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Agrément Certificate

08/4596

Product Sheet 1

HYDRO INTERNATIONAL HYDRO-BRAKE FLOW CONTROLS

STH RANGE HYDRO-BRAKE FLOW CONTROLS

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to STH Range Hydro-Brake Flow Controls for use as outlet flow controls in surface/storm water management systems.

AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Flow characteristics — the performance characteristics of the flow controls have been assessed (see section 5).

Durability — under normal service conditions, the flow controls will have a life expectancy in excess of the structure in which it is installed (see section 7).



The BBA has awarded this Agrément Certificate to the company named above for the products described herein. These products have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Brian Chamberlain
Head of Approvals — Engineering

Greg Cooper
Chief Executive

Date of First issue: 17 October 2008

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, STH Range Hydro-Brake Flow Controls, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



The Building Regulations 2000 (as amended) (England and Wales)

Requirement:	H3(3)	Rainwater drainage
Comment:		The units can be used in a construction to meet this Requirement. See sections 5.1 to 5.6 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The system components are acceptable. See section 7 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The system components are acceptable. See sections 6.1, 6.2 and 7 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards — construction
Standard:	3.6(a)	Surface water drainage
Comment:		The units can be used in a construction to satisfy this Standard, with reference to clauses 3.6.1 ⁽¹⁾ (2) to 3.6.5 ⁽¹⁾ (2). See sections 5.1 to 5.6 of this Certificate. (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2000 (as amended)

Regulation:	B2	Fitness of materials and workmanship
Comment:		The system components are acceptable. See section 7 and the <i>Installation</i> part of this Certificate.
Regulation:	B3(2)	Suitability of certain materials
Comment:		The system components are acceptable. See sections 6.1 and 6.2 of this Certificate.
Regulation:	N5	Rain-water drainage
Comment:		The units can be used in a construction to satisfy this Regulation. See sections 5.1 to 5.6 of this Certificate.

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See sections: 2 *Delivery and site handling* (2.3) and 8 *Installation* (General)

Non-regulatory Information

NHBC Standards 2008

In the opinion of the BBA, the use of STH Range Hydro-Brake Flow Controls, in relation to this Certificate, is not subject to the requirements of these Standards.

Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, the use of STH Range Hydro-Brake Flow Controls, in relation to this Certificate, is not subject to the requirements of this Technical Manual.

General

This Certificate relates to STH Range Hydro-Brake Flow Controls for use as outlet flow controls in surface/storm water management systems.

Hydro-Brake, Flush-Flo, Kick-Flo and Switch-Flo are trademarks of Hydro International plc.

1 Description

1.1 Hydro International STH Range Hydro-Brake Flow Controls are vortex flow controls manufactured from 3 mm thick grade 304 stainless steel. Alternative grades are available depending on the application; the Certificate holder should be contacted for further details.

1.2 The units are available in a range of sizes to give design flow rates from 2.1 ls⁻¹ to 18 ls⁻¹ suitable for use in surface/storm water management applications. A summary of technical information is given in Table 1. Other types and sizes are available for different flow and head ranges and applications other than surface/storm water but these are outside the scope of this Certificate.

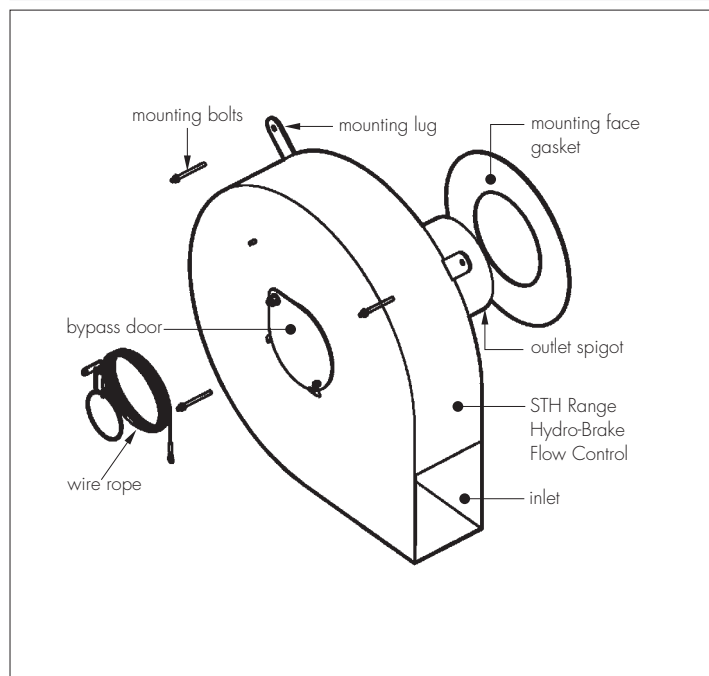
Table 1 Summary of technical information

Characteristic	Typical range of values
Design flow rate (ls ⁻¹)	2.1 to 18
Design head (m)	0.62 to 2
Maximum lateral dimension (mm)	Lug mounting units: 420 to 760 Plate mounting units: dependent on discharge pipe size
Mass (kg)	Lug mounting units: 7 to 26 plus packaging Plate mounting units: dependent on plate mount size

1.3 Each unit is supplied fully assembled and with attachment fittings including (see Figure 1):

- an STH Hydro-Brake Flow Control with integral pivoting bypass door, pipe location spigot and mounting face gasket
- wire rope to allow remote operation of the pivoting bypass door (7 mm diameter rope consisting of seven stainless steel strands each of 3 mm diameter) and wire rope attachment brackets (stainless steel).
- mounting anchor bolts (A4 316 stainless steel). The performance and suitability of the mounting bolts is outside the scope of this Certificate; the Certificate holder should be contacted for advice on the most appropriate fixings for individual projects.

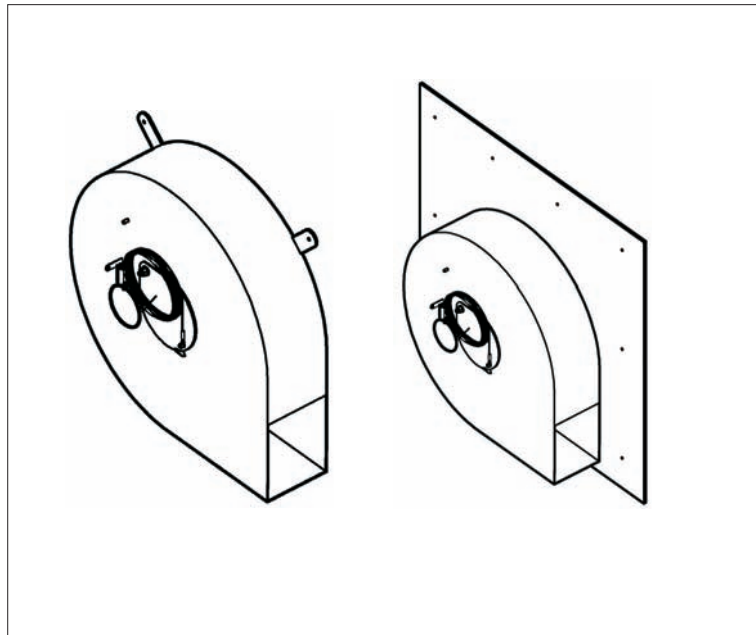
Figure 1 Components



1.4 The flow controls are available with two different types of mounting facility (see Figure 2):

- lug mounting — lugs are provided at points around the perimeter of the flow control mounting face, appropriate for the majority of applications where the outlet diameter of the installation structure is approximately 0.5 times the flow control body diameter or less.
- backplate mounting — a rectangular mounting plate is provided to allow fixing to the outlet of the installation structure where lug mounting is not appropriate. If a flat surface is not available, the mounting plate may also be provided curved to the same radius as the chamber in which it is to be fitted.

Figure 2 Mounting arrangements



1.5 The units are normally supplied to site for installation in purpose built or existing structural housings. These must have adequate strength to resist the loads imposed by the unit. The design of these structures is outside the scope of this Certificate. The units may also be supplied pre-installed in a pre-cast concrete or other type of chamber ready for installation within the ground. The performance of the chamber is outside the scope of this Certificate but the performance and durability of the flow control will be unaffected, provided it is installed in accordance with the recommendations of this Certificate.

1.6 Factory production control is exercised during manufacture including checks on: conformity to the specification of the raw materials, key dimensions and weld integrity. In addition, each unit is visually inspected prior to dispatch.

2 Delivery and site handling

2.1 STH Range Hydro-Brake Flow Controls are supplied in polyethylene and plywood packaging for small units and on a pallet for large units. They should be handled and stored appropriately to avoid being dropped or receiving impacts, eg from construction plant.

2.2 Each unit is stamped with the Certificate holder's unique project reference number and carries a label bearing the Certificate holder's contact information and advice on orientation. The packaging also bears details of the package weight and client details.

2.3 Care should be taken handling larger units and when lowering them into position for installation. Where appropriate, mechanical lifting/lowering equipment should be used.

Assessment and Technical Investigations

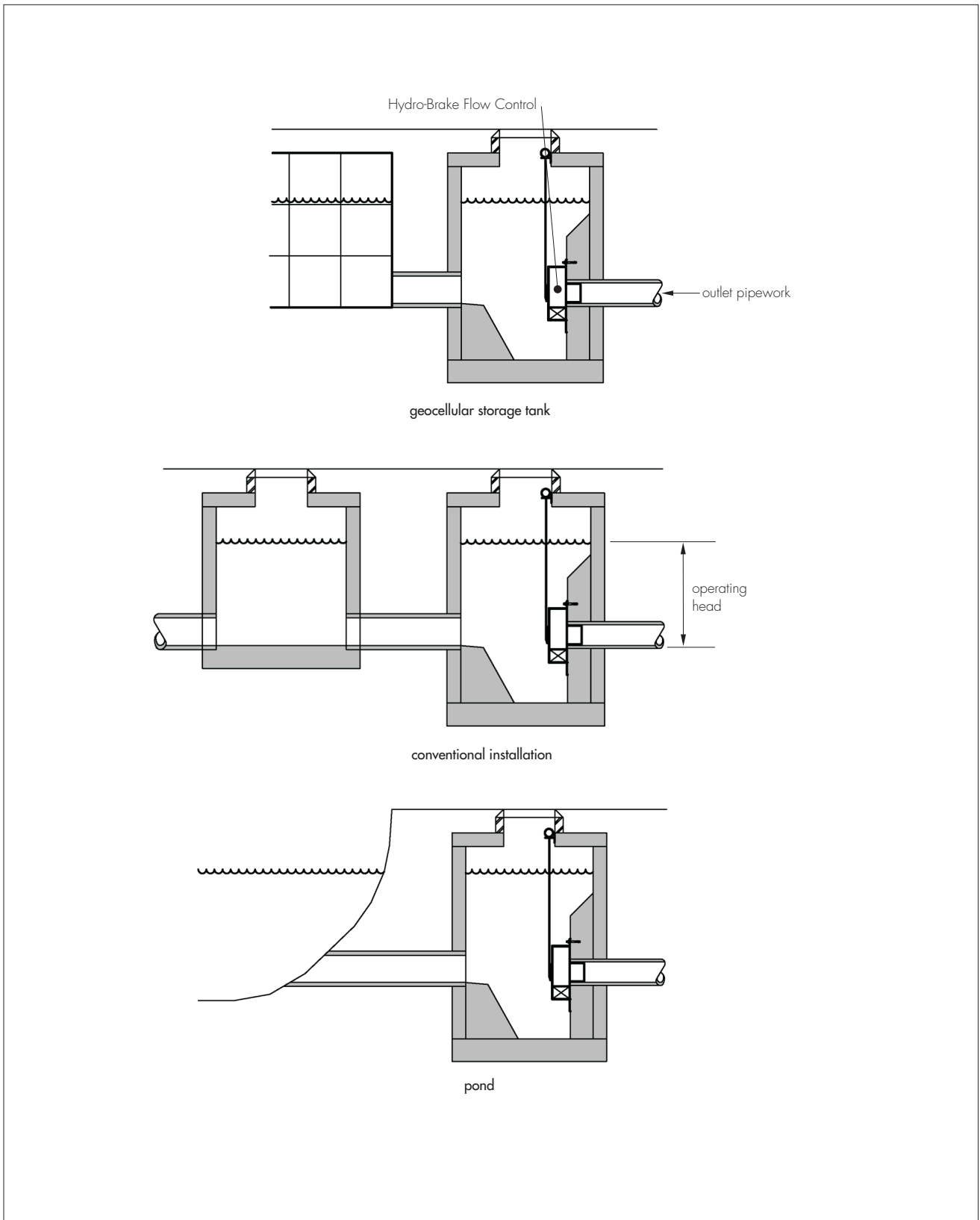
The following is a summary of the assessment and technical investigations carried out on STH Range Hydro-Brake Flow Controls.

Design Considerations

3 General

3.1 STH Range Hydro-Brake Flow Controls are intended to restrict the outlet flow from a surface/storm water management system by increasing back pressure, achieved by inducing a vortex flow pattern in the water passing through the device. In these applications, the units are often used in conjunction with storage facilities, including geocellular storage systems, concrete tanks, oversized pipes and ponds. The performance of these items is outside the scope of this Certificate. Guidance on design of sustainable drainage systems is given in Planning Policy Statement 25 *Development and Flood Risk* and CIRIA C697 *The SUDS Manual*. Typical installation details are shown in Figure 3.

3.2 The units are self-activating; they do not have moving parts and do not require external power. Their 'hydrodynamic' rather than 'physical restriction' based operating principle provides flow regulation whilst maintaining larger clearances compared to most other types of flow control device, designed to give an equivalent duty head-flow point. This makes them less susceptible to blockage from any debris that may reach the inlet. As a matter of good design practice, measures should be taken to remove silt sediment and debris from the surface water at an early stage to prevent problems further downstream.



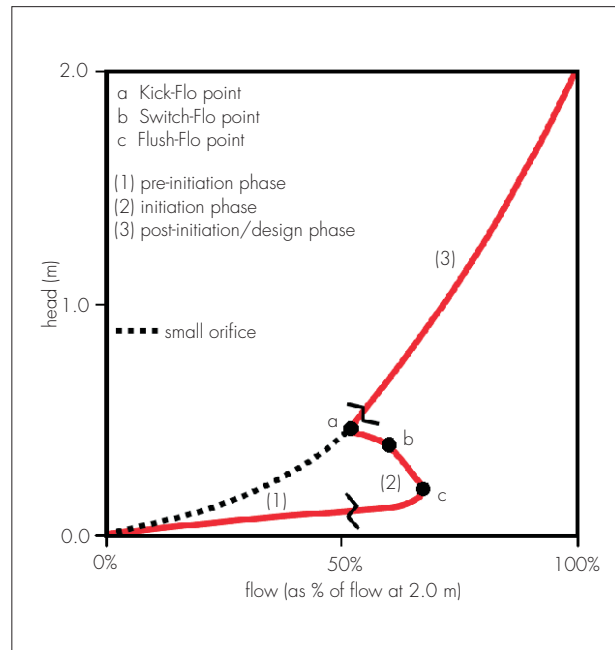
4 Practicability of installation

The units can be easily installed by operatives with minimal training. The location of the devices may mean that the installer will need to be competent and appropriately trained for working in confined spaces.

5 Flow characteristics

5.1 Due to their 'S'-shaped head-flow characteristic, the units are able to pass greater volume flow rates at lower heads compared to most other types of flow control device designed for an equivalent head-flow point whilst still limiting the flow at the duty/design point to an acceptable level. This allows more efficient use of upstream storage facilities which may enable a more economical design through reduced storage volume requirements. A typical head versus flow characteristic for the units is given in Figure 4

Figure 4 Typical head versus flow characteristics



5.2 The units have a hydraulic characteristic, comprising three distinct stages corresponding to different phases of operation (see Figure 4):

- Pre-initiation phase — at low heads, the flow control provides similar performance to an orifice plate with equivalent size to its outlet. Although a flow control would never be selected with the duty/design point in this region, this part of the characteristic will have implications to overall drainage system operation. Flow rate accuracy of $\pm 5\%$ of the ultimate duty/design flow is typically achievable in this region
- Vortex initiation phase — as the head increases, vortex motion will start to develop inside the unit, starting to restrict the flow. Initially, this will tend to form and break, resulting in a relatively unstable behaviour. Although a flow control would never be selected with the duty/design point in this region, this part of the characteristic will have implications to overall drainage system operation. Flow rate accuracy of -5% of flow to $+5\%$ of phase peak is typically achievable in this region
- Post-initiation/design phase — following vortex initiation, the flow control characteristic stabilises, providing hydraulic performance equivalent to a substantially smaller orifice plate than the unit's outlet. The units can be specified to give a duty/design point in any part of this region, though in most practical cases, specification will be at flow rates above the initiation phase peak (corresponding to the Flush-Flo point). Flow rate accuracy of $\pm 5\%$ of flow is typically achievable in this region.

5.3 The units are specified and supplied to meet individual application requirements. Though their characteristics are incorporated into a number of commercially available hydraulic modelling packages, the Certificate holder should be contacted directly for advice on correct selection. The following information should be provided:

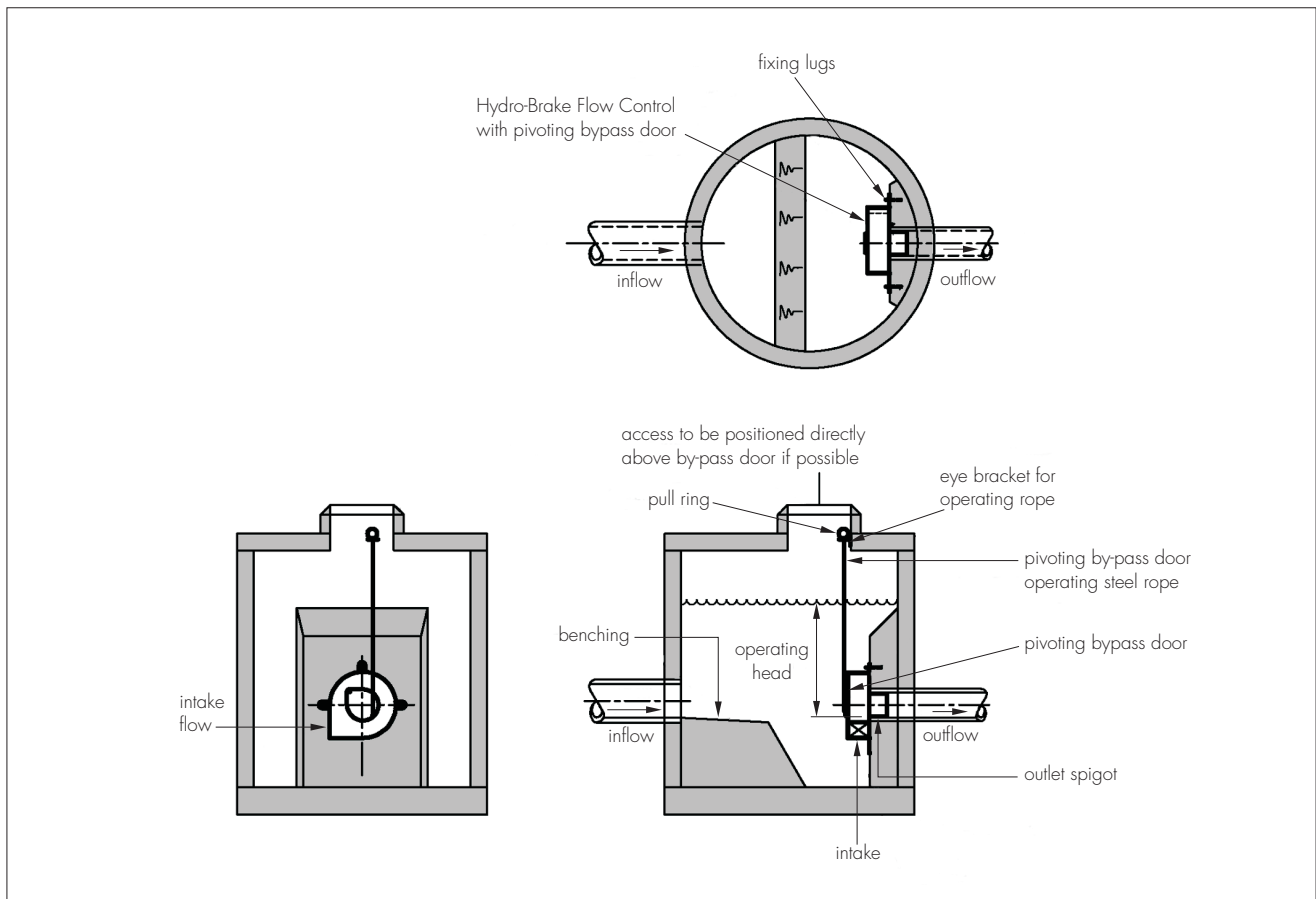
- operating head — depth from the unit's outlet invert to maximum design water level (see Figure 5)
- flow — required discharge at the given head
- manhole details or control chamber proposals, including outlet size
- information on any 'special' conditions, for example if the unit is expected to be subject to downstream surcharging or possible siphoning effects.

5.4 In most cases, the downstream drainage system will be designed to allow the unit a free discharge. However, this is not always possible and where surcharging does occur it should be noted that the head-flow characteristic of the unit may be significantly affected (the Certificate holder should be contacted for further details). Installations where the outlet of the flow control is expected to be submerged are outside the scope of this Certificate.

5.5 An example sump arrangement is shown in Figure 5. Recommended clearance information specific to individual models is available from the Certificate holder.

5.6 Where a drainage system design has been completed around the use of an STH Range Hydro-Brake Flow Control, it is essential to ensure that the same flow control, or a flow control that has been confirmed to provide equivalent hydraulic performance, is used in the final installation, given the potential implications to system operation. Multiple design point information, defining the main features of each flow control, is available from the Certificate holder.

Figure 5 Typical sump arrangement



6 Maintenance



6.1 Access should be allowed for clearing debris from the chamber housing the flow control. In the event that the inlet to the unit becomes blocked, the pivoting bypass door may be operated by pulling the wire rope attached upwards to drain down the chamber and provide access for maintenance.

6.2 Regular inspections should be carried out to ensure that debris that may obstruct the inlet to the flow control is not present in the chamber. The frequency of inspection will depend on the location of the unit but must be at least once per year.

7 Durability



The units are made from materials that will not be adversely affected by contaminants likely to be found in surface water. In the opinion of the BBA, the units will have a design life in excess of the design life of typical structures in which they might be installed.

Installation

8 General

8.1 STH Range Hydro-Brake Flow Controls must be installed in accordance with the Certificate holder's instructions. In many cases the installation will be in a confined space and all appropriate measures must be taken to ensure the safety of operatives working in such areas.

8.2 It is important that the flow control chamber is constructed to the drawing. Other than where a curved backplate is supplied, this should incorporate a flat mounting surface on the inside face of the chamber wall at the outlet pipe. It should also be ensured that the sump floor level is sufficiently below the invert of the outlet pipe and sufficiently disposed to accommodate the unit.

8.3 The benching/standing area should be formed as indicated on the installation drawing.

9 Procedure

9.1 The unit should be offered up to the chamber outlet wall until the spigot projects into the outlet pipe with its invert seated to the outlet pipe invert and with the unit in the correct orientation (see Figure 5).

9.2 With the unit in position, the position of the required number of bolt holes is marked and drilled through the fixing lugs or plate mount (depending on specification).

9.3 Ensuring that the supplied rubber gasket is suitably positioned over the outlet spigot of the flow control, the fixings should be inserted and tightened until moderate compression of the gasket is achieved.

9.4 The supplied eye brackets on the pivoting bypass door operating rope should be fixed to the soffit of the roof slab using masonry bolts to achieve a direct vertical line of pull from over the chamber access cover to the pivoting bypass door. It should be arranged that the rope is taut when held in the upper eye bracket. Where it is not possible to attain a direct vertical line of pull, additional eye brackets can be used to account for the change of direction.

9.5 The rope stop should be positioned to ensure that, when the pivoting bypass door is open, the rope stop can be clipped to the uppermost bracket. Once positioned, the stop attachment grub screws should be tightened.

10 Tests

Tests were carried out to determine⁽¹⁾:

- the dimensional accuracy of a range of units designed to restrict flows from 2.1 ls^{-1} to 18 ls^{-1} at heads up to 2 m
- the hydraulic performance of a range of units as above.

(1) The findings were compared to the Certificate holder's specification.

11 Investigations

11.1 The manufacturing process was examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

11.2 A site visit was made to assess the practicability and ease of installation.

11.3 An assessment of the Certificate holder's predicted characteristics was made against the results of hydraulic performance.

11.4 An evaluation of existing data was made to assess durability.

12 Conditions

12.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English law.

12.2 References in this Certificate to any Act of Parliament, Statutory Instrument, Directive or Regulation of the European Union, British, European or International Standard, Code of Practice, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Certificate.

12.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

12.4 In granting this Certificate, the BBA is not responsible for:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

12.5 Any information relating to the manufacture, supply, installation, use and maintenance of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.

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