

### **Picardie Foundry\***

ISO 9001 : Quality Management System  
 ISO 14001 : Environmental Management System  
 ISO 50001 : Energy Management System  
 ISO 45001 : Health Management System and Safety at work

### **Manufacture Ardennes\***

ISO 9001 : Quality Management System  
 ISO 14001 : Environmental Management System  
 OHSAS 18001 : Occupational Health and Safety Management System

### **Birr Manufacture**

ISO 9001 : Quality Management System  
 ISO 14001 : Environmental Management System  
 ISO 45001 : Health Management System and Safety at work

# Your Projects

## Technical Drawing Service

If you require technical drawings for a specific application or are unable to find what you are looking for, please feel free to contact us at [www.ejco.com](http://www.ejco.com).

Our team will make sure that you are getting the most from the design of your project whilst not impacting on performance. We will also work alongside engineers included in the project where required to make sure that all parties are satisfied.

## Your Project

For surface water drainage requirements, during the process of designing and value engineering your project we use industry standard formulae to ensure that our products are sized efficiently. By generating falls over a single sized channel or stepped fall configuration, we can ensure every channel is designed fit for purpose. Returned to you will be a complete design package for your project.

In some cases you may require bespoke items, one-off drawings or something that isn't available within our standard packages. As an industry leading manufacturer, we will offer a solution for most situations.

## Experience

With more than 100 years of first hand industry experience, EJ has put together a hive of products that provides a wealth of benefits to the water management access chambers, and access solutions market. With this extensive knowledge we are able to share industry expertise and work alongside our customers to provide the optimal solution for projects within the drainage, civils, construction and attenuation sectors.

## Coverage

EJ is a global company spanning 5 continents.

## AquaCALC® Drainage Calculator

The Swarm AquaCalc™ Drainage Calculator is a straightforward easy to navigate drainage calculator that puts you in control of your own project. AquaCalc™ can be used to size Swarm Aqua® channels for projects both big & small, providing results for single sized channels and also stepped fall configurations.

AquaCalc™, is totally free and independent for you to use when carrying out calculations for the Swarm Aqua® Linear Drainage system!

**AquaCALC® Drainage Calculator**

Run Length (m): 50  
 Drainage Area (m<sup>2</sup>): 1500  
 Surface Finish: 6  
 Gradient (%): 0.75  
 Rainfall Rate: 75

**Calculation Results**  
 Required Flow Rate: 31 l/s  
 SA300 - 300mm Swarm Aqua®: 24 Lit  
 SA325 - 325mm Swarm Aqua®: 34 Lit  
 SA350 - 350mm Swarm Aqua®: 48 Lit  
 SA375 - 375mm Swarm Aqua®: 78 Lit

**Single Size Recommendation: SA300 - 300mm**  
**Stepped Fall Recommendation: SA300, SA325, SA350, SA375**

SA300 300mm SA325 325mm SA350 350mm SA375 375mm  
 10m 16m 24m

**Project Information**  
 Project Name:   
 Project Address:   
 Address Line 1:   
 Address Line 2:   
 Drawing No:   
 Drawing to:   
 Date Calculated:   
 Date:

**Load Rating:** Swarm Aqua® channels are up to F200's when installed in a full concrete surround.

**Treadsafe:** All channels in the Swarm Aqua® range are treadsafe.

**Long Design Life:** Swarm Aqua® channels have a design life of over 60 years.

Visit our website for up to date technical information on all of our products and services at [ejco.com](http://ejco.com) & [swarmwm.co.uk](http://swarmwm.co.uk)



# The Swarm Aqua® System.

Swarm Aqua® channels have been designed with simplicity in mind all the way through from design to installation. Swarm Aqua® channels are a modular system that can cater for a wide range of projects, load ratings and surface finishes, from the smallest driveway to the largest distribution centre.

Have you seen our case studies? Swarm Aqua® channels have been installed across the UK and further afield in an array of surface finishes and applications.

Swarm Aqua® channels all use the same twinwall pipe underground, no matter the surface finish, application or loading, which means if a 150mm channel is big enough, it's big enough in all configurations as shown below.

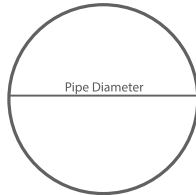
Choosing your Swarm Aqua® system is a simple process and should follow the order below:



## 1 Select Your Channel Size

Swarm Aqua® channels are available in the following sizes of Twinwall Pipe:

- 150mm - (max volume 17.67l/m)
- 225mm - (max volume 39.76l/m)
- 300mm - (max volume 70.69l/m)
- 375mm - (max volume 110.45l/m)



As the channels utilise standard twinwall pipe sizes, these can be calculated with standard drainage calculation software such as Microdrainage. We also offer an in-house design service whereby we carry out your calculations for you, or you can ask us for a FREE copy of our own calculation software, AquaCalc®.

## 3 Select Your Load Rating

If using a slot type top for block paving the choice has already been made for you as it is available as an up to D400kN option only.

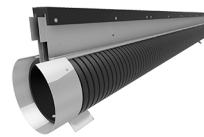
If you are using a Cast Top style finish, there are two choices; an up to D400kN loading version and an F900kN version. Both use the same Cast iron top, though the steel throat on the F900kN version is deeper to accommodate the heavier loading through the concrete surround.

## 2 Select Your Surface Finish

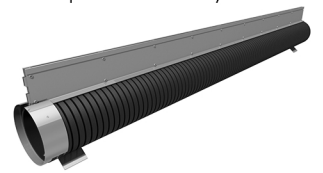
Next it is important to determine what the surface finish is going to be. This in turn dictates the Top Profile of the Swarm Aqua® system. Generally this will be Block Paving, Concrete or Asphalt, though other finishes have been used successfully such as resin bound surfaces.

Swarm Aqua has two options of top profile, a Cast Iron top or a slimline Slot suitable for Paving style finishes.

**Cast Top**  
D400 & F900kN



**Paving Finish**  
Up to D400 only.



## Product Codes

The Product Codes for Swarm Aqua are descriptive and constructed from the three sections on this page. Starting with SA for "Swarm Aqua®", then the channel size, then the loading or top profile, i.e.

Example: **SA 150 P**

With the channel size choices of 150mm-375mm. Suffix D for D400kN (Cast), F for F900kN (Cast) and P for Paving.

# Applications

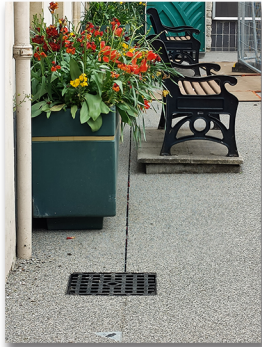
Choosing your Swarm Aqua® system is a simple process and by selecting the correct size and type of channel, the most efficient and cost-effective solution to your project will be provided.

All Swarm Aqua® channels use the same Twinwal Pipe diameters, so once you know what size channel you need it's easy to choose the right channel based on the surface finish and loading.

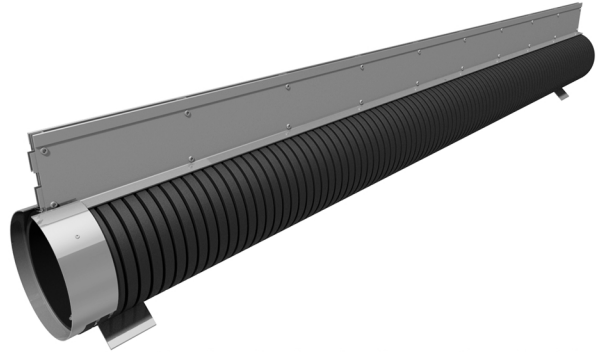
Swarm Aqua® Channels with a Paving Finish are suitable for areas such as:

- Block Paved areas
- Resin Bound Surfaces
- Pedestrian Zones
- City Centres
- Shopping Centres
- Landscaped Areas

Swarm Aqua® channels with a paving finish are not suitable for areas with heavy or turning traffic.



D400kN Loading



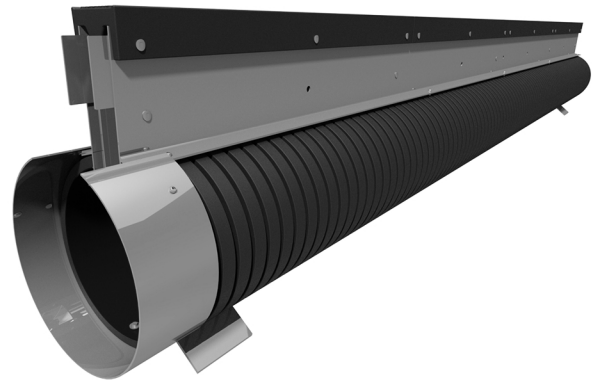
Product Codes: for Swarm Aqua® with a Paving Finish are: SA [Channel Size] P

Swarm Aqua® Channels with a Cast Top are suitable for areas such as:

- Concreted Areas
- Asphalt
- Driveways
- Car Parks
- Roadways
- Trafficked Areas
- Heavy Loading Areas
- Distribution Yards
- Merchants Yards



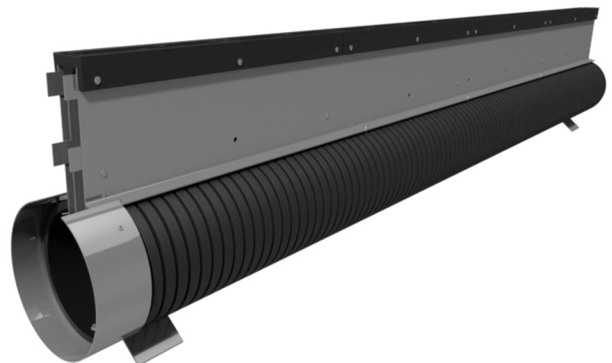
D400kN Loading



Product Codes: for Swarm Aqua® with a D400kN Cast top are: SA [Channel Size] D



F900kN Loading



Product Codes: for Swarm Aqua® with a F900kN Cast top are: SA [Channel Size] F

### Swarm Aqua® Paving Product Tables

Code	Description	Loading	Weight	Length	Height	Invert	Width	Depth
SA150P	150mm Swarm Aqua	D400	15kg	2.0m	298mm	278mm	578mm	408mm
SA225P	225mm Swarm Aqua	D400	18kg	2.0m	385mm	365mm	665mm	495mm
SA300P	300mm Swarm Aqua	D400	21kg	2.0m	474mm	454mm	754mm	584mm
SA375P	375mm Swarm Aqua	D400	27kg	2.0m	546mm	526mm	826mm	676mm

### Swarm Aqua® Cast D400kN Product Tables

Code	Description	Loading	Weight	Length	Height	Invert	Width	Depth
SA150D	150mm Swarm Aqua	D400	34kg	2.0m	298mm	278mm	578mm	408mm
SA225D	225mm Swarm Aqua	D400	38kg	2.0m	385mm	365mm	665mm	495mm
SA300D	300mm Swarm Aqua	D400	41kg	2.0m	474mm	454mm	754mm	584mm
SA375D	375mm Swarm Aqua	D400	44kg	2.0m	546mm	526mm	826mm	676mm

### Swarm Aqua® Cast F900kN Product Tables

Code	Description	Loading	Weight	Length	Height	Invert	Width	Depth
SA150F	150mm Swarm Aqua	F900	35kg	2.0m	348mm	328mm	578mm	478mm
SA225F	225mm Swarm Aqua	F900	40kg	2.0m	435mm	415mm	665mm	565mm
SA300F	300mm Swarm Aqua	F900	42kg	2.0m	524mm	504mm	754mm	654mm
SA375F	375mm Swarm Aqua	F900	45kg	2.0m	596mm	576mm	826mm	726mm

### Reinforcement

In order to meet some loading criteria and especially on the largest sizes, Swarm Aqua® channels may require reinforcement within the concrete surround. The responsibility to design the reinforcement is that of the project engineer, however Swarm can provide independently generated structural guidelines for these scenarios. Please contact us for these installation guides.



### Accessories

Swarm Aqua® channels are designed to be as simple as possible. That's why the accessories shown on this page can be used in all surface finishes, all load ratings and with both cast iron and steel tops.

### Closing Channel Joints

Once the Swarm Aqua® channels have been placed in their final locations and it is ensured that any gaps are closed using the integrated connection system, we recommend checking all joints and connections to make sure the channels are in place and secure. Throughout the installation process, please make sure that channels are protected as the load rating of the system is achieved once installation is complete.

### Male and Female Ends

Swarm Aqua® channels are designed with a male and female end to make installation quick and as simple as possible. The integrated throat spacer and factory fitted collar provides a spigot for the channels to connect to each other ensuring a snug and straight fit.

### Maintenance

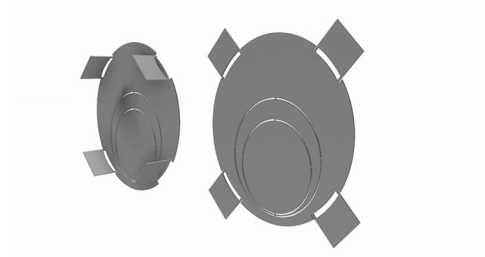
Swarm Aqua® channels can be rodded from the combined boxes, however general maintenance can be achieved by jetting from one end or through the slots in the surface finish as required. The maximum jetting pressure that can be safely applied to the Twinwall pipe section of Swarm Aqua® channels is 180 Bar or 2500 PSI.

The Swarm Aqua® system has been designed so that almost all of the accessories that accompany the system are transferable across all of the products regardless of the surface finish.

### Swarm Aqua® Universal End Caps

A simple steel plate to cap the end of a Swarm Aqua® channel run where a rodding point or outlet is not required.

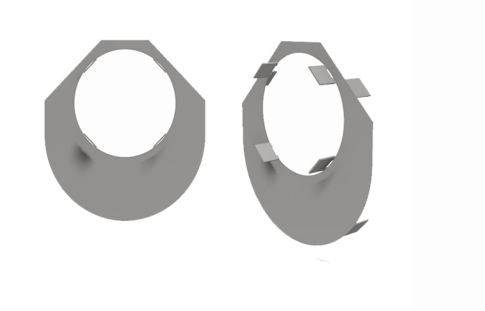
Code	Description	Loading	Weight	Length	Height	Width	Invert
SB02	150mm End Cap	N/A	1kg	1.5mm	178mm	178mm	Channel
SB03	225mm End Cap	N/A	1kg	1.5mm	265mm	265mm	Channel
SB04	300mm End Cap	N/A	2kg	1.5mm	354mm	354mm	Channel
SB05	375mm End Cap	N/A	2kg	1.5mm	426mm	426mm	Channel



### Swarm Aqua® Universal Transition Pieces

Used to connect one Swarm Aqua® Channel to the next when there is a change in size to achieve a graduated fall.

Code	Description	Loading	Weight	Length	Height	Width	Invert
SC02	150/225 Transition	N/A	1kg	1.5mm	285mm	265mm	Channel
SC03	225/300 Transition	N/A	1kg	1.5mm	374mm	354mm	Channel
SC04	300/375 Transition	N/A	2kg	1.5mm	446mm	426mm	Channel



### Swarm Aqua® Universal Chamber Connectors

Used to connect one Swarm Aqua® Channel to Combined Access/Outlet Boxes shown overleaf.

Code	Description	Loading	Weight	Length	Height	Width	Invert
SS02	150mm Connector	N/A	1kg	450mm	178mm	178mm	Channel
SS03	225mm Connector	N/A	1kg	450mm	265mm	265mm	Channel
SS04	300mm Connector	N/A	2kg	450mm	354mm	354mm	Channel
SS05	375mm Connector	N/A	2kg	450mm	426mm	426mm	Channel



Universal access & outlet boxes to allow for both rodding access and outfall into external water systems. For Cast systems, a grating or cover is supplied. For Paving systems, a recessed steel cover can be supplied.

**Swarm Aqua® Combined Access/Outlet Boxes**

Code	Description	Loading	Weight	Length	Height	Depth
SD01	Small Combined Box	D400*	31kg	524mm	610mm	450mm
SD02	Large Combined Box	D400*	48kg	605mm	750mm	675mm

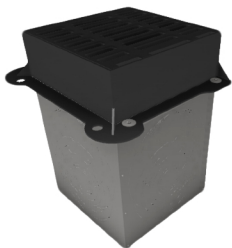
\*Swarm combined boxes are supplied with D400kN covers as standard



**Swarm Aqua® Combined Access/Outlet Boxes for Paving**

Code	Description	Loading	Weight	Length	Height	Depth
PD01	Small Paving Box	D400*	31kg	524mm	610mm	450mm

\*Swarm combined boxes are supplied with D400kN covers as standard



**Combined Access/Outlet Units**

Swarm Aqua® is a complete solution for most cases, as such Combined Access/Outlet Units are available to provide both an access solution for maintenance and an outlet for discharge into local waste water systems. Combined boxes are available for channels up to 300mm (small) and for channels up to 375mm (large).

The grating and frames supplied are load rated for up to D400kN. If access or outlet units are required with especially deep inverts, a chamber can be formed on site. F900kN Covers must be requested as special items.



**Using Swarm Aqua® Access/Outlet Units**

Swarm Aqua® combined boxes have been pre-perforated with the appropriate sizes for channel connections with Swarm Aqua® Chamber Connectors or standard twinwall pipe fittings. The knockouts are removable by cutting through the 1.5mm steel tabs that hold them in place, following required site safety guidelines.

Outlet knockouts are also pre-cut on all four sides of the combined access/outlet boxes for connection to local waste water systems. These all provide an invert lower than the invert of Swarm Aqua® channels to ensure water is efficiently removed from the system.



**Swarm Aqua® Chamber Connectors**

When using either a Swarm Aqua® combined access/outlet box or a chamber formed on site, a Swarm Aqua® Chamber Connector can be used. This is a standard Twinwall pipe fitting and it is normal to use offcuts on site in lieu of this piece. A 200mm gap is recommended between the end of the channel and the chamber itself to ensure that the cover and frame receive an adequate concrete surround to ensure the appropriate load rating is achieved.

# Recycling & Swarm Aqua®

Swarm Aqua® is manufactured from a variety of components, which when combined provide a product that is recycled, recyclable, sustainable with a long life expectancy.

With the quality of our suppliers and the components that we use, we always make sure that the environmental impact of our products and processes remains as minimal as possible.

Our suppliers are accredited with ISO 9001, ISO 14001, OHAS 18001, BBA, HAPAS Roads & Bridges which is a testament to their respective dedication to quality and the environment.

## Ductile Iron

The top casting of Swarm Aqua® channels is manufactured from ductile iron. This iron part once installed should never need to be removed and has a design life of well over 100 years, although it is a 100% recyclable part.

The raw material that goes into manufacturing this part is cast from 75-99% recycled iron from a wide range of sources that could otherwise be sent to landfill.

The foundry where Swarm Aqua® tops are cast like to take things one step further however, they shred and reuse waste paper on-site to be used in packaging, and have installed energy and water saving measures throughout their site.

## Galvanised Steel

Steel walls form the sides of the Swarm Aqua® channels. Steel is a 100% recyclable material and generally contains around 25% of recycled materials.

The use of scrap steel saves up to 74% of the energy needed to make steel from virgin materials.

Recycling one tonne of steel cans saves:

- 1.5 tonnes of iron ore
- 0.5 tonnes of coke
- 1.28 tonnes of solid waste
- Reduces air emissions by 86%
- Reduces water pollution by 76%

## HDPE Pipe

The twinwall channel part of Swarm Aqua® is manufactured from 100% recycled HDPE, which itself is also 100% recyclable as it is one of the easiest plastic polymers to recycle. In addition to its green properties, the twinwall pipe also has a design life of over 60 years, which means that not only is it environmentally conscious, it also doesn't require remedial, repair or replacement works once installed.

Other uses for HDPE include plastic shopping bags, trays, tanks, food containers, pipe fittings, hinges, cutting boards, wear plates and more.

Each length of Swarm Aqua uses up to 858 recycled HDPE plastic bottles.



## Connecting Channels

Swarm Aqua® channels are designed with a male and female end to make installation quick and as simple as possible. The integrated throat spacer provides a spigot for the channels to connect to each other ensuring a snug and straight fit.



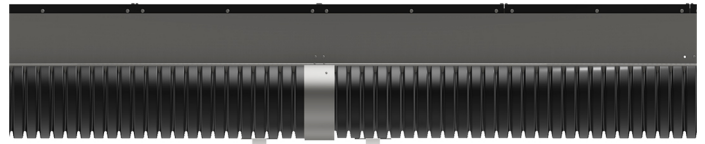
## Connecting Accessories

All of the accessories available with Swarm Aqua® systems use a similar method of jointing. Metal tabs are used to keep the channel located in place and it is recommended that the accessory is held in place securely to prevent ingress of concrete during installation.



## Closing Channel Joints

Once the Swarm Aqua® channels have been placed in their final locations and it is ensured that any gaps are closed using the integrated connection system, we recommend checking all joints and connections to make sure the channels and accessories are in place and secure. Throughout the installation process, please make sure that channels are protected as the load rating of the system is achieved once installation is complete.



## Integrated Throat Spacer

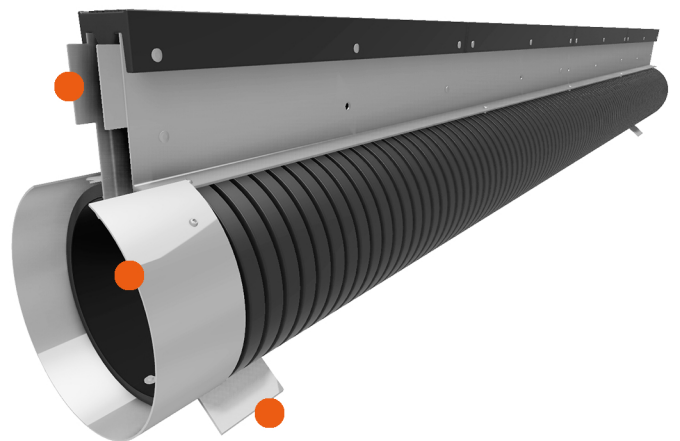
The throat spacer protrudes from the steel throat to locate one Swarm Aqua® channel to the next. As the location is inside the channel walls this avoids any interference with the concrete near the surface of the trench.

## Positive Collar Connection

An integrated steel collar provides connection of the channel conduit from one unit to the next, ensuring a straight, neat finish every time.

## Stabilising Channel Feet

The steel feet are provided to stabilise the Swarm Aqua® channels during installation.



# Site Preparation

Swarm Aqua® channels are designed to be installed within a concrete surround and completed at surface level with a range of finishes, be it pavement quality concrete, asphalt, block paving or landscaping. Swarm recommends using a two-pour installation method within a pre-formed trench to ensure the final load rating of the channel is in line with project specifications. When installed in concrete, Swarm Aqua® channels can cater for loadings of up to F900kN. For block paving and asphalt installations, Swarm Aqua® is rated for up to D400 loading as it is not recommended to surpass this loading due to the nature of the malleable or movable surface.



## Trench Preparation

Swarm Aqua® channels are designed to be installed within a preformed trench before being set within concrete using a two-pour method. It is important to follow the instructions laid out within our recommended installation drawings SA-S-001 (Full Concrete Surround), SA-S-002 (Asphalt Surface Finish) & SA-S-003 (Paved Surface Finish) to achieve the required load rating for the project. The trench is required to be 150mm deeper than the base of the channel section and 200mm wide from either side of the channel to ensure the concrete can flow underneath the Swarm Aqua® channel and provide suitable wall thickness.



## Reinforcement

EJ have performed an independent design and loading check on Swarm Aqua® when it is installed in concrete, asphalt and Block Paving.

Our recommendations for reinforcement can be requested from us and are represented by an installation drawing showing a reinforcement mesh where required for the relevant loadings.

## Handling & Storage

Swarm Aqua® channels can be heavy, as such it is important to observe all relevant site health and safety guidelines and regulations and use mechanical lifting methods where necessary. The channels themselves should be kept in their original packaging and stored in a location that will prevent damage on site.



Once installed in the ground if it is necessary for site equipment to traverse the trench, a protective bridge should be formed to protect the Swarm Aqua® channel from unnecessary damage. It is important that Swarm Aqua® is never trafficked prior to the final stage of it's installation, as the strength of the drainage channel is dependent on it's concrete surround and any unnecessary loading will cause deformation and may affect the quality or length of the channel's lifespan



### Full concrete surround

When installed within a full concrete surround, Swarm Aqua® channels are capable of achieving load ratings of up to F900kN. The details provided are a guideline and must be signed-off by the project specific engineer. Concrete reinforcement may be necessary to achieve F900kN loadings. Reinforcement details are the responsibility of the project engineer.

For full and up to date drawings in both DWG and PDF formats please feel free to contact us.



### Asphalt surface finish

When installed with an asphalt surface finish, Swarm Aqua® channels are capable of achieving load ratings of up to D400kN and as with all installation details, they are provided as a guideline and must be signed-off by the project specific engineer.

For full and up to date drawings in both DWG and PDF formats please feel free to contact us.

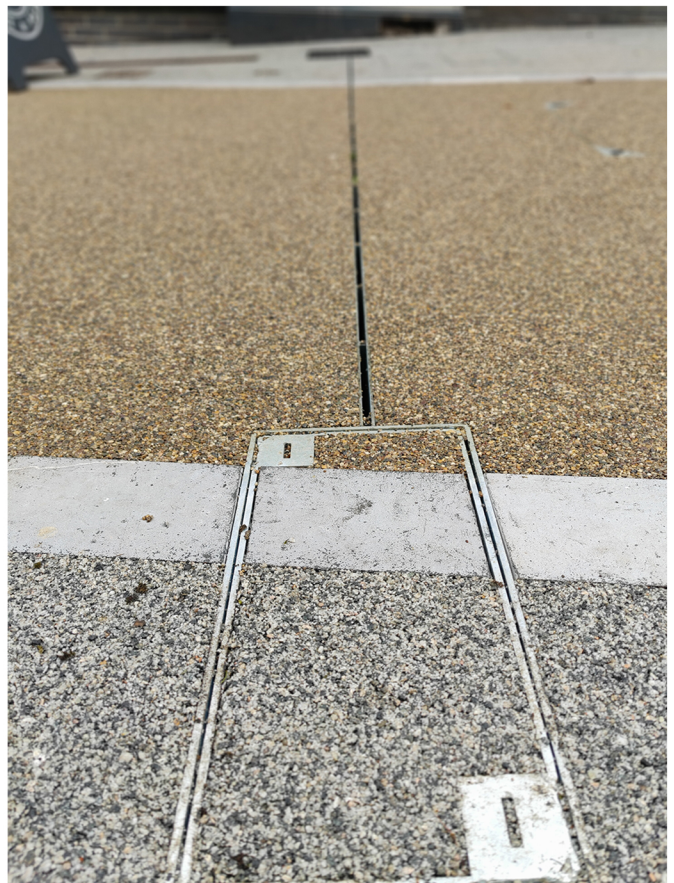


### Block paving surface finish

When installed with a block paving surface finish, Swarm Aqua® channels are capable of achieving load ratings of up to D400kN. The blocks closest the channel line should be affixed with a polymer modified mortar to prevent excessive movement. Both open sand jointed, and cement jointed paving installation methods can be used, and loading depending on each type should be specified by the project engineer.

For full and up to date drawings in both DWG and PDF formats please feel free to contact us.





# Handling Swarm Aqua®

Swarm Aqua® channels are generally 2m long and can be heavy, as such it is important to observe all relevant site health and safety guidelines and regulations and use mechanical lifting methods where necessary. Lifting straps should not be attached through the throat spacers or around the feet, they should be wrapped around the channel, between ribs where able to do so.

Swarm Aqua® accessories can be handled manually, however as they are primarily of cut steel construction it is important to take care that any burrs and sharp edges are avoided, and PPE considerations are made.



## Delivery to Site

In most cases Swarm Aqua® channels are delivered to your site packaged in bundles as shown in the image to the right. The channels will be tessellated to protect them from movement during haulage, however care should be taken when separating the bundle on site to ensure components or units are not damaged in any way during this process. Accessories will be either bundled together with the channel or delivered in their own crate and should be easily separated. Delivery to site will be made on articulated flat bed lorries without hi-ab or off-loading facilities, so it is important that site off-loading facilities are provided on site.



## PPE



Swarm Aqua® has laser cut steel parts and as such some parts of the channel and accessories may have sharp edges or burrs. Although every effort is taken to minimize these areas of risk, It is important when handling channels and accessories that relevant PPE is worn and site health and safety guidelines are followed.



## Transporting Swarm Aqua Channels



Swarm Aqua® channels are delivered in tessellated 2m bundles no more than 1.2m wide. When arriving on site it is recommended that the bundles are kept together and a forklift is used to move the bundle to a safe area where the channels can be stored until they are ready to be installed. Preferably this area is covered and in an area where possible damage to the channels is minimal.



## Site Off-loading Facilities

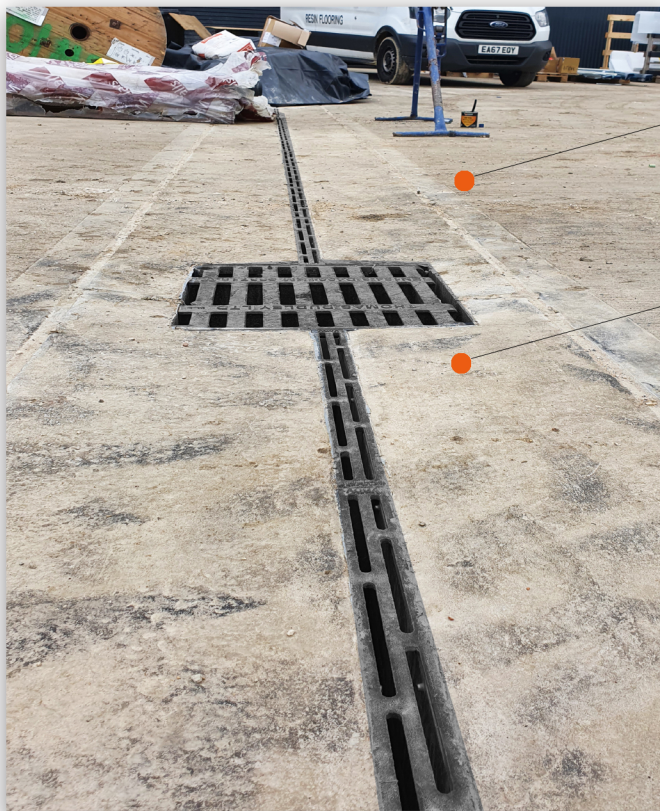
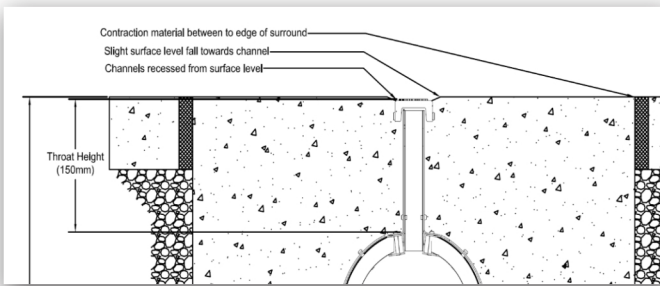
Swarm Aqua® channels are delivered on flat lorries without hi-ab or off-loading facilities. It is the responsibility of the site receiving delivery to arrange for mechanical site off-loading facilities.

# Installation Details

Full and up to date installation details for the Swarm Aqua® systems are available online at [www.swarmwm.co.uk](http://www.swarmwm.co.uk) or by request. It is important to follow the guidelines regarding trenching, setting, concreting, expansion and contraction joints as these details have been verified to achieve the specified load ratings by third-party structural engineers. If Swarm Aqua® is not installed in line with the given guidelines it may cause damage to the product and/or effect the final load rating or finish of the installation.

## Expansion & Contraction Joints

Swarm Aqua® must reside within its own concrete surround which includes an expansion material between the surround and any other surface finishes beyond that. Failure to include an expansion joint at this point can result in product damage due to the natural thermal expansion and contraction of concrete and other materials.



## Expansion Joints

Large concrete bays must always be separated from the Swarm Aqua® trench to ensure independent movement and expansion into the drainage void.

## Surface Crossfall

When installing Swarm Aqua® a slight crossfall on the concrete surround of around 5mm will ensure all surface water is collected in the system and prevents surface pooling.

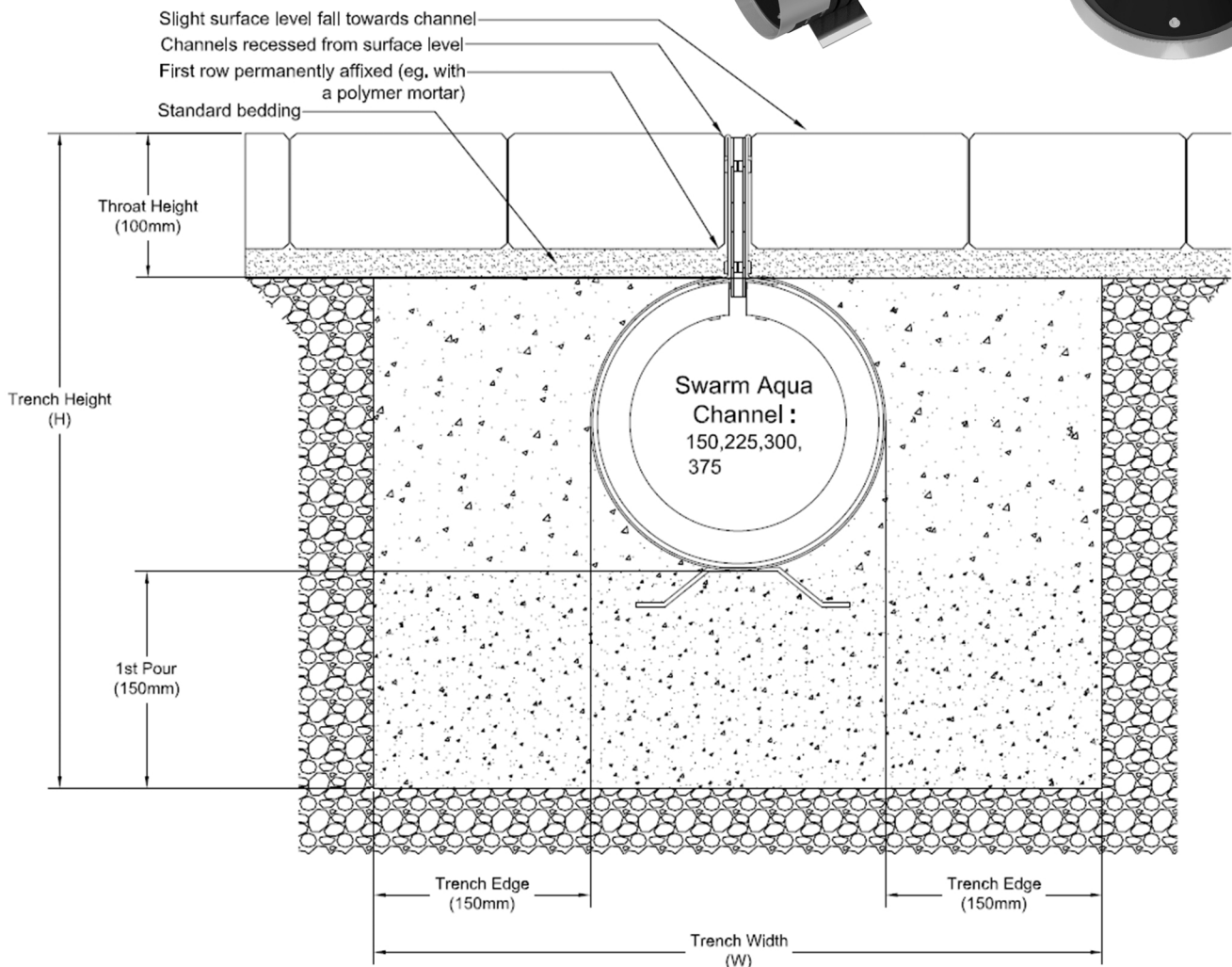
## Crack Inducers

K-Form screed railing can be used as a crack inducer at each channel joint in order to ensure the integrity of the finished slab in full concrete installations. However it is also possible to use a generic crack inducer to achieve the same result.



# Paving Installation

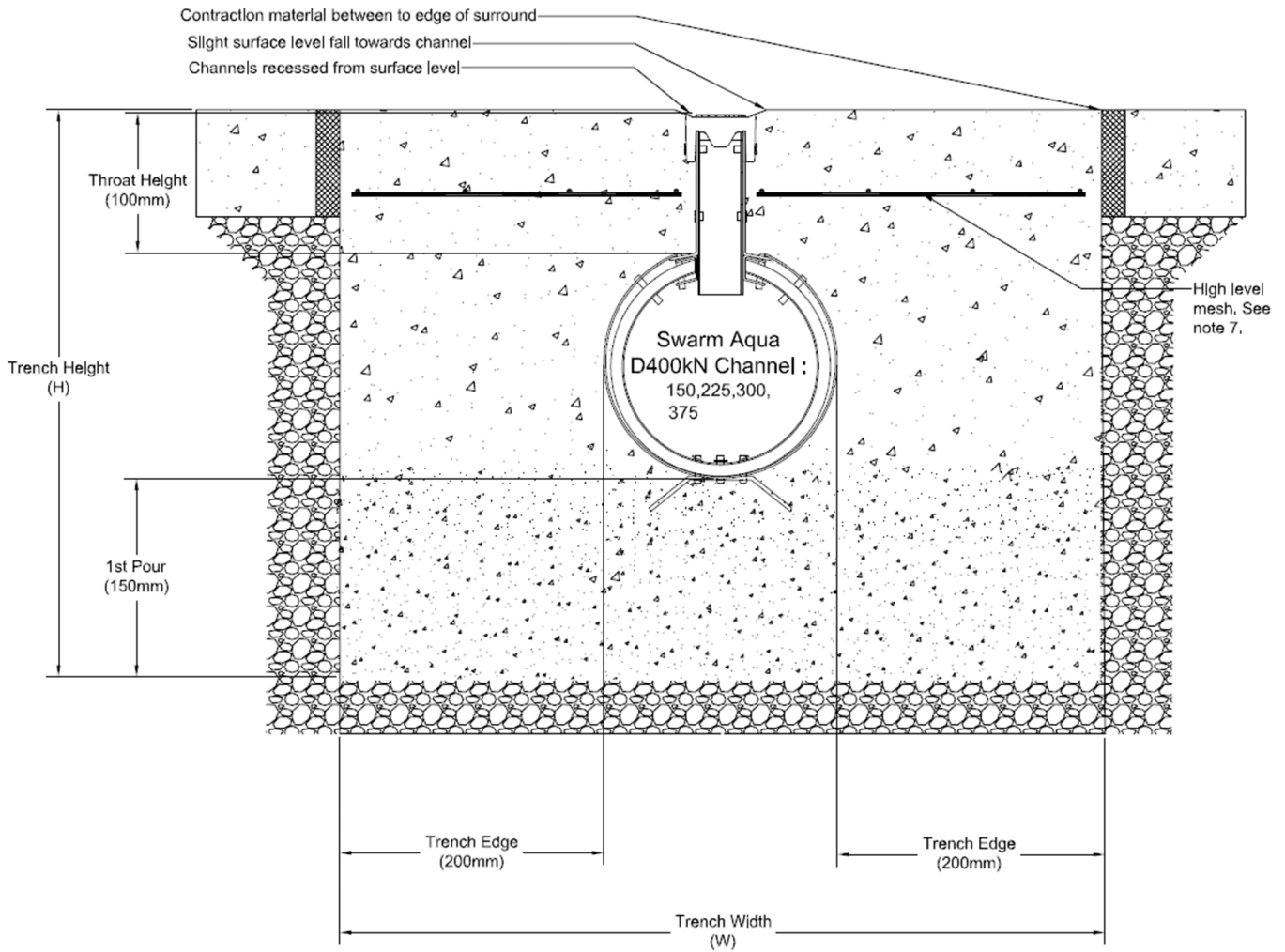
The below detail and table shows the Swarm Aqua® paving system with a discrete single slot arrangement installed in a block paved scenario. This system is rated up to D400kN along with its recessed access box covers (supplied with part PD01S) to ensure the optimum aesthetic solution for high-end or block paved areas.



Product Information								Trench Information	
Code	Description	Loading	Length	Width	Height	Invert	Opening	Width (W)	Height (H)
SA150P	150mm Aqua Paving	D400	2.0m	178mm	300mm	280mm	20000mm <sup>2</sup>	478mm	430mm
SA225P	225mm Aqua Paving	D400	2.0m	265mm	390mm	370mm	20000mm <sup>2</sup>	565mm	520mm
SA300P	300mm Aqua Paving	D400	2.0m	354mm	480mm	460mm	20000mm <sup>2</sup>	654mm	610mm
SA375P	375mm Aqua Paving	D400	2.0m	426mm	550mm	530mm	20000mm <sup>2</sup>	726mm	680mm

# D400 (Concrete) Installation

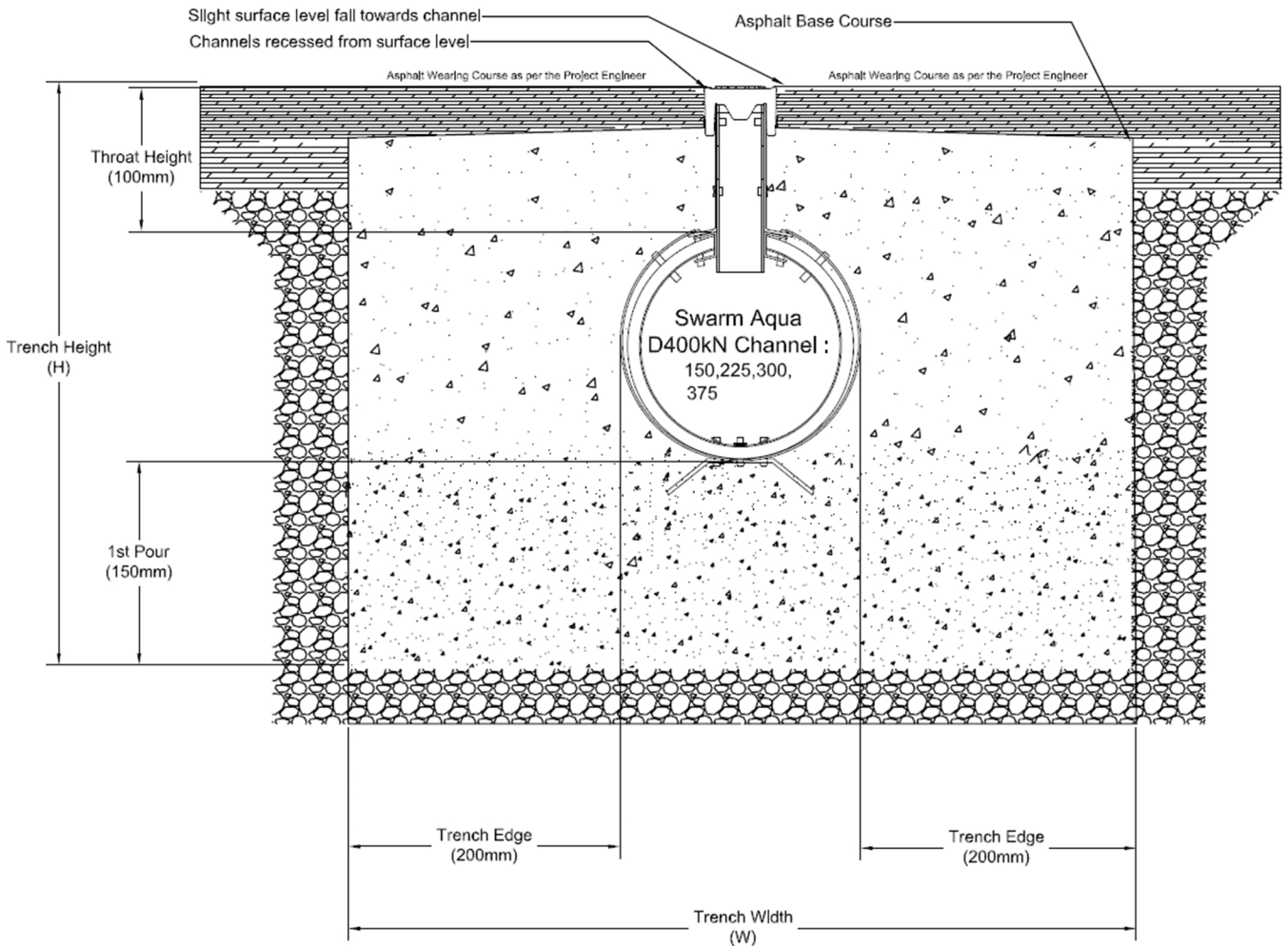
The below detail and table shows the Swarm Aqua® D400kN system installed in a concrete surface finish. This system can be installed in situations requiring a load rating of up to D400kN along with ductile iron grating and frames.



Product Information								Trench Information	
Code	Description	Loading	Length	Width	Height	Invert	Opening	Width (W)	Height (H)
SA150D	150mm Swarm Aqua	D400	2.0m	178mm	298mm	278mm	14490mm <sup>2</sup>	578mm	428mm
SA225D	225mm Swarm Aqua	D400	2.0m	265mm	385mm	365mm	14490mm <sup>2</sup>	665mm	515mm
SA300D	300mm Swarm Aqua	D400	2.0m	354mm	474mm	454mm	14490mm <sup>2</sup>	754mm	604mm
SA375D	375mm Swarm Aqua	D400	2.0m	426mm	546mm	526mm	14490mm <sup>2</sup>	826mm	676mm

# D400 (Asphalt) Installation

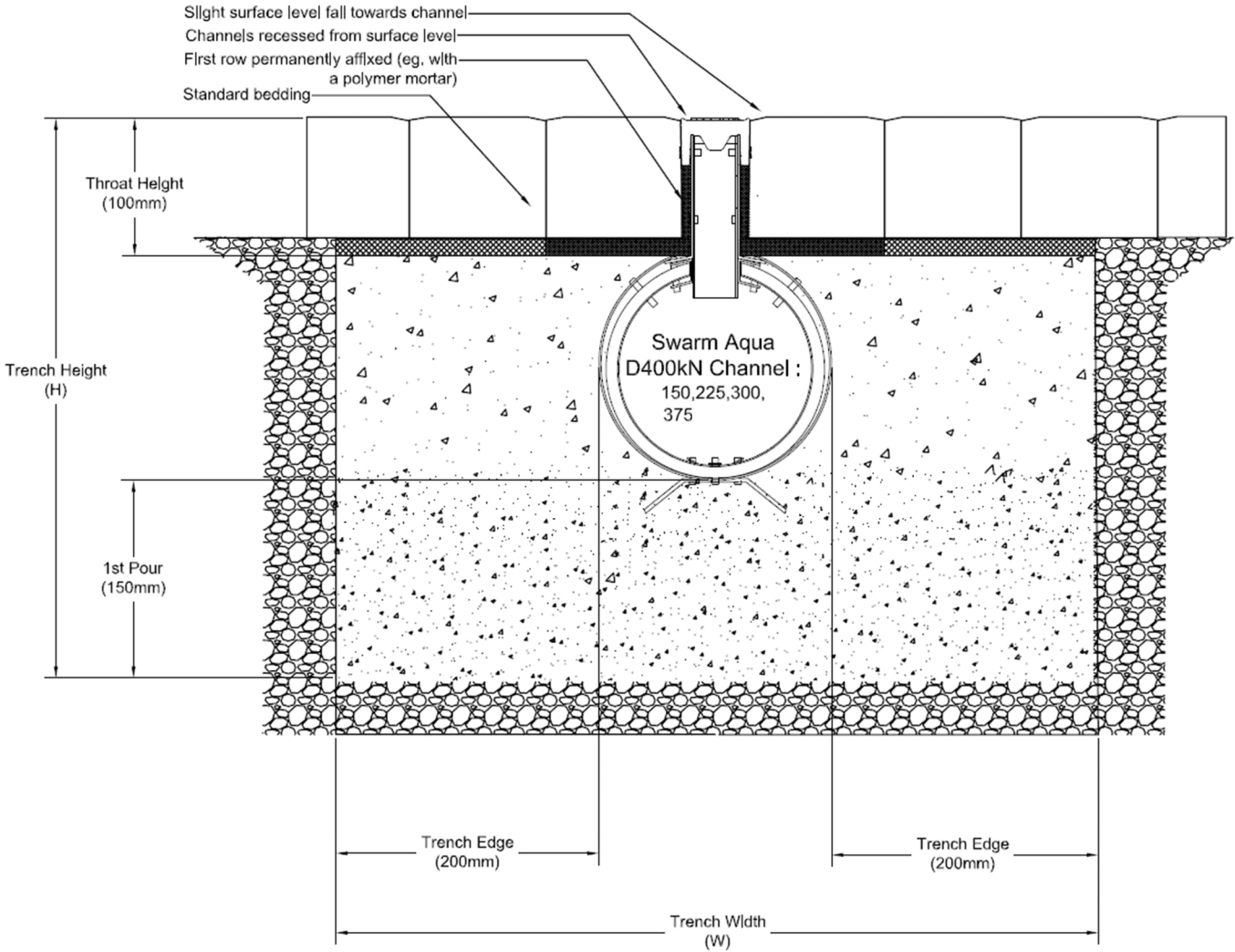
The below detail and table shows the Swarm Aqua® D400kN system installed in an asphalt surface finish. This system can be installed in situations requiring a load rating of up to D400kN along with ductile iron grating and frames.



Product Information								Trench Information	
Code	Description	Loading	Length	Width	Height	Invert	Opening	Width (W)	Height (H)
SA150D	150mm Swarm Aqua	D400	2.0m	178mm	298mm	278mm	14490mm <sup>2</sup>	578mm	428mm
SA225D	225mm Swarm Aqua	D400	2.0m	265mm	385mm	365mm	14490mm <sup>2</sup>	665mm	515mm
SA300D	300mm Swarm Aqua	D400	2.0m	354mm	474mm	454mm	14490mm <sup>2</sup>	754mm	604mm
SA375D	375mm Swarm Aqua	D400	2.0m	426mm	546mm	526mm	14490mm <sup>2</sup>	826mm	676mm

# D400 (Paving) Installation

The below detail and table shows the Swarm Aqua® D400kN system installed in a paved surface finish. This system can be installed in situations requiring a load rating of up to D400kN along with ductile iron grating and frames.

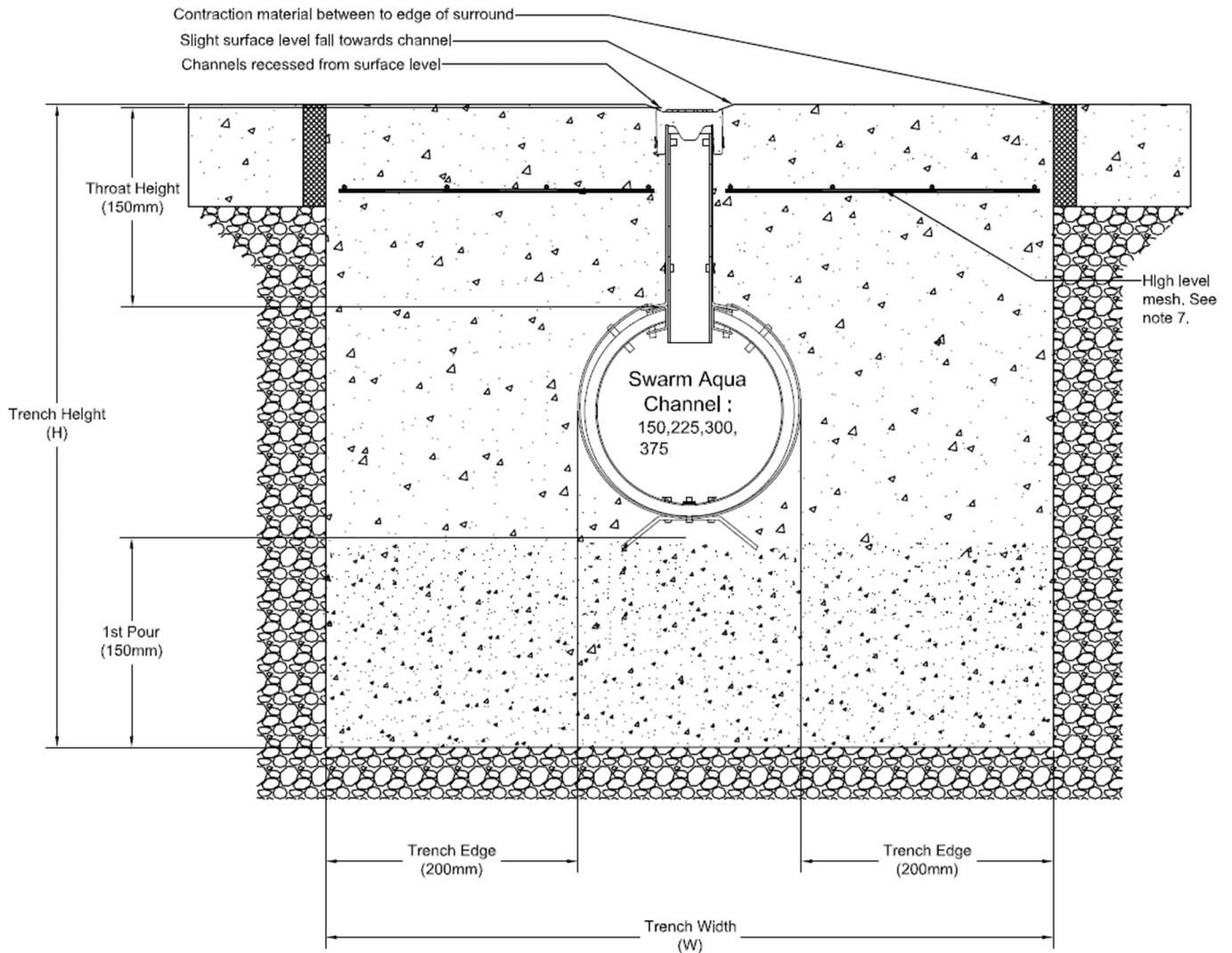


Product Information								Trench Information	
Code	Description	Loading	Length	Width	Height	Invert	Opening	Width (W)	Height (H)
SA150D	150mm Swarm Aqua	D400	2.0m	178mm	298mm	278mm	14490mm <sup>2</sup>	578mm	428mm
SA225D	225mm Swarm Aqua	D400	2.0m	265mm	385mm	365mm	14490mm <sup>2</sup>	665mm	515mm
SA300D	300mm Swarm Aqua	D400	2.0m	354mm	474mm	454mm	14490mm <sup>2</sup>	754mm	604mm
SA375D	375mm Swarm Aqua	D400	2.0m	426mm	546mm	526mm	14490mm <sup>2</sup>	826mm	676mm



# F900 Product (Concrete) Installation up to E600

The below detail and table shows the Swarm Aqua® F900kN system when installed with a full concrete surround. This system can be installed in situations requiring a load rating of up to F900kN along with ductile iron grating and frames.



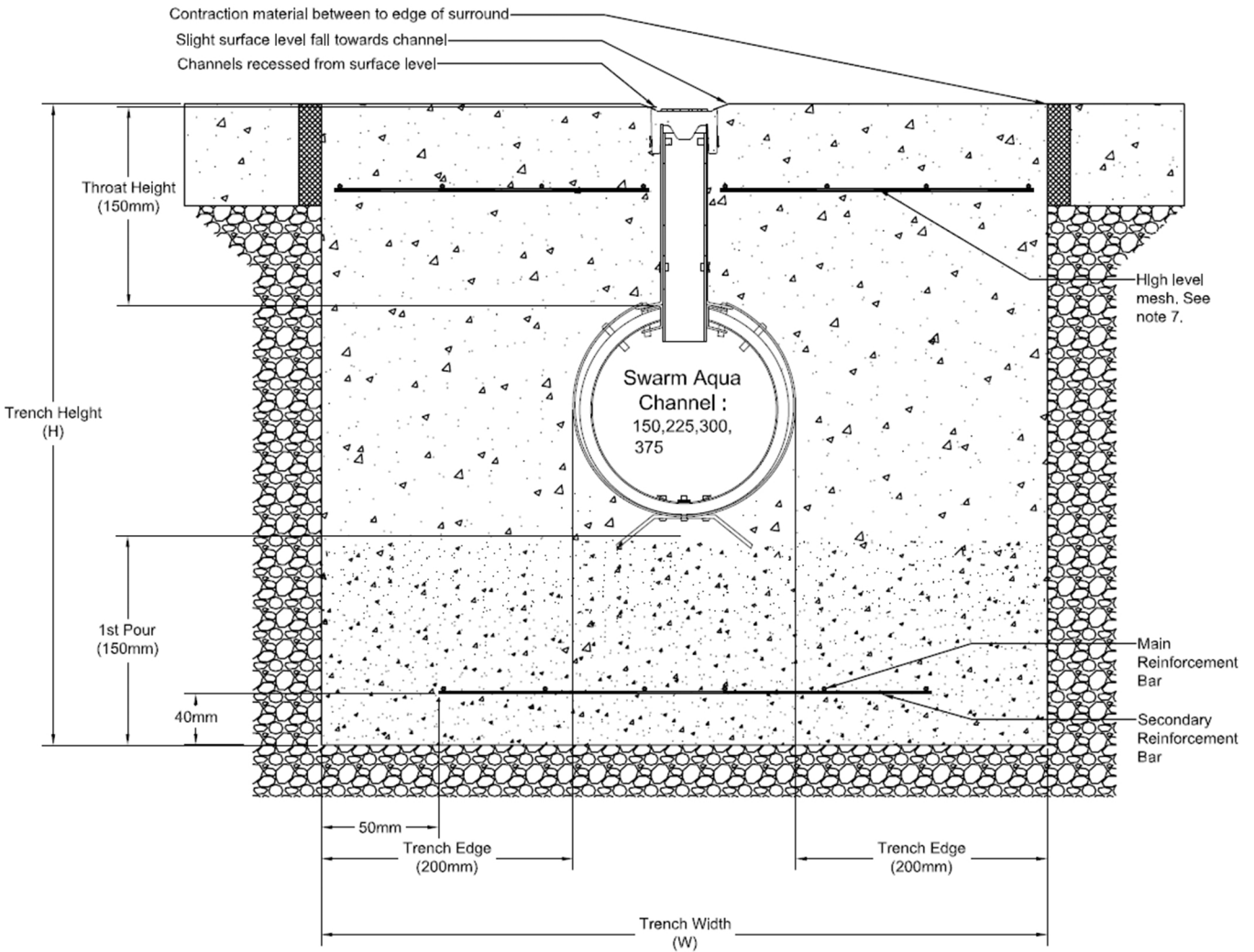
D400 Reinforcement Requirements		
Code	Description	Mesh
SA150F	150mm Swarm Aqua	N/A
SA225F	225mm Swarm Aqua	N/A
SA300F	300mm Swarm Aqua	N/A
SA375F	375mm Swarm Aqua	N/A

E600 Reinforcement Requirements		
Code	Description	Mesh
SA150F	150mm Swarm Aqua	N/A
SA225F	225mm Swarm Aqua	N/A
SA300F	300mm Swarm Aqua	N/A
SA375F	375mm Swarm Aqua	N/A

F900 Reinforcement Requirements		
Code	Description	Mesh
SA150F	150mm Swarm Aqua	B785
SA225F	225mm Swarm Aqua	B785
SA300F	300mm Swarm Aqua	B785
SA375F	375mm Swarm Aqua	B785

# F900 Reinforcement Detail

The below detail and table shows the Swarm Aqua® F900kN system with its required reinforcement profile to meet specific load ratings. This system can be installed in situations requiring a load rating of F900kN along with ductile iron grating and frames.



D400 Reinforcement Requirements		
Code	Description	Mesh
SA150F	150mm Swarm Aqua	N/A
SA225F	225mm Swarm Aqua	N/A
SA300F	300mm Swarm Aqua	N/A
SA375F	375mm Swarm Aqua	N/A

E600 Reinforcement Requirements		
Code	Description	Mesh
SA150F	150mm Swarm Aqua	N/A
SA225F	225mm Swarm Aqua	N/A
SA300F	300mm Swarm Aqua	N/A
SA375F	375mm Swarm Aqua	N/A

F900 Reinforcement Requirements		
Code	Description	Mesh
SA150F	150mm Swarm Aqua	B785
SA225F	225mm Swarm Aqua	B785
SA300F	300mm Swarm Aqua	B785
SA375F	375mm Swarm Aqua	B785

# Saving Time & Money

At EJ we pride ourselves on our ability to effectively save time and money on projects of everyone involved. There are a number of factors that dictate the overall cost of a project, which we can identify and manage as below.

## Efficiency of Design

The most efficient drainage system is one that has been correctly sized. Flows along the length of channel runs are typically not as steep as lateral inflows as this means creating falls in multiple directions. This in turn leads to a near-flat fall and a single sized, oversized channel configuration.

By incorporating a stepped-fall type configuration, it is possible to generate an average, artificial gradient along the length of the channel run which will in turn create smaller channel sizes, faster flow rates (helping to achieve a self-cleaning velocity), a cheaper channel run, less trenching and less refilling material.

AquaCalc® is our own calculator that is available for FREE for you to use to calculate your required channel size. The software works with your variables such as run length, drainage area, gradient and rainfall rate to optimize a stepped-fall system for your projects.



## Competitive Product Rates

Swarm Aqua® is a competitively priced product within the surface water drainage market. We are confident that even on a like-for-like basis against other products, Swarm Aqua® is always a cost effective solution for most projects.

## Lifetime of the Project

Some costs that are saved by using Swarm Aqua® are variables that may arise in the future. The Iron top of the channel is independently tested to F900kN in its own right and will not corrode within the next 100 years in the ground. The HDPE twinwall pipe also has a design life of over 60 years - this all means less renovations and a longer lifecycle of each given project.

Swarm Aqua® is also a monolithic product with no moving parts. This means less wear, less remedial works and less time and effort once it's been installed.

## Using Standard Parts

Swarm Aqua® channels are constructed in part from a standard Twinwall conduit. This means that when changing between surface water drainage and an underground system there is no need for special adapters or bespoke components. It's as simple as attaching a short length of twinwall pipe onto the end of a Swarm Aqua® run and it's ready to be considered as a standard drainage system - this means that standard twinwall accessories can easily be incorporated such as tees, junctions, connectors etc. This also means that if a drainage run is required to go 'underground' such as in landscaped areas or under kerbs, it's easy to do so without adding addition costs and effort.



As Swarm Aqua® channels are used in trafficked areas as well as pedestrianised zones, it is important that the relevant standards are met and quality upheld. As a manufacturer it is our duty to enact quality testing to meet the criteria set out by legislation. Swarm Aqua® channels are compliant with the following:



### EN 1433:2002 - Drainage Channels for Vehicular and pedestrian areas.

CE Marking for construction products is regulated via design and testing requirements that conform to a range of load class ratings as follows:

- A15 Pedestrians & Pedal Cyclists
- B125 Footways, Private Car Parks or Parking Decks
- C250 Kerb Sides, Non-Trafficked Areas & Hard Shoulders
- D400 Carriageways & Car Parks for All Vehicles
- E600 High Wheel Loads, Ports & Dock Sides
- F900 Especially High Loadings eg. Aircraft Pavements

There is also a restriction on the drainage product's surface pronouncement based on the loading range. In essence this means that the amount of steel (or iron) that a vehicle can make contact with is regulated in the following way:

- C250 2mm (min) for trafficked edges
- D400 4mm (min) for trafficked edges
- E600 Design applicable but more than D400
- F900 Design applicable but more than D400

### Slot size restrictions

- A15 & B125 8-18mm Slot has no length restriction. 18mm Slot must be 170mm long or less.
- C250-F900 When oriented along the direction of traffic and up to 45 degrees off-standing, a slot of over 18mm wide must be no longer than 170mm long.

### Relevant Standards for Component Manufacture

- Rolled Steel: ISO 630
- Tolerances for Cast Iron: ISO 8062
- Hot Dip Galvanising: ISO 1461, EN 10142 EN 10214, EN 10215
- Stainless Steel: EN 10088-1, EN 10088-2, EN 10088-3
- Reinforcing Steel: ENV 10080

### SWH Clause 517 (Highways)

Linear drainage channel systems shall be suitable for their intended use and place of installation in the works. The Contractor shall provide evidence of such suitability for the purpose to the Overseeing Organisation. For prefabricated or manufactured linear drainage systems this shall be the declaration of performance. The declaration of performance shall demonstrate that the linear drainage system meets the requirements of the specification.

**Swarm Aqua® channels meet the criteria for Clause 517 as above through testing and supply of the declaration of performance.**



### CPD Certification Service Member

CPD stands for Continuing Professional Development (CPD) and is the term used to describe the learning activities professionals engage in to develop and enhance their abilities. It enables learning to become conscious and proactive, rather than passive and reactive.

We are proud to bring our knowledge to the industry. Our highly experienced team is on hand to give seminars and presentations regarding our own Swarm Aqua® system. With a background in linear drainage and a wealth of knowledge, we are able to answer all of your questions so that specifying or installing Swarm Aqua® is as easy as it should be.

These seminars are suitable for Architects, Engineers, Quantity Surveyors, Cost Consultants, Contractors and Suppliers.

### SUDS

Swarm are able to design and supply attenuation solutions and flow restriction valves to work within sustainable and flow restricted sites. By combining Swarm Aqua® surface water drainage with these products, it is possible to meet even the strictest of demands.

### Interception Capability

- 100mm: 7.85l/m
- 150mm: 17.67l/m
- 225mm: 39.76l/m
- 300mm: 70.69l/m
- 375mm: 110.45l/m

Twin drainage slots have been designed with a 15352mm<sup>2</sup>/m opening which is standard across all products in the Swarm Aqua® range. The Paving style channel has an opening of 9000mm<sup>2</sup>/m in a single continuous slot for optimum interception.

### BBA

While the Twinwall pipe component of Swarm Aqua® channels is BBA certified, Slot Type surface water drainage channels do not require BBA certification.

Please feel free to contact us with any enquiries or questions you may have.

### EJ UK

Nuneaton, UK  
024 7664 1777



**UK PATENT NO: GB2566537**

### The Swarm Aqua® System at a glance

Please feel free to contact us with any enquiries or questions you may have.

We provide coverage across the UK to ensure your project is completed efficiently and in a cost effective manner.



#### Recycled & Recyclable

Swarm Aqua® is manufactured from both recyclable and recycled materials. A full case study detailing the environmental considerations of Swarm Aqua® channels is available online.



#### Ideal in Heavy Loading Traffic Areas

The strong, durable design of Swarm Aqua® means that when installed with a full concrete surround, it can be used in areas of heavy loading traffic up to F900kN.



#### Long Design Life

The twinwall channel is manufactured from 100% recyclable material (HDPE plastic) and is resistant to a range of chemicals, with a predicted design life of over 60 years.

Swarm Aqua® is a hybrid surface water drainage system that combines the benefits of proven materials and robust manufacturing techniques to create an exceptional surface water drainage product for external use. With a focus on strength, rigidity and lighter weight, Swarm Aqua® provides the perfect solution.

A strong, durable ductile iron top section designed specifically to take D400 or F900kN loadings, combined with steel side walls and Twinwall conduit ensures that the product is ideal for external drainage applications.

Swarm Aqua® is also available with a paving slot style finish which has been specifically designed to provide a discrete slot type drainage system to landscaped or block paved areas, with a load rating of up to D400kN.

# Swarm Aqua® Paves the Way for Aesthetic Drainage in Coventry City Centre.

It isn't just heavy duty, concrete yards all across the UK for the Swarm Aqua® linear drainage system, in fact that's only one of many surface finishes that Swarm Aqua® is suitable for. The perfect example of a high-end paved location is Coventry City Centre, where Swarm Aqua® was chosen to compliment the paved pedestrian areas, whilst still matching the bold iron planters dotted around the scheme.

Working together through from the early design stages with the consultants and engineers on the prestigious 'City of Culture', Swarm Aqua® channels were proven to be adaptable, simple to specify, and above all competitively priced.

Striving to always arrive at the best solution for everyone involved in the project, the team at EJ provided bespoke shorter units, which aided site with less cutting to suit on site and more of a 'click and connect' style kit that could be installed quickly and efficiently.

Swarm Aqua® channels showed their versatility as the contractors installed standard twinwall fittings in conjunction with the Swarm Aqua® channels. This allowed changes direction, dog-legs and avoided complications that would otherwise have made the installation longer and more difficult.



**Products used on this scheme:**

- Swarm Aqua® Cast D400kN
- Combined Access/Outlet Boxes D400kN

**Products used on this scheme:**

- Swarm Aqua® Cast D400kN
- Slimline Paving Recessed Boxes D400kN



# Swarm Aqua® does it's magic at the Wizarding World of Harry Potter.

Swarm Aqua® channels are always simple to size and specify, with calculations available to be carried out in-house for the convenience of anyone looking to specify the system from consultants to groundworkers.

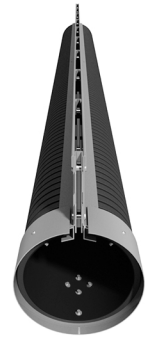
Though this particular driveway is seldom trafficked (though perhaps occasionally by a flying car or motorbike), the system is rated to D400kN and has a design life of more than 60 years, which means it will stand the test of time and continue to function for many years to come.

Having used Swarm Aqua® before, the contractor knew that the system would be installed quickly in this active set, reducing any downtime as much as possible. Combined with a quick delivery, from start to finish this project was completed causing a minimal amount of disruption for the location.

Swarm Aqua® is available in a range of sizes from 150mm to 375mm wide, with a choice of iron top or steel slot and a loading capability up to D400kN or F900kN. Swarm Aqua® drainage channels are suitable for any application and surface finish from a residential driveway through to a major distribution centre.

Swarm Aqua® Paving Product Tables

Code	Description	Loading	Weight	Length	Height	Invert	Width	Depth
SA150P	150mm Swarm Aqua	D400	15kg	2.0m	298mm	278mm	578mm	408mm
SA225P	225mm Swarm Aqua	D400	18kg	2.0m	385mm	365mm	665mm	495mm
SA300P	300mm Swarm Aqua	D400	21kg	2.0m	474mm	454mm	754mm	584mm
SA375P	375mm Swarm Aqua	D400	27kg	2.0m	546mm	526mm	826mm	676mm



Swarm Aqua® Cast D400kN Product Tables

Code	Description	Loading	Weight	Length	Height	Invert	Width	Depth
SA150D	150mm Swarm Aqua	D400	34kg	2.0m	298mm	278mm	578mm	408mm
SA225D	225mm Swarm Aqua	D400	38kg	2.0m	385mm	365mm	665mm	495mm
SA300D	300mm Swarm Aqua	D400	41kg	2.0m	474mm	454mm	754mm	584mm
SA375D	375mm Swarm Aqua	D400	44kg	2.0m	546mm	526mm	826mm	676mm



Swarm Aqua® Cast F900kN Product Tables

Code	Description	Loading	Weight	Length	Height	Invert	Width	Depth
SA150F	150mm Swarm Aqua	F900	35kg	2.0m	348mm	328mm	578mm	478mm
SA225F	225mm Swarm Aqua	F900	40kg	2.0m	435mm	415mm	665mm	565mm
SA300F	300mm Swarm Aqua	F900	42kg	2.0m	524mm	504mm	754mm	654mm
SA375F	375mm Swarm Aqua	F900	45kg	2.0m	596mm	576mm	826mm	726mm



Swarm Aqua® Universal End Caps

Code	Description	Loading	Weight	Length	Height
SB02	150mm End Cap	N/A	1kg	178mm	178mm
SB03	225mm End Cap	N/A	1kg	265mm	265mm
SB04	300mm End Cap	N/A	2kg	354mm	354mm
SB05	375mm End Cap	N/A	2kg	426mm	426mm

Swarm Aqua® Chamber Connectors

Code	Description	Loading	Weight	Length
SS02	150mm Connector	N/A	1kg	450mm
SS03	225mm Connector	N/A	1kg	450mm
SS04	300mm Connector	N/A	2kg	450mm
SS05	375mm Connector	N/A	2kg	450mm

Swarm Aqua® Transition Pieces

Code	Description	Loading	Weight	Length	Height
SC02	150/225 Transition	N/A	1kg	285mm	265mm
SC03	225/300 Transition	N/A	1kg	374mm	354mm
SC04	300/375 Transition	N/A	2kg	446mm	426mm

Swarm Aqua® Access/Outlet Boxes D400

Code	Description	Weight	Length	Height	Depth
SD01	Small Combined Box	31kg	524mm	610mm	450mm
SD02	Large Combined Box	48kg	605mm	750mm	675mm

Swarm Aqua® Paving Access/Outlet Boxes D400

Code	Description	Weight	Length	Height	Depth
PD01	Small Paving Box	31kg	524mm	610mm	450mm
PD01S	Slimline Recessed Box	30kg	503mm	250mm	500mm



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