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Agrément Certificate

17/5404

Product Sheet 5

YALE FRICTION HINGES

YALE REVOLUTION FULLY REVERSIBLE HINGES

This Agrément Certificate Product Sheet⁽¹⁾ relates to Yale Revolution Fully Reversible Hinges, for use as fully reversible hinges for PVC-U, timber or aluminium windows, to allow opening of fully reversible sashes.

(1) Hereinafter referred to as 'Certificate'.

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

Safety — windows fitted with the products have a restrictor device and can be safely limited to an opening of 100 mm (see section 5).

Resistance to wear and fatigue — the products have sufficient resistance to wear under normal use to provide a service life consistent with that of a window (see section 6).

Resistance to mechanical loading — windows fitted with the products have adequate resistance to mechanical loading and achieved the classifications shown in section 7 of this Certificate.

Means of escape — windows fitted with the products can provide adequate means of escape by providing a clear opening of not less than 0.33 m² (section 8).

Durability — the products have been tested and classified to BS EN 1670 : 2007 and have adequate resistance to corrosion in the conditions envisaged throughout the expected life of the windows (see section 10).

The BBA has awarded this 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

Date of First issue: 12 April 2018

John Albon – Head of Approvals
Construction Products

Claire Curtis-Thomas
Chief Executive

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, Yale Revolution Fully Reversible Hinges, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulation in the region or regions of the UK depicted):



The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	B1	Means of warning and escape
Comment:		The products can contribute to satisfying this Requirement. See section 8 of this Certificate.
Requirement:	K5.3	Safe opening and closing of windows etc (applicable to England only)
Comment:		In buildings other than dwellings, the products satisfy this Requirement in relation to preventing falls through open windows with a restrictor. See section 5.1 of this Certificate.
Requirement:	K5.4	Safe access for cleaning of windows, etc (applicable to England only)
Comment:		In buildings other than dwellings, the products can contribute to satisfying this Requirement, allowing opening lights to be safely cleaned from inside the building. See section 5.2 of this Certificate.
Requirement:	N3	Safe opening and closing of windows etc (applicable to Wales only)
Comment:		In buildings other than dwellings, the products satisfy this Requirement in relation to preventing falls through open windows with a restrictor. See section 5.1 of this Certificate.
Requirement:	N4	Safe access for cleaning windows etc (applicable to Wales only)
Comment:		In buildings other than dwellings, the products can contribute to satisfying this Requirement, allowing opening lights to be safely cleaned from inside the building. See section 5.2 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The products are acceptable. See section 10.2 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Durability, workmanship and fitness of materials
Comment:		The products satisfy this Regulation. See sections 9.1 and 10.2 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	2.9	Escape
Comment:		The products can contribute to satisfying this Standard. See section 8 of this Certificate.
Standard:	4.8(c)	Danger from accidents
Comment:		The products can contribute to satisfying this Standard, allowing opening lights to be safely cleaned from inside the building, with reference to clause 4.8.3 ⁽¹⁾⁽²⁾ . See section 5.2 of this Certificate.



The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	23	Fitness of materials and workmanship
Comment:		The products are acceptable. See section 10.2 and the <i>Installation</i> part of this Certificate.

Regulation:	33(c)	Means of escape
Comment:		The products can contribute to satisfying this Regulation. See section 8 of this Certificate.
Regulation:	98	Safe opening and closing of windows, skylights and ventilators
Comment:		The products can contribute to satisfying this Regulation in relation to preventing falls through open windows with a restrictor. See section 5.1 of this Certificate.
Regulation:	99	Safe means for cleaning glazing
Comment:		The products can contribute to satisfying this Standard, allowing opening lights to be safely cleaned from inside the building. See section 5.2 of this Certificate.

Construction (Design and Management) Regulations 2015

Construction (Design and Management) Regulations (Northern Ireland) 2016

In the opinion of the BBA, this Certificate does not include any content which relates to the obligations of the client, designer (including Principal Designer) and contractor (including Principal Contractor) under these Regulations.

Additional Information

NHBC Standards 2018

In the opinion of the BBA, Yale Revolution Fully Reversible Hinges, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapter 6.7 *Doors, windows and glazing*.

Technical Specification

1 Description

1.1 The main components of Yale Revolution Fully Reversible Hinges (see Figures 1, 2 and 3) are made from:

Links:	cold-rolled carbon steel, grade DC01 to BS EN 10130 : 2016 DC01, zinc-plated, full trivalent passivate and lacquered
Rivets:	austenitic stainless steel, grade 1.4301 to BS EN 10088-2 : 2014
Channels:	aluminium alloy, grade 6063-T6 to BS EN 755-2 : 2016 with powder-coated finish
Die-cast components:	zinc alloy, grade ZL3 to BS EN 1774 : 1997, zinc-plated, full trivalent passivated and lacquered
Washers:	Nylon 6
Sliders:	Nylon 6

Sizes and maximum sash weights are given in Table 1.

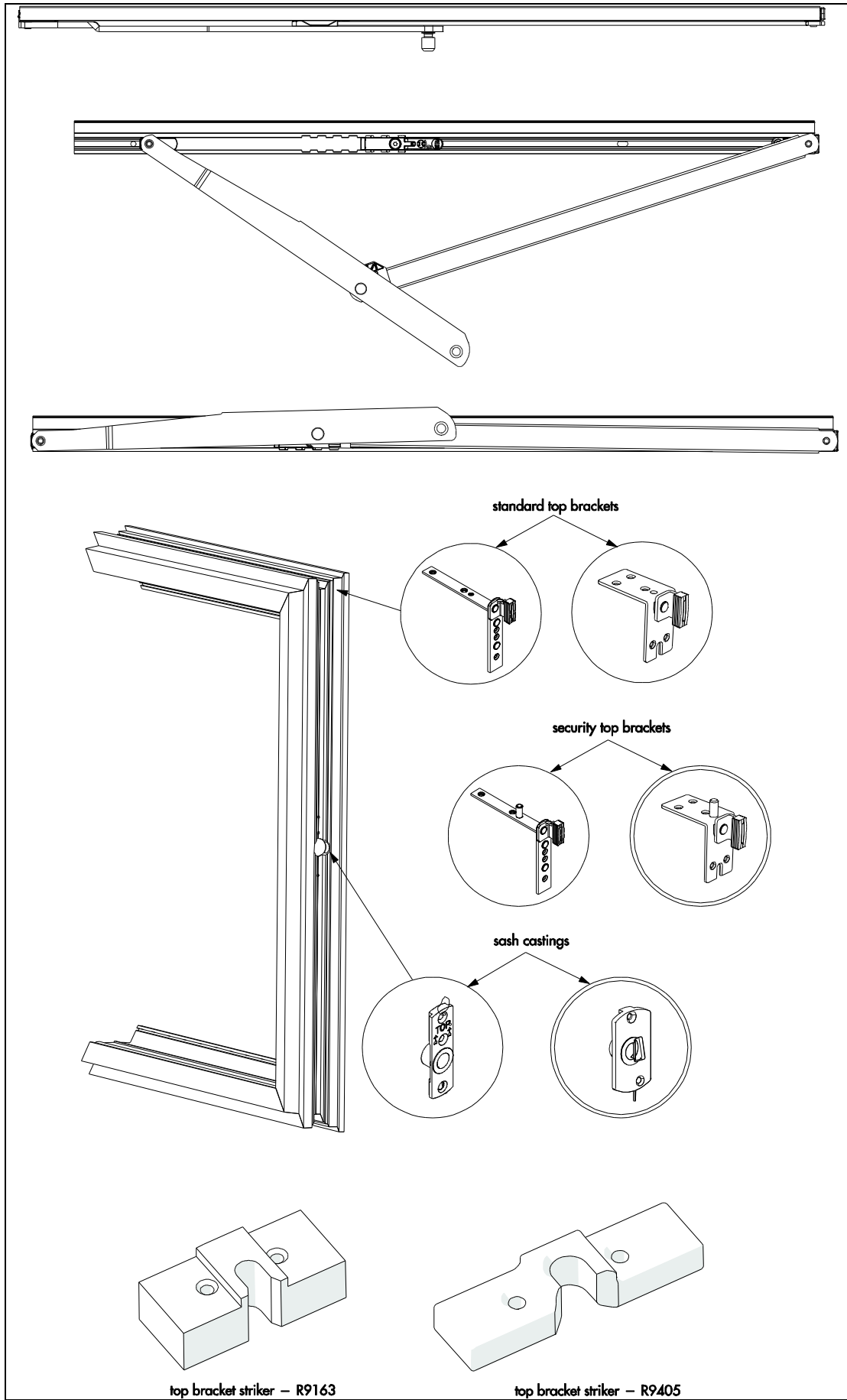
Table 1 Yale Revolution Fully Reversible Hinges — range

Manufacturer's code	Module size	Built-in restrictor	Maximum sash weight ⁽¹⁾ (kg)	Maximum sash height ⁽²⁾ (mm)	Overall hinge length (mm)
YREV-M040-SL	M4.0	—	80	353	318
YREV-M045-SL	M4.5	—	80	403	368
YREV-M050-SL	M5.0	—	80	453	418
YREV-M055-SL	M5.5	—	80	503	468
YREV-M060-SL	M6.0	✓	80	553	518
YREV-M065-SL	M6.5	✓	80	603	568
YREV-M070-SL	M7.0	✓	80	653	618
YREV-M075-SL	M7.5	✓	80	703	668
YREV-M080-SL	M8.0	✓	80	753	718
YREV-M085-SL	M8.5	✓	80	803	768
YREV-M090-SL	M9.0	✓	80	853	818
YREV-M095-SL	M9.5	✓	80	903	868
YREV-M100-SL	M10.0	✓	80	953	918
YREV-M105-SL	M10.5	✓	80	1003	968
YREV-M110-SL	M11.0	✓	80	1053	1018
YREV-M115-SL	M11.5	✓	80	1103	1068
YREV-M120-SL	M12.0	✓	80	1153	1118
YREV-M125-SL	M12.5	✓	80	1203	1168
YREV-M130-SL	M13.0	✓	80	1253	1218
YREV-M135-SL	M13.5	✓	80	1303	1268
YREV-M140-SL	M14.0	✓	80	1353	1318
YREV-M145-SL	M14.5	✓	80	1403	1368
YREV-M150-SL	M15.0	✓	80	1453	1418
YREV-M155-SL	M15.5	✓	80	1503	1468
YREV-M160-SL	M16.0	✓	80	1603	1518
YREV-M170-SL	M17.0	✓	60	1703	1618
YREV-M180-SL	M18.0	✓	60	1803	1718

(1) Manufacturer's own data.

(2) Sash size depends on specific window profiles. The Certificate holder can advise.

Figure 1 Typical Yale Revolution Fully Reversible Hinges



1.2 A restrictor mechanism is fitted to the left-hand side part of the hinges (when viewed from the inside — see Figure 2 and Table 1). The hinge can be configured to either:

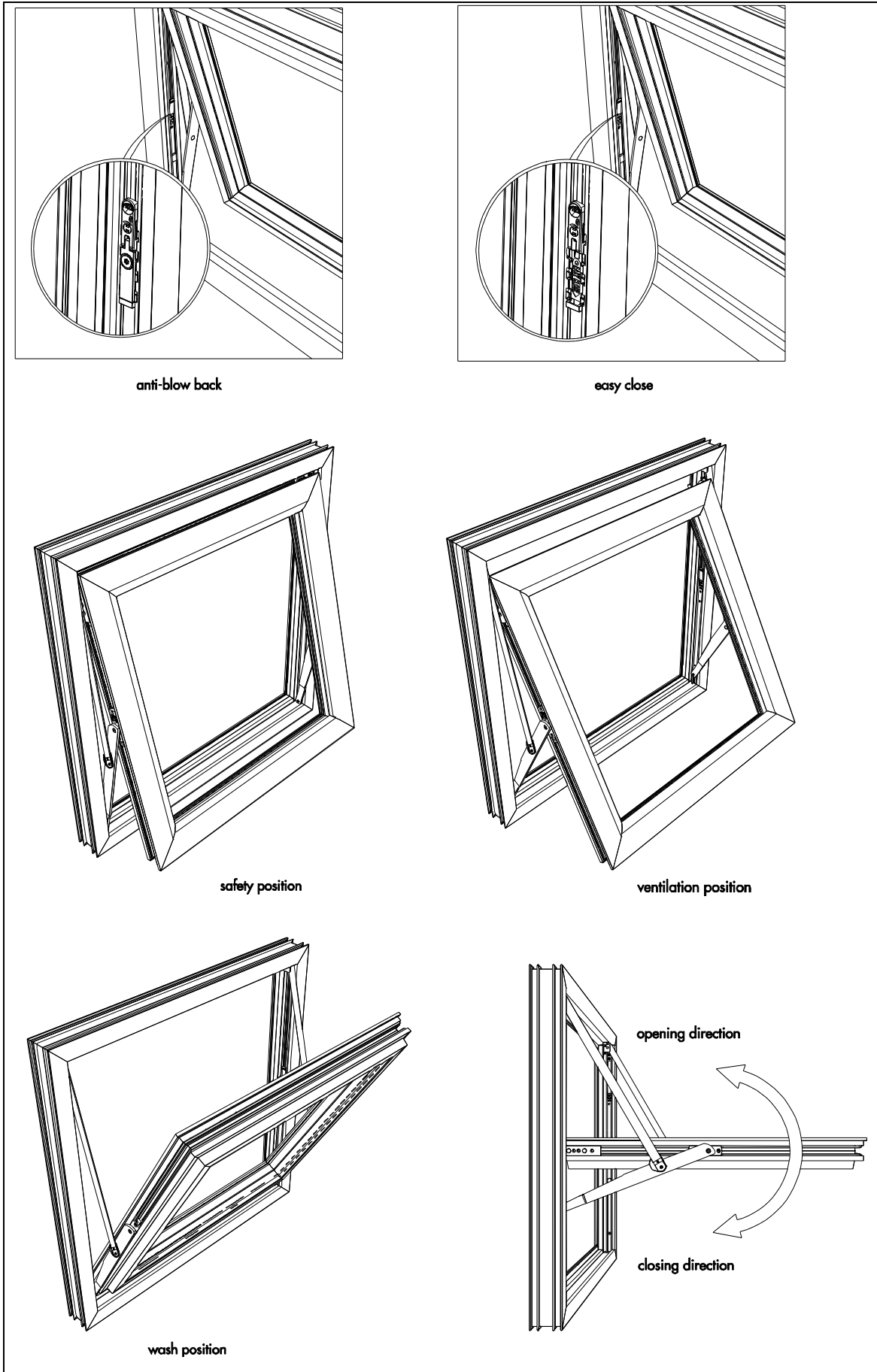
- anti-blow back position – hinge as supplied will hold sash in the set restricted positions (safety, ventilation and wash positions)

The restrictor lever needs to be pressed in order to open or close the window from restricted positions (safety, ventilation and wash positions).

- easy close position – the hinge function can be changed by re-configuration of the sash release lever. This can be done by the following sequence:
 - using the key to engage the lock-out feature
 - removing the retaining screw
 - removing the insert
 - disengaging the lock-out feature.

The restrictor lever needs to be pressed in order to open the window from the set restricted positions (safety, ventilation and wash positions); however, there is no need to press the button to close the window.

Figure 2 Restrictor positions



1.3 Two top bracket assemblies, standard and security, are available (see Figure 1). These are manufactured from carbon steel grade DD11 to BS EN 10111 : 2008. Security top brackets are used in conjunction with security top bracket strikers, manufactured from Nylon 6. The sash castings are cast from zinc alloy, grade ZL5 to BS EN 1774 : 1997, zinc plated, full trivalent passivated and lacquered.

2 Manufacture

2.1 The arms of the products are fastened to the slider and each other using rivets which are assembled using an orbital riveting process. The top block is crimped into the channel, and the restrictor lever is mounted on the restrictor spring and the lever interacts with cut-outs in the channel.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control being operated by the manufacturer are being maintained.

2.3 The management systems of Assa Abloy Ltd have been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 (Certificate FM611016) by BSI.

3 Delivery and site handling

3.1 The products are packed in cardboard boxes, each containing 5 pairs of hinges labelled with the BBA logo incorporating the number of this Certificate. Accessories are bagged in pairs and then into cardboard boxes, 10 bagged pairs per box.

3.2 Boxes should be stored under cover in a clean area and suitably supported to avoid distortion or damage.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Yale Revolution Fully Reversible Hinges.

Design Considerations

4 Use

Yale Revolution Fully Reversible Hinges are suitable for use in fully reversible windows made from PVC-U, timber or aluminium, within the limits shown in Table 1. Windows must have an outer frame/sash design suitable for correct fixing of the stays using appropriate screws⁽¹⁾ through the profiles or reinforcement. The Certificate holder can advise on the suitability of window profiles. It is the responsibility of the specifier to ensure that the finished window meets any required safety specifications.

(1) Outside the scope of this Certificate.

5 Safety



5.1 The products are fitted with a restrictor device⁽¹⁾ to restrict the opening to less than 100 mm, as recommended for child safety in BS 8213-1 : 2004.

(1) The restrictor is present in module sizes M6.0 and above (see Table 1).



5.2 The products are manufactured to allow the opening sash to be opened in such a way to allow safe cleaning of the window from inside the building. To achieve this, after opening the sash, the restrictor lever is pressed to release the sash to engage it in the ventilation position, pressed again to release the

sash and then the sash is fully reversed until it engages into the wash position. Consideration should be given to 'reach capabilities' and the danger of over-reaching (see BS 8213-1 : 2004).

6 Resistance to wear and fatigue

Yale Revolution Fully Reversible Hinges were tested for cyclic operation in accordance with BS EN 1191 : 2012, and achieved Class 3 — Heavy Duty when classified to BS EN 12400 : 2002 (see Table 2).

Table 2 Endurance results

Manufacturer's code	Dimensions of sash tested (mm)	Weight of sash tested (kg)	Comments
M16.0	1400 wide by 1590 high	80	Normal operation after 20,000 cycles

7 Resistance to mechanical loading

7.1 Selected samples from the range were tested on suitable windows in accordance with BS 6375-2 : 2009 (see Table 3).

Table 3 Mechanical loading characteristics

Test method	Fully reversible hinge M16.0 ⁽¹⁾
Resistance to static torsion (BS 6375-2 : 2009)	Class 3
Resistance to racking (BS 6375-2 : 2009)	Class 3
Load bearing capacity of safety devices (BS EN 14351-1 : 2006)	Pass ⁽²⁾

(1) Weight of tested sash, 80 kg; dimensions of tested sash, 1400 mm wide by 1590 mm high.

(2) Both corners of the sash were tested in all modes (ie top-hung and fully reversible in safety, ventilation and wash positions).

7.2 If classification of mechanical strength of a particular window is required, the window itself should be tested in accordance with BS EN 14351-1 : 2006.

8 Means of escape



The products can be fitted to fully reversible windows to have a clear opening of not less than 0.33 m² to allow for emergency egress. Windows of this type must have a clear opening at least 450 mm high and at least 450 mm wide.

9 Maintenance



9.1 The products can be cleaned using a soft sponge and soapy water. Solvent-based, corrosive or abrasive cleaners must not be used. The channels should be lubricated at the time of installation using neutral grease, and the hinge pivot points should be kept lightly lubricated with light machine oil; the channels and hinge pivot points should then be cleaned and lubricated twice per year, depending on local conditions, to minimise wear and to ensure smooth operation.

9.2 If damage occurs, the products can be replaced by removing the fixing screws and replacing the hinge.

10 Durability

10.1 The products were tested for resistance to salt spray as defined in BS EN 1670 : 2007 and achieved Grade 4 — Very high corrosion resistance.



10.2 The products are constructed from durable materials and, when installed in accordance with this Certificate, will last the expected life of the window where windows are installed in areas not subject to particularly corrosive conditions (such as coastal locations or near sources of industrial pollutants).

10.3 The products may need to be replaced within the life of a window if they become damaged.

11 Reuse and recyclability

The products comprise stainless steel, carbon steel, aluminium and zinc alloys which can be recycled.

Installation

12 General

12.1 Installation of the products must be carried out in accordance with the Certificate holder's instructions, using suitable corrosion-resistant screws⁽¹⁾.

(1) Outside the scope of this Certificate.

12.2 The correct size of hinges should be chosen to suit the sash weight and height.

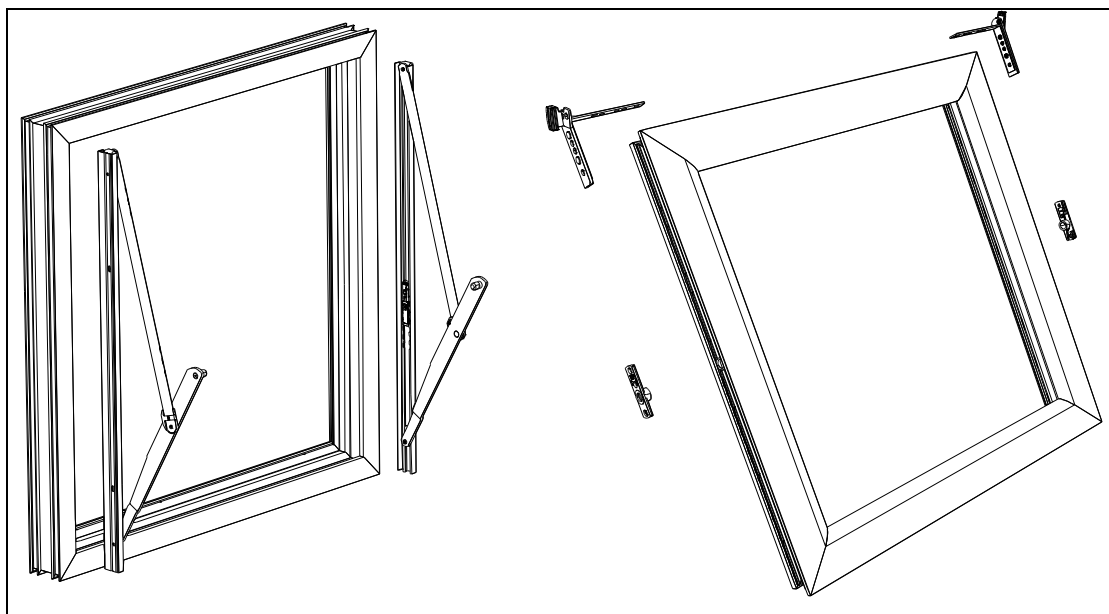
12.3 Drilling jigs⁽¹⁾ are available from the Certificate holder to facilitate installation of the hinges.

(1) Outside the scope of this Certificate.

13 Procedure

Firstly, the hinges are screwed to the window outer frame and the accessories to the sash. The sash is then installed into the frame (see Figure 3).

Figure 3 Typical installation details



14 Tests

Tests were carried out to determine:

- cyclic operation
- mechanical loading
- resistance to salt spray.

15 Investigations

15.1 An assessment was made of:

- the durability of the products
- mechanical loading.

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

Bibliography

BS 6375-2 : 2009 *Performance of windows and doors — Classification for operation and strength characteristics and guidance on selection and specification*

BS 8213-1 : 2004 *Windows, doors and rooflights — Design for safety in use and during cleaning of windows, including door-height windows and roof windows — Code of practice*

BS EN 755-2 : 2016 *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Mechanical properties*

BS EN 1191 : 2012 *Windows and doors — Resistance to repeated opening and closing — Test method*

BS EN 1670 : 2007 *Building hardware — Corrosion resistance — Requirements and test methods*

BS EN 1774 : 1997 *Zinc and zinc alloys — Alloys for foundry purposes — Ingot and liquid*

BS EN 10088-2 : 2014 *Stainless steels — Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*

BS EN 10111 : 2008 *Continuously hot rolled low carbon steel sheet and strip for cold forming — Technical delivery conditions*

BS EN 10130 : 2016 *Cold rolled low carbon steel flat products for cold forming — Technical delivery conditions*

BS EN 12400 : 2002 *Windows and pedestrian doors — Mechanical durability — Requirements and classification*

BS EN 14351-1 : 2006 + A2 : 2016 *Windows and doors — Product standard, performance characteristics — Windows and external pedestrian doorsets*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

16 Conditions

16.1 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 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.

16.2 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.

16.3 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.

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

16.5 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
- actual 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
- any claims by the manufacturer relating to CE marking.

16.6 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.