

## Tamakiş Sifonik Yağmur Suyu Toplama Sistemleri İnşaat San.ve Tic Ltd, STİ

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Agrément Certificate  
**09/4631**  
Product Sheet 1

### MAXFLOW SYPHONIC DRAINAGE SYSTEM

#### PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to the Maxflow Syphonic Drainage System, for use on all building types.

#### 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

**System design and dimensioning** — the software allows the system to be designed to deal with anticipated rainfall. A trained system designer is responsible for this work (see section 5).

**Flow characteristics** — the performance of the outlets running at normal and peak rainfall intensities has been assessed (see section 6).

**Strength** — the outlets have sufficient strength to resist the loads that may reasonably be expected to occur during installation and service (see section 8).

**Durability** — under normal service conditions, the outlets will have a service life comparable to, or in excess of, the gutter or roof into which they are installed (see section 14).

The BBA has awarded this Agrément Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is 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 Second issue: 2 November 2011

Originally certified on 12 March 2009

*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](http://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, Maxflow Syphonic Drainage System, 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 2010 (England and Wales)

|                                  |   |
|----------------------------------|---|
| <b>Requirement:</b> C2(b)        | <b>Resistance to moisture</b>   |
| <b>Comment:</b>                  | The joints between the roof outlet and the roof will adequately resist the passage of moisture to the inside of the building. See section 7.2 of this Certificate.                            |
| <b>Requirement:</b> H3(1)        | <b>Rainwater drainage</b>   |
| <b>Comment:</b>                  | The roof outlets will contribute to carrying the flow of rainwater from the roof to an outfall, thus minimising the risk of blockage or leakage. See sections 7.1 and 11 of this Certificate. |
| <b>Requirement:</b> Regulation 7 | <b>Materials and workmanship</b>  |
| <b>Comment:</b>                  | The system is acceptable. See sections 14.1 to 14.3 and the <i>Installation</i> part of this Certificate.   |



## The Building (Scotland) Regulations 2004 (as amended)

|                            |   |
|----------------------------|---|
| <b>Regulation:</b> 8(1)(2) | <b>Fitness and durability of materials and workmanship</b>  |
| <b>Comment:</b>            | The system can contribute to a construction satisfying this Regulation. See sections 13, 14.1 to 14.3 and the <i>Installation</i> part of this Certificate.   |
| <b>Regulation:</b> 9       | <b>Building standards – construction</b>  |
| <b>Standard:</b> 3.6(a)    | <b>Surface water drainage</b>   |
| <b>Comment:</b>            | The roof outlets will contribute to carrying the flow of rainwater from the roof to an outfall, thus minimising the risk of blockage or leakage and, therefore, meeting the requirements of this Standard, with reference to clause 3.6.1 <sup>(1)(2)</sup> . See sections 7.1 and 11 of this Certificate.  |
| <b>Standard:</b> 3.10      | <b>Precipitation</b>  |
| <b>Comment:</b>            | The joints between the roof outlet and the roof will adequately resist the passage of moisture to the inside of the building and, therefore, the system meets the relevant requirement of this Standard, with reference to clause 3.10.7 <sup>(1)(2)</sup> . See section 7.2 of this Certificate.<br>(1) Technical Handbook (Domestic).<br>(2) Technical Handbook (Non-Domestic). |



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

|                          |   |
|--------------------------|---|
| <b>Regulation:</b> B2    | <b>Fitness of materials and workmanship</b>   |
| <b>Comment:</b>          | The system is acceptable. See sections 14.1 to 14.3 and the <i>Installation</i> part of this Certificate.   |
| <b>Regulation:</b> B3(2) | <b>Suitability of certain materials</b>   |
| <b>Comment:</b>          | The system is acceptable. See section 13 of this Certificate.   |
| <b>Regulation:</b> C4    | <b>Resistance to ground moisture and weather</b>  |
| <b>Comment:</b>          | The system meets the relevant requirements of this Regulation. See section 7.2 of this Certificate.         |
| <b>Regulation:</b> N5    | <b>Rain-water drainage</b>  |
| <b>Comment:</b>          | The system meets the relevant requirements of this Regulation. See sections 7.1 and 11 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* (2.2) and 15 *General* of this Certificate.

# Non-regulatory Information

## NHBC Standards 2011

The use of the Maxflow Syphonic Drainage System is not subject to these Standards.

# General

This Certificate relates to the Maxflow Syphonic Drainage System, comprising full-bore flow components and the software used in design. The products are for use with conventional pressure-rated pipe systems.

The system is for use in installations designed in accordance with BS EN 12056-1 : 2000 and BS EN 12056-3 : 2000 for the conveyance of surface water as is permitted to be discharged into public sewers by The Water Industry Act 1991, Chapter 56, and surface water as is permitted and defined by the Sewerage (Scotland) Act 1968 and the Water and Sewerage Services (Northern Ireland) Order 1973.

It is essential that the system is installed precisely in accordance with the computed design. Collecting pipes are installed horizontally at any level in the building, reducing the number of downpipes and the associated underground work and drainage.

Components of the system are used individually or in conjunction with conventional pressure-rated pipes and fittings which comply with the performance specification denoted in the Certificate holder's technical manual.

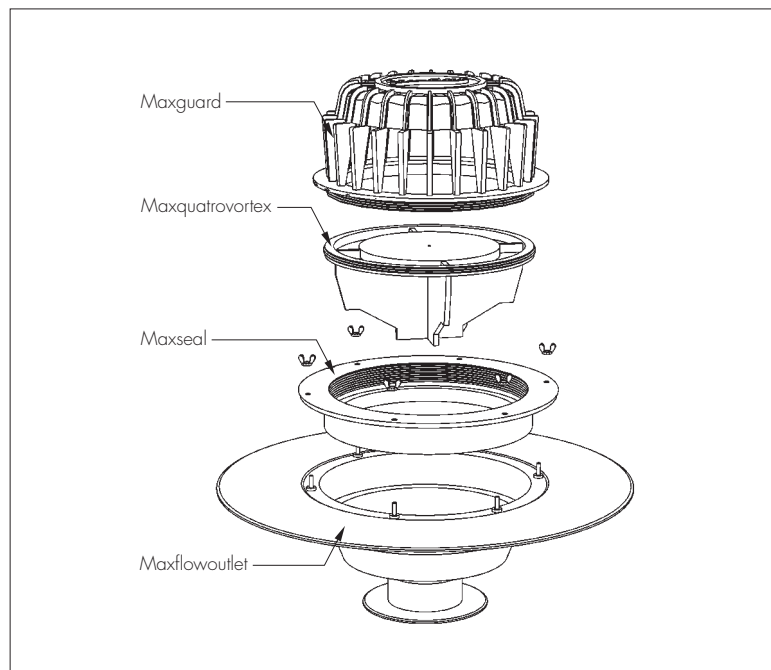
## Technical Specification

### 1 Description

1.1 The Maxflow Syphonic Drainage System consists of one size of roof outlet, available in powder-coated mild steel, stainless steel or aluminium, and with technical specifications and computer software to design the pipework for each installation.

1.2 The roof outlets each have an outlet pipe of 56 mm internal diameter and are fitted with a flange for connection to the pipework. The outlet components are shown in Figure 1.

Figure 1 Roof outlet — exploded view



1.3 The roof outlets are for use with the pipes and fittings covered by the performance specification given in section 3. Pipework should be independently certificated for compliance with the declared specification.

1.4 Suitable pipes and fittings are available in the following materials:

- cast iron
- galvanized steel
- PVC-U
- ABS
- stainless steel
- copper
- PE
- PP.

1.5 The computer software used for the design of Maxflow Syphonic Drainage Systems is Drainstar which is based on the German standard VDI 3806 : 2000.

1.6 Factory production control is exercised during manufacture including checks for conformity to the specification of the raw materials, and checks on dimensions, thickness and visual appearance.

### 2 Delivery and site handling

2.1 Each outlet carries the product code, the manufacturer's logo and the BBA identification mark incorporating the number of this Certificate. The BBA identification mark including the number of this Certificate is incorporated in the company's technical literature. The products are delivered to site packaged individually in cardboard cartons.

2.2 Care should be taken when handling the products, to avoid damage and ensure the safety of site operatives.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Maxflow Syphonic Drainage System.

## 3 General

3.1 When designed, installed and used in accordance with the provisions of this Certificate, the Maxflow Syphonic Drainage System will convey rainwater from the roof to a below-ground drainage system outside the building.

3.2 Further advice on designing full-bore flow roof drainage systems is given in the Certificate holder's Technical Manual and BS 8490 : 2007.

3.3 Gutters should be designed in accordance with BS EN 12056-3 : 2000. Where there is a deviation in calculated water depths between BS EN 12056-3 : 2000 and the Certificate holder's technical manual, the most conservative value should be used.

3.4 Pipes and fittings must meet the performance specification fully detailed in the Certificate holder's technical manual. The key characteristics include:

- pipework must withstand both negative and positive pressure; negative pressures to  $-0.9$  bar and positive pressures according to the design specification, which must not exceed the rating of the pipe
- joints must be capable of either resisting longitudinal forces without sliding apart or must be restrained to prevent relative movement
- bends deviating more than  $45^\circ$  from straight flow should be of a smooth radius
- eccentric reducers are recommended for use in horizontal flows with the crown of the pipe level.

3.5 The capacity of the underground drainage system must be sufficient to cope with the design flow rate of the Maxflow system. Where appropriate, the guidance given in BS 8490 : 2007, clause 8.10.1, should be followed to ensure surcharging of the underground drainage system does not cause a positive pressure at the Maxflow system discharge point. If the underground system is part of the Maxflow system, other connections must not be made upstream of the Maxflow system discharge.

## 4 Practicability of installation

The system is designed to be installed by a competent general builder, or a contractor, experienced with this type of product.

## 5 System design and dimensioning

5.1 Each system must be designed by a person trained to use the Drainstar computer software and who is familiar with hydraulic and roof drainage design procedures.

5.2 The system is designed to flow at maximum capacity when rainfall is at the design intensity. A system using the pipe dimensions obtained from the design will ensure sufficient capacity to transport the water from the roof to the discharge point.

5.3 Information required to enable a design to be carried out includes:

- design rainfall intensity (normally selected or calculated from BS EN 12056-3 : 2000, or other appropriate guidance documents and with due allowance made for the possible effects of climate change)
- geometric layout of the roof and outlets including the height of the building and its location and plan location
- position of underground connection.

5.4 Use of the computer program ensures that the most economic and effective design is achieved. Critical conditions to be achieved in any design include:

- (a) minimum water velocity must be  $0.7 \text{ m}\cdot\text{s}^{-1}$  at the design flow intensity to achieve a self-cleansing velocity
- (b) computed flow<sup>(1)</sup> from an individual outlet must not exceed the specified maximum for the outlet of 17 litres per second
- (c) in systems with more than one roof outlet, the balance in the system should not exceed the smaller of 10% of the available head or 1 m
- (d) the maximum negative pressure at any point in the pipework must not exceed  $-0.9$  bar
- (e) the time for the system to prime should not exceed 60 seconds.

(1) The computation of the ultimate capacity under full-bore flow has been verified by testing.

5.5 The designer may vary the pipework sizing, layout, or flow to each outlet, to achieve an acceptable installation.

5.6 To ensure that the permitted negative pressure is not exceeded, vertical downpipes should be modelled as a very short upper section and a longer lower section (making up the remainder of the downpipe) of the same diameter. This will ensure that the pressure near the top of the downpipe is calculated. It must also be ensured that the calculated exit velocity does not exceed  $2.5 \text{ m}\cdot\text{s}^{-1}$ .

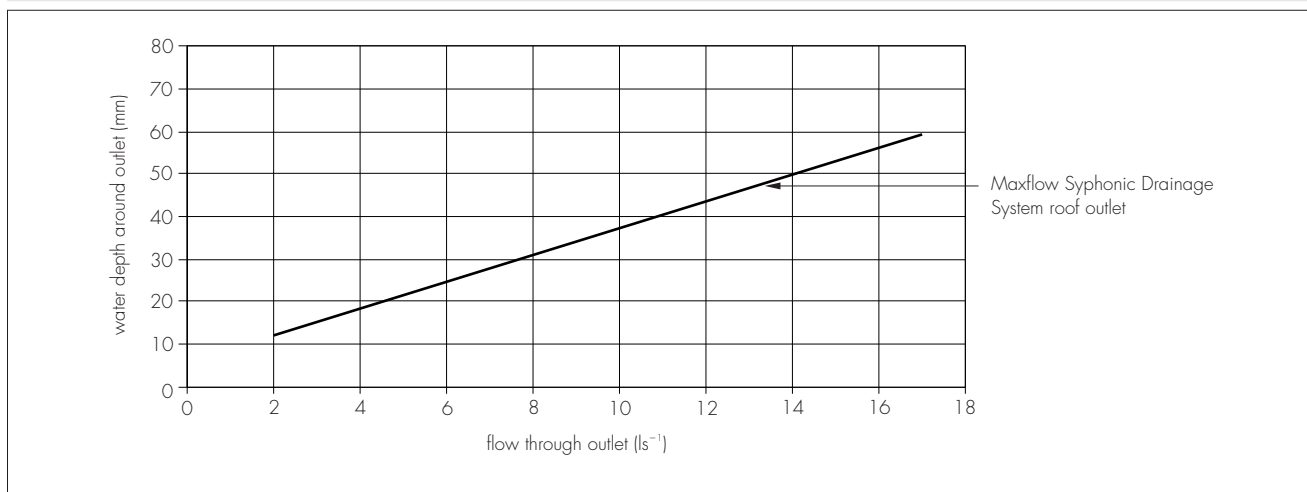
5.7 The time for the system to prime should be calculated in accordance with the method given in BS 8490 : 2007, clause 8.8.2. This must be less than 60 seconds unless provision is made to safely store the rainwater that might be retained during the design storm.

5.8 A simplified procedure for checking the suitability of a siphonic system is given in BS 8490 : 2007, Annex C. This procedure must not be used as a substitute for detailed design calculations.

## 6 Flow characteristics

When the system is operating at its design intensity, the high velocity of the water will ensure the system is self-cleansing. Self-cleansing can also occur at rainfalls as low as 25% of the design intensity. At rainfalls less than this, the system will operate under vented gravity flow conditions. The flow characteristics of the outlets are shown in Figure 2.

Figure 2 Flow against depth of water at the outlet (at full-bore flow)



## 7 Performance of joints



7.1 The performance of the joint to the pipework system is dependent on the pipework system adopted. Conventional jointing techniques using independently approved products should provide satisfactory performance (see section 1.3).

7.2 The performance of the joint between the outlet and the roof material is dependent on the installation. Conventional jointing techniques for roofs constructed of similar materials applied correctly should give satisfactory performance.

## 8 Strength

The roof outlets have adequate strength to resist loads associated with installation and subsequent use. The gratings comply with BS EN 1253-1 : 2003, Class H1.5.

## 9 Roof/gutter design

9.1 The roof must be designed to allow rainwater to flow freely to the outlets.

9.2 The water depth around the outlet when the system is operating at its maximum flow rate (full-bore flow) may be estimated from Figure 2.

9.3 The maximum water depth on the roof or in the gutter must be estimated in accordance with BS EN 12056-3 : 2000. Where calculated water depths differ between the Certificate holder's technical manual and BS EN 12056-3 : 2000, the most conservative values should be used.

9.4 The water loading on the roof or gutter, caused by the calculated water depth, must not exceed the allowable roof or gutter loading.

9.5 It is recommended that in accordance with BS EN 12056-3 : 2000, the roof and/or gutter design incorporate a built-in overflow facility. The roof must be designed to hold water up to this level should the design rainfall be exceeded or unexpected blockages occur.

## 10 Resistance to chemicals

The performance of the roof outlets will be unaffected by the types and quantities of chemicals associated with rainwater.

## 11 Resistance to blockage



The high velocities at which the water flows through the pipework, together with the design of the roof outlets, reduce the risk of blockages (see also sections 5.4 (a), 9 and 14).

## 12 Behaviour in relation to fire

The bodies of the roof outlets will not affect the overall fire resistance of the roof in which they are installed.

## 13 Maintenance



Periodic inspection in accordance with BS EN 12056-3 : 2000, Clause NE 5.1, should be carried out to ensure that the outlets are free from gravel, leaves and other debris which could impair the performance of the system. Maintenance is the responsibility of the building owner.

## 14 Durability



14.1 The aluminium and stainless steel outlets will have a life expectancy in excess of 40 years. The powder-coated mild steel outlets will have a life expectancy of 15 years in heavily polluted areas and 20 years in other areas, though there may be some deterioration of the appearance of the outlets over this time period.

14.2 It is essential that the correct fixings, as specified by the Certificate holder, are used for each type of material.

14.3 Aluminium outlets must not come into contact with the materials listed below. Where problems of incompatibility are likely to occur, barriers (eg paints, tapes or pads, appropriate to the materials and environment) should be incorporated:

- in any conditions
  - ungalvanized mild steel
  - copper and its alloys (including the run-off from copper roofs)
  - timber treated with fire retardants
  - mortar
  - alkali-bearing materials
- in damp conditions
  - timber preserved with copper compounds
  - other metals (ie bimetallic contact)
- in coastal environments
  - lead
  - stainless steel
- in industrial environments
  - lead.

## Installation

### 15 General

15.1 The design of the layout of the roof outlets in the Maxflow Syphonic Drainage System should be in accordance with the recommendations given in BS EN 12056-3 : 2000.

15.2 The roof outlets should be placed at the roof low points to allow efficient flow of water to the outlets.

15.3 The system must be installed in strict accordance with the design. Small differences to pipework length/diameter can significantly affect the performance of the system.

15.4 Appropriate safety measures should be taken during installation, particularly to protect personnel working at height and to prevent hazards from falling objects.

15.5 The guidance given in the Certificate holder's installation manual and BS 8490 : 2007, clause 10, should be followed.

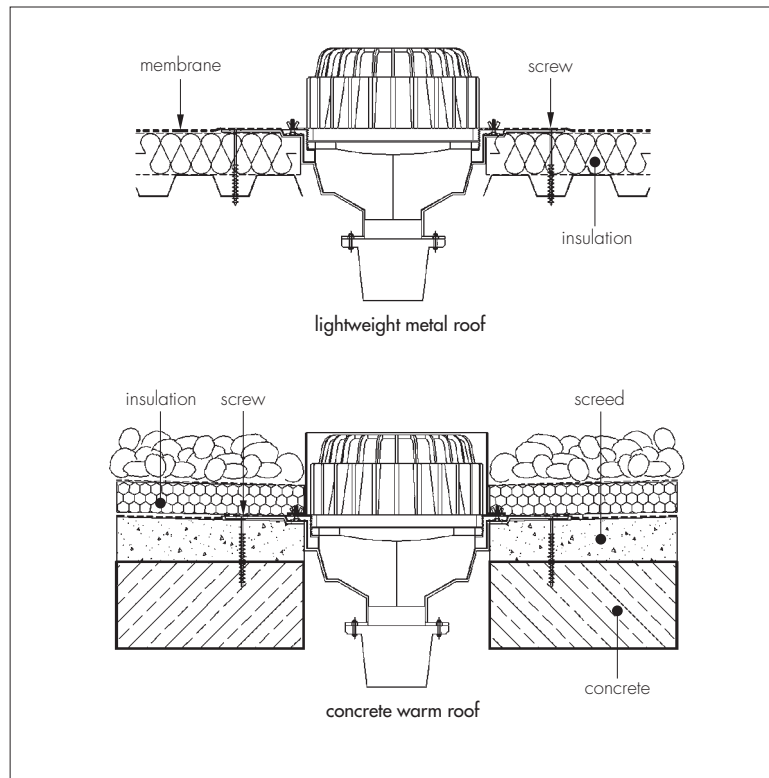
### 16 Procedure

16.1 A 180 mm diameter hole must be formed or cut in the roof structure or gutter to accommodate the outlet. The outlet must be secured to the roof structure with appropriate fasteners (see Figure 3).

16.2 The BBA has not assessed individual installation details since they will depend on the roof construction.

16.3 Typical installation details not assessed by the BBA but suggested by the Certificate holder are shown in the Certificate holder's installation manual (see also Figure 3).

Figure 3 Roof outlets — typical installation details



## Technical Investigations

### 17 Tests

Tests were carried out to determine:

- dimensional accuracy
- maximum flow capacities
- watertightness
- resistance to loading.

### 18 Investigations

18.1 An evaluation of existing data was made to assess:

- resistance to chemicals
- suitability of materials
- durability
- ease of jointing to pipework
- practicability of installation.

18.2 An investigation was carried out to verify the scientific basis and the correlation with full-scale testing of the computer software used to design the installations.

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

## Bibliography

BS 8490 : 2007 *Guide to siphonic roof drainage systems*

BS EN 1253-1 : 2003 *Gullies for buildings — Requirements*

BS EN 12056-1 : 2000 *Gravity Drainage Systems inside Buildings — General and performance requirements*

BS EN 12056-3 : 2000 *Gravity Drainage Systems inside Buildings — Roof drainage, layout and calculation*

VDI 3806 : 2000 *Roof drainage with siphonic system*

## 19 Conditions

19.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- 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.

19.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

19.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and 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.

19.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

19.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- 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 their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal.

19.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal 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, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue 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.