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Agrément Certificate
15/5239
Product Sheet 1

BRIDGEND EXTRUSIONS LTD

K-FORM PERMANENT CONCRETE FORMWORK

This Agrément Certificate Product Sheet(1) relates to K-Form Permanent Concrete Formwork, low-profile permanent PVC-U shuttering for construction joints and stopends in ground floor concrete slabs, floors and screeds.

(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

Strength and stability — when installed and used in accordance with this Certificate, the product will have sufficient strength and stiffness to support the discharge of the pumped concrete (see section 6).

Durability — the product will be fully protected and will remain intact for the lifetime of the structure into which it is cast (see section 9).

The BBA has awarded this Certificate to the company named above for the product described herein. This product 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

Date of First issue: 25 August 2015

Brian Chamberlain
Head of Technical Excellence

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.

Regulations

In the opinion of the BBA, K-Form Permanent Concrete Formwork, 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 Regulations in the region or regions of the UK depicted):

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

Regulation:	7	Materials and workmanship
Comment:		The product is acceptable. See section 9 and the *Installation* part of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Durability, workmanship and fitness of materials
Comment:		The use of the product satisfies the Requirements of this Regulation. See section 9 and the *Installation* part of this Certificate.

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

Regulation:	23(a)(i)(ii)(iii)	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 9 and the *Installation* part of this Certificate.

Construction (Design and Management) Regulations 2015

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

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

See section: 1 *Description* (1.4) and 3 *Delivery and site handling* (3.2 and 3.3) of this Certificate.

Additional Information

NHBC Standards 2014

In the opinion of the BBA, the use of K-Form Permanent Concrete Formwork, in relation to this Certificate, is not subject to the requirements of these Standards.

Technical Specification

1 Description

1.1 K-Form Permanent Concrete Formwork comprises K85 and K135 low-profile permanent PVC-U shuttering for construction joints and stopends in ground floor concrete slabs, floors and screeds. It is an inverted hollow-ribbed T-shaped form extruded from recycled PVC-U material. Its cellular-type structure also enables it to act as an expansion joint (see Figure 1).

1.2 The product range, K85 and K135 (also known as K-Form Screed Rail) is supplied in 3 m lengths. Holes 24 mm in diameter are drilled at 300 mm centres in the vertical flange to allow dowel bars to be inserted or steel reinforcement to run continuously through jointed slabs. Eight holes, 46 mm in diameter (four per side) are drilled at 800 mm centres in the horizontal base to allow bedding mortar or lean mix to extrude through and provide stability during the concrete pouring and levelling processes.

1.3 Lengths of the product may be joined end-to-end using connecting tabs pushed into the hollow profile (see Figure 2). More analytically, K135 requires 2 joining clips and K85 requires 1 clip. Junctions and corners are formed by cutting the bottom flange with a handsaw, where necessary, and joining the profiles at the top using cross-shaped junction connectors (see Figure 3) which can also be trimmed according to the type of joint required. A top strip is clipped on top of the form but can be removed after the concrete has cured to create a 10 mm by 10 mm rebate for joint sealant (see Figure 4).

Figure 1 K-Form Permanent Concrete Formwork — cross-section

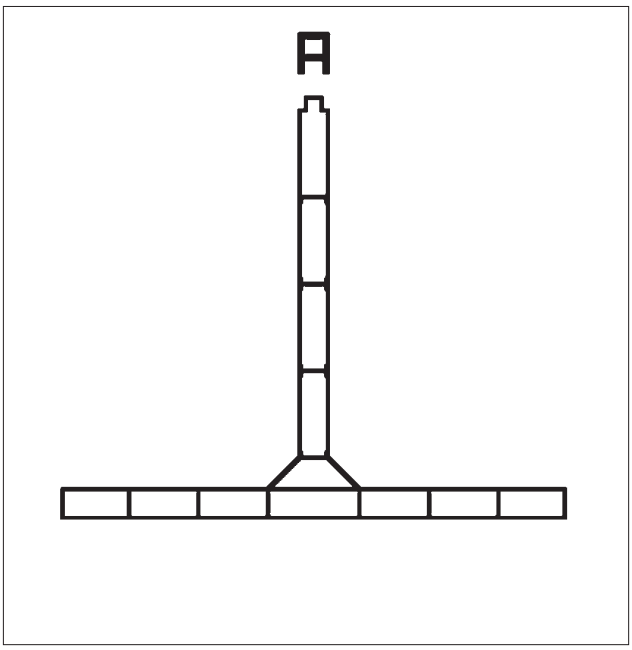


Figure 2 End-to-end connection

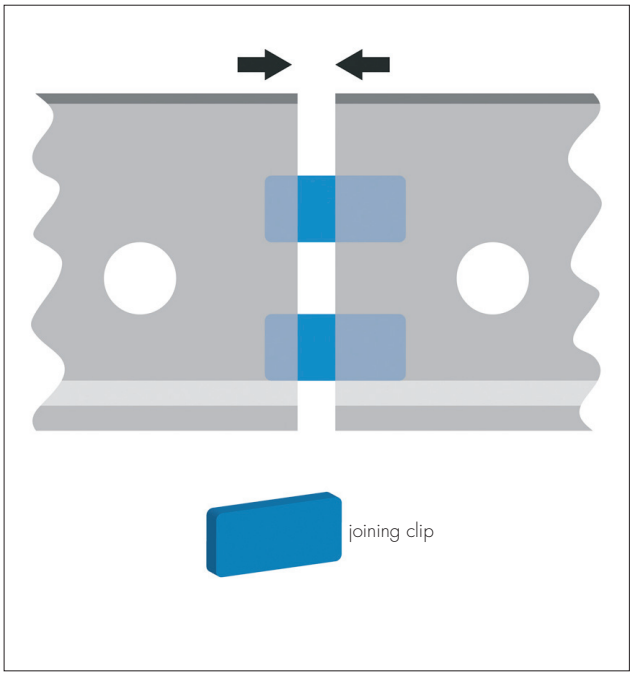


Figure 3 Junction connector

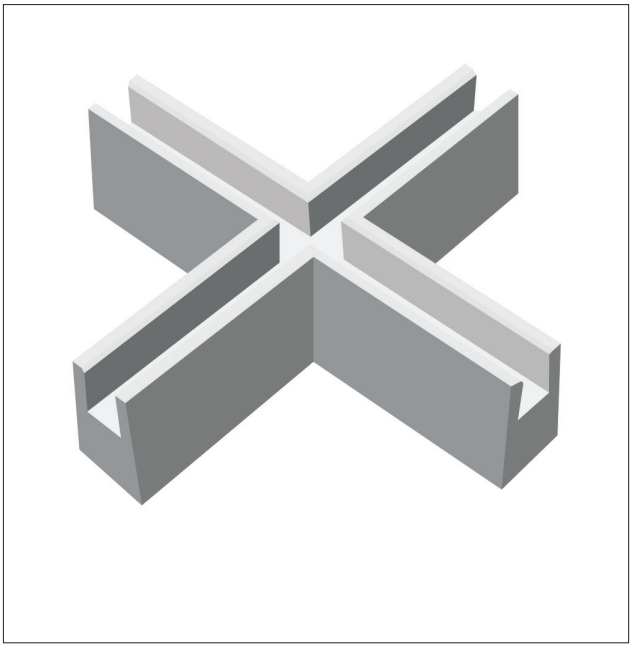
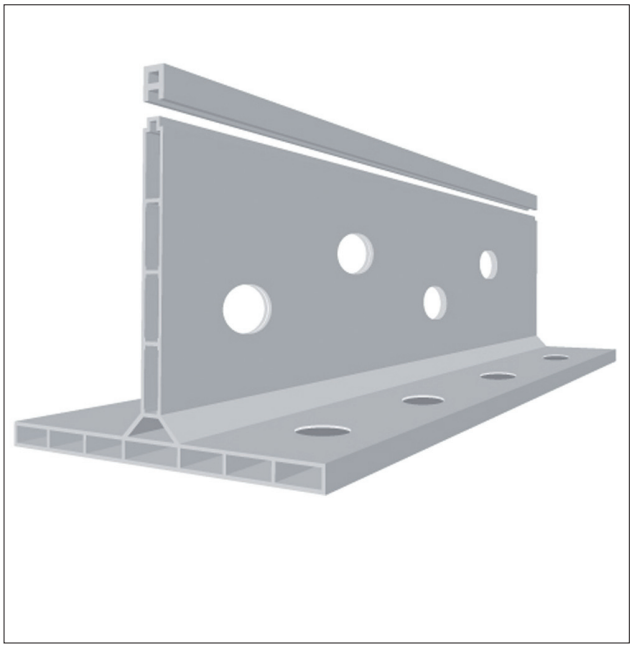


Figure 4 Profile and top strip



1.4 Product characteristics are given in Table 1.

Table 1 Product characteristics

Characteristic	K-Form profile		Cover strip
	K85	K135	
Length (m)	3	3	3
Overall depth (mm)	85	135	10
Overall width (mm)	155	155	10.68
Wall thickness (mm)	10.68	10.68	10.68
Weight ($kg \cdot m^{-1}$)	1.24	1.3	0.116

1.5 The product range varies in height and therefore is suitable for formation of different thicknesses of concrete slabs. K135 is suitable for concrete slabs from 150 mm to 225 mm thick and K85 is suitable for pours of 100 mm to 140 mm thick. The height of the formwork and, therefore, the thickness of the slab, can be adjusted by varying the amount of mortar on which the PVC profiles are set and/or the specific height of the extension strip used in each case. The extension strip has not been assessed and is therefore outside the scope of this Certificate.

2 Manufacture

2.1 The product (K-Form Screed Rail) is manufactured from 100% recycled PVC-U.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has [delete as applicable]:

- 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 operated by the manufacturer are being maintained.

2.3 The management system of Bridgend Extrusions Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by LRQA (Certificate LRQ 4008615).

3 Delivery and site handling

3.1 The product is delivered to site singly in 3 m lengths.

3.2 The profile lengths should be adequately supported during unloading, handling and storage. Care should be taken to avoid excessive bending or kinking, or crushing. Contact with abrasive surfaces or sharp edges should be minimised.

3.3 Lengths of profile should be stored horizontally and fully supported on a flat surface. Prolonged unprotected storage in direct sunlight should be avoided. Ideally, the product should be installed as soon as possible after delivery.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on K-Form Permanent Concrete Formwork.

Design Considerations

4 General

4.1 K-Form Permanent Concrete Formwork is effective in forming permanent shuttering and expansion joints in ground floor concrete slabs.

4.2 All installations should be designed and constructed in accordance with the Certificate holder's instructions and literature and this Certificate.

4.3 Care should be taken during placing and compaction of the concrete to ensure that the shuttering is not dislodged or skewed (see sections 10 and 11), particularly if it is necessary to use vibrating pokers.

5 Practicability of installation

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

6 Strength and stability

6.1 The examination of the effects of impact forces on the product by the discharge of pumped concrete, indicated that it would perform satisfactorily in all practical situations where the manufacturer's instructions for installation had been followed. The concrete mix could also be poured directly from the delivery lorry as well as pumped, provided that K-Form Screed Rails are properly anchored. The amount of grout loss and the degree of deformation of the product would be minimal.

6.2 The bedding concrete will provide an adequate anchor to the flanges and that movement and/or unlocking of joints had not occurred during the pouring of concrete.

6.3 Data was obtained from site trials on K135, which has the most pressure applied on the wall of the specific screed. These trails indicated that, during pouring of concrete, the product had an average displacement of 2.4 mm on compacted ground and 4.9 mm on surfaces covered by damp-proof membrane.

6.4 The bedding concrete's strength is required to be adequate to resist the pressure, caused by the concrete pour, as well as the vibration beam, so that the bedding anchorage of K-Form Screed Rails do not move.

7 Behaviour in relation to fire

The product will not adversely affect the fire resistance of the structures into which it is cast.

8 Maintenance

As the product is fully embedded in the concrete or under finishes, maintenance is not required.

9 Durability

In the situations assessed, K-Form Permanent Concrete Formwork will be fully protected and will remain intact for the lifetime of the slab.

Installation

10 General

The installation and support of the K-Form Permanent Concrete Formwork must be in accordance with the Certificate holder's instruction and the requirements of section 3 of this Certificate.

11 Procedure

Formwork

11.1 The site of the installation is suitably prepared and marked out. A damp-proof membrane is laid if necessary.

11.2 A lean concrete or sharp sand/cement mix is prepared and placed in batches along the lines of the profiles at intervals to align with the holes drilled in the profile bases, ie at approximately 800 mm centres (see section 1.2). The quantity of mortar in each batch should be such that the top of the profile will be at the required height once bedded in.

11.3 The profiles are laid onto the top of the mortar batches and joined where necessary using the joining clips. Junctions and right angled joints are made by cutting the profiles and/or junction connectors with a handsaw prior to laying. The top strip and junction connectors are tapped into place using a soft-faced mallet; this process also serving to bed the profiles into the mortar which extrudes through the holes in the profile base. The installation should be checked regularly during emplacement for height, level, perpendicularity and dimensional accuracy.

11.4 The bedding concrete must reach adequate strength to resist the wet designed concrete pressure. Generally, the installed form with normal concrete used may be expected to take 24 hours to allow it to be fully cured. The extrusion of the bedding mortar through the holes helps hold the installation in place during the subsequent concrete pour.

Concrete installation

11.5 Where required, steel reinforcement bars may be installed through the holes in the uprights of the profiles. Such reinforcement is outside the scope of this Certificate.

11.6 The formwork is suitable for use with most grades of concrete conforming to BS EN 206 : 2013 and which may be placed directly or by pump. In general, the slump should be between 70 mm and 100 mm, but slumps up to 125 mm can be used. During the pour, the concrete should be placed at a minimum distance of 500 mm from the formwork and allowed to flow up to it.

11.7 The formwork can support most types of vibrating machinery, including vibrating twin beams and bunyan steel rollers, without bending. However, vibrating pokers should be kept at least 300 mm away from the formwork when used in continuous vibration. If the layout of the formwork requires the pokers to be closer, they should only be used for periods of between 5 and 10 seconds; this gives adequate compaction and keeps the loss of fines to a reasonable level.

11.8 Where required for continuity, steel dowel bars may be inserted through the holes provided in the vertical flange of the profiles. This has not been assessed in the site trial.

Expansion joints

11.9 When the concrete has cured, the top strip can be removed leaving a 10 mm by 10 mm rebate for joint sealant to form watertight expansion joints. However, this is outside the scope of this Certificate.

Technical Investigations

12 Tests

12.1 Dimensional checks were carried out to determine material characteristics.

12.2 Site trial tests were carried out to determine:

- practicability of installation on compacted ground and on damp-proof-membrane-covered surfaces
- movement at joints
- spacing of support members and the placing of the concrete.

13 Investigations

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 EN 206 : 2013 *Concrete — Specification, performance, production and conformity*

BS EN ISO 9001 : 2018 *Quality managment systems — Requirements*

Conditions of Certification

14 Conditions

14.1 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.

14.2 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.

14.3 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.

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

14.5 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.

14.6 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.

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