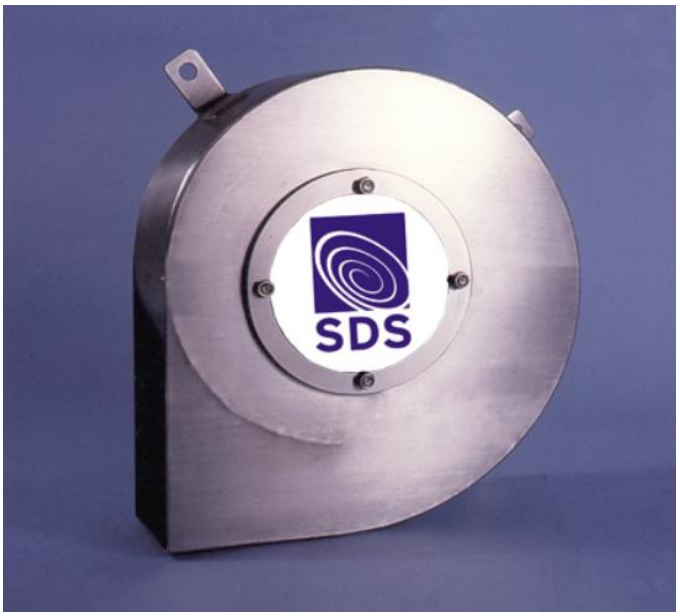
Sustainable Drainage Systems Ltd – Vortex Flow Control Unit



Purpose Built Flow Controls

Developed specifically for use in drainage systems, the individually designed vortex flow controls offer an effective solution to storm water management problems. Each unit is configured to suit the site and to fit easily into the drainage infrastructure. The SDS vortex flow control units are currently in use throughout the U.K, Ireland and Europe.

Vortex flow control units do not rely on external power supplies or moving parts. An internal vortex, generated by the incoming water controls the through flow. The unique flow characteristic of the vortex flow control ensures optimum use of upstream storage while the large cross sectional areas greatly reduce the risk of blockage. The Vortex flow control units have no moving parts to wear or fail. Made from stainless steel plate they will resist scour, degradation and chemical attack. A Vortex flow control unit should easily outlast the system in which it is installed.

Performance Characteristics

The discharge curve of a flow control unit has a bistable characteristic.
At low heads the discharge coefficient is relatively large allowing water to flow comparatively freely.

At a predetermined head the vortex begins to form within the Vortex Chamber causing a reduction in the discharge coefficient. There is a short transitional phase where the coefficient is reduced as the vortex becomes fully formed. This is represented by the classic “kickback” in the curve.
Once formed the vortex establishes a reduced but stable discharge coefficient.

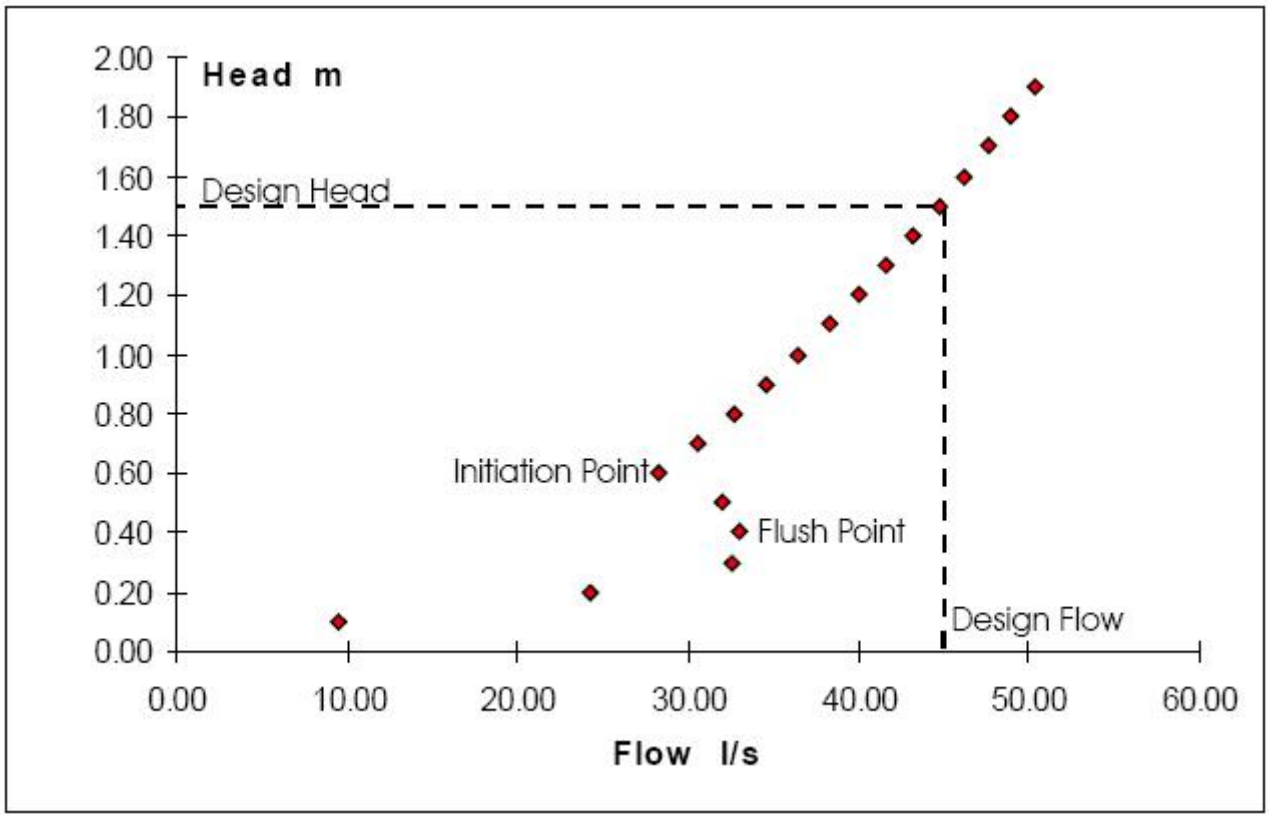
The significant points to note on the curve are:

1) **The flush point** - The point at which the initial flow peaks. For optimum performance this should be as close as practical to the design flow without exceeding it.

2) **The initiation point** - The point at which the vortex becomes fully formed and the discharge coefficient is stabilized.

3) **The design head** - The head at which the design flow is to be archived. This should always be above the initiation point.

4) **The design flow** - The maximum discharge rate required for the system. This should always be in the stable region above the initiation point.

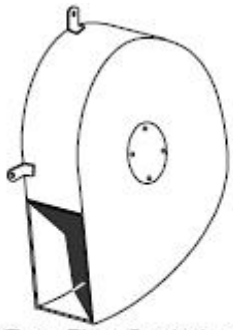


The construction of the vortex flow control unit is varied to alter the head at which the flush point and initiation point occur. This gives rise to a number of different types and many variations within each type. For example reducing the cone angle of a conical unit or reducing the casing diameter of a radial type will lower the head required for initiation

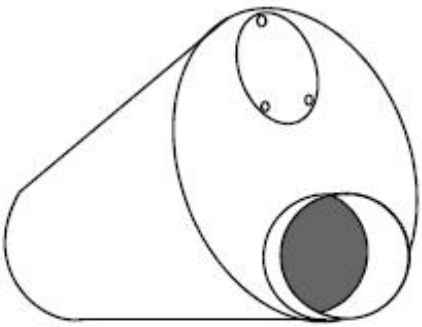
Types of Vortex Flow Control Unit

Flow Control units fall into Three Main Categories:

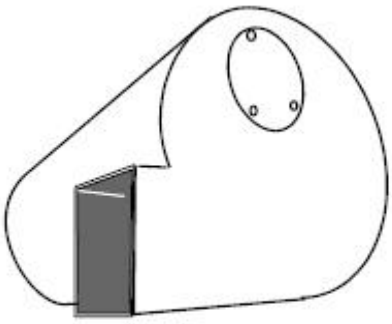
Within each Category the Vortex Chamber and the inlet and Outlet Dimensions are varied to give a vide variety of flow control units with differing characteristics.



Radial Type Flow Control unit
Surface Water Only



Conical Type Flow Control unit
Rear Inlet

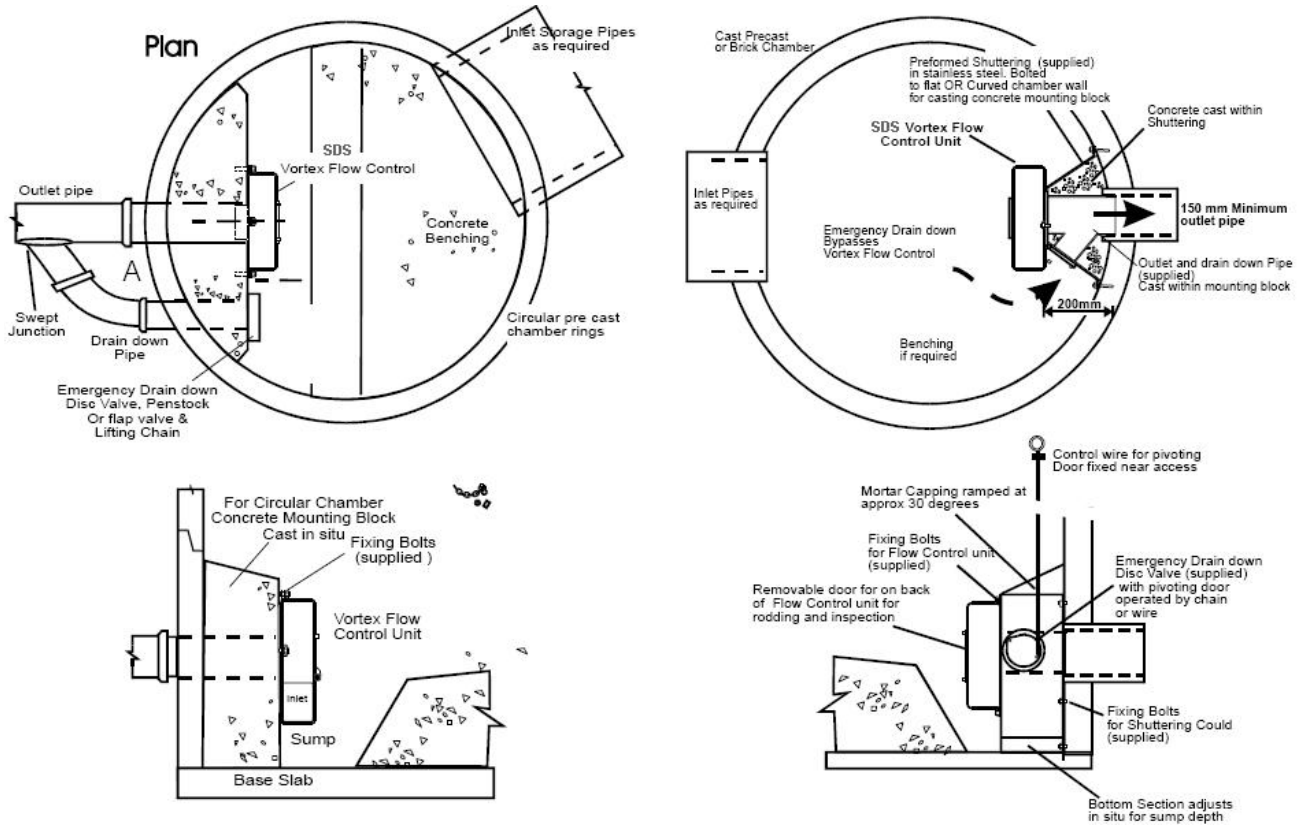


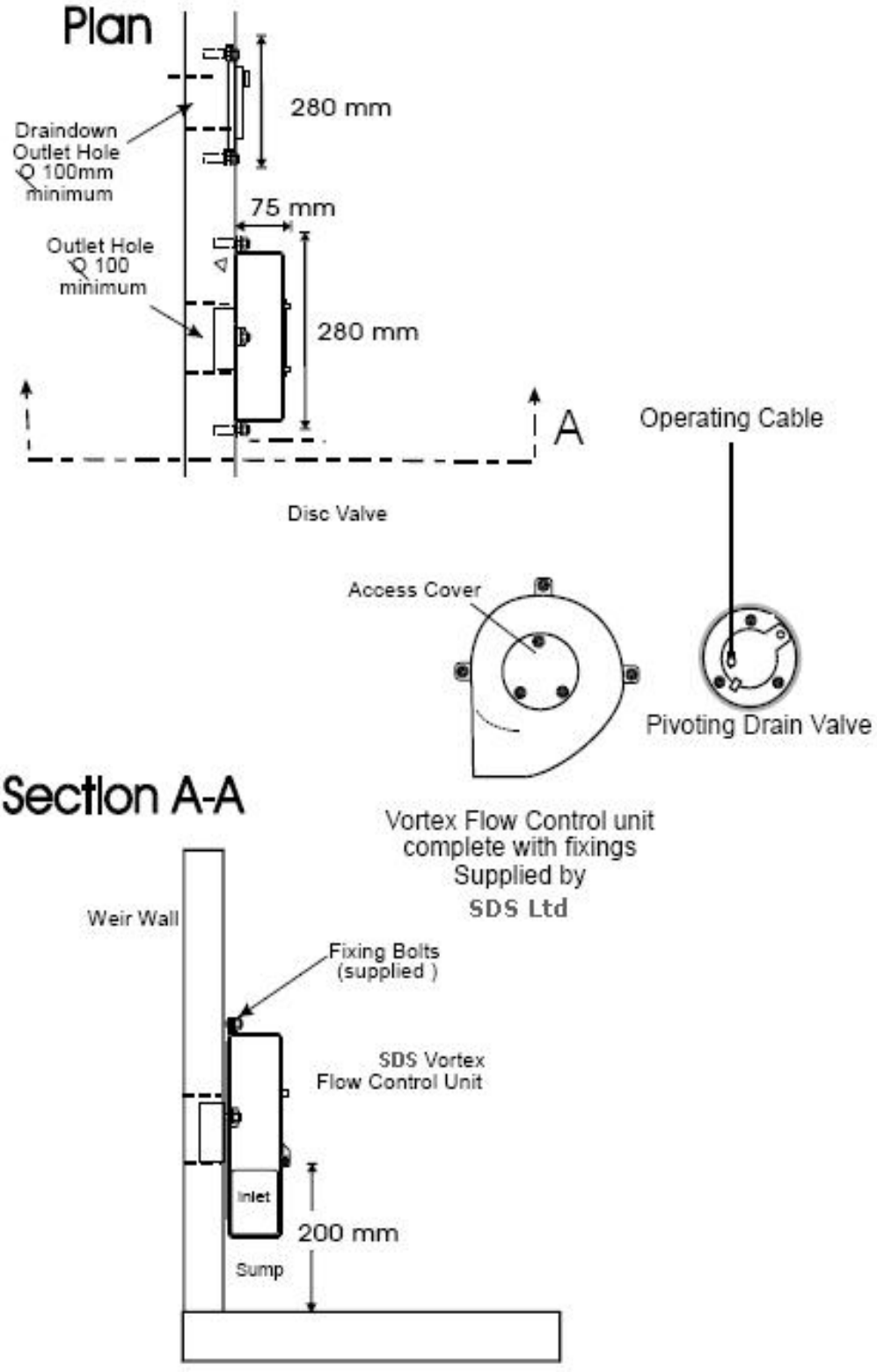
Conical Type Flow Control unit
Side inlet

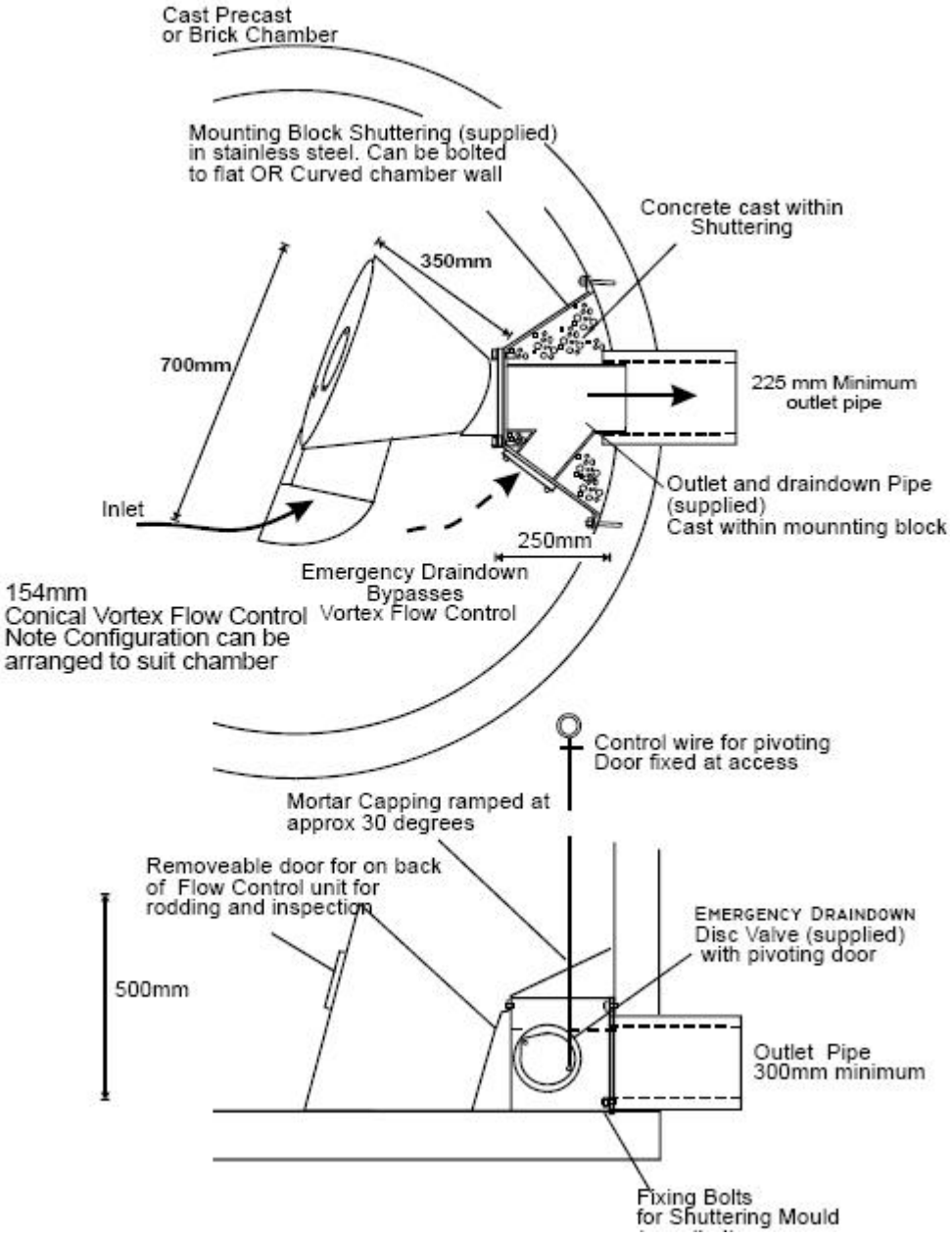
Example

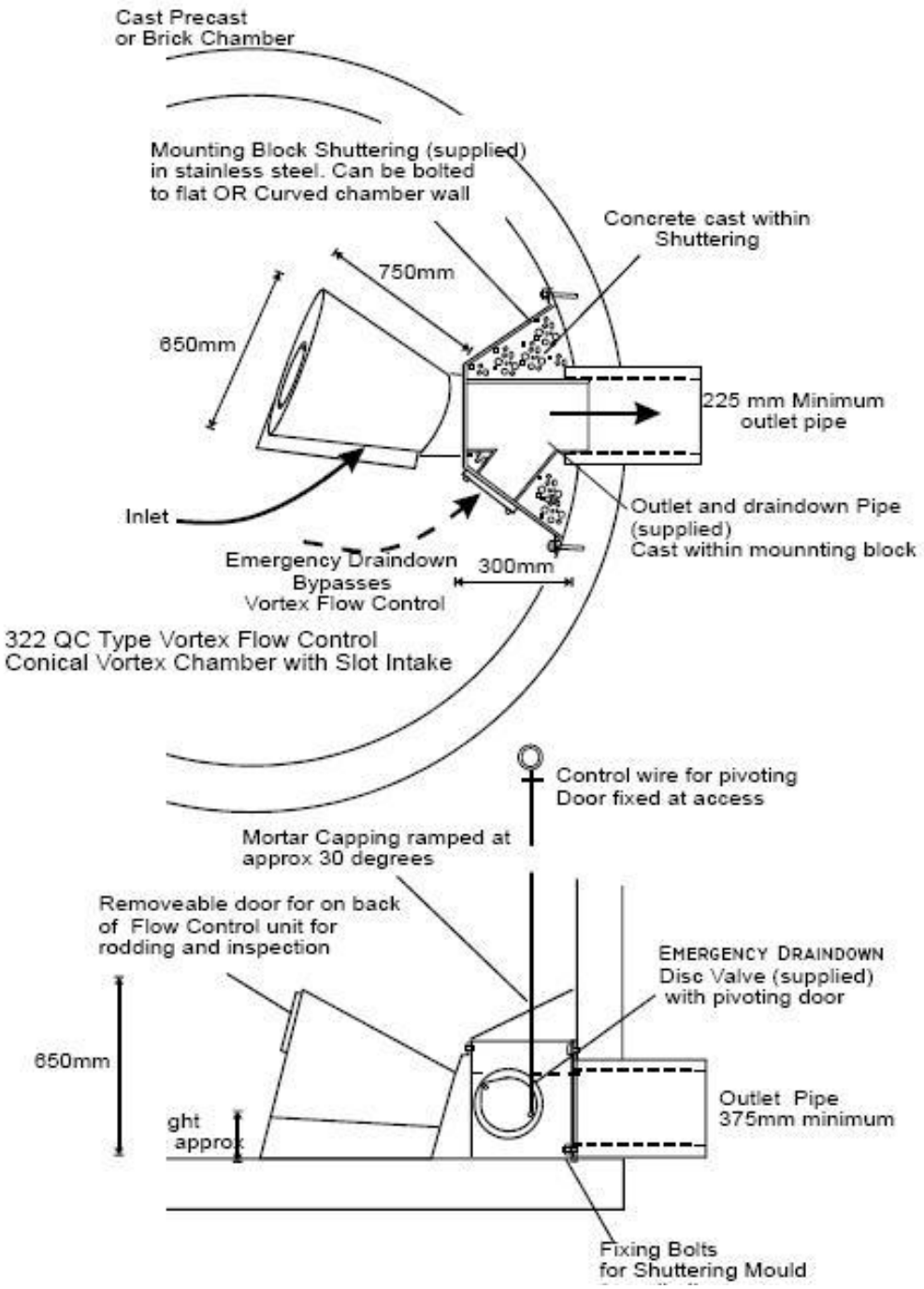
Emergency Drain down

A flow control unit is a choke point in the network and there is potential for a blockage. Consideration should be given to dealing with a blockage. In the event it is likely that the chamber will be full of water and the flow control will probably be inaccessible. An alternate means of draining the chamber is highly recommended. The emergency drain down, MUST BE CAPABLE OF BYPASSING THE ENTIRE FLOW CONTROL UNIT. A blockage can occur at the inlet but it may equally well be inside the vortex chamber or obstructing the outlet. The drain down should be independent of the flow control unit. SDS have always advocated the use of an entirely separate drain down pipe in the control chamber controlled by a penstock or disc valve. Where there is only a single outlet pipe from a chamber there should be a branch off this pipe inside the chamber to allow for independent drain down. We offer a preformed stainless steel assembly which enables the contractor to install this branch pipe and drain valve quickly and simply before bolting on a vortex flow control unit or other flow control device. We do not advocate siting the drain down valve on the upstream face of the flow control unit. This arrangement bypasses only the inlet and may be ineffective if there is an internal blockage (such as a plastic bin bag) in the vortex chamber.




Plan
280 mm
Draindown
Outlet Hole
Ø 100mm
minimum
75 mm
Outlet Hole
Ø 100
minimum
280 mm
A
Operating Cable
Disc Valve
Access Cover
Pivoting Drain Valve
Section A-A
Vortex Flow Control unit
complete with fixings
Supplied by
SDS Ltd
Weir Wall
Fixing Bolts
(supplied)
SDS Vortex
Flow Control Unit
Inlet
200 mm
Sump


Cast Precast
or Brick Chamber
Mounting Block Shuttering (supplied)
in stainless steel. Can be bolted
to flat OR Curved chamber wall
Concrete cast within
Shuttering
350mm
700mm
225 mm Minimum
outlet pipe
Outlet and draindown Pipe
(supplied)
Cast within mounnting block
Inlet
250mm
Emergency Draindown
Bypasses
Vortex Flow Control
154mm
Conical Vortex Flow Control
Note Configuration can be
arranged to suit chamber
Control wire for pivoting
Door fixed at access
Mortar Capping ramped at
approx 30 degrees
Removeable door for on back
of Flow Control unit for
rodding and inspection
EMERGENCY DRAINDOWN
Disc Valve (supplied)
with pivoting door
500mm
Outlet Pipe
300mm minimum
Fixing Bolts
for Shuttering Mould


Cast Precast
or Brick Chamber
Mounting Block Shuttering (supplied)
in stainless steel. Can be bolted
to flat OR Curved chamber wall
Concrete cast within
Shuttering
750mm
650mm
225 mm Minimum
outlet pipe
Inlet
Outlet and draindown Pipe
(supplied)
Cast within mounnting block
Emergency Draindown
Bypasses
Vortex Flow Control
300mm
322 QC Type Vortex Flow Control
Conical Vortex Chamber with Slot Intake
Control wire for pivoting
Door fixed at access
Mortar Capping ramped at
approx 30 degrees
Removeable door for on back
of Flow Control unit for
rodding and inspection
EMERGENCY DRAINDOWN
Disc Valve (supplied)
with pivoting door
650mm
Outlet Pipe
375mm minimum
Fixing Bolts
for Shuttering Mould

DESIGN

Individual Design.

All of our Vortex Flow Control's are individually designed to meet our client's optimum performance criteria.

Will our Vortex Flow Control's Block?

The relatively large cross sectional areas and high internal velocities greatly reduce the risk of blockage.

How Long Will They Last?

Vortex Flow Control's have no moving parts to wear or fail. Made from stainless steel plate they will resist scour, degradation and chemical attack. A Vortex Flow Control should easily outlast the sewer in which it is installed.

MANUFACTURE

All of our Vortex Flow Control's are manufactured as follows.

Material Used.

304 Grade Stainless Steel as standard. Other material optional.

Plate Thickness.

Generally 3mm thickness, thicker where required.

Welding.

Coded welders approved to BS4872 - All welded seams continuous for maximum strength.

Rodding Access.

Removable access plate on each unit, most units easily removed for access to the downstream pipe.

QUALITY ASSURANCE

We operate an externally regulated ISO 9000 Quality Assurance System.

INSTALLATION

All of our Vortex Flow Controls are purpose built to suit the specific site and to fit easily into the drainage infrastructure. For example, units can be made with curved faces to fit directly into circular chambers and can be supplied in sections to ease assembly within confined spaces.

MAINTENANCE

Vortex Flow Control units themselves require no routine maintenance. Inspection chambers require inspection & maintenance in line with current practice.

WHAT DESIGN INFORMATION DO WE NEED?

We require the following basic information to specify a Vortex Flow Control for you.

1) The design Flow - *Maximum Discharge*
2) The design Head - *Invert to Top Water Level*
3) Type of drainage - *Surface or Foul*

From this information we will size and design the Vortex Flow Control to meet the design criteria and to suit the proposed infrastructure.

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