

Keystone Lintels Ltd

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Agrément Certificate
98/3493
Product Sheet 1

KEYSTONE LINTELS

KEYSTONE LINTELS RANGE S/K AND HD/K

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Keystone Lintels Range S/K and HD/K, for use in cavity walls of brickwork and/or blockwork.

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

Structural performance — the product is suitable for use in masonry cavity walls as indicated in Tables 1 and 2 (see section 5).

Behaviour in relation to fire — in a conventional brick/block construction, the lintel can have a fire resistance of one-hour (see section 6).

Thermal performance — opening head junctions can adequately limit heat loss and permit the use of the default psi value specified in the Accredited Construction Details in SAP and SBEM calculations (see section 8).

Condensation risk — the risk of local surface condensation around opening heads will be minimal (see section 9).

Durability — the product should have a working life commensurate with that of the building in which it is installed (see section 11).



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: 30 November 2009

Originally certificated on 15 July 1998

Certificate amended on 22 November 2010 to add new Figure 3 and text to section 8 Thermal performance.

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, Keystone Lintels Range S/K and HD/K, 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: A1	Loading
Comment:	The lintels have sufficient strength and stiffness provided: (a) they are correctly installed. See the <i>Installation</i> part of this Certificate. (b) the design loads are in accordance with sections 5.1 to 5.3 of this Certificate.
Requirement: B3(1)	Internal fire spread (structure)
Comment:	When protected in accordance with this Certificate, the lintels will have the period of fire resistance as given in section 6.1 of this Certificate.
Requirement: C2(b)	Resistance to moisture
Comment:	When used in external masonry cavity walls, the product will not adversely affect the ability of the wall to satisfy the stated requirements, provided correct construction details are adopted. See sections 9.1 and 9.2 of this Certificate.
Requirement: C2(c)	Resistance to moisture
Comment:	The product can contribute to satisfying this Requirement. See section 9.3 of this Certificate.
Requirement: L1	Conservation of fuel and power
Comment:	When installed in accordance with this Certificate, the lintels will have the thermal properties described in section 8.2 of this Certificate.
Requirement: Regulation 7	Materials and workmanship
Comment:	The products are acceptable. See sections 11.1 and 11.2 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation: 8(1)	Fitness and durability of materials and workmanship
Comment:	See sections 11.1 and 11.2 and the <i>Installation</i> part of this Certificate.
Regulation: 9	Building standards – construction
Standard: 1.1(a)(b)	Structure
Comment:	The product is acceptable, with reference to clause 1.1.1 ⁽¹⁾⁽²⁾ . See sections 5.1 to 5.3 of this Certificate.
Standard: 2.3	Structural protection
Comment:	The product can be incorporated in a construction satisfying this Standard, with reference to clauses 2.3.1 ⁽¹⁾⁽²⁾ and 2.3.3 ⁽¹⁾⁽²⁾ and Appendices 2B ⁽¹⁾ and 2D ⁽²⁾ . See section 6.1 of this Certificate.
Standard: 3.15	Condensation
Comment:	When incorporated in an external masonry cavity wall, the product can satisfy this Standard, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ , 3.15.4 ⁽¹⁾⁽²⁾ and 3.15.5 ⁽¹⁾⁽²⁾ . See sections 9.1 to 9.3 of this Certificate.
Standard: 6.1	Carbon dioxide emissions
Standard: 6.2	Building insulation envelope
Comment:	Heads of openings in external walls incorporating the product can limit heat loss and the risk of condensation, with reference to clauses 6.1.6 ⁽¹⁾ , 6.2.3 ⁽¹⁾ , 6.2.4 ⁽²⁾ , 6.2.5 ⁽²⁾ , 6.2.10 ⁽¹⁾ and 6.2.11 ⁽²⁾ . See section 8.2 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 products are acceptable. See sections 11.1 and 11.2 and the <i>Installation</i> part of this Certificate.
Regulation: C5	Condensation
Comment:	The products can contribute to satisfying this Regulation. See sections 9.2 and 9.3 of this Certificate.
Regulation: D1	Stability
Comment:	The lintels have sufficient strength and stiffness provided: (a) they are correctly installed. See the <i>Installation</i> of this Certificate. (b) the design loads are in accordance with sections 5.1 to 5.3 of this Certificate.
Regulation: E4(1)(2)	Internal fire spread – Structure
Comment:	When protected in accordance with this Certificate, the lintels will have the period of fire resistance as given in section 6.1 of this Certificate.
Regulation: F2	Conservation measures
Regulation: F3	Target carbon dioxide Emissions Rate
Comment:	Heads of openings in external masonry cavity walls incorporating these products can limit heat loss and the risk of condensation. See section 8.2 of this Certificate.

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

See section: 1 Description (1.1).

Non-regulatory Information

NHBC Standards 2008

NHBC accepts the use of Keystone Lintels Range S/K and HD/K, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapters 6.1 *External masonry walls* and 6.3 *Internal walls*.

General

This Certificate relates to Keystone Lintels Range S/K and HD/K and are for use in cavity walls of brickwork and/or blockwork.

They provide support to vertical loads from walls, floors and roofs, or combinations of these, above window or door openings.

The lintels must be used in conjunction with an appropriate damp-proof course (dpc) when used in an external wall.

Technical Specification

1 Description

Profiles

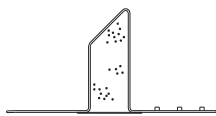
1.1 Keystone Lintels are available in various profiles and types shown in Tables 1 and 2. The tabulated safe working loads have been determined from tests and are the lesser of:

- test failure load divided by 1.6
- test load causing a maximum deflection recovery of 20% after one hour under load
- test load causing a vertical or horizontal deflection of effective span divided by 325.

Table 1 Profiles — Type S/K lintels

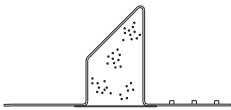
Standard

Type S/K-50⁽¹⁾ (cavity widths: 50 mm to 70 mm)



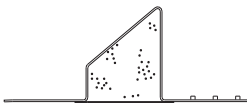
Lengths typically in 150 mm increments	600–1200	1350–1500	1650–1800	1950–2100	2250–2400	2550–2700	2850–3000	3150–3600	3750–4000	4200–4800
Height of lintel (mm)	79	95	110	134	150	172	172	209	209	209
Thickness of lintel (mm)	1.6	2.0	2.0	2.0	2.0	2.0	2.6	3.2	3.2	3.4
UDL ^(2a) (kN)	12	14	19	21	21	26	27	27	26	27
UDL ^(2b) (kN)	10	12	16	17	19	22	20	20	19	22
Weight (kg·m ⁻¹)	5.21	6.91	7.3	8.08	8.44	9.22	11.94	15.7	15.7	18.68

Type S/K-70⁽¹⁾ (cavity widths: 70 mm to 90 mm)



Lengths typically in 150 mm increments	600–1200	1350–1500	1650–1800	1950–2100	2250–2400	2550–3000	3150–3600	3750–4000	4200–4800
Height of lintel (mm)	98	89	106	130	142	168	204	204	204
Thickness of lintel (mm)	1.6	2.0	2.0	2.0	2.0	2.6	3.2	3.2	3.4
UDL ^(2a) (kN)	12	14	18	21	21	27	27	26	27
UDL ^(2b) (kN)	10	12	14	17	19	22	20	19	22
Weight (kg·m ⁻¹)	5.85	6.91	7.46	8.08	8.6	11.95	15.7	15.7	18.68

Type S/K-90⁽¹⁾ (cavity widths: 90 mm to 110 mm)

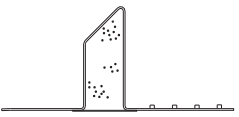


Lengths typically in 150 mm increments	600–1200	1350–1500	1650–1800	1950–2100	2250–2400	2550–2700	2850–3000	3150–3600	3750–4000	4200–4800
Height of lintel (mm)	88	85	107	125	150	162	171	200	200	200
Thickness of lintel (mm)	1.6	2.0	2.0	2.0	2.0	2.6	2.6	3.2	3.2	3.4
UDL ^(2a) (kN)	12	16	19	21	23	27	27	27	26	27
UDL ^(2b) (kN)	10	13	16	17	18	22	20	20	19	22
Weight (kg·m ⁻¹)	6.16	7.47	8.0	8.4	9.18	12.13	12.68	15.7	15.7	18.68

Table 1 Profiles — Type S/K lintels (continued)

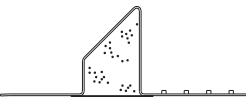
Wider inner leaf

Type S/K-50⁽¹⁾ WIL (cavity widths: 50 mm to 70 mm)




Lengths typically in 150 mm increments	600–1350	1500–1650	1800	1950–2100	2250–2400	2550–3000	3150–3600	3750–4000	4200
Height of lintel (mm)	91	96	110	136	162	172	196	196	196
Thickness of lintel (mm)	1.6	2.0	2.0	2.0	2.0	2.6	3.2	3.2	3.4
UDL ^(2a) (kN)	12	12	15	20	24	28	30	27	26
UDL ^(2b) (kN)	10	10	13	18	20	21	26	25	22
Weight (kg·m ⁻¹)	5.91	7.39	7.65	8.44	9.22	12.48	17.7	17.7	18.68

Type S/K-70⁽¹⁾ WIL (cavity widths: 70 mm to 90 mm)



Lengths typically in 150 mm increments	600–1350	1500–1650	1800	1950–2100	2250–2400	2550–3000	3150–3600	3750–4000	4200
Height of lintel (mm)	93	90	100	134	158	167	191	192	190
Thickness of lintel (mm)	1.6	2.0	2.0	2.0	2.0	2.6	3.2	3.2	3.4
UDL ^(2a) (kN)	12	13	20	19	24	27	30	27	26
UDL ^(2b) (kN)	10	11	17	17	20	21	26	25	22
Weight (kg·m ⁻¹)	6.28	7.45	7.85	8.6	9.38	13.04	17.7	17.7	18.68

Type S/K-90⁽¹⁾ WIL (cavity widths: 90 mm to 110 mm)



Lengths typically in 150 mm increments	600–1200	1350–1800	1950–2400	2550–3000	3150–3600	3750–4000	4200		
Height of lintel (mm)	82	107	142	177	191	187	187		
Thickness of lintel (mm)	1.6	2.0	2.0	2.6	3.2	3.2	3.4		
UDL ^(2a) (kN)	13	17	23	24	30	27	26		
UDL ^(2b) (kN)	11	14	18	18	26	25	21		
Weight (kg·m ⁻¹)	8	8.4	9.58	13.19	17.7	17.7	18.68		

(1) Incorporating an indented inner leaf flange and a slotted 'thermal-break' plate fixed across the cavity with spot welds.

(2) Total uniformly distributed load (UDL):

(a) load ratio from 0.5 to 0.75

(b) load ratio from 0.75 to 0.95

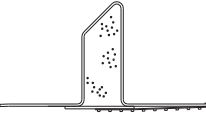
$$\text{load ratio} = \frac{w_1}{w_1 + w_2}$$

where: w_1 = total load on inner leaf
 w_2 = total load on outer leaf
 $w_1 + w_2$ = total load on lintel.

Table 2 Profiles — Type HD/K lintels

Heavy duty

Type HD/K-50⁽¹⁾ (cavity widths: 50 mm to 70 mm)



Lengths typically in 150 mm increments	600–1350	1500	1650	1800–2100	2250–3000	3150–3600	3750–4000
Height of lintel (mm)	105	121	121	171	209	209	209
Thickness of lintel (mm)	3.2	3.2	3.2	3.2	3.2	3.2	3.2
UDL ^(2a) (kN)	21	27	27	32	37	34	30
UDL ^(2b) (kN)	18	22	22	24	33	31	27
Weight (kg·m ⁻¹)	10.74	13.63	13.63	16.23	18.17	18.17	18.17

(1) Incorporating an indented inner leaf flange and a slotted 'thermal-break' plate fixed across the cavity with spot welds.

(2) Total uniformly distributed load (UDL):

(a) load ratio from 0.5 to 0.75

(b) load ratio from 0.75 to 0.95

$$\text{load ratio} = \frac{w_1}{w_1 + w_2}$$

where: w_1 = total load on inner leaf
 w_2 = total load on outer leaf
 $w_1 + w_2$ = total load on lintel.

Materials

1.2 The lintels are fabricated from galvanized steel to BS EN 10346 : 2009 and have a grade DX51D+ Z600 coating. Cut edges, fillet welds and rivets are treated with an anti-corrosion paint system.

1.3 The lintels incorporate an indented inner leaf flange and a slotted plate, acting as a thermal break across the cavity, spot welded to the flanges.

Insulation

1.4 All lintels are fully insulated with expanded polystyrene which is inserted into the upstand prior to the installation of the slotted plate.

Manufacture

1.5 Steel coil is slit, straightened and cut to length to provide blanks from which the lintels are formed by press-braking.

1.6 The additional thermal-break slotted bottom plate is fixed with intermittent spot welds at 150 mm centres.

1.7 Quality control includes checks on the incoming steel for:

- chemical composition
- dimensional tolerances
- mechanical properties
- thickness and quality of galvanizing.

1.8 During manufacture, regular checks are made on lintel dimensions and weld thickness. Quality checks are made on welds, insulation and protective coating.

2 Delivery and site handling

2.1 The lintels are delivered to site or to builders' merchants in bundles, each carrying a label bearing the manufacturer's name. The BBA identification mark incorporating the number of this Certificate is marked on each lintel.

2.2 Reasonable care must be taken during unloading, stacking and storage to avoid damage to the protective coating. Lintels that have suffered deformation or major damage to the protective coatings must not be used, and minor damage must be repaired by using the same anti-corrosive paint used for treating cut edges, or zinc-rich paint.

2.3 The lintels must be stored off the ground in such a manner as to avoid the risk of either mechanical damage or contamination by corrosive substances.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Keystone Lintels Range S/K and HD/K.

Design Considerations

3 General

Keystone Lintels Range S/K and HD/K is satisfactory for use in cavity walls of brickwork and/or blockwork to provide support to wall, roof or floor loads (or a combination of these) above windows or door openings (see Tables 1 and 2).

4 Practicability of installation

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


4.2 The weights of lintels are given in Tables 1 and 2.

4.3 The lintels incorporate plaster keys, providing a suitable substrate for plastering.

4.4 The lintels preserve the inner leaf of the wall intact and therefore allow plastering and the fixing of curtain tracks.

4.5 The use of stopends to the lintels should be applied as recommended in BS 5628-3 : 2005, and where required by *NHBC Standards*.

5 Structural performance

 5.1 All lintels have adequate strength and stiffness to sustain the uniformly distributed working loads given in Tables 1 and 2 subject to the following conditions:

- (1) The defined cavity width, size of masonry unit and clear span are not exceeded.
- (2) The specified loads given in Tables 1 and 2 relate to simply-supported lintels laterally and torsionally unrestrained. Therefore, there are no requirements for composite action with, or restraint by, adjacent elements of construction.
- (3) Not more than half the total load on the lintel is supported at outer leaf position.

- (4) Where part of the loading is applied as concentrated loads, each concentrated load must be supported over a length of lintel of not less than 200 mm. In such cases the total applied loading must not produce bending moments, shear forces or reactions greater than those produced by the uniformly distributed loads specified in Tables 1 and 2.
- (5) The applied concentrated loads must not exceed the eccentricities given in Table 3.

Table 3 Maximum permissible eccentricities

Lintel type	Maximum allowable masonry width (mm)		Allowable cavity width (mm)	Maximum allowable eccentricity ⁽¹⁾ (mm)	
	Block inner leaf	Brick outer leaf		Block inner leaf	Brick outer leaf
S/K-50, HD/K-50	100	100	50	75	75
	100	100	70 ⁽¹⁾	85	85
S/K-70	100	100	70	85	85
	100	100	90 ⁽²⁾	95	95
S/K-90	100	100	90	95	95
	100	100	110 ⁽²⁾	105	105
S/K-50 WIL	125	100	50	87.5	75
	125	100	70 ⁽²⁾	97.5	85
S/K-70 WIL	125	100	70	97.5	85
	125	100	90 ⁽²⁾	107.5	95
S/K-90 WIL	125	100	90	107.5	95
	125	100	110 ⁽²⁾	117.5	105

(1) Eccentricity: centre of lintel width to centre of leaf.

(2) Maximum.



5.2 In addition to the requirements specifically referred to in this Certificate, structures of brickwork or blockwork in which the lintels are incorporated must be designed and constructed to comply with BS 5628-1 : 2005 and BS 5628-3 : 2005, and the national Building Regulations:

England and Wales — Approved Document A1/2, Part C, Section 1

Scotland — Part C, Small Building Guide

Northern Ireland — Technical Booklet D, Section 3.

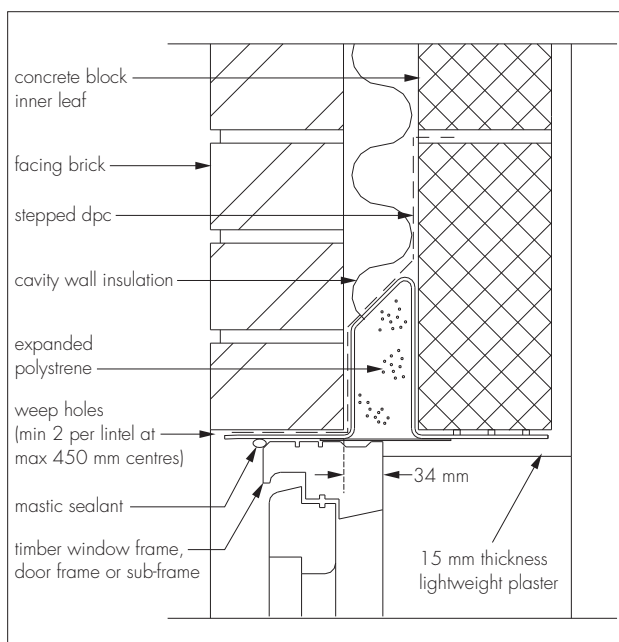
5.3 Guidance on the assessment of loads on lintels in masonry is given in BS 5977-1 : 1981.

6 Behaviour in relation to fire



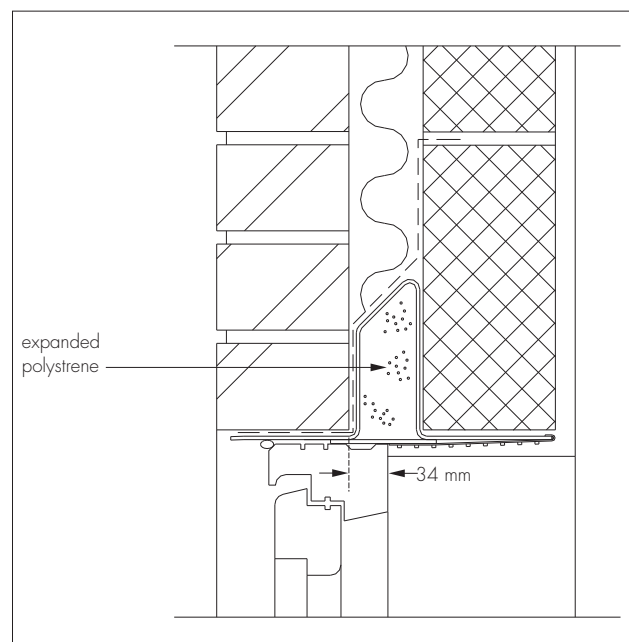
6.1 The construction details shown in Figures 1 to 3 have been assessed as capable of satisfying the national Building Regulations in situations where a one-hour fire resistance is required.

Figure 1 Installation detail — S/K-50



Note: For the thermal performance of the lintels of buildings in Scotland, the inner face of the door or window frame must be set in by a minimum of 34 mm from the inside of the outer leaf.

Figure 2 Installation detail — HD/K-50



Note: For the thermal performance of the lintels of buildings in England and Wales, and Scotland, the inner face of the door or window frame must be set in by a minimum of 34 mm from the inside of the outer leaf.

6.2 Where any other form of wall construction incorporating Keystone Lintels is subject to fire resistance requirements, an appropriate assessment or test must be carried out by a United Kingdom Accreditation Service (UKAS) accredited laboratory for the test concerned.

7 Corrosion protection

The lintels have adequate protection against corrosion providing:

- the protective zinc is undamaged or minor changes repaired
- mortar complies with the requirements of BS 5628-3 : 2005
- timber door or window frames in contact with the lintels are treated with boron compounds or organic solvent type preservatives. The composition and application of any such treatment must be in accordance with BS 5589 : 1989. The risks of corrosion associated with other forms of preservative treatment and with treatment with inorganic flame retardant salts are described in BRE Digest 301 *Corrosion of metals by wood*
- contact with, or contamination from, copper, copper-bearing materials or aqueous run-off from copper-bearing materials (including copper, brass or bronze wall ties), are avoided
- sands from marine sources used in mortars are washed in fresh water to reduce the sodium chloride content to a value of less than 0.1% by weight of dry material
- all cut edges of the lintel are painted with an approved, anti-corrosion exterior paint.

8 Thermal performance

8.1 Typical example details containing type S/K and type H/D lintels, based on the construction details shown in Figures 1, 2 and 3, were analysed numerically to determine their likely hygrothermal performance.



8.2 Opening head soffits will adequately limit excessive heat loss and allow use of the following psi values in carbon emission rate calculations. Detailed guidance in this respect and on limiting heat loss by air infiltration can be found in the documents referred to in section 9.2.

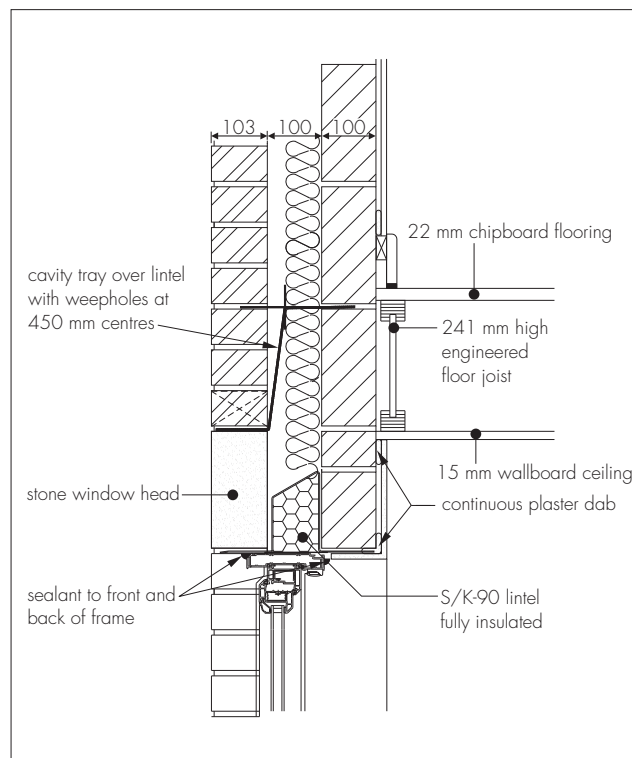
0.50 W·m⁻¹·K⁻¹

Figures 1 and 2, where the door/window is set-back at least 34 mm into the cavity, sealed at the front and back against the external wall and the internal surface of the reveal is covered by at least a 15 mm thickness of lightweight plaster or material with equivalent thermal resistance

0.26 W·m⁻¹·K⁻¹

Figure 3, where the door/window is fully set-back over the wall cavity, the blockwork conductivity is 0.15 W·m⁻¹·K⁻¹ and the wall U value is 0.30 W·m⁻²·K⁻¹.

Figure 3 Installation detail — 100 mm Cavity S/K-90



8.3 For other junction details, the linear thermal transmittance and temperature factor should be calculated following the guidance in BR 497 : 2007 *Conventions for Calculating Linear Thermal Transmittance and Temperature Factors*.

9 Condensation risk

Surface condensation



9.1 Opening head soffits in external walls with a minimum door/window set-back of 34 mm into the cavity and with the internal surface of the reveal covered by at least a 15 mm thickness of lightweight plaster or material with equivalent thermal resistance, will achieve a minimum temperature factor in excess of 0.75 and will adequately limit the risk of surface condensation in buildings of all humidity classes except 'Special Buildings', eg buildings such as laundries, breweries, swimming pools as defined in BS 5250 : 2002, Table B.5. The surface condensation risk of other constructions should be established by numerical modelling in accordance with BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings* using for the base plate lintel a thermal conductivity value of $10 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ and a thickness of 1 mm.



9.2 Further guidance on limiting the risk of surface condensation can be found in:

England and Wales — *Limiting thermal bridging and air leakage: Robust construction details for dwellings and similar buildings* TSO 2002 or Accredited Construction Details (version 1.0)

Scotland — Accredited Construction Details (Scotland)

Northern Ireland — Accredited Construction Details (version 1.0).

Interstitial condensation

9.3 Under normal domestic conditions, the level of interstitial condensation associated with the product will be low and the risk of any resultant damage minimal.

10 Maintenance

Maintenance is not required, but the exposed toe of the lintel may be painted to improve appearance using finishes compatible with the zinc coating.

11 Durability



11.1 The lintels will have adequate durability subject to the following conditions:

- (1) The lintels are installed and used within the temperature and humidity conditions described in section 9 of this Certificate.
- (2) The conditions specified in sections 7 and 8 of this Certificate must be observed.

11.2 The durability of the lintel will not be impaired by contact with conventional cavity insulation material or mortar admixtures.

Installation

12 Procedure

General

12.1 Typical installation details are shown in Figures 1, 2 and 3. Lintels must be installed with at least the minimum end bearing dimension illustrated in Figure 3, and be fully bedded on bricklaying mortar on a full-size masonry unit.

12.2 The inner and outer leaves supporting the lintel must be raised together to avoid excessive eccentricity of loading.

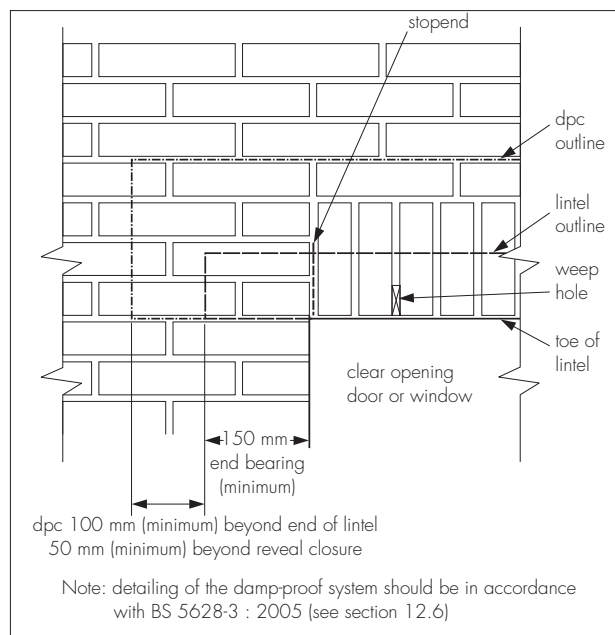
12.3 Weep holes should be provided in the outer leaf above the lintel to drain moisture from the cavity. A minimum of two weep holes should be provided per lintel. For fair-faced masonry, weep holes should be provided at centres not greater than 450 mm. The use of stopends to the lintel should also be considered, as recommended in BS 5628-3 : 1985 and, where required, by *NHBC Standards*, particularly in areas of severe exposure and where full fill cavity insulation is specified (see Figure 4).

12.4 The lintels must be used in conjunction with a dpc.

12.5 To comply with *NHBC Standards* in Scotland, Northern Ireland and areas of severe exposure as detailed in BRE Report *Thermal Insulation : avoiding risks*, Second Edition, separate dpc protection must be provided over the lintels and stopend to the lintel, and cavity trays are required under all exposure conditions.

12.6 The durability assessment assumes that water does not collect on the lintel, therefore precautions must be taken in cavity wall construction to prevent mortar dropping through the cavity and onto the lintels and obstructing the weep holes.

Figure 4 Typical installation detail



12.7 To avoid excessive eccentricities of loading, the lintels must only be used with nominal thickness of masonry units given and nominal cavity width (see Tables 1 and 2). Lintel upstands should be located centrally within the cavity.

12.8 Any operation likely to damage the protective coatings or impair the strength of the lintels (for example, cutting, welding or drilling) should not be undertaken. Cleaning of any excess mortar must be carried out with a soft material to avoid damaging the coating and the flexible dpc.

12.9 In cavity walls the inner and outer leaves supported by the lintels must be raised together to avoid excessive eccentricity of loading.

Technical Investigations

13 Tests

Tests were carried out to establish:

- load–deflection characteristics
- effectiveness of plastering key
- fire resistance test to BS 476-20 : 1987 on constructional detail incorporating lintel type S/K-70.

14 Investigations

14.1 To establish structural performance, calculations were undertaken and examined in conjunction with the results of the load–deflection tests (see section 13).

14.2 Calculations were undertaken to determine:

- the U value in accordance with CIBSE A3 : 1986, and
- the condensation risk.

14.3 Existing information relating to the suitability of the corrosion protection, including results of long-term exposure tests on galvanized steel carried out by the British Steel Corporation, was examined.

14.4 Assessment on the basis of existing data was made of:

- practicability of installation
- suitability, where appropriate, of the indentation and perforations provided to establish the plastering key
- behaviour in relation to fire of construction detail incorporating the lintels.

14.5 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.

Bibliography

- BS 476-20 : 1987 *Fire tests on building materials and structures — Method for determination of the fire resistance of elements of construction (general principles)*
- BS 5250 : 2002 *Code of practice for control of condensation in buildings*
- BS 5589 : 1989 *Code of practice for preservation of timber*
- BS 5628-1 : 2005 *Code of practice for the use of masonry — Structural use of unreinforced masonry*
- BS 5628-3 : 2005 *Code of practice for the use of masonry — Materials and components, design and workmanship*
- BS 5977-1 : 1981 *Lintels — Method for assessment of load*
- BS EN 10346 : 2009 *Continuously hot-dip coated steel flat products — Technical delivery conditions*
- CIBSE A3 : 1986 *Thermal properties of building structures*

15 Conditions

15.1 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
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