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CE marking of curtain walling

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1 Foreword

FAECF Guidance Sheet

This FAECF Guidance Sheet provides an explanation to the product standard on curtain walling EN 13830 with more details for the manufacturer and reader of the standard. This Guidance Sheet provides guidance on how to read EN 13830 and shall enlighten some background details. This Guidance Sheet is not intended to be used as any kind of test method, nor for certification purposes. This paper is published by FAECF in cooperation with the EAA.

2 Introduction

Intention of CE marking

CE marking is a passport for the product for the whole European Economic Area (EEA). It covers all legal requirements addressed by the relevant harmonized technical specification prevailing in all EU Member States.
CE marking replaces any national mandatory marking, e.g. Ü-mark in Germany. No additional requirement can be imposed in national or regional building regulations. National building regulations have to be adapted, if they are contrary to the European rules or insist on national methods.
CE marking sets up a common level playing field by providing manufacturers with:

- Common European test methods and procedures
- Single assessment valid throughout Europe.

CE for curtain walling

With effect from 1st December 2005, curtain walling manufacturers will be required to apply CE marking. The mark will be applied to finished products and will not extend to installation/erection. CE marking will be MANDATORY and will constitute the system to which all entities must adhere, by law, in order to be able to sell their products in the European Union. CE marking will confirm that the finished product provides certain performance specifications for regulated requirements in relation to the intended uses.

3 Definition of curtain walling

What is curtain walling

According to prEN 13119 curtain walling is an external building facade produced with framing made mainly of metal, timber or PVC-U, usually consisting of vertical and horizontal structural members, connected together and anchored to the supporting structure of the building, which provides, by itself or in conjunction with the building construction, all the normal func-

tions of an external wall, but does not contribute to the load bearing characteristics of the building structure.
Two examples of possible principles of curtain walling are shown in Fig. 1 and Fig. 2:

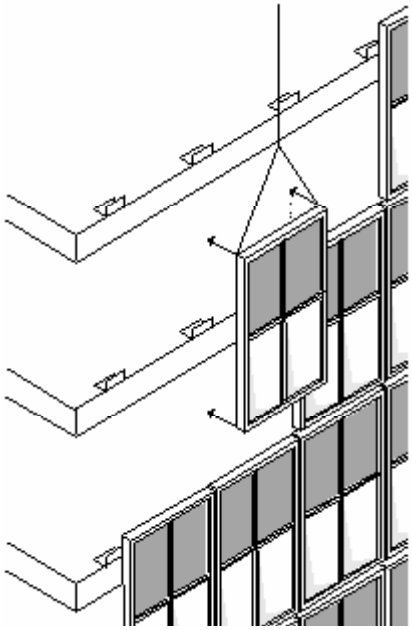

Fig. 1: Unitised construction

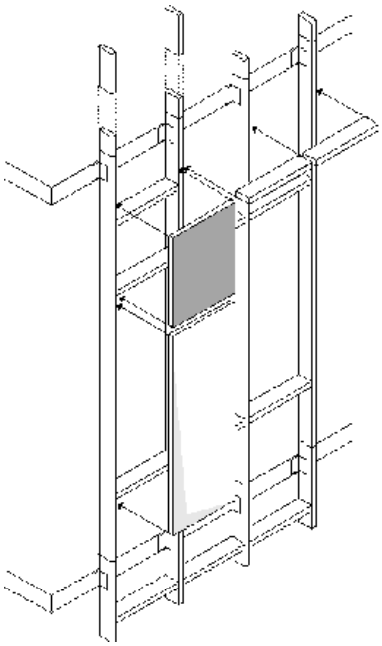

Fig. 2: Stick construction

4 Construction Products Directive (CPD 89/106) and CE marking of products

Legal basis for CE marking

- The application of the CE mark implies that the construction products are suitable for intended use;
- Construction products means any product, which is produced for incorporation in a permanent manner in construction works;
- Products which enable the buildings in which they are used, provided it is adequately designed and built, to meet the six essential requirements established by the European Directive applicable to them (Construction Products Directive 89/106/EEC, also known as CPD) are deemed to be suitable for use;
- CE marking is compulsory and constitutes the system to which all manufacturers must adhere in order to be entitled to sell their products in the European Union;
- The manufacturer, or his authorised representative established in EEA [European Economic Area], is responsible for affixing CE marking on the product, on a label affixed to the product, on its packaging or on the commercial documents which accompany it.

5 Presumption of conformity and suitability for use of products

CE marking an relevance of technical specifications

- For building regulators a product is deemed to be suitable for the intended use if it has been shown to meet the essential requirements as described in the product standard;
- CE marking must be affixed to products which satisfy, chiefly, one of the following conditions:
    - Conformity with the national standards which are identical to the harmonised European Standards EN, the details of which have been published in the European Official Journal;
    - Conformity with European Technical Approvals ETAs issued on the basis of guidelines.

- Harmonised European Standards are produced by CEN (European Committee for Standardisation), whereas European Technical Approvals are issued by EOTA (European Organisation for Technical Approvals);
- The task of producing hEN and the guidelines for the issue of ETA is delegated by the European Commission to CEN or EOTA depending on the product in question.

6 Essential characteristics for curtain walling

The performance specifications which CE marked curtain walling must comply shall be associated with essential applicable characteristics (s. Table 1).
The product standard assesses the collected number of requirements throughout the EU's Member States. Therefore, it might happen that a certain characteristic, e.g. "reaction to fire" or "thermal shock resistance", is not required by the regulation in place of destination. In this case, manufacturers placing their products on this market are not obliged to determine or declare the performance of their products with regard to this characteristic and the option "No performance declared" (npd) in the information accompanying the CE marking may be used. The npd option may not be used, however, where the characteristic is subject to a threshold level. For an example see Fig. 4 (CE Marking).

Table 1: Essential characteristics according to EN 13830

Reaction to fire **		Thermal shock Resistance	
Fire resistance **		Resistance to live horizontal loads	
Fire propagation **		Air Permeability	
Watertightness		Water vapour permeability	
Resistance to dead load (self weight)		Thermal transmittance	
Resistance to wind load		Airborne sound insulation	
Resistance against impact		Durability	

** These requirements are deemed to be applicable when explicitly required by national building/ fire regulations.

7 Special conditions in case of fire performance characteristics

reaction to fire

For curtain walls concerned with uses subject to regulations on reaction to fire different Attestation of Conformity (AoC) systems apply (1 or 3) following levels or classes as defined in EN 13501-1 “Fire classification of construction products and building elements - Part 1: Classification using test data from reaction to fire tests.”

fire resistance

In case of fire resistance relevant classes apply in accordance with the classification criteria defined in prEN 13501-2 “Fire classification of construction products and building elements - Part 2: Classification using data from fire resistance tests, excluding ventilation services”.

At present it is not possible to provide a fire resistance classification of curtain walling due to the fact that the relevant test methods (prEN 1364-3 and prEN 1364-4) are not yet available.

8 When CE marking become obligatory for curtain walling

- CE marking of curtain walling involves a process made up of the various stages necessary for the entry into effect of standards documents;
- More specifically, after the formal vote and publication of a harmonised European Standard EN standard, the one-year coexistence period begins during which the application of CE marking to products is voluntary;
- Upon expiry of the coexistence period, CE marking becomes mandatory ,i.e. only curtain walling with CE marking are legally allowed to be placed on the market.

After coexistence period CE marking is obligatory: 1st December 2005

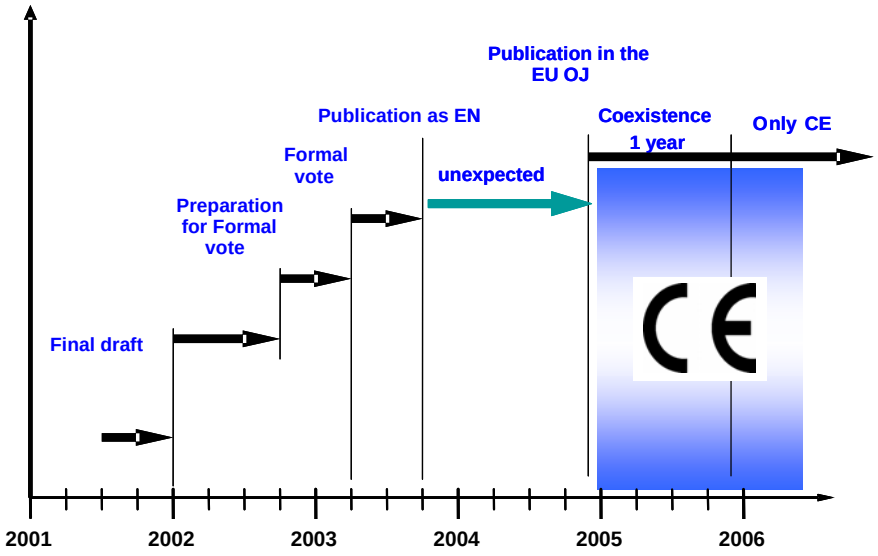

Fig. 3: Time schedule EN 13830 and CE marking for Curtain Walling

9 Different processes for special types of curtain walling

- For curtain walling without structural glazing, the process implies the conformity with the harmonised European Standard EN 13830 written by the Technical Committee TC 33 of CEN;
- For curtain walling with structural glazing, implies the compliance with the European Technical Approval (ETA) issued by the member organisations of EOTA according to the guidelines ETAG 002;
- For Cladding and point fixed glazing ETAGs are in preparation.

Structural glazing, cladding and point fixed glazing needs European Technical Approvals

10 Field of application of EN 13830 for curtain walling

In general, the standard applies to curtain walling ranging from a vertical position to 15° from the vertical, onto the building face. For the purposes of affixing CE marking, curtain walling cannot be deemed to be a finished product until it is installed, because it is made up of a series of components which constitute curtain walling only when they are assembled on the work site.

curtain walling ranging from a vertical position to 15° from the vertical, onto the building face

The standard therefore applies to curtain walling in kit form, i.e. to a set of components which once assembled provide a finished product. Consequently it applies both to curtain walling which is designed, produced and installed on the basis of a commercial range system and to curtain walling produced or installed for a specific works site on the basis of a specific design.

EN 13830 is not applicable to

- all curtain walling with structural glazing.
- all fully glazed point fixed curtain walling.

11 CE marking for curtain walling

CE marking means that each curtain walling kit must be accompanied by a document containing the following information (see Fig. 4):

- the graphic symbol of the CE marking;
- the last two digits of the year in which the CE mark was affixed;
- name or identifying mark and registered address of the manufacturer;
- product code;
- a list of the mandatory requirements with which the product complies.

CE 01234	*CE conformity marking, consisting of the "CE" symbol given in directive 93/68/EEC* *Identification number of the certification body (where relevant)*
Any Co. Ltd, PO Box 21, B-1050 02 01234 –CPD-00234	*Name or identifying mark and registered address of the producer* *Last two digits of the year in which the marking was affixed* *Certificate number (where relevant)*
EN 13830 Curtain wall product Intended to be used in City Office application	*Number of European standard* *Description of product*
Reaction to fire - Classes	*Information on regulated characteristics*
Fire resistance - npd	
Watertightness - class R6	
Resistance to own dead load - kN	
Wind load resistance - 1200 kN/m^2	
Impact resistance - Technical classes	
Thermal shock resistance - Glass type	
Resistance to horizontal load - kN at m sill height	
Thermal transmittance - npd	
Air permeability - class A3	
Airborne sound insulation - dB	

Fig. 4: Example of CE marking on accompanying papers

In the wording of the CPD, a "kit" is the equivalent of a "construction product". A construction product is a "kit" when it is a set of at least two separate components that need to be put together to be installed permanently in the works (i.e. to become an "assembled system").

For curtain walling the whole wall might be defined as a kit, if the performance level can be detected. Usually there will be more than one kit in a curtain walling, because of different performance areas. Therefore it is suggested to declare repeating modules as kits and to mark them with CE.

curtain walling kit

12 How to decide performance levels

The manufacturer shall decide the performance levels to attribute to its products for all the performance characteristics required by CE marking. The requirements and respective performance levels chosen must comply with the requirements stated within the national reference standards (e.g. the national energy efficiency standards, the national building regulations/ acts) where these exist or come into force. In particular, the npd option (no performance declared) can be used if that requirement is not subject to regulation.

The manufacturer is responsible and must declare

13 Initial Type Test (ITT) for determination of the performance characteristics

According to the case in question, the manufacturer needs laboratory tests and/or calculations on test specimen(s) that are representative of the product range in accordance with the requirements of European reference standards, as shown in the table below.

ITT

No	Designation	Units	Class or Declared value					
1	Resistance to Wind load	kN/m^2	npd	Declared value				
2	Dead load	kN/m^2	npd	Declared value				
3	Resistance against Impact Internal *Drop height*	*(mm)*	npd	I0 *(n.a.)*	I1 *(200)*	I2 *(300)*	I3 *(450)*	I4 *(700)*
4	External *Drop height*	*(mm)*	npd	E0 *(n.a.)*	E1 *(200)*	E2 *(300)*	E3 *(450)*	E4 *(700)*
5	Air permeability Test pressure	*(Pa)*	npd	A1 *(150)*	A2 *(300)*	A3 *(450)*	A4 *(600)*	AE *(>600)*
6	Watertightness Test pressure	*(Pa)*	npd	R4 *(150)*	R5 *(300)*	R6 *(450)*	R7 *(600)*	RE *(>600)*
7	Airborne sound insulation R_w (C;Ctr)	dB	npd	Declared value				
8	Thermal transmittance U_{cw}	W/m^2K	npd	Declared value				
9	Fire resistance Integrity **(E)** **i → o, o → i, o ↔ i**	*(min)*	npd	E 15	E 30	E 60	E 90	
10	Integrity and insulation **(EI)** **i → o, o → i, o ↔ i**	*(min)*	npd	EI 15	EI 30	EI 60	EI 90	
11	Equipotentiality	Ohms	npd	Declared value				
12	Resistance to horizontal loads	kN at m sill height	npd	Declared value				

Fig. 5: Classification table EN 13830

Where the initial test report supplied to the manufacturer from the system house results from tests carried out by a Notified Body, it may be used for CE marking purposes without that the manufacturer needs involving a Notified Body to check the product (see Annex 1).

Usage of tests from system supplier

The assessment of performances [by means of laboratory tests or calculation methods, ITT], must be carried out ONCE ONLY at the beginning of the production under CE marking. The manufacturer shall, however, be required to guarantee the consistancey of its production over time that the performances initially provided by the curtain walling test specimen(s) are

One test for Europe

maintained, and that the traceability of the products is ensured. The above must be ensured by means of a traceable Factory production control system (FPC).

Notified Bodies

Laboratory tests can be carried out anywhere in Europe at an organisation suitably notified by the individual Member States of the European Union. Notice has not yet been given of the accredited organisations in Europe. A list of notified bodies will be published at http://europa.eu.int/comm/enterprise/nando-is after EN 13830 becomes harmonized.

Table 2: Tasks to be performed by Notified Body and the Manufacturer

Essential characteristic		ITT	FPC	INS	Essential characteristic		ITT	FPC	INS
Reaction to fire under AoC System 1		NB	M	NB	Thermal shock Resistance		M	M	
Reaction to fire under AoC System 3		NB	M		Resistance to live horizontal loads		NB	M	
Fire resistance		NB	M		Air Permeability		M	M	
Fire propagation		NB	M		Water vapour permeability		M	M	
Watertightness		M	M		Thermal transmittance		M	M	
Resistance to dead load (self weight)		NB	M		Airborne sound insulation		M	M	
Resistance to wind load		NB	M		Durability		M	M	
Resistance against impact		NB	M						

ITT = Initial Type Test FPC = Factory Production Control
INS = First inspection of FPC and permanent surveillance
NB = Notified Body M = Manufacturer

Minor modifications

The manufacturer is responsible and needs to decide whether to carry out subsequent type tests in the event of later modifications to the product. In general, if the essential concept characteristics of the product remain unchanged (e.g. no changes are made to the design principle of the main sections), it should not be necessary to carry out new tests.

Annex 1: Ways to CE marking for windows, doors and curtain walling under System AoC 3 according to Guidance Paper M

CE with	Manufacturers ITT M	Shared ITT P	Cascading ITT S
Initial Type Test (ITT)		P asks for ITT NB tests P owner of ITT test report	S asks for ITT NB tests S owner of ITT test report
+	M asks for ITT NB tests M owner of ITT test report	M is allowed to use ITT of P NB checks that the product is identical M owner of ITT test report	M uses ITT of S - Agreement between M and S - Instructions for assembling and installation of S relevant for FPC of M - No reduction of performance level of product ITT of S as verification for M
Factory Production Control (FPC)	Task of M		
= CE marking	M is responsible for product declaration and performance		

Legend:

NB =	Notified Body	S =	System supplier
M =	Manufacturer	P =	Partner (e.g. second Manufacturer), industry (e.g. hardware producers) or designer

Annex 2: Selection of representative test specimen and range of application

To reduce test costs, for curtain walling the notion of 'families' should be considered.
For each family one representative test specimen is tested and the test result can be used for all other members of the family. Using a "worst case scenario" is generally a good way of defining a family.
The product standard EN 13830 for curtain walling does not give any information or guidance on how such a product family should be defined and how a representative specimen for such a product family should be selected.
The following table contains an example specification for representative test specimen and the range of application for the main characteristics of curtain walling. Other characteristics can be added if required.

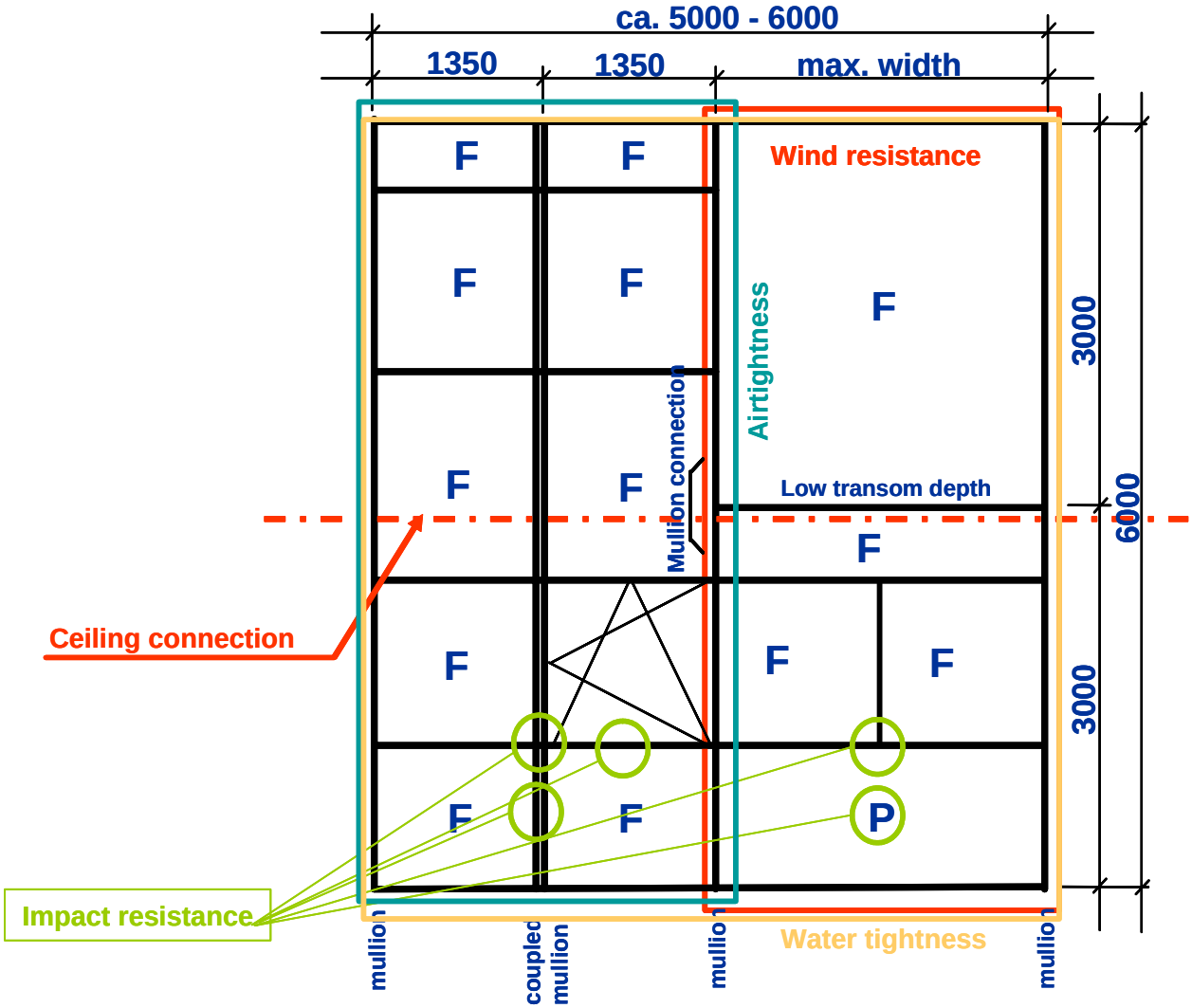

Fig. 6: Example of test specimen that is representative of the product range

Note: The coloured frames are marking the relevant part of test specimen for the characteristic. The test has do be performed with the test specimen in total.

Components of test specimen:
- All T-connector variants
- All sealing systems
- All support systems
- Different mullion and transom depths
- All drainage systems have to be considered

Sometimes additional tests have to be performed on smaller samples for individual components

The range of application is listed in the following table:

Characteristic	"worst case" test specimen design	range of application
resistance to wind load	max span of transoms and mullions for serviceability the cross-sections have to be dimensioned according to the design load by calculation	all smaller spans using calculation
Dead load (self weight)	max transom length, max glass weight the cross-sections have to be dimensioned according to the glass weight by calculation	all smaller and lighter products using static calculation
impact resistance	all typical glazing bars	products with similar construction details
air tightness	small elements, many joints all types of sealing systems, mullion-joints and T-connections	products with similar construction details
water tightness	all sealing systems all corner connections all drainage systems	all systems with similar construction details
sound insulation	in coordination with Notified Body	
thermal insulation	U_f of profiles can be calculated according to EN ISO 10077-2 (guidelines for profile systems are available at relevant institutes). U_{cw} is calculated for each kit	
fire characteristics	in coordination with Notified Body	
others	in coordination with Notified Body	

Annex 3: Bibliography

[1] EN 13830: 2003 Curtain Walling – Product Standard

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