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Agrément Certificate
98/3493
Product Sheet 1

KEYSTONE LINTELS

KEYSTONE LINTELS FOR INTERNAL AND EXTERNAL MASONRY AND TIMBER-FRAME WALLS

This Agrément Certificate Product Sheet(1) relates to Keystone Lintels, galvanised steel lintels for use in internal and external masonry and timber-frame walls to provide support to walls, floors and roofs above window or door openings.

(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

Structural performance — the products are suitable for use in walls, with lintels between 600 mm and 6600 mm long (see Tables 1 to 8 and section 6).

Behaviour in relation to fire — in a conventional brick/block construction, the lintels can have a fire resistance of up to one-hour (see section 7).

Thermal performance —junctions incorporating the products can adequately limit heat loss (see section 8).

Condensation — the risk of local surface condensation can be acceptable in junctions incorporating the products (see section 9).

Durability — the products should have a service life commensurate with that of the building in which they are installed, with a minimum period of 60 years (see section 12).

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 Third issue: 18 May 2022

Originally certificated on 15 July 1998

Hardy Giesler
Chief Executive Officer

Regulations

In the opinion of the BBA, Keystone Lintels for Internal and External Masonry and Timber-frame Walls, 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)

Requirement:	**A1**	**Loading**
Comment:		The products can contribute to satisfying this Requirement. See section 6 of this Certificate.
Requirement:	**B3(1)**	**Internal fire spread (structure)**
Comment:		The products can be incorporated in a construction satisfying this Requirement. See section 7.2 of this Certificate.
Requirement:	**C2(b)**	**Resistance to moisture**
Comment:		The products incorporated in external cavity walls will not adversely affect the ability of the wall to satisfy these requirements. See sections 9.1 to 9.3 of this Certificate.
Requirement:	**C2(c)**	**Resistance to moisture**
Comment:		The products can contribute to satisfying this Requirement. See section 9.4 of this Certificate.
Requirement:	**L1(a)(i)**	**Conservation of fuel and power**
Comment:		The products can contribute to satisfying this Requirement. See section 8.3 of this Certificate.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The products are acceptable. See section 12 and the *Installation* part of this Certificate.
Regulation:	**7(2)**	**Materials and workmanship**
Comment:		The products are unrestricted by this Regulation. See section 7.1 of this Certificate.
Regulation:	**26**	**CO_2 emission rates for new buildings**
	26A	**Fabric energy efficiency rates for new dwellings (applicable to England only)**
	26A	**Primary energy consumption rates for new buildings (applicable to Wales only)**
	26B	**Fabric performance values for new dwellings (applicable to Wales only)**
Comment:		The products can contribute to satisfying these Regulations. See section 8.3 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	**8(1)(2)**	**Durability, workmanship and fitness of materials**
Comment:		The products are acceptable. See section 12 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	1.1(a)(b)	Structure
Comment:		The products are acceptable, with reference to clauses 1.1.1$^{(1)(2)}$ and 1.1.2$^{(1)(2)}$. See section 6 of this Certificate.

Standard:	2.3	Structural protection
Comment:		The products 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 sections 7.1 and 7.2 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The products can contribute to satisfying these Standards, with reference to clauses 3.10.1[(1)(2)], 3.10.2[(1)(2)], 3.10.3[(1)(2)], and 3.10.5[(1)(2)]. See section 9.4 of this Certificate.
Standard:	3.15	Condensation
Comment:		When incorporated in an external masonry cavity wall, the products will not adversely affect the ability of the wall to 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 9.4 of this Certificate.
Standard:	6.1	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The products can contribute to satisfying these Standards, with reference to clauses 6.1.1[(1)], 6.1.2[(2)], 6.1.6[(1)], 6.2.3[(1)], 6.2.4[(2)], 6.2.5[(2)], and 6.2.11[(2)], and 6.2.11[(2)]. See section 8.3 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The products can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6 and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.
Regulation:	**12**	**Building standards applicable to conversions**
Comment:		All comments given for these products under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1[(1)(2)] and Schedule 6[(1)(2)].

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

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

Regulation:	**23(a)(i)**	**Fitness of materials and workmanship**
Comment:	**(iii)(b)(i)**	The products are acceptable. See section 12 and the *Installation* part of this Certificate.
Regulation:	**28(b)**	**Resistance to moisture and weather**
Comment:		The products can contribute to satisfying this Regulation. See section 9.4 of this Certificate.
Regulation:	**29**	**Condensation**
Comment:		When incorporated in an external masonry cavity wall, the products will not adversely affect the ability of the wall to satisfy this Regulation. See sections 9.2 and 9.3 of this Certificate.
Regulation:	**30**	**Stability**
Comment:		The products are acceptable. See the *Installation* part of this Certificate and section 6.
Regulation:	**35(1)**	**Internal fire spread — Structure**
Comment:		The products can be incorporated in a construction satisfying this Regulation. See sections 7.1 and 7.2 of this Certificate.
Regulation:	**39(a)(i)**	**Conservation measures**
Regulation:	**40**	**Target carbon dioxide Emissions Rate**
Comment:		The products can contribute to satisfying these Regulations. See section 8.3 of this Certificate.

Construction (Design and Management) Regulations 2015
Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 1 *Delivery and site handling* (3.4) of this Certificate.

Additional Information

NHBC Standards 2022

In the opinion of the BBA, Keystone Lintels for Internal and External Masonry and Timber-frame Walls, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, 6.1 *External masonry walls*, 6.2 *External timber framed walls*, and 6.3 *Internal walls*.

CE marking

The Certificate holder has taken the responsibility of CE marking the product in accordance with harmonised European Standard BS EN 845-2 : 2013.

Technical Specification

1 Description

1.1 Keystone Lintels are steel lintels for external and internal masonry or timber walls, including:

- masonry walls with cavity widths from 50 mm to 165 mm, with insulated inserts to the lintels
- single leaf and solid walls
- box lintels
- eaves lintels.

1.2 The lintel profiles available are shown in Figures 1 and 2.

Figure 1 Lintel profiles for masonry cavity walls

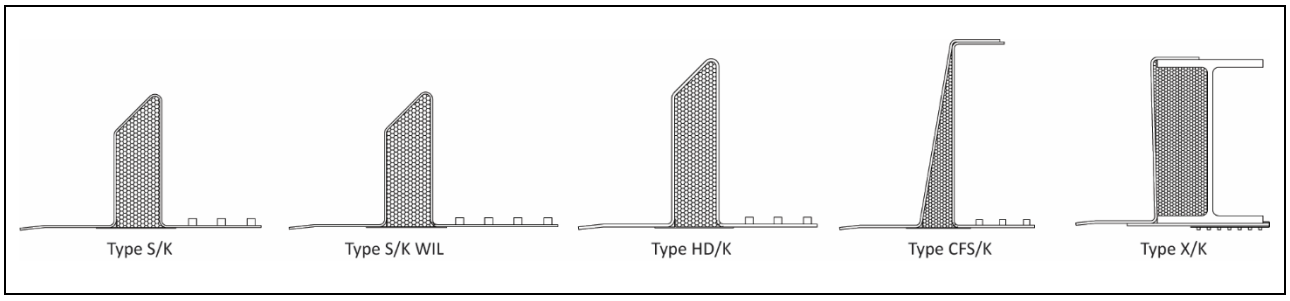
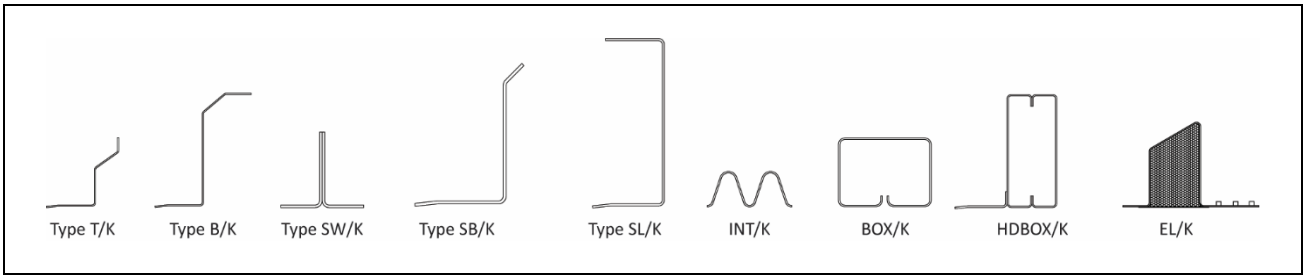


Figure 2 Lintel profiles for single leaf and solid walls, box lintels and eaves lintels



1.3 Lintels are available in a range of lengths from 600 mm to 6600 mm in 150 mm increments, see section 6 and Tables 1 to 7.

1.4 Lintels incorporate plaster keys, providing a suitable substrate for plastering.

1.5 Lintels for use in masonry cavity walls incorporate an indented inner leaf flange and a slotted baseplate, acting as a thermal break across the cavity, spot welded to the flanges.

1.6 Lintels for use on masonry cavity walls and eaves lintels (Types S/K, S/K WIL, HD/K, CFS/K, X/K and EL/K) incorporate cavity insulation inserts, made from expanded polystyrene to a defined density and declared thermal conductivity ($\lambda_{90/90}$ value) of 0.039 $W.m^{-1}.K^{-1}$.

1.7 Other items or components which may be used with the product, but which are outside the scope of this Certificate, are:

- brick or block masonry units, to BS EN 771-1 to 6
- bricklaying mortar, to BS EN 998-2 : 2016
- timber frame
- cavity trays
- plasterwork
- gypsum plasterboard to BS EN 520 : 2004
- wall insulation
- damp proof membranes.

Note: Details of suitable products/specifications may be obtained from the Certificate holder.

2 Manufacture

2.1 The lintels are manufactured from galvanized steel grade DX51D + Z600 zinc coating to BS EN 10346 : 2015.

2.2 Steel coil or sheet is cut to length to provide blanks from which the lintels are formed by press-braking.

2.3 Types S/K, S/K WIL, HD/K, CFS/K, X/K and EL/K have expanded polystyrene inserted into the upstand to fully insulate the lintel.

2.4 Types S/K, S/K WIL, HD/K, CFS/K, and EL/K include a thermal-break slotted bottom plate fixed with intermittent spot welds or clinched at 150 mm centres.

2.5 Type X/K include a continuous solid bottom plate, welded along the length.

2.6 Cut edges, fillet welds and rivets are treated with an anti-corrosion paint system.

2.7 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 operated by the manufacturer are being maintained.

2.8 The quality management system of the manufacturer has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by the BBA (Certificate 18/Q059).

2.9 The environmental management system of the Keystone Group has been assessed and registered as meeting the requirements of BS EN ISO 14001 : 2015 by the British Board of Agrément (Certificate 18/E019).

3 Delivery and site handling

3.1 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.

3.2 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. Minor damage to the galvanised steel profile can be repaired by using the same anti-corrosive paint used for treating cut edges, or zinc-rich paint.

3.3 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.

3.4 The lintels may be handled by site personnel or mechanical lifting devices – care must be taken to ensure any forks, slings or chains do not damage the protective coating.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Keystone Lintels for internal and external masonry and timber-frame walls.

Design Considerations

4 General

4.1 Keystone Lintels for Internal and External Masonry and Timber-frame Walls are satisfactory for use in cavity and single skin walls of brickwork, blockwork and/or timber-frame to provide support to wall, roof or floor loads (or a combination of these) above window or door openings (see Tables 1 to 8).

4.2 It is important for designers, planners, contractors and/or installers to ensure that the installation of the lintels is in accordance with the Certificate holder's instructions and the information given in this Certificate.

4.3 A cavity tray over the lintel must be provided and installed in accordance with BS 8215 : 1991 and NHBC Standards, Chapters 6.1, External Masonry Walls and 6.2 External timber framed walls. The installation must incorporate appropriate weep-holes and stop-ends to direct moisture out of the cavity.

4.4 In Scotland and Northern Ireland, or where exposure to driving rain is 'very severe', the upstand part of the damp-proof course should be returned into the inner leaf of masonry.

4.5 Lintels for use with masonry cavity walls preserve the inner leaf continuity and, therefore, allow plastering and the fixing of curtain tracks.

5 Practicability of installation

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

6 Structural performance

6.1 The tabulated safe working loads in Tables 1 to 7 (with the exception of Table 4) have been determined from tests and are the lesser of:

- test failure load divided by 1.6
- test load causing a vertical or horizontal deflection of 1/325 times the effective span.

6.2 The tabulated safe working loads in Table 4 have been determined from calculations in line with BS EN 1090-2 : 2018, and BS EN 1993-1-1 : 2005 and its National Annex.

6.3 All lintels have adequate strength and stiffness to sustain the uniformly distributed working loads given in Tables 1 to 7, subject to the following conditions:

- the defined cavity width, size of masonry unit and clear spans in Table 8 are not exceeded
- the specified loads given in Tables 1 to 7 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
- the applied loads are assumed to act uniformly distributed along the length of the lintel
- 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 to 7
- design of the wall and opening details, together with appropriate workmanship on site, must ensure that eccentric loading on the galvanized steel profile does not exceed the eccentricities given in Table 8.

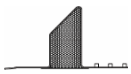
Table 1 Profiles — Masonry Cavity Walls – Type S/K lintels

Standard

Type S/K-50[1] (cavity widths: 50 mm to 65 mm)

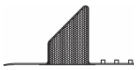
Lengths, typically in 150 mm increments	600–1200	1350–1500	1650–1800	1950–2100	2250–2400	2550–2700	2850–3000	3150–3600	3750–4000	4200	4350–4800
Height of lintel (mm)	79	96	109	134	147	172	172	209	209	210	210
Thickness of lintel (mm)	1.6	1.8	2.0	2.0	2.0	2.0	2.5	2.9	2.9	3.2	3.2
UDL[2a] (kN)	12	14	19	21	21	26	27	27	26	27	25
UDL[2b] (kN)	10	12	16	17	19	22	20	20	19	22	22
Weight (kg·m^{-1})	5.05	6.10	7.13	7.92	8.32	9.11	11.27	14.83	14.83	16.31	16.31

Type S/K-70[1] (cavity widths: 70 mm to 85 mm)



Lengths, typically in 150 mm increments	600-1200	1350-1500	1650-1800	1950-2100	2250-2400	2550-3000	3150-3600	3750-4000	4200	4350-4800
Height of lintel (mm)	99	88	105	130	142	168	206	206	207	224
Thickness of lintel (mm)	1.6	1.8	2.0	2.0	2.0	2.5	2.9	2.9	3.2	3.2
UDL[2a] (kN)	12	14	18	21	21	27	27	26	27	27
UDL[2b] (kN)	10	12	14	17	19	22	20	19	22	22
Weight (kg·m^{-1})	5.79	6.22	7.25	8.04	8.44	11.39	14.98	14.98	16.46	17.34

Type S/K-90[1] (cavity widths: 90 mm to 105 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	4350-4800
Height of lintel (mm)	88	88	107	126	151	164	172	202	202	202	220
Thickness of lintel (mm)	1.6	1.8	2.0	2.0	2.0	2.5	2.5	2.9	2.9	3.2	3.2
UDL[2a] (kN)	12	16	19	21	23	27	27	27	26	27	27
UDL[2b] (kN)	10	13	16	17	18	22	20	20	19	22	22
Weight (kg·m^{-1})	5.90	6.57	7.76	8.16	8.95	11.51	12.00	15.13	15.13	16.61	17.49

Type S/K-150[1] (cavity widths: 150 mm to 165 mm)

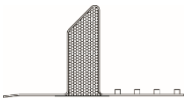
Lengths, typically in 150 mm increments	600-1200	1350-1500	1650-1800	1950-2100	2250-2400	2550-3000	3150-3600	3750-4000	4200-4800
Height of lintel (mm)	73	74	120	120	149	150	175	176	194
Thickness of lintel (mm)	1.8	2.0	2.0	2.0	2.0	2.5	2.5	3.2	3.2
UDL[2a] (kN)	12	15	22	21	25	25	26	26	25
UDL[2b] (kN)	10	13	18	17	20	20	19	19	20
Weight (kg·m^{-1})	7.35	8.08	9.28	9.29	10.09	12.36	13.62	17.06	17.95

(1) Incorporating an indented inner leaf flange and a slotted 'thermal-break' plate fixed across the cavity with intermittent spot welds or clinched at 150 mm centres.

(2) Total uniformly distributed load (UDL):
(a) load ratio 3:1
(b) load ratio 19:1

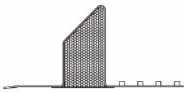
Table 1 Profiles — Masonry Cavity Walls – Type S/K lintels (continued)

Type S/K-50[1] WIL (cavity widths: 50 mm to 65 mm)



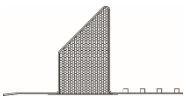
Lengths, typically in 150 mm increments	600-1500	1650-1800	1950-2100	2250-2400	2550-3000	3150-3600	3750-4200
Height of lintel (mm)	97	109	134	159	172	198	198
Thickness of lintel (mm)	2.0	2.0	2.0	2.0	2.5	3.2	3.2
UDL[2a] (kN)	12	15	20	24	28	30	27
UDL[2b] (kN)	10	13	18	20	21	26	25
Weight (kg·m^{-1})	7.12	7.53	8.32	9.11	11.76	16.30	16.31

Type S/K-70[1] WIL (cavity widths: 70 mm to 85 mm)



Lengths, typically in 150 mm increments	600-1350	1500-1650	1800	1950-2100	2250-2400	2550-3000	3150-3600	3750-4200
Height of lintel (mm)	90	90	105	130	155	168	194	194
Thickness of lintel (mm)	2.0	2.0	2.0	2.0	2.0	2.5	3.2	3.2
UDL[2a] (kN)	12	13	20	19	24	27	30	27
UDL[2b] (kN)	10	11	17	17	20	21	26	25
Weight (kg·m^{-1})	7.23	7.24	7.64	8.43	9.22	11.88	16.45	16.46

Type S/K-90[1] WIL (cavity widths: 90 mm to 105 mm)



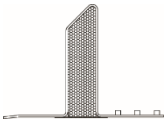
Lengths, typically in 150 mm increments	600-1200	1350-1800	1950-2400	2550-3000	3150-3600	3750-4200
Height of lintel (mm)	95	107	151	176	190	190
Thickness of lintel (mm)	2.0	2.0	2.0	2.5	3.2	3.2
UDL[2a] (kN)	13	17	23	24	30	27
UDL[2b] (kN)	11	14	18	18	26	25
Weight (kg·m^{-1})	7.72	8.15	9.34	12.49	16.60	16.61

(1) Incorporating an indented inner leaf flange and a slotted 'thermal-break' plate fixed across the cavity with spot welds or clinched at 150 mm centres.

(2) Total uniformly distributed load (UDL):
  (a) load ratio 3:1
  (b) load ratio 19:1

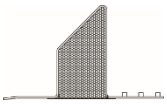
Table 2 Profiles — Masonry Cavity Walls – Heavy Duty Type HD/K lintels

Type HD/K-50[1] (cavity widths: 50 mm to 65 mm)



Lengths, typically in 150 mm increments	600–1200	1350-1500	1650-2100	2250–2550	2700–3000	3150–3600	3750–4200
Height of lintel (mm)	106	123	173	209	210	210	210
Thickness of lintel (mm)	2.9	2.9	2.9	2.9	3.2	3.2	3.2
UDL[2a] (kN)	30	30	40	40	40	35	33
UDL[2b] (kN)	22	22	35	35	35	32	28
Weight (kg·m^{-1})	10.04	10.81	13.10	14.82	16.30	16.30	16.31

Type HD/K-90[1] (cavity widths: 90 mm to 105 mm)



Lengths, typically in 150 mm increments	600-1200	1350-1500	1650-2100	2250-2550	2700-3000	3150-3600	3750-4200
Height of lintel (mm)	109	139	164	202	202	202	202
Thickness of lintel (mm)	2.9	2.9	2.9	2.9	3.2	3.2	3.2
UDL[2a] (kN)	30	30	40	40	40	35	33
UDL[2b] (kN)	22	22	35	35	35	32	28
Weight (kg·m^{-1})	11.07	12.23	13.40	15.11	16.59	16.60	16.61

(1) Incorporating an indented inner leaf flange and a slotted 'thermal-break' plate fixed across the cavity with spot welds or clinched at 150 mm centres.

(2) Total uniformly distributed load (UDL):
  (a) load ratio 3:1
  (b) load ratio 19:1

Table 2 Profiles — Masonry Cavity Walls – Heavy Duty Type HD/K lintels (continued)

Type HD/K-150[1] (cavity widths: 150 mm to 165 mm)

Lengths, typically in 150 mm increments	600-1500	1650-2100	2250-3000	3150-3600	3750-4000
Height of lintel (mm)	126	156	180	180	194
Thickness of lintel (mm)	2.9	2.9	3.2	3.2	3.2
UDL[2a] (kN)	30	30	35	30	30
UDL[2b] (kN)	20	22	30	25	26
Weight (kg·m^{-1})	13.22	14.63	17.04	17.05	17.94

(1) Incorporating an indented inner leaf flange and a slotted 'thermal-break' plate fixed across the cavity with spot welds or clinched at 150 mm centres.

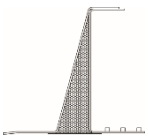
(2) Total uniformly distributed load (UDL):
- (a) load ratio 3:1
- (b) load ratio 19:1

Table 3 Profiles — Masonry Cavity Walls – Extra Heavy Duty Type CFS/K lintels

Type CFS/K-50[1] (cavity widths: 50 mm to 65 mm)

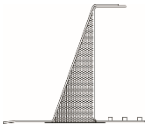
Lengths, typically in 150 mm increments	600-1500	1650-2100	2250-3000	3150-4000	4200-4800
Height of lintel (mm)	234	234	234	234	234
Thickness of lintel (mm)	2.9	2.9	2.9	3.2	3.2
UDL [2a] (kN)	-	-	-	-	-
UDL [2b] (kN)	70	60	50	45	40
Weight (kg·m^{-1})	18.32	18.34	18.35	19.95	19.95

Type CFS/K-70[1] (cavity widths: 70 mm to 85 mm)



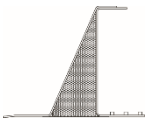
Lengths, typically in 150 mm increments	600-1500	1650-2100	2250-3000	3150-4000	4200-4800
Height of lintel (mm)	234	234	234	234	234
Thickness of lintel (mm)	2.9	2.9	2.9	3.2	3.2
UDL [2a] (kN)	-	-	-	-	-
UDL [2b] (kN)	70	60	50	45	40
Weight (kg·m^{-1})	18.46	18.49	18.50	20.35	20.35

Type CFS/K-90[1] (cavity widths: 90 mm to 105 mm)



Lengths, typically in 150 mm increments	600-1500	1650-2100	2250-3000	3150-4000	4200-4800
Height of lintel (mm)	234	234	234	234	234
Thickness of lintel (mm)	2.9	2.9	2.9	3.2	3.2
UDL [2a] (kN)	-	-	-	-	-
UDL [2b] (kN)	70	60	50	45	40
Weight (kg·m^{-1})	18.60	18.63	18.65	20.50	20.51

Type CFS/K-110[1] (cavity widths: 110 mm to 125 mm)



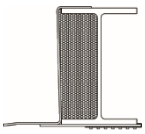
Lengths, typically in 150 mm increments	600-1500	1650-2100	2250-3000	3150-4000	4200-4800
Height of lintel (mm)	234	234	234	234	234
Thickness of lintel (mm)	2.9	2.9	2.9	3.2	3.2
UDL [2a] (kN)	-	-	-	-	-
UDL [2b] (kN)	70	60	50	45	40
Weight (kg·m^{-1})	18.75	18.78	18.80	20.65	20.66

(1) Incorporating an indented inner leaf flange and a slotted 'thermal-break' plate fixed across the cavity with spot welds or clinched at 150 mm centres.

(2) Total uniformly distributed load (UDL):
- (a) load ratio 3:1
- (b) load ratio 19:1

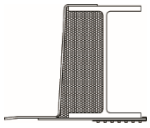
Table 4 Profiles — Masonry Cavity Walls – Extreme Type X/K lintels

Type X/K-50[(1)] (cavity widths: 50 mm to 65 mm)



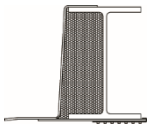
Lengths, typically in 150 mm increments	600-3000	3150-4800	5100	5400	5700	6000	6300	6600
Height of lintel (mm)	213	213	213	213	213	213	213	213
Thickness of lintel (mm)	2.9	3.2	3.2	3.2	3.2	3.2	3.2	3.2
UDL (kN)	95	80	70	62	55	50	45	40
Weight (kg·m^{-1})	42.29	43.56	43.56	43.56	43.56	43.56	43.56	43.56

Type X/K-70[(1)] (cavity widths: 70 mm to 85 mm)



Lengths, typically in 150 mm increments	600-3000	3150-4800	5100	5400	5700	6000	6300	6600
Height of lintel (mm)	213	213	213	213	213	213	213	213
Thickness of lintel (mm)	2.9	3.2	3.2	3.2	3.2	3.2	3.2	3.2
UDL (kN)	95	80	70	62	55	50	45	40
Weight (kg·m^{-1})	42.75	44.07	44.07	44.07	44.07	44.07	44.07	44.07

Type X/K-90[(1)] (cavity widths: 90 mm to 105 mm)



Lengths, typically in 150 mm increments	600-3000	3150-4800	5100	5400	5700	6000	6300	6600
Height of lintel (mm)	213	213	213	213	213	213	213	213
Thickness of lintel (mm)	2.9	3.2	3.2	3.2	3.2	3.2	3.2	3.2
UDL (kN)	95	80	70	62	55	50	45	40
Weight (kg·m^{-1})	43.20	44.57	44.57	44.57	44.57	44.57	44.57	44.57

(1) Incorporating an indented inner leaf flange and a continuous solid bottom plate, welded along the length.

Table 5 Profiles — Solid wall and single-leaf lintels

Timber frame

Type T/K-50 (single leaf)

Lengths, typically in 150 mm increments	600-1200	1350-1800	1950-2400	2550-3600	3750-4800
Height of lintel (mm)	110	111	136	187	252
Thickness of lintel (mm)	2.0	2.5	2.5	2.8	3.0
UDL (kN)	4	5	5	9	12
Weight (kg·m^{-1})	3.53	4.42	4.91	6.59	8.60

Type T/K-90 (single leaf)

Lengths, typically in 150 mm increments	600-1650	1800-2400	2550-3000	3150-4800
Height of lintel (mm)	121	166	197	257
Thickness of lintel (mm)	2.5	2.5	2.9	3.2
UDL (kN)	5	8	9	12
Weight (kg·m^{-1})	5.20	6.08	7.74	10.05

Solid wall

Type B/K-50 (single leaf)

Lengths, typically in 150 mm increments	600-1800	1950-2400	2550-3000	3150-4800
Height of lintel (mm)	150	225	225	225
Thickness of lintel (mm)	2.5	2.5	2.9	3.0
UDL (kN)	6	12	10	14
Weight (kg·m^{-1})	6.12	7.65	8.88	9.18

Table 5 Profiles — Solid wall and single-leaf lintels (continued)

SW/K-100

Lengths, typically in 150 mm increments	600-1200	1350-1650	1800-2100	2250-2700
Height of lintel (mm)	58	88	89	116
Thickness of lintel mm)	2.5	2.5	2.9	3.2
UDL (kN)	6	8	8	10
Weight (kg·m^{-1})	3.93	5.10	5.92	7.89

SW/K

Lengths, typically in 150 mm increments	600-1200	1350-1650	1800-2100	2250-2700
Height of lintel (mm)	58	93	94	117
Thickness of lintel mm)	2.5	2.5	2.9	3.0
UDL (kN)	6	8	8	10
Weight (kg·m^{-1})	5.89	7.26	8.42	9.80

Type SB/K

Lengths, typically in 150 mm increments	0600-0900	1050-1200	1350-1500	1650-1800	1950-2250	2400-2700
Height of lintel (mm)	55	55	102	102	152	202
Thickness of lintel (mm)	2.0	2.5	2.5	2.9	2.9	2.9
UDL (kN)	2.5	4	5	7	7	8
Weight (kg·m^{-1})	2.36	2.94	3.93	4.55	5.69	6.83

Type SL/K

Lengths, typically in 150 mm increments	600-1800	1950-2400	2550-2700	2850-3000
Height of lintel (mm)	150	227	227	227
Thickness of lintel mm)	2.5	2.5	2.9	3.0
UDL (kN)	16	20	22	22
Weight (kg·m^{-1})	5.89	7.65	8.88	9.18

INT/K-75

Lengths, typically in 150 mm increments	900–1200
Height of lintel (mm)	28
Thickness of lintel (mm)	1.2
UDL (kN)	5
Weight (kg·m^{-1})	1.41

INT/K-100

Lengths, typically in 150 mm increments	900–1200
Height of lintel (mm)	28
Thickness of lintel (mm)	1.2
UDL (kN)	7
Weight (kg·m^{-1})	2.07

Table 6 Profiles — Box lintels

Standard

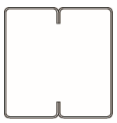
BOX/K-75

Lengths, typically in 150 mm increments	600-1200	1350-1650	1800
Height of lintel (mm)	70	70	70
Thickness of lintel (mm)	1.6	1.6	2.0
UDL (kN)	15	10	10
Weight (kg·m^{-1})	3.99	3.99	4.99

BOX/K-100

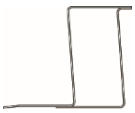
Lengths, typically in 150 mm increments	600-1200	1350-1500	1650-1800	1950-2400	2550-2700	2850-3600	3750-4200	4350-4800
Height of lintel (mm)	70	70	150	150	150	215	215	215
Thickness of lintel (mm)	1.6	2.0	1.6	2.0	2.0	2.5	2.5	2.5
UDL (kN)	15	15	18	25	20	35	30	24
Weight (kg·m^{-1})	3.99	4.99	6.58	8.23	8.23	13.07	13.07	13.07

BOX/K-150



Lengths, typically in 150 mm increments	600-1800	1950-2100	2250-2400	2550-2700	2850-3600	3750-4200	4350-4800
Height of lintel (mm)	150	150	150	150	215	215	215
Thickness of lintel (mm)	1.6	2.0	2.0	2.0	2.5	2.5	2.5
UDL (kN)	18	30	25	20	35	30	25
Weight (kg·m^{-1})	8.04	10.05	10.05	10.05	17.00	17.00	17.00

BOX/K-200



Lengths, typically in 150 mm increments	600-1800	1950-2100	2250-2400	2550-2700	2850-3600	3750-4200	4350-4800
Height of lintel (mm)	150	150	150	150	215	215	215
Thickness of lintel (mm)	1.6	2.0	2.0	2.0	2.5	2.5	2.5
UDL (kN)	18	30	25	20	35	30	24
Weight (kg·m^{-1})	8.79	9.61	9.61	9.61	14.19	14.19	14.19

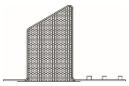
Heavy duty

HDBOX/K-200

Lengths, typically in 150 mm increments	600-1200	1350-1800	1950-2400	2550-2700
Height of lintel (mm)	150	150	215	215
Thickness of lintel (mm)	2.5	2.5	2.5	2.5
UDL (kN)	40	35	45	40
Weight (kg·m^{-1})	12.83	12.83	15.62	15.62

Table 7 Profiles — Eaves lintels

EL/K-90 (cavity widths: 90 mm to 125 mm)



Lengths, typically in 150 mm increments	600-1500	1650-2100	2250-2400	2550-2700
Height of lintel (mm)	107	145	163	164
Thickness of lintel (mm)	1.8	2	2	2.5
UDL[(1)] (kN)	18	20	22	25
Weight (kg·m^{-1})	6.33	8.16	8.56	10.52

(1) Incorporating an indented inner leaf flange and a slotted 'thermal-break' plate fixed across the cavity with spot welds or clinched at 150 mm centres.

(2) Total uniformly distributed load (UDL), load ratio from 19:1

6.4 The following limitations apply:

- end support bearing length must be a minimum of 150 mm, with the exception of Table 4, where a minimum of 200 mm is required
- the load ratio between the inner and outer flanges for masonry cavity walls should be a minimum of 3:1 and not exceed 19:1:

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

where:

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

6.5 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 EN 1996-1-1 : 2005, BS EN 1996-1-2 : 2005, BS EN 1996-2 : 2006 and BS EN 1996-3 : 2006 and their UK National Annexes, and the national Building Regulations.

6.6 The load-span data shown in Tables 1 to 7 is valid only for the safe working loads and the lintel lengths given. For other loading conditions, or spans outside this range, the Certificate holder should be consulted for advice.

6.7 Guidance on the assessment of loads on lintels in masonry is given in BS EN 845-2 : 2013 and PD 6697 : 2019. It is the responsibility of the designer to ensure that the applied loads do not exceed the safe working loads given in Tables 1 and 7.

6.8 To avoid excessive eccentricities of loading, the lintel must only be used with standard masonry units 100 mm to 150 mm wide, see Table 8.

Table 8 Maximum permissible eccentricities

Lintel types	Maximum allowable masonry width (mm)		Allowable cavity width	Maximum allowable eccentricity(1) (mm)	
	Block inner leaf	Brick outer leaf	(mm)	Block inner leaf	Brick outer leaf
S/K-50, HD/K-50,	100	100	50	75	75
CFS/K-50 and X/K-50	100	100	65(2)	82.5	82.5
S/K-70, CFS/K-70 and	100	100	70	85	85
X/K-70	100	100	85(2)	92.5	92.5
S/K-90, HDK-90,	100	100	90	95	95
CFS/K-90 and X/K-90	100	100	105(2)	102.5	102.5
CFS/K-110	100	100	110	105	105
	100	100	125(2)	112.5	112.5
S/K-150 and HD/K-150	100	100	150	125	125
	100	100	165(2)	132.5	132.5
S/K-50 WIL	150	100	50	100	75
	125	100	65(2)	95	82.5
S/K-70 WIL	150	100	70	110	85
	125	100	85(2)	105	92.5
S/K-90 WIL	150	100	90	120	95
	125	100	105(2)	115	102.5

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

6.9 In addition to the requirements specifically referred to in this Certificate, timber structures in which the lintels are incorporated must be designed and constructed to comply with BS EN 1995-1-1 : 2004, BS EN 1995-1-2 : 2004, and their UK National Annexes, and the national Building Regulations.

7 Behaviour in relation to fire

7.1 Galvanized steel profiles have a reaction to fire classification of A1 to BS EN 13501-1 : 2018 in accordance with national Building Regulations.

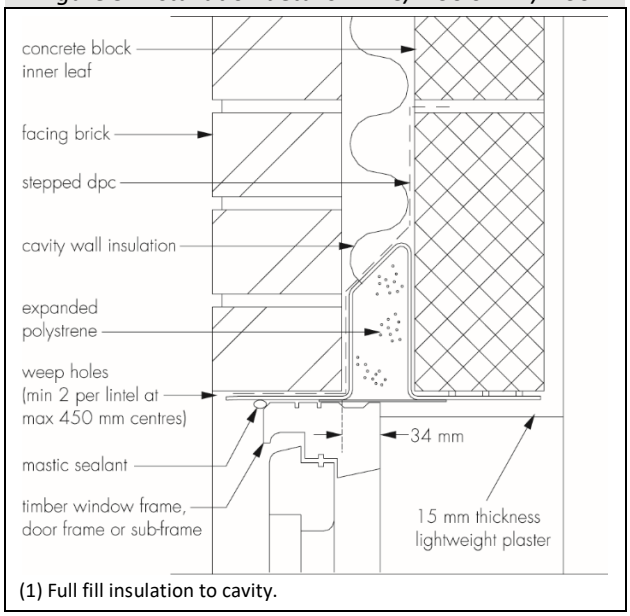
7.2 The construction detail shown in Figure 3 has been assessed to BS 476-20 : 1987 as capable of satisfying the national Building Regulations in situations where a one-hour fire resistance is required(1).

(1) Designers should refer to Exova test report Warres No. 101263, available from the Certificate holder.

7.3 The insulated profiles contain EPS insulation, which has not been classified to BS EN 13501-1 : 2018.

7.4 Where any other form of wall construction incorporating the 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, or equivalent, for the test concerned.

Figure 3 Installation details(1) — S/K-50 or HD/K-50



(1) Full fill insulation to cavity.

8 Thermal performance

8.1 S/K, S/K WIL, HD/K, CFS/K, X/K and EL/K lintels are fully insulated with expanded polystyrene ($\lambda_{90/90}$ declared value of 0.039 $W \cdot m^{-1} \cdot K^{-1}$) which is inserted into the upstand.

8.2 Typical example details containing type S/K and type HD/K lintels, based on the construction details shown in Figures 3 to 6, were analysed numerically to determine their likely hygrothermal performance.

8.3 The opening head soffits given below 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 BRE Report BR 262 : 2002.

- 0.50 $W \cdot m^{-1} \cdot K^{-1}$ detail shown in Figure 3, with 210 mm high, 3.2 mm thick S/K-50 lintel, 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, full fill insulation conductivity is 0.021 $W \cdot m^{-1} \cdot K^{-1}$, and equivalent conductivity of baseplate is 9.1 $W \cdot m^{-1} \cdot K^{-1}$

- 0.37 $W \cdot m^{-1} \cdot K^{-1}$ detail shown in Figure 3, with 121 mm high 2.9 mm thick HD/K-50 lintel, 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, full fill insulation conductivity is 0.040 $W \cdot m^{-1} \cdot K^{-1}$, and equivalent conductivity of baseplate is 9.1 $W \cdot m^{-1} \cdot K^{-1}$

- 0.30 $W \cdot m^{-1} \cdot K^{-1}$ detail shown in Figure 4, with 151 mm high 2.0 mm thick S/K-90 lintel, where the door/window is set-back at least 40 mm into the cavity, sealed at front and the internal surface of reveal is covered by at least a 15 mm thickness of lightweight plaster, wall U value is 0.28 $W \cdot m^{-2} \cdot K^{-1}$ and equivalent conductivity of a baseplate is 17.9 $W \cdot m^{-1} \cdot K^{-1}$

- 0.26 $W \cdot m^{-1} \cdot K^{-1}$ detail shown in Figure 5, with 151 mm high 2.0 mm thick S/K-90 lintel, where the door/window is fully set-back over the wall cavity, the blockwork conductivity is 0.15 $W \cdot m^{-1} \cdot K^{-1}$, the wall U value is 0.30 $W \cdot m^{-2} \cdot K^{-1}$ and equivalent conductivity of baseplate is 17.9 $W \cdot m^{-1} \cdot K^{-1}$.

8.3 For other junction details, the linear thermal transmittance and temperature factor should be calculated following the guidance given in BRE Report 497 : 2016.

Figure 4 Installation detail — S/K-90 (100 mm full fill cavity)

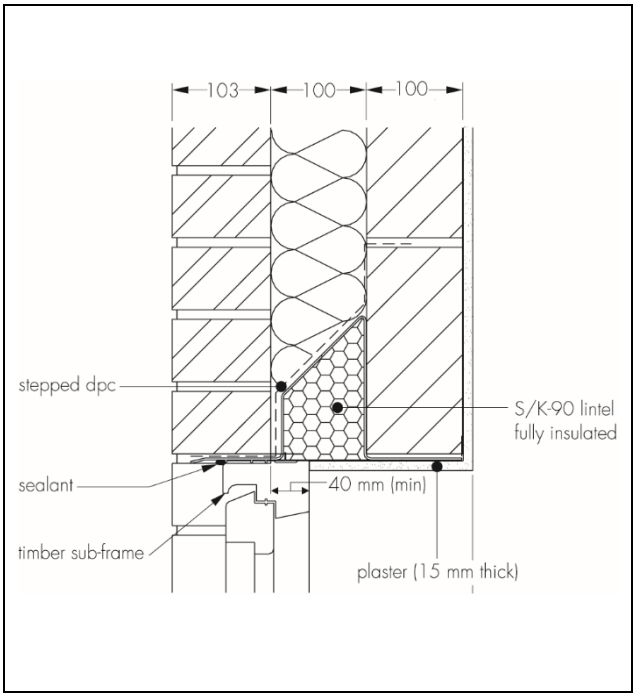
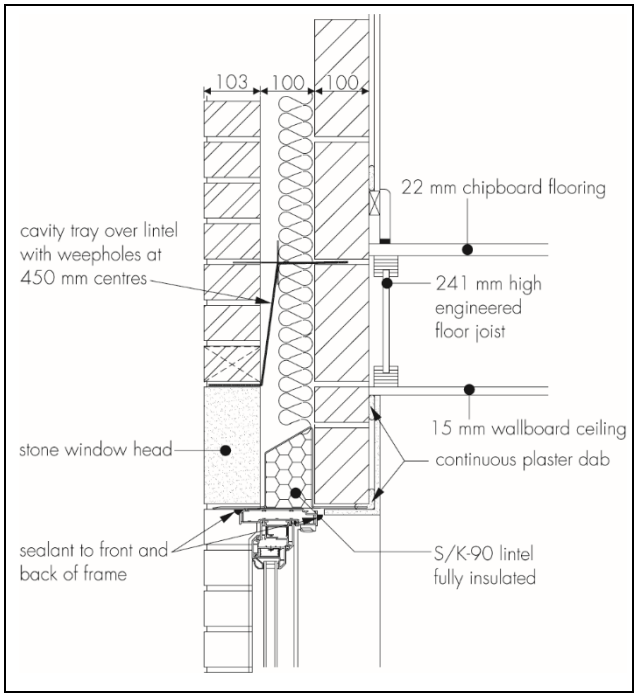


Figure 5 Installation detail – S/K-90 (100 mm partial fill cavity)



9 Condensation

Surface condensation

9.1 The constructions described in section 8.3 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', e.g. buildings such as laundries, breweries, swimming pools as defined in BS 5250 : 2021. For other constructions, see section 8.4 of this Certificate.

Interstitial condensation

9.2 The risk of interstitial condensation in both the external walling and roofing is greatest when the building is drying out after construction. Guidance on preventing condensation is given in BRE Report BR 262 : 2002.

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.

Precipitation

9.4 It is essential that walls incorporating the system are rain resistant and show no sign of water ingress. Careful attention must be paid to joints and junctions in and between components and elements.

10 Corrosion protection

The lintels are suitable for contact with conventional cavity insulation materials and mortar additives and have adequate protection against corrosion providing:

- the protective zinc is undamaged or minor changes repaired
- mortar complies with the requirements of BS EN 1996-1-1 : 2005
- timber door or window frames in contact with the lintels are treated with boron compounds or organic solvent type preservatives. 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.

11 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. The Certificate holder should be consulted for details of suitable coatings.

12 Durability

Providing the lintels are designed and installed in accordance with this Certificate, they should have a working life commensurate with that of the building in which they are installed, with a minimum period of 60 years, subject to the following conditions:

- the lintels are installed and used in accordance with the temperature and humidity conditions described in section 9 of this Certificate
- the galvanized steel profile of the lintel is protected as described in section 10.

13 Reuse and recyclability

The products comprise galvanized steel which is readily recyclable.

Installation

14 Procedure

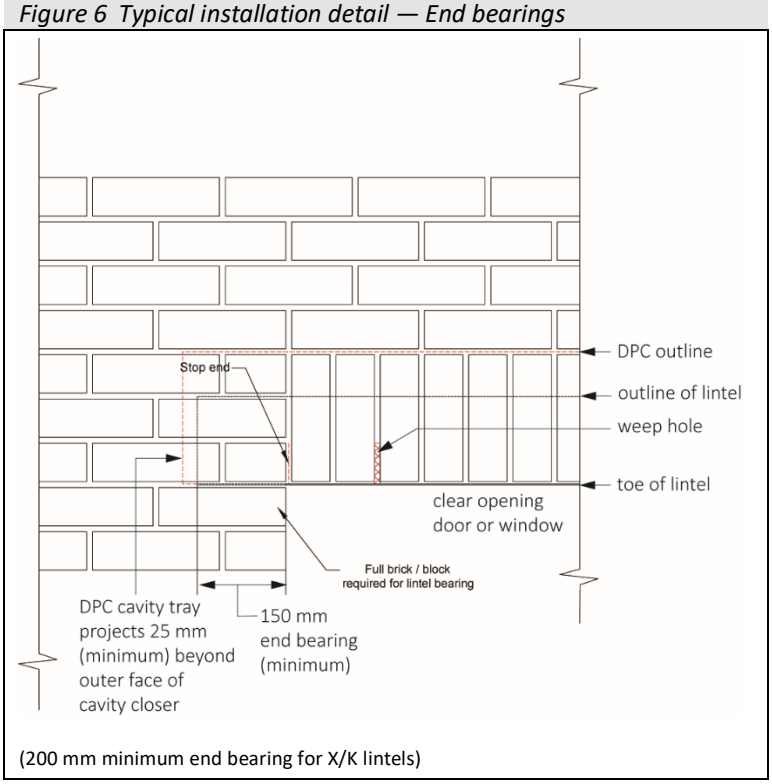
General

14.1 Typical installation details of Keystone Lintels for Internal and External Masonry and Timber-frame Walls are shown in Figures 3 to 9.

14.2 Except for the longer span lintels, the lintels can generally be lifted and handled by a single operative. Protective gloves should be worn when handling the product.

14.3 Lintels must be installed with at least the minimum end bearing dimensions given in section 6.5 and illustrated in Figure 6, and be fully bedded on bricklaying mortar on a full-size masonry unit.

Figure 6 Typical installation detail — End bearings



(200 mm minimum end bearing for X/K lintels)

Masonry inner leaf

14.4 The inner and outer leaves supported by the lintel must be raised simultaneously to avoid excessive eccentricity of loading, with a maximum height difference of 225 mm (masonry should be laid on a mortar bed and all perpendicular joints should be filled).

Timber frame

14.5 A timber pinch batten (minimum 300 mm long at midspan, outside the scope of this Certificate) is required to prevent rotation of the timber frame lintel during the building phase.

14.6 Timber frame lintels must be installed with restraining clips at maximum 500 mm centres, at the mid-span, and maximum 300 mm from the end of the lintel. Timber frame restraint clips are available from the Certificate holder, and must be fixed to the timber frame structure by 3.3 mm diameter by 50 mm long galvanised nails.

14.7 Allowance should be made for the movement of the timber frame structure due to settlement and shrinkage.

Outer leaf

14.8 Masonry should not overhang any lintel flange by more than 25 mm (see Figure 7).

14.9 The lintels must be used in conjunction with a DPC.

14.10 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; where required by *NHBC Standards*, and particularly in areas of severe and very severe exposure, and where full-fill cavity insulation is specified (see Figure 8).

Figure 7 Typical installation detail — Window / door heads

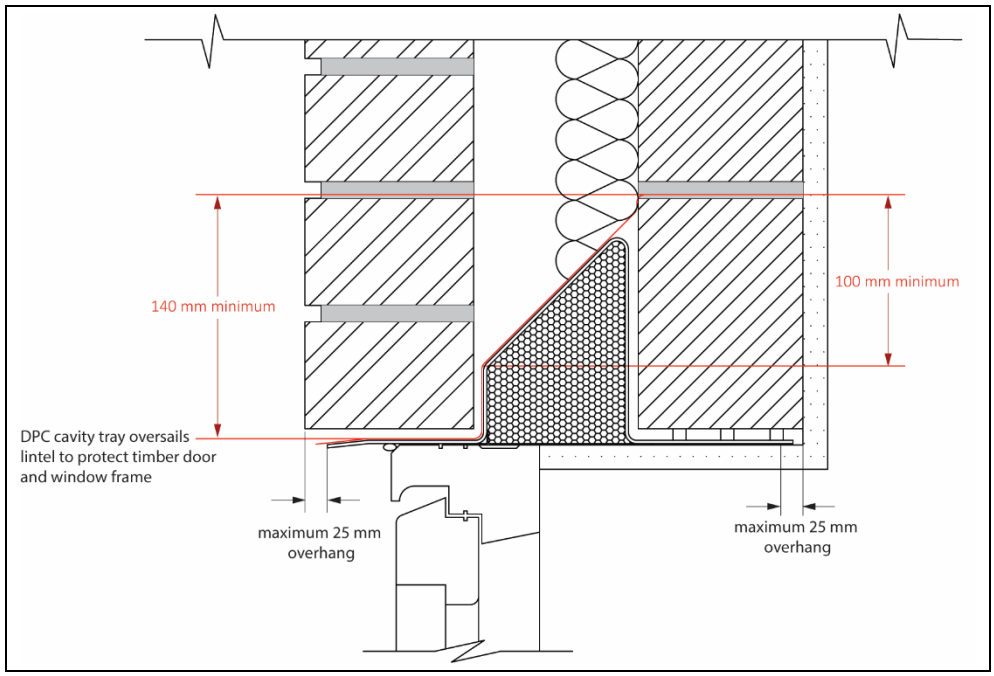
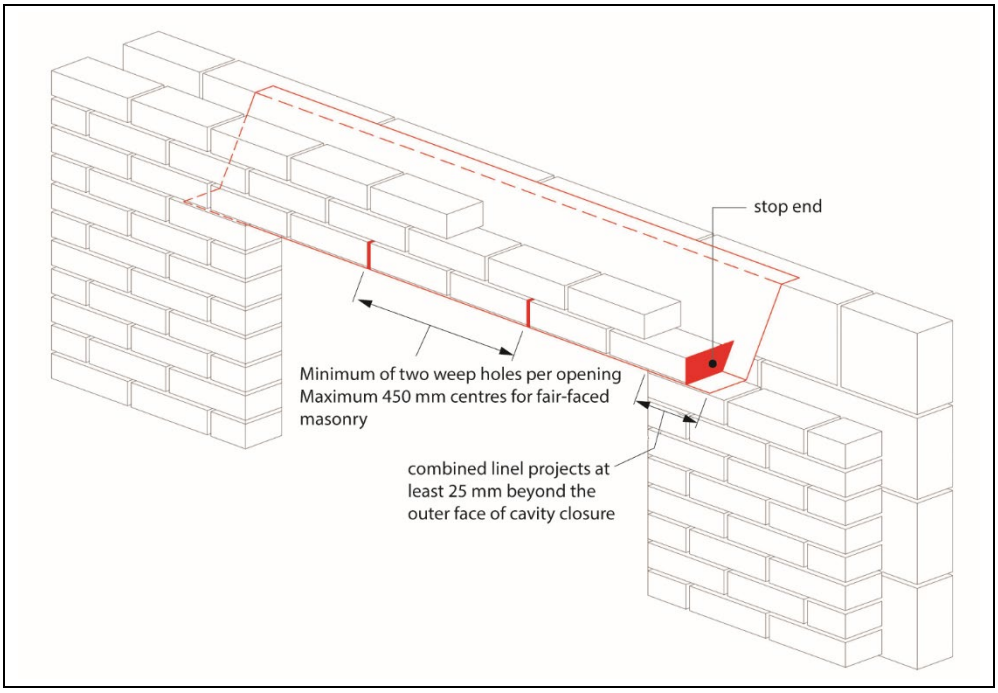


Figure 8 Typical installation detail — DPC and weep holes



14.11 To comply with *NHBC Standards* in Scotland, Northern Ireland and areas of severe and very severe exposure as detailed in BRE Report 262, separate DPC protection must be provided over the lintels and stopend. Cavity trays are required under all exposure conditions.

14.12 Stop ends (outside the scope of this Certificate) should be provided to cavity trays and lintels.

14.13 Mortar must be allowed to cure before applying floor or roof loads. Temporary propping beneath a steel lintel is sometimes practised to facilitate speed of construction.

14.14 When installing concrete floor units or other heavy components above a lintel, care should be taken to avoid shock loading and floor units should not be dragged into position.

14.15 Point loads should not be applied directly onto lintel flanges. Lintels should have a minimum of 150 mm masonry between the flange and the application level of any form of loading. The Certificate holder should be contacted for guidance if a point load is to be applied above the lintel.

14.16 The external lintel flange must project beyond the window / door frame and it is recommended that a flexible sealing compound is used between the underside of the lintel flange and the frame.

14.17 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.

Technical Investigations

15 Tests

Tests were carried out to establish:

- load/deflection characteristics
- effectiveness of plastering key
- fire resistance.

16 Investigations

16.1 To establish structural performance, calculations were undertaken and examined in conjunction with the results of the load/deflection tests (see section 15).

16.2 Calculations were undertaken to determine:

- psi values
- condensation risk.

16.3 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.

16.4 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.

16.5 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

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PD 6697 : 2019 *Recommendations for the design of masonry structures to BS EN 1996-1-1 and BS EN 1996-2*

17 Conditions

17.1 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.

17.2 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.

17.3 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.

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

17.5 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.

17.6 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.