


## CE Marking for specialist contractors and specifiers

**Construction Products Regulation  
 Curtain walling**

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### Construction Products Regulation

- What is it?
- Harmonised product standard
- CE marking
- Performance characteristics
- Impacts on industry



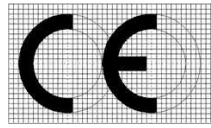


### Construction Products Regulation

- Construction Products Regulation (CPR)
  - A European Union regulation
  - Mandatory in every EU state
  - No national opt-out
  - A legal requirement from July 2013



### Construction Products Regulations

- Construction Products for which there is a harmonised European Standard (hEN) have to be CE marked
- Performance requirements of the hEN have to be declared unless:
  - They do not have a threshold performance
 and
  - They are not part of National Regulations

## CE Marking for specialist contractors and specifiers

### Harmonised standard

- The harmonised product standard for curtain walling is:
  - EN 13830
  - Curtain walling – Product standard
- This is being re-written:
  - Final draft late 2012
  - Public comment 2013
  - Published early 2014
  - Much is common with the existing BS EN 13830
  - Existing test results remain valid



### hEN 13830

- The CE mark is affixed to the wall by the company placing it in the market
- Reaction to fire
- Fire resistance
- Fire propagation
- Resistance to own load
- Wind load resistance
- Impact resistance
- Resistance to live horizontal loads
- g-value
- U-value
- ...

<b>CE</b>	
01234	
AnyCo Ltd, PO Box 21, B-1000	
11	
01234-CPD-00234	
<b>EN 13830</b>	
Curtain walling, as external walls	
Reaction to fire	A1
Fire resistance	E60
Fire propagation	DS0
Water tightness	RE
Dead load resistance	0.5kN/m <sup>2</sup>
Wind load resistance	B
Snow load resistance	C
Impact resistance	11 – E1
Horizontal live load resistance	10
Thermal shock resistance	Toughened glass
Seismic resistance	10 mm
Direct airborne sound insulation	35 dB
Flanking sound transmission	50 dB
Thermal transmittance	1.5 W/m <sup>2</sup> K
Air permeability	1.0 kg/m <sup>2</sup> /hPa
Water vapour permeability	A2
Solar factor	0.25
Light transmittance	0.25
Durability of water tightness	
Durability of thermal shock resistance	
Durability of wind load resistance	
Durability of snow load resistance	
Durability of impact resistance	
Durability of horizontal live load resistance	
Durability of thermal shock resistance	
Durability of seismic resistance	
Durability of air permeability	



### Scope of CE marking

- EN 13830 covers:
  - Stick construction
  - Unitised construction
  - Double skin walls
  - Structural sealant glazing
  - Bolted glazing
- Components
  - Framing members
  - Connections
  - Seals
  - Flashings
  - Closures
  - Interfaces
  - Spandrels
  - Glass



### hEN 13830

- 'Curtain walling is not a product which can be completed in all respects within a manufacturing area, but is a series of components and/or prefabricated units which only become a finished product when assembled together on site.'
- 'Curtain walling is a building façade made of a framework ..... containing fixed and/or openable infills, which provides all the required functions of an internal or external wall or part thereof, ...'



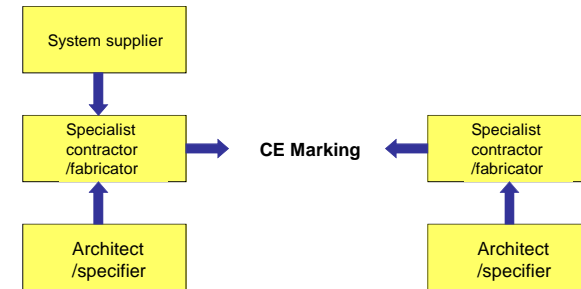
## CE Marking for specialist contractors and specifiers

### System or kit?

- Curtain walling system:  
  
'Collection of components from which a curtain walling kit may be created for subsequent installation on a building. It can give rise to one or more different kits'
- Curtain walling kit:  
  
'Collection of components or pre-fabricated units which, when installed on a building, form a curtain wall.'
- A curtain wall kit is CE marked by including the relevant information in accompanying commercial documents.

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### Industry structure



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### Attestation of conformity

Intended use	Reaction to fire	Attestation of conformity system
Wall with reaction to fire requirements	Class A1, A2, B, C Performance dependent on production process*	1
Wall with reaction to fire requirements	All classes Performance not dependent on production process	3
Wall with no reaction to fire requirements		3

\* For instance the application of intumescent coatings

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### Attestation of conformity

- System 3 applies to most walls. It requires:
  - Initial type testing
    - By a notified body (*Test house*)
  - Factory production control
    - Quality scheme has to be documented
    - Design has to be documented
    - There is no requirement for third party accreditation (*i.e. ISO 9000*)

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## CE Marking for specialist contractors and specifiers

### Attestation of conformity

- System 1 applies to some walls with reaction to fire characteristics. It requires:
  - Initial type testing
    - By a notified body (*Test house*)
  - Factory production control
    - Quality scheme certified by a notified body

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### Initial type testing (ITT)

- A curtain wall has to be type tested
- A type test is required to define the characteristics but this test may also be used to define the characteristics of walls of similar construction
- ITT of a curtain wall system will be undertaken by the system designer/supplier
- ITT for a bespoke project design will be by the specialist contractor.

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### Similar design

- 'Curtain walling modified by the replacement of components (e.g. glazing, hardware, weather stripping) and/or change of material specification and/or dimensional change of profile section and/or methods and means of assembly which will not adversely affect the classification and/or declared value of a performance characteristic' are of similar design
- ITT is valid for walls of similar design
- ITT may be cascaded from a system supplier
- ITT may be transferred laterally.

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### Performance characteristics

- |                                      |                               |
|--------------------------------------|-------------------------------|
| • Reaction to fire                   | • Seismic resistance          |
| • Resistance to fire                 | • Direct airborne sound       |
| • Fire propagation                   | • Flanking sound transmission |
| • Watertightness                     | • Thermal transmittance       |
| • Resistance to self-weight          | • Air permeability            |
| • Windload resistance                | • g-value                     |
| • Resistance to snow load            | • Light transmittance         |
| • Impact resistance                  |                               |
| • Resistance to horizontal live load |                               |

For some characteristics it is acceptable to CE mark with 'npd'  
 (No performance determined)

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## CE Marking for specialist contractors and specifiers

### Reaction to fire

- Testing of components and materials
  - Framing materials
  - Spandrels
  - Linings
  - Gaskets
  - Finishes
  - Tests arranged by supplier  
*(May require third party accreditation)*
- Requirement of Building Regulations AD B
- Required for CE marking
- Cascaded from material suppliers
- Some materials such as steel may be classified without further testing (CWFT)

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### Resistance to fire

- Testing of complete wall construction
- Tested to EN 1364-3
- Not always a requirement in Building Regulations AD B
- May be marked 'npd'
- May be cascaded from system supplier
- Depends on glazing type etc. and may require project testing.

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### Fire propagation

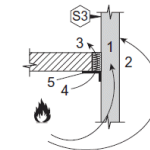
- Testing of wall, fire stopping and slab edge
- Tested to EN 1364-4
- Required in Building Regulations AD B even for walls that are not fire resistant
- Required for CE marking unless we redefine the AD B requirements
- Possible use of 'standard details'

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### Fire propagation

- Building Regulations AD B
- 'Junction should maintain fire resistance of compartmentation'
- Taken to be the fire resistance of the floor
- Impossible to test as the wall is allowed to fail before the floor

internal



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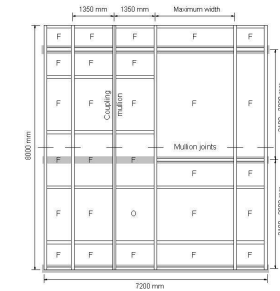
## CE Marking for specialist contractors and specifiers

### Watertightness

- Testing of large specimen of wall
- Type test applicable to many geometries and dimensions
- Not explicitly required in Building Regulations AD C
- Not required for atrium walls
- Probably required for CE marking for commercial reasons as 'npd' is not credible.

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### Watertightness



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### Resistance to self-weight

- Checked by calculation
- In accordance with relevant structural Eurocode
  - EN 1999 for Aluminium
- Not explicitly required by Building Regulations AD A but covered by generally safety requirements
- Probably required for CE marking for commercial reasons as 'npd' is not credible

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### Windload resistance

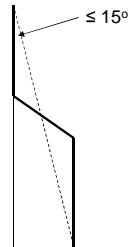
- Testing of large specimen of wall
- Calculation for mullions and transoms of different length and cross section
- In accordance with relevant structural Eurocode
  - EN 1990 and EN 1991 for loads
  - EN 1999 for Aluminium
- Explicitly required in Building Regulations AD A
- Required for CE marking

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## CE Marking for specialist contractors and specifiers

### Resistance to snow load

- By calculation
- Applies to sloping parts of curtain walls
- Curtain wall is envelope within 15° of vertical. It may contain less steep sections.



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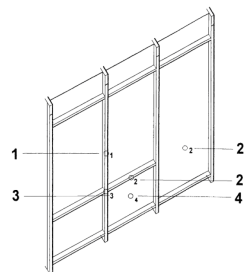
### Impact resistance

- Impact testing of the wall assembly
- Impact applied to:
  - Framing members
  - Opaque infill
- Not explicitly required by Building Regulations AD A or AD K
- CE marking probably required for commercial reasons as 'npd' is not credible

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### Impact resistance

- EN 14019 requires:
  - Impact testing on spandrels
  - Impact testing on full height panels if there is no transom



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### Horizontal live load

- By calculation
  - May be applied to a transom
  - May be applied to glazing
- Explicitly required by Building Regulations AD K
- Required for CE marking

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## CE Marking for specialist contractors and specifiers

### Seismic resistance

- By testing a large specimen of the wall
- Not a UK issue
- Requirements for:
  - Safety
  - Serviceability
- Not required for CE marking in the UK
- Unless exporting to seismic regions!

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### Direct airborne sound

- Testing of a standard specimen
- Not required by Building Regulations AD E
- Specimen is only 1.23 m x 1.48 m
- May be a specification issue
- Substitution of infill panel with one of higher performance is allowed
- May require testing on a project-by-project basis for larger areas of infill and glazing

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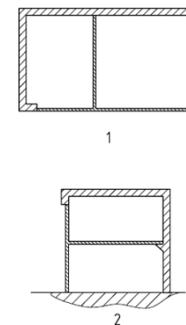
### Flanking sound transmission

- Testing of the wall
- Explicitly required by AD E in some uses
- Calculation rules for different lengths of interface
- Often required by specifiers
- Will be required for CE marking of walls for apartments

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### Flanking sound transmission

- EN ISO 10848-1 and EN ISO 10848-2 require large specimens
- Different geometries may be calculated
- Possible use of 'standard details'



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## CE Marking for specialist contractors and specifiers

### Thermal transmittance

- Initial calculation for the framing
- Additional calculation required for overall U-value including infill panels and glazing
- Required by Building Regulations AD L
- May be required by EU regulations in the future
- Required for CE marking

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### Air permeability

- Test of large specimen of wall
- Rules for application
  - -100% okay
  - +50% but reduce one class  
*(Based on ratio of seal length to area)*
  - May be calculated from tests
- Not explicitly required in Building Regulations AD L
- Will be required in specifications
- Probably required for CE marking for commercial reasons as 'npd' is not credible

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### Radiation properties

- g-value
  - Product test
  - Calculation
- Light transmission
  - Product test
  - Calculation
- Both depend on glazing and infill panels
- g-value is explicitly required in Building Regulations AD L
- Required for CE marking

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### Durability

- 'The curtain wall shall retain its characteristic performance at an acceptable level for the economic life of the wall'
- There is no stated life span
- Not required by Building Regulations
- Mandatory under the Construction Products Regulations

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## CE Marking for specialist contractors and specifiers

### Durability

- The durability requirements of the Product Standard EN 13830 are being written by:
  - CWCT
  - Politecnico di Milano
- They will be available by February 2012
- Economic life is not defined in EU Mandates
- Interpretation will be:
 

'It should be possible to maintain, repair and replace any component of the wall that has shorter service life than the wall'
- This is the current requirement of the CWCT Standard

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### Assessing similarity

Characteristic	Hardware and fixings	Gaskets and sealants	Frame material	Frame profile	Glazing	Other infill
Reaction to fire	(Y)	Y	Y	(Y)	N	N
Fire resistance integrity	N	(Y)	(Y)	(Y)	(Y)	(Y)
Fire propagation	N	(Y)	(Y)	(Y)	(Y)	(Y)
Thermal insulation	N	(Y)	(Y)	(Y)	Y	Y
Radiation properties	N	N	N	N	Y	(Y)

Y Modification will change the characteristic  
(Y) Modification may change the characteristic  
N Modification will not change the characteristic

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### Assessing similarity

Characteristic	Hardware and fixings	Gaskets and sealants	Frame material	Frame profile	Glazing	Other infill
Watertightness	(Y)	Y	(Y)	Y	N	N
Air permeability	(Y)	Y	(Y)	Y	N	N
Wind load resistance	(Y)	(Y)	Y	Y	Y	Y
Horizontal load	(Y)	N	Y	Y	Y	Y
Impact	(Y)	N	(Y)	(Y)	Y	Y

Y Modification will change the characteristic  
(Y) Modification may change the characteristic  
N Modification will not change the characteristic

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### Assessing similarity

Characteristic	Hardware and fixings	Gaskets and sealants	Frame material	Frame profile	Glazing	Other infill
Durability	N	Y	Y	(Y)	(Y)	Y
Direct airborne sound	N	(Y)	(Y)	Y	Y	(Y)
Flanking sound	N	(Y)	(Y)	Y	Y	(Y)
Self-weight	(Y)	N	Y	Y	Y	(Y)

Y Modification will change the characteristic  
(Y) Modification may change the characteristic  
N Modification will not change the characteristic

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## CE Marking for specialist contractors and specifiers

### System supplier role

- The system supplier cannot be responsible for:
  - Glazing
  - Infill panels
  - Flashings and closures
- The system supplier cannot CE mark for:
  - Thermal transmittance or g-value
  - Wind load on different geometries
  - Fire propagation
  - *Horizontal live load*
  - *Impact*

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### System supplier role

- The system supplier will probably type test for:
  - Watertightness
  - Air permeability
  - Resistance to windload
  - Impact
  - Fire propagation / reaction to fire
- The system supplier may make available software/charts or tables for:
  - Selection of components for windload at different geometries
  - Selection of components for barrier load at different geometries
  - Calculation of U-values for a limited range of glasses
  - ....

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### Specialist contractor (fabricator) role

- The specialist contractor will have to CE mark on the basis of:
  - ITT by the system company
  - ITT by component suppliers
  - *Additional testing*
  - Calculation of characteristics for:
    - Resistance to windload
    - Resistance to self-weight
    - Horizontal live load
    - Thermal shock resistance
    - Thermal transmittance
    - g-value

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### Specialist contractor (fabricator) role

- The specialist contractor may make recourse to:
  - System company software, charts or tables
  - Component supplier guidance
  - Internal knowledge and skills
  - External consultants
  - Deemed to satisfy details

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## CE Marking for specialist contractors and specifiers

### Specialist contractor (fabricator) role

- EN 13830 requires:

'The factory production control system shall document the various stages in the design of products, identify the checking procedure and those individuals responsible for all stages of design. During the design process itself, a record shall be kept of all checks, their results, and any corrective actions taken.'

'This record shall be sufficiently detailed and accurate to demonstrate that all stages of the design phase, and all checks, have been carried out satisfactorily'.

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### Specialist contractor (fabricator) role

- 'Products marked in accordance with appropriate harmonised European specifications may be presumed to have the performances stated with that marking, ....
- ....although this does not replace the responsibility on a curtain wall designer to ensure that the curtain wall as a whole is correctly designed and its component products have the necessary performance values to meet the design.'

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