CEN

Secrétariat CEN/TC 229

"Produits préfabriqués en béton"
"Precast concrete products"
"Vorgefertigt Betonerzengriβe"

CEN/TC 229 N 290 E

Le comité membre français :

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CEN/TC 229
Work Programme

Answer prepared by CEN/TC 229
to the mandate on precast concrete
(normal/lightweight/autoclaved aerated concrete)
products M/100

CEN

Secrétariat CEN/TC 229
"Produits préfabriqués en béton"
"Precast concrete products"
"Vorgefertigt Betonerzengriβe"

Our ref. : BAM/SG
TC229L32

Mr DA COSTA
CEN/CS
Rue de Stassart, 36
B-1050 BRUSSELS

Epernon, 16th October 1996

Subject : CEN/TC 229 work programme

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Dear Mr DA COSTA,

We have the pleasure in sending you CEN/TC 229 revised final answer -CEN/TC 229 N 290, 74 pages- to Mandate on precast products M/100, resulting from various discussions and meetings with Mr L. BROCART throughout 1996.

As you know its elaboration ought to undergo many main steps as follows :

95-02-22	European Commission DG III sent CEN the finalized Mandate M/100 ;
95-11-07	Seventh activity report of Mr KATSARAKIS. Page 2, proposed action : "...to prepare a proposal for (these) guidelines and a model CEN/TC answer." ;
96-02-12	Mr KATSARAKIS sent CEN/TC 229 Secretariat Document BTS 1-N 877 with Annex 3-Model of CEN/TC 33, for preparing the answer ;
96-02-23	CEN/TC 229 Secretariat sent Mr KATSARAKIS the first draft work programme ;
96-04-26	Mr L. BROCART sent back his written comments ;
96-06-10	M. VALLES and B. AMIAND met Mr BROCART at Afnor office for detailed explanations ;
96-06-20	The revised draft work programme was sent Mr BROCART ;
96-07-16	Mr L. BROCART sent back his written comments ;
96-08-01	CEN/TC 229 Secretariat sent Mr BROCART and Mr DA COSTA the finalized work programme (82 pages) ;

Association reconnue
d'utilité publique
Comité membre français
du CEN et de l'ISO
Siret 775 724 818 00015
Code APE 751 E

CEN/TC 229 N 290 E
Work Programme
13/10/96

Contents list

Foreword

- CEN/TC 229 answer to the mandate on precast concrete products was prepared by Chairman M. VALLÈS and its Chairmanship. They worked more than 200 h to finalize it.

- The timetable, the progress report and the publication of each standard are presented in CEN/TC 229 Business Plan (CEN/TC 229 N 258 E).

- Every aspect (characteristics, products, specific intended uses...) indicated in the mandate is covered by CEN/TC 229 programme.

- The performance approach is followed in every standard.

- Concerning structural performances, both verification by calculation and by testing have been considered. When relevant, either only one or the both of them are covered in the standard.

- CEN/TC 229 answer was prepared taking into account available information as on October 1996. Consequently, this answer cannot prejudge future evolutions of any TCs experts work whose supporting draft standards have not yet reached CEN enquiry stage. Moreover it is obvious that some test or calculation methods prepared by other TCs should not be strictly specific for precast concrete products and then should be subsequently adjusted in some ways.

- When a supporting test standard directly related to one characteristic is not publicly available for a product and the intended use, CEN/TC 229 is able to produce one that will be included in a normative Annex of the product standard.
  Such a "proper test method" might be a fair copy of an existing working paper under preparation by another organization that will not be refered to.

- Supporting standards will be preferably ENs. When not yet stabilized or publicly available other normative documents will be referenced such as existing ISO standards. As and when published, new ENs could be referenced on the occasion of product standard revision.

- Durability requirements are dealt with in the framework provided by the state of the art at present. For instance supporting references such as Eurocodes contain implicitly provisions for assuring above.

0 General comments of the CEN/TC related to the answer to the mandate

1. Request for clarification on the scope of the mandate concerning the product and allocation of work : none.

   NOTE : If necessary, the TCs shall request here clarification on the products and materials included in the scope of the mandate.

2. Requests for clarification on the intended uses : none.

   NOTE : If necessary, the TCs shall request here clarification on the intended uses of the products included in the mandate.

3. Information on products under the scope of the mandate which are the subject of other CEN/TCs - Information on the organization of the work between the TCs :

   According to CEN/TC 229 scope, the answer concerns precast concrete products made with normal or lightweight concrete (plain, prestressed, reinforced or composite steel/concrete), excluding products covered by CEN/TC 177 i.e. autoclaved aerated concrete. CEN/TC 229 has established a liaison with CEN/TC 177 (see annex : CEN/TC 229 N 205 E)

4. Information on issues concerning the scope and intended uses included in the mandate, for which no work has yet been started in the TC, or for which the TC cannot provide a standard :

   CEN/TC 229 can provide every standard to answer to the mandate (see Business Plan CEN/TC 229 N 258 E).

   NOTE : The TCs shall give here relevant information on the feasability of the European standard with a timetable. If an European standard cannot be elaborated, the TC shall provide detailed justification).

5. Specific requests for additions to the mandate of products, materials, intended uses, essential characteristics, etc.

   NOTE : The TCs will provide the necessary information with explanations and justification.

   CEN/TC 229 should wish additions to the mandate for complementary precast concrete products :
   - garages (monolithically precast or by elements),
   - window frames,
   - floor slats for stock farming buildings,
   - street furniture and garden units.

   These additions are still to be justified by national regulations of one Member State at least.

6. Liaison with other TCs for certain horizontal tests - Information on the organization of the work between the TCs :

   See the list of liaisons established with other CEN/TCs (annex : CEN/TC 229 N 205 E).

7. Other issues which the TC considers necessary for the comprehension of the answer to the mandate :

   - For precast concrete elements for floors, CEN/TC 229 lays emphasis on the fact that essential characteristics as impact noise transmission index are a matter for finished works and not for floors elements as a part of a whole.
   - Precast concrete products are considered by E.C. as reaction to fire class A without the need for testing (when organic materials $\leq$ 1,0 %) (see annex : Finalized list of materials considered as reaction to fire class A without testing - 6 pages).

- Supporting standards pointed out are items suggested to be used as guidance documents for TGs experts. For instance it is the case of Eurocodes since they are design rules for entire structural works but not for each component considered separately. CEN/TC 229 european harmonized standards shall guarantee that every precast concrete product displays all pertinent performance characteristics that will enable the works in which it is used to meet all CPD essential requirements.

  If the product performance is determined by calculation, the standard shall provide specific rules -on condition that the methods involved were tried and proven- so as to meet basic design instructions requirements defined in part 1 of Eurocode 1.

  In relation to this, it is remembered that Eurocode 2 - Paragraph 1.2 states that "it is permissible to use alternative design rules different from the Application Rules given in the Eurocodes, provided that it is shown that the alternative rules accord with the relevant Principles and are at least equivalent with regard to the resistance, serviceability, and durability achieved for the structure with the present Eurocode."

  If an application rule forming part of the present version of the Eurocode appears to be relevant for determining the performance required of the product, this rule may be quoted directly or referred to, with indication of where to find it in the present version of Eurocode 2.

  If the product performance is established by means of testing, specific tests shall be clearly defined by the product standard itself or by test methods standards that shall be referred to.

  Irrespective of the method for determining performance -either calculation or testing- the product performance shall be expressed as a design value in accordance with Eurocode 1 - Part 1.

  The repercussion of Eurocode 2 on works built with concrete elements is the main subject of part 1-3 which deals with works built totally or partially with mass-produced components. Although in its current form it appears to be non-exhaustive (could it be anything else, going by the diversity of the components themselves and their conditions of use in different countries ?), part 1-3 is a reference document for drawing up "*works*" informative annexes to be appended to the various product standards.

  By "*works*" we refer here to the constructional assembly built with components whose performance is defined by the corresponding "*product*" standard (e.g. composite floor system made with floor plates), and the connections between that assembly and the rest of the structure.

A Concrete prefabricated culverts

A.1 Box culverts

A.1.1 Product standard

WI 00229018

(i) Title : Box culverts Availability : 1999-12

(ii) Scope : Pipeline concrete elements whose cross-section is closed, generally man-entry, rectangular and intended for a large variety of uses.

(iii) Intended use : Floor beds (including suspended ground floors), roads and other trafficked areas. Structural, non structural or light structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Compressive strength *(of concrete)*, **ultimate tensile and tensile yield strength** *(of steel)*, **detailing**, **durability of compressive strength against freeze-thaw** *(only for exposed applications)*, **durability of ultimate tensile and tensile yield strength against corrosion**

(In case of verification by testing) **loadbearing capacity** and its **durability against corrosion** and **freeze-thaw** *(only for exposed applications)*

(In case of verification by calculation) **mechanical strength** and its **durability against corrosion** and **freeze-thaw** *(only for exposed applications)*

Additional characteristics for LWC :

- **drying shrinkage** *(in end use conditions)*

(v) other aspects

The harmonized product standard will also contain :

a) clauses on evaluation of conformity and compliance criteria

- initial type testing ;
- factory production control :
  . procedures and written policies ;
  . verifications and tests ;
  . sampling plans ;
  . conformity criteria ;
  . recording of operations and results ;
  . corrections of non-conformity ;
- initial inspection of factory and of factory production control continuous surveillance, judgement and assessment ;

b) a reference to the Commission's Decision on attestation of conformity ;

c) guidance on the characteristics to be stated in the labelling accompanying the CE marking and on the way of expressing the determined values of these characteristics.

NOTE : This point will be detailed according to the Commission guidance to be finalized.

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will only recopy the useful parts of existing normative documents to what is strictly necessary. In that case, these documents are not indicated in the list of supporting standards.

1. Compressive strength (of concrete)

1.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.1
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2 and 3.1
ENV 1992-1-4	1994	Eurocode 2 : Design of concrete structures - Part 1-4 : Lightweight aggregate concrete with closed structure Clause 3.1

1.2 Verification by testing

ISO 4012	1978	Concrete - Determination of compressive strength of test specimens
ISO/DIS 7034	1983	Cores of hardened concrete - Taking, examination and testing in compression

1.3 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

2. Ultimate tensile and tensile yield strength of either reinforcing steel or prestressing steel

2.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.2 : Reinforcing steel Clause 3.3 : Prestressing steel
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2, 3.2 and 3.3

2.2 Verification by testing

prEN 10138	(under preparation by ECISS/TC 19) 1991	Prestressing steels
ISO 6935	1991	Steel for the reinforcement of concrete
ISO 10544	1992	Cold reduced steel wire for the reinforcement of concrete and the manufacture of welded fabric
ENV 10080	1995	Steel for the reinforcement of concrete - Weldable ribbed reinforcing steel B 500 - Technical delivery conditions for bars, coils and welded fabric
ISO 6934	1991	Steel for the prestressing of concrete

2.3 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

3. Detailing

3.1 Verification by calculation

Specific requirements will be given in the product standard itself.

3.2 Verification by testing

Specific measurement methods will be required in the product standard itself.

4. Loadbearing capacity

4.1. Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

4.2 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

4.3 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

5. Mechanical strength

5.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 4
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clause 4

5.2 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

5.3 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

6. Drying shrinkage (only for LWC)

6.1 Verification by testing

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

B Precast retaining walls

B.1 Retaining wall elements

B.1.1 Product standard

WI 00229014

(i) Title : Retaining wall elements Availability : 1999-12

(ii) Scope : Precast concrete element for the execution of retaining walls with possible additional cast in situ concrete. The standard specifies the mechanical and structural properties of prefabricated wall elements to be assembled on site.

(iii) Intended use : Foundations and retaining walls. Structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Compressive strength *(of concrete)*, **ultimate tensile and tensile yield strength** *(of steel)*, **detailing, watertightness** *(of joints)* , **water vapour permeability** *(for external walls)* and the **durability of ultimate tensile and tensile yield strength against corrosion** and the **durability of compressive strength, watertightness, water vapour permeability against freeze-thaw** *(only for exposed applications)*

(In case of verification by testing) **loadbearing capacity** and its **durability against corrosion** and **freeze-thaw** *(only for exposed applications)*

(In case of verification by calculation) **mechanical strength** and its **durability against corrosion** and **freeze-thaw** *(only for exposed applications)*

Additional characteristics for LWC :

- **drying shrinkage** *(in end use conditions)*
- *(in case of verification by calculation)* **density.**

(v) other aspects

The harmonized product standard will also contain :

a) clauses on evaluation of conformity and compliance criteria

- initial type testing ;
- factory production control :
  . procedures and written policies ;
  . verifications and tests ;
  . sampling plans ;
  . conformity criteria ;
  . recording of operations and results ;
  . corrections of non-conformity ;
- initial inspection of factory and of factory production control continuous surveillance, judgement and assessment ;

b) a reference to the Commission's Decision on attestation of conformity ;

c) guidance on the characteristics to be stated in the labelling accompanying the CE marking and on the way of expressing the determined values of these characteristics.

NOTE : This point will be detailed according to the Commission guidance to be finalized.

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Compressive strength (of concrete)

1.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.1
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2 and 3.1
ENV 1992-1-4	1994	Eurocode 2 : Design of concrete structures - Part 1-4 : Lightweight aggregate concrete with closed structure Clause 3.1

1.2 Verification by testing

ISO 4012	1978	Concrete - Determination of compressive strength of test specimens
ISO/DIS 7034	1983	Cores of hardened concrete - Taking, examination and testing in compression

1.3 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

2. Ultimate tensile and tensile yield strength of either reinforcing steel or prestressing steel

2.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.2 : Reinforcing steel Clause 3.3 : Prestressing steel
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2, 3.2 and 3.3

2.2 Verification by testing

prEN 10138	(under preparation by ECISS/TC 19) 1991	Prestressing steels
ISO 6935	1991	Steel for the reinforcement of concrete
ISO 10544	1992	Cold reduced steel wire for the reinforcement of concrete and the manufacture of welded fabric
ENV 10080	1995	Steel for the reinforcement of concrete - Weldable ribbed reinforcing steel B 500 - Technical delivery conditions for bars, coils and welded fabric
ISO 6934	1991	Steel for the prestressing of concrete

2.3 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

3. Detailing

3.1 Verification by calculation

Specific requirements will be given in the product standard itself.

3.2 Verification by testing

Specific measurement methods will be required in the product standard itself.

4. Watertightness *(of joints)* or water vapour permeability *(for external walls)* and their durability against freeze-thaw

The product standard will not include requirements depending on work execution and on finished work.
Water vapour permeability characteristic is not relevant for concrete ordinary works.

5. Loadbearing capacity

5.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

5.2 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

5.3 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

6. Mechanical strength

6.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 4
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clause 4

6.2 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

6.3 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

7. Drying shrinkage (only for LWC)

7.1 Verification by testing

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

8. Density (only for LWC)

8.1 Verification by testing

prEN 12363	(under preparation by CEN/TC 104) Hardened concrete - Determination of density (ISO 6275)	(1998-12)

C Precast concrete piles

C.1 Foundation piles (normal concrete only)

C.1.1 Product standard

WI 00229002/016

(i) Title : Precast concrete foundation-Part 1 : Piles / Part 2 : Supports Availability : 1999-12

(ii) Scope : This standard specifies performance requirements and detailing provisions for precast foundation piles with a solid or hollowcore section, either single length or segmental in reinforced or prestressed concrete irrespective of the method of production.

(iii) Intended use : Pile foundations. Structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Compressive strength *(of concrete)*, **ultimate tensile and tensile yield strength** *(of steel)*, **detailing, rigidity of joints** and **durability of ultimate tensile and tensile yield strength against corrosion**

(In case of verification by testing) **loadbearing capacity** and its **durability against corrosion**

(In case of verification by calculation) **mechanical strength** and its **durability against corrosion**

(v) other aspects

The harmonized product standard will also contain :

a) clauses on evaluation of conformity and compliance criteria

- initial type testing ;
- factory production control :
  . procedures and written policies ;
  . verifications and tests ;
  . sampling plans ;
  . conformity criteria ;
  . recording of operations and results ;
  . corrections of non-conformity ;
- initial inspection of factory and of factory production control continuous surveillance, judgement and assessment ;

b) a reference to the Commission's Decision on attestation of conformity ;

c) guidance on the characteristics to be stated in the labelling accompanying the CE marking and on the way of expressing the determined values of these characteristics.

NOTE : This point will be detailed according to the Commission guidance to be finalized.

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Compressive strength (of concrete)

1.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.1
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2 and 3.1
ENV 1992-1-4	1994	Eurocode 2 : Design of concrete structures - Part 1-4 : Lightweight aggregate concrete with closed structure Clause 3.1

1.2 Verification by testing

ISO 4012	1978	Concrete - Determination of compressive strength of test specimens
ISO/DIS 7034	1983	Cores of hardened concrete - Taking, examination and testing in compression

2. Ultimate tensile and tensile yield strength of either reinforcing steel or prestressing steel

2.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.2 : Reinforcing steel Clause 3.3 : Prestressing steel
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2, 3.2 and 3.3

2.2 Verification by testing

prEN 10138	(under preparation by ECISS/TC 19)	
	1991	Prestressing steels
ISO 6935	1991	Steel for the reinforcement of concrete
ISO 10544	1992	Cold reduced steel wire for the reinforcement of concrete and the manufacture of welded fabric
ENV 10080	1995	Steel for the reinforcement of concrete - Weldable ribbed reinforcing steel B 500 - Technical delivery conditions for bars, coils and welded fabric
ISO 6934	1991	Steel for the prestressing of concrete

2.3 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

3. Detailing

3.1 Verification by calculation

Specific requirements will be given in the product standard itself.

3.2 Verification by testing

Specific measurement methods will be required in the product standard itself.

4. Rigidity of joints

4.1 Verification by testing

CEN/TC 229 will prepare a specific test method for this precast concrete product that will be included in a normative Annex.

5. Loadbearing capacity

5.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

5.2 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

6. Mechanical strength

6.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 4
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clause 4

6.2 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

D Loadbearing wall elements

D.1 Loadbearing wall elements

D.1.1 Product standard

WI 00229013

(i) Title : Loadbearing wall elements for buildings Availability : 1999-12

(ii) Scope : Reinforced or prestressed concrete two-dimensional element used as a bearing wall in a building with or without additional in situ cast concrete.

(iii) Intended use : External walls, internal walls and partitions of buildings. Structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Compressive strength *(of concrete)*, **ultimate tensile and tensile yield strength** *(of steel)*, **detailing**, **watertightness** *(of joints)*, **water vapour permeability** *(for external walls)*, **water permeability** *(for external walls)*, *(in the end use conditions)* **resistance to fire R** *(only for loadbearing uses)*, **E** and **I**, **airborne sound insulation index** *(only when the product is intended also for acoustic applications)* and the **durability of compressive strength, watertightness** and **water vapour permeability against freeze-thaw** and the **durability of ultimate tensile and tensile yield strength against corrosion**

(In case of verification by testing), **loadbearing capacity** and its **durability against corrosion** and **freeze-thaw** *(only for exposed applications)*

(In case of verification by calculation), **mechanical strength** and its **durability against corrosion** and **freeze-thaw** *(only for exposed applications)*

Additional characteristics for specific materials :

- **drying shrinkage** *(in end use conditions and only for LWC) ;*
- **reaction to fire** *(only for synthetic aggregates and exposed applications)* ;
- **thermal resistance** *(only when claimed by the manufacturer) ;*
- *(in case of verification by calculation)* **density** *(only for LWC)*

(v) other aspects

The harmonized product standard will also contain :

a) clauses on evaluation of conformity and compliance criteria

- initial type testing ;
- factory production control :
  . procedures and written policies ;
  . verifications and tests ;
  . sampling plans ;
  . conformity criteria ;
  . recording of operations and results ;
  . corrections of non-conformity ;
- initial inspection of factory and of factory production control continuous surveillance, judgement and assessment ;

b) a reference to the Commission's Decision on attestation of conformity ;

c) guidance on the characteristics to be stated in the labelling accompanying the CE marking and on the way of expressing the determined values of these characteristics.

NOTE : This point will be detailed according to the Commission guidance to be finalized.

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Compressive strength (of concrete)

1.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.1
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2 and 3.1
ENV 1992-1-4	1994	Eurocode 2 : Design of concrete structures - Part 1-4 : Lightweight aggregate concrete with closed structure Clause 3.1

1.2 Verification by testing

ISO 4012	1978	Concrete - Determination of compressive strength of test specimens
ISO/DIS 7034	1983	Cores of hardened concrete - Taking, examination and testing in compression

1.3 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

2. Ultimate tensile and tensile yield strength of either reinforcing steel or prestressing steel

2.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.2 : Reinforcing steel Clause 3.3 : Prestressing steel
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2, 3.2 and 3.3

2.2 Verification by testing

prEN 10138	(under preparation by ECISS/TC 19) 1991	Prestressing steels
ISO 6935	1991	Steel for the reinforcement of concrete
ISO 10544	1992	Cold reduced steel wire for the reinforcement of concrete and the manufacture of welded fabric
ENV 10080	1995	Steel for the reinforcement of concrete - Weldable ribbed reinforcing steel B 500 - Technical delivery conditions for bars, coils and welded fabric
ISO 6934	1991	Steel for the prestressing of concrete

2.3 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

3. Detailing

3.1 Verification by calculation

Specific requirements will be given in the product standard itself.

3.2 Verification by testing

Specific measurement methods will be required in the product standard itself.

4. Resistance to fire - Loadbearing capacity, integrity, insulation

4.1 Verification by calculation

ENV 1992-1-2	1994	Eurocode 2 : Design of concrete structures - Part 1-2 : General rules - Structural fire design Clauses 4.3, 4.5 and 4.6

4.2 Verification by testing

Pertinent Supporting standards will be selected among test methods elaborated by CEN/TC 127 in accordance with their scope.

WI 45	Contribution to fire resistance of structural members - Part 3 : Concrete elements	(1999-12)
prEN 1187-1	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 1 : Simulated burning brands	(1999-12)
prEN 1187-2	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 2 : Simulated burning brands impressed radiant heat and wind	(1999-12)
prEN 1363-1	Fire resistance tests - Part 1 : General requirements	(1999-12)
prEN 1363-2	Fire resistance tests - Part 2 : Alternative and additional procedures	(1999-12)
prEN 1364-1	Fire resistance tests - Non-loadbearing elements - Part 1 : walls	(1999-12)
prEN 1365-1	Fire resistance tests - Loadbearing elements - Part 1 : Walls	(1999-12)
prEN 1365-2	Fire resistance tests - Loadbearing elements - Part 2 : Floors and roofs	(1999-12)
prEN 1365-3	Fire resistance tests - Loadbearing elements - Part 3 : Beams	(1999-12)
prEN 1365-4	Fire resistance tests - Loadbearing elements - Part 4 : Columns	(1999-12)

5. **Watertightness** (of joints), **water permeability or water vapour permeability** (for external walls), and their durability

The product standard will not include requirements depending on work execution and on finished work.
Water vapour permeability characteristic is not relevant for concrete ordinary works.

6. Direct airborne sound insulation index

Pertinent supporting standards will be selected among standards elaborated by CEN/TC 126 in accordance with their scope.

6.1 Verification by calculation

prEN 20717-1	Acoustics - Rating of sound insulation in buildings and of building elements Part 1 : Airborne sound insulation	(1997-02)
prEN 12354-1	Estimation of acoustic performance of buildings from the performance of products Part 1 : Airborne sound insulation between rooms	(1998-11)
prEN 12354-3	Estimation of acoustic performance of buildings from the performance of products Part 3 : Airborne sound insulation for outdoor noise	(1999-09)

6.2 Verification by testing

EN 20140-3:1995	Acoustics - Measurement of sound insulation in buildings and of building elements Part 3 : Laboratory measurements of airborne sound insulation of building elements (ISO/DIS 140-3)	
prEN 20140-4	Acoustics - Measurement of sound insulation in buildings and of building elements Part 4 : Field measurements of airborne sound insulation between rooms	(1999-02)
prEN 20140-5	Acoustics - Measurement of sound insulation in buildings and of building elements Part 5 : Field measurements of airborne sound insulation of facade elements and facades	(1999-02)

7. Loadbearing capacity

7.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

7.2 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

7.3 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

8. Mechanical strength

8.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 4
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clause 4

8.2 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

8.3 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

9. Drying shrinkage (only for LWC)

9.1 Verification by testing

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

10. Reaction to fire (only for synthetic aggregates and exposed applications)

10.1 Verification by testing

Pertinent supporting standards will be selected among test methods elaborated by CEN/TC 127 in accordance with their scope.

WI 01	Reaction to fire - Non-combustibility	(1999-12)
WI 02	Reaction to fire - Ignitability	(1999-12)
WI 13	Reaction to fire - Determination of calorific value	(1999-12)
WI 26	Reaction to fire - General requirements for conditioning and specimen preparation	(1999-12)

11. Thermal resistance

In case of intended use for thermal insulation applications, precast concrete products are completed with specifically thermal insulating materials. Therefore this characteristic is not relevant to bare precast concrete products.

12. Density (only for LWC)

12.1 Verification by testing

prEN 12363	(under preparation by CEN/TC 104) Hardened concrete - Determination of density (ISO 6275)	(1998-12)

E Cladding panels

E.1 Cladding elements

E.1.1 Product standard

WI 00229022

(i) Title : Cladding elements Availability : 1999-12

(ii) Scope : Non bearing wall panels for façades to be fastened upon a bearing structure.

(iii) Intended use : External walls, internal walls and partitions. Non structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Loadbearing capacity, watertightness *(of joints)*, **water vapour permeability** *(for external walls)*, **water permeability** *(for external walls)*, **resistance to fire E** and **I** *(in end use conditions)*, **strength of fixture, airborne sound insulation index** *(only when the product is intended also for acoustic applications)* and the **durability of loadbearing capacity, watertightness** and **water vapour permeability against freeze-thaw** and the **durability of loadbearing capacity against corrosion**

Additional characteristics for specific materials :

- **drying shrinkage** *(in end use conditions and only for LWC)* ;
- **density** *(only for LWC)* ;
- **reaction to fire** *(only for synthetic aggregates and exposed applications)* ;
- **thermal resistance** *(only when the product is intended also for thermal applications)*

(v) other aspects

The harmonized product standard will also contain :

a) clauses on evaluation of conformity and compliance criteria

- initial type testing ;
- factory production control :
  . procedures and written policies ;
  . verifications and tests ;
  . sampling plans ;
  . conformity criteria ;
  . recording of operations and results ;
  . corrections of non-conformity ;

b) a reference to the Commission's Decision on attestation of conformity ;

c) guidance on the characteristics to be stated in the labelling accompanying the CE marking and on the way of expressing the determined values of these characteristics.

NOTE : This point will be detailed according to the Commission guidance to be finalized.

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Loadbearing capacity

Considering that cladding elements are non structural, this characteristic will not be dealt with.

2. Resistance to fire - Loadbearing capacity, integrity, insulation

2.1 Verification by calculation

ENV 1992-1-2	1994	Eurocode 2 : Design of concrete structures - Part 1-2 : General rules - Structural fire design Clauses 4.3, 4.5 and 4.6

2.2 Verification by testing

Pertinent Supporting standards will be selected among test methods elaborated by CEN/TC 127 in accordance with their scope.

WI 45	Contribution to fire resistance of structural members - Part 3 : Concrete elements	(1999-12)
prEN 1187-1	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 1 : Simulated burning brands	(1999-12)
prEN 1187-2	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 2 : Simulated burning brands impressed radiant heat and wind	(1999-12)
prEN 1363-1	Fire resistance tests - Part 1 : General requirements	(1999-12)
prEN 1363-2	Fire resistance tests - Part 2 : Alternative and additional procedures	(1999-12)
prEN 1364-1	Fire resistance tests - Non-loadbearing elements - Part 1 : walls	(1999-12)
prEN 1365-1	Fire resistance tests - Loadbearing elements - Part 1 : Walls	(1999-12)
prEN 1365-2	Fire resistance tests - Loadbearing elements - Part 2 : Floors and roofs	(1999-12)
prEN 1365-3	Fire resistance tests - Loadbearing elements - Part 3 : Beams	(1999-12)
prEN 1365-4	Fire resistance tests - Loadbearing elements - Part 4 : Columns	(1999-12)

3. **Watertightness** (of joints), **water permeability or water vapour permeability** (for external walls), and their durability

The product standard will not include requirements depending on work execution and on finished work.
Water vapour permeability characteristic is not relevant for concrete ordinary works.

4. Strength of fixture

4.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the finished precast concrete product that will be included in a Normative Annex.

5. Direct airborne sound insulation index

Pertinent supporting standards will be selected among standards elaborated by CEN/TC 126 in accordance with their scope.

5.1 Verification by calculation

prEN 20717-1	Acoustics - Rating of sound insulation in buildings and of building elements Part 1 : Airborne sound insulation	(1997-02)
prEN 12354-1	Estimation of acoustic performance of buildings from the performance of products Part 1 : Airborne sound insulation between rooms	(1998-11)
prEN 12354-3	Estimation of acoustic performance of buildings from the performance of products Part 3 : Airborne sound insulation for outdoor noise	(1999-09)

5.2 Verification by testing

EN 20140-3:1995	Acoustics - Measurement of sound insulation in buildings and of building elements Part 3 : Laboratory measurements of airborne sound insulation of building elements (ISO/DIS 140-3)	
prEN 20140-4	Acoustics - Measurement of sound insulation in buildings and of building elements Part 4 : Field measurements of airborne sound insulation between rooms	(1999-02)
prEN 20140-5	Acoustics - Measurement of sound insulation in buildings and of building elements Part 5 : Field measurements of airborne sound insulation of facade elements and facades	(1999-02)

6. **Drying shrinkage** (only for LWC)

6.1 Verification by testing

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

7. **Density** (only for LWC)

7.1 Verification by testing

prEN 12363	(under preparation by CEN/TC 104) Hardened concrete - Determination of density (ISO 6275)	(1998-12)

8. **Reaction to fire** (only for synthetic aggregates and exposed applications)

8.1 Verification by testing

Pertinent supporting standards will be selected among test methods elaborated by CEN/TC 127 in accordance with their scope.

WI 01	Reaction to fire - Non-combustibility	(1999-12)
WI 02	Reaction to fire - Ignitability	(1999-12)
WI 13	Reaction to fire - Determination of calorific value	(1999-12)
WI 26	Reaction to fire - General requirements for conditioning and specimen preparation	(1999-12)

9. **Thermal resistance**

In case of intended use for thermal insulation applications, precast concrete products are completed with specifically thermal insulating materials. Therefore this characteristic is not relevant to bare precast concrete products.

F Precast concrete slabs and beams, including beam and block systems, prestressed or reinforced hollow core elements, ribbed floor elements, floor slats

F.1 Precast hollow core elements for floors

F.1.1 Product standard

WI 00229001

(i) Title : Precast prestressed hollow core elements Availability : 1998-12

(prEN 1168) CEN enquiry in 1993
Availability 1998-12

(ii) Scope : This standard deals with precast prestressed hollow core elements in normal weight concrete and lightweight aggregate concrete with closed structure, having hollow cores in the shape of longitudinal voids to reduce weight. The cross section of these elements is constant along the element and presents one symmetrical axe. The longitudinal cores may have a circular, quasi-circular, oval, or oblong shape.
The elements have lateral edges provided with a longitudinal profile in order to make a shear key for transfer of vertical shear through joints between contiguous elements. For diaphragm action the joints have to function as horizontal shear joints.
The elements are manufactured in factories by extrusion or by slip forming.
Hollow core elements have neither transverse nor shear reinforcement and the main reinforcement is provided by active prestressing steel.
The element may be used in a composite structure with an in situ structural concrete topping cast on site.
The application of the standard is limited to elements with a maximum depth of 440 mm and a maximum width of 1 200 mm.
The application area concerns elements in floors, roofs, walls, and similar applications, not subjected to fatigue loading.
Product properties and performances not dealt with in the body of the standard are not covered and the relating establishment of suitability shall be subjected to national or other regulations.

> NOTE : All the mechanical characteristics are applicable to elements for roofs or walls.
> The other characteristics are specified in the product standard "loadbearing wall elements" (WI 000229013), or in the product standard "roof elements" (WI 000229015).

(iii) Intended use : Floors, galleries, ceilings. Structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Compressive strength *(of concrete)*, **ultimate tensile and tensile yield strength** *(of steel)*, **detailing** *(in end use conditions)*, **resistance to fire R** *(only for loadbearing uses)*, **airborne sound insulation index** and **impact noise transmission index** *(for floors) (only when the product is intended also for acoustic applications)*

(In case of verification by testing) **loadbearing capacity**

(In case of verification by calculation) **mechanical strength**

Additional characteristics for LWC :

- **drying shrinkage** *(in end use conditions)*
- **thermal resistance** *(only when the product is intended also for thermal applications)*
- *(in case of verification by calculation)* **density.**

(v) other aspects

Clauses on evaluation of conformity and compliance criteria

- general
- type testing
- factory production control
  . organization - responsibility and authority
  . factory production control system
  . document control
  . process control
  . inspection and testing
  . non conforming products
  . corrective actions
  . sampling plans and compliance criteria
- assessment of compliance by a third party
  . general
  . initial inspection of factory and factory production control
  . routine surveillance, assessment and approval of factory production control

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Compressive strength (of concrete)

1.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.1
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2 and 3.1
ENV 1992-1-4	1994	Eurocode 2 : Design of concrete structures - Part 1-4 : Lightweight aggregate concrete with closed structure Clause 3.1

1.2 Verification by testing

ISO 4012	1978	Concrete - Determination of compressive strength of test specimens
ISO/DIS 7034	1983	Cores of hardened concrete - Taking, examination and testing in compression

2. Ultimate tensile and tensile yield strength of either reinforcing steel or prestressing steel

2.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.2 : Reinforcing steel Clause 3.3 : Prestressing steel
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2, 3.2 and 3.3

2.2 Verification by testing

prEN 10138	(under preparation by ECISS/TC 19)	
	1991	Prestressing steels
ISO 6935	1991	Steel for the reinforcement of concrete
ISO 10544	1992	Cold reduced steel wire for the reinforcement of concrete and the manufacture of welded fabric
ENV 10080	1995	Steel for the reinforcement of concrete - Weldable ribbed reinforcing steel B 500 - Technical delivery conditions for bars, coils and welded fabric
ISO 6934	1991	Steel for the prestressing of concrete

3. Detailing

3.1 Verification by calculation

Specific requirements will be given in the product standard itself.

3.2 Verification by testing

Specific measurement methods will be required in the product standard itself.

4. Resistance to fire - Loadbearing capacity, integrity, insulation

4.1 Verification by calculation

ENV 1992-1-2	1994	Eurocode 2 : Design of concrete structures - Part 1-2 : General rules - Structural fire design Clauses 4.3, 4.5 and 4.6

4.2 Verification by testing

Pertinent Supporting standards will be selected among test methods elaborated by CEN/TC 127 in accordance with their scope.

WI 45	Contribution to fire resistance of structural members - Part 3 : Concrete elements	(1999-12)
prEN 1187-1	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 1 : Simulated burning brands	(1999-12)
prEN 1187-2	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 2 : Simulated burning brands impressed radiant heat and wind	(1999-12)
prEN 1363-1	Fire resistance tests - Part 1 : General requirements	(1999-12)
prEN 1363-2	Fire resistance tests - Part 2 : Alternative and additional procedures	(1999-12)
prEN 1364-1	Fire resistance tests - Non-loadbearing elements - Part 1 : walls	(1999-12)
prEN 1365-1	Fire resistance tests - Loadbearing elements - Part 1 : Walls	(1999-12)
prEN 1365-2	Fire resistance tests - Loadbearing elements - Part 2 : Floors and roofs	(1999-12)
prEN 1365-3	Fire resistance tests - Loadbearing elements - Part 3 : Beams	(1999-12)
prEN 1365-4	Fire resistance tests - Loadbearing elements - Part 4 : Columns	(1999-12)

5. Direct airborne sound insulation index

Pertinent supporting standards will be selected among standards elaborated by CEN/TC 126 in accordance with their scope.

5.1 Verification by calculation

prEN 20717-1	Acoustics - Rating of sound insulation in buildings and of building elements Part 1 : Airborne sound insulation	(1997-02)
prEN 12354-1	Estimation of acoustic performance of buildings from the performance of products Part 1 : Airborne sound insulation between rooms	(1998-11)
prEN 12354-3	Estimation of acoustic performance of buildings from the performance of products Part 3 : Airborne sound insulation for outdoor noise	(1999-09)

5.2 Verification by testing

EN 20140-3:1995	Acoustics - Measurement of sound insulation in buildings and of building elements Part 3 : Laboratory measurements of airborne sound insulation of building elements (ISO/DIS 140-3)	
prEN 20140-4	Acoustics - Measurement of sound insulation in buildings and of building elements Part 4 : Field measurements of airborne sound insulation between rooms	(1999-02)
prEN 20140-5	Acoustics - Measurement of sound insulation in buildings and of building elements Part 5 : Field measurements of airborne sound insulation of facade elements and facades	(1999-02)

6. Impact noise transmission index

This characteristic is a matter for finished works and not for elements as a part of a whole. Therefore this characteristic has not to be covered by the harmonized product standard.

7. Loadbearing capacity

7.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

8. Mechanical strength

8.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 4
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clause 4

9. Drying shrinkage (only for LWC)

9.1 Verification by testing

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

10. Thermal resistance (only for LWC)

In case of intended use for thermal insulation applications, precast concrete products are completed with specifically thermal insulating materials. Therefore this characteristic is not relevant to bare precast concrete products.

11. Density (only for LWC)

11.1 Verification by testing

prEN 12363	(under preparation by CEN/TC 104) Hardened concrete - Determination of density (ISO 6275)	(1998-12)

(vii) Additional information, comments and remarks

All the mechanical characteristics are applicable to elements for floors, roofs or walls. The other relevant characteristics :

- for roofs are dealt with in the product standard "roof elements" (WI 000229015) ;
- for walls are dealt with in the product standard "loadbearing wall elements" (WI 000229013).

F.1.2 Product standard

WI 00229001

(i) Title : Precast reinforced hollow core elements Availability : 1999-12

(ii) Scope : This standard deals with precast reinforced hollow core elements in normal weight concrete and lightweight aggregate concrete with closed structure, having hollow cores in the shape of longitudinal voids to reduce weight. The cross section of these elements is constant along the element and presents one symmetrical axe. The longitudinal cores may have a circular, quasi-circular, oval or oblong shape.
The elements have lateral edges provided with a longitudinal profile in order to make a shear key for transfer of horizontal shear, or both. For diaphragm action, the joints have to function as horizontal shear joints.
Hollow core elements have no shear reinforcement and the main reinforcement is provided by passive reinforcing steel.
The elements may be used in a composite structure with an in situ structural concrete topping cast on site.
The application of the standard is limited to elements with a maximum depth of 300 mm and a maximum width of 1 200 mm without transverse reinforcement, up to a width of 2 400 mm with transverse reinforcement.
The application area concerns elements in floors, roofs, walls and similar applications, not subjected to fatigue loading.
Product properties and performances not dealt with the body of the standard are not covered and the relating establishment of suitability shall be subjected to national or other regulations.

(iii) Intended use : Floors, galleries, ceilings. Structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Compressive strength *(of concrete)*, **ultimate tensile and tensile yield strength** *(of steel)*, **detailing** *(in end use conditions)*, **resistance to fire R** *(only for loadbearing uses)*, **airborne sound insulation index** and **impact noise transmission index** *(for floors) (only when the product is intended also for acoustic applications)*.

(In case of verification by testing) **loadbearing capacity**

(In case of verification by calculation) **mechanical strength**

Additional characteristics for LWC :

- **drying shrinkage** *(in end use conditions)*
- **thermal resistance** *(only when the product is intended also for thermal applications)*
- *(in case of verification by calculation)* **density**

(v) other aspects

Clauses on evaluation of conformity and compliance criteria

- general
- type testing
- factory production control
  . organization - responsibility and authority
  . factory production control system

. document control
. process control
. inspection and testing
. non conforming products
. corrective actions
. sampling plans and compliance criteria

- assessment of compliance by a third party
. general
. initial inspection of factory and factory production control
. routine surveillance, assessment and approval of factory production control

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Compressive strength (of concrete)

1.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.1
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2 and 3.1
ENV 1992-1-4	1994	Eurocode 2 : Design of concrete structures - Part 1-4 : Lightweight aggregate concrete with closed structure Clause 3.1

1.2 Verification by testing

ISO 4012	1978	Concrete - Determination of compressive strength of test specimens
ISO/DIS 7034	1983	Cores of hardened concrete - Taking, examination and testing in compression

2. Ultimate tensile and tensile yield strength of either reinforcing steel or prestressing steel

2.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.2 : Reinforcing steel Clause 3.3 : Prestressing steel
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2, 3.2 and 3.3

2.2 Verification by testing

prEN 10138	(under preparation by ECISS/TC 19)	
	1991	Prestressing steels
ISO 6935	1991	Steel for the reinforcement of concrete
ISO 10544	1992	Cold reduced steel wire for the reinforcement of concrete and the manufacture of welded fabric
ENV 10080	1995	Steel for the reinforcement of concrete - Weldable ribbed reinforcing steel B 500 - Technical delivery conditions for bars, coils and welded fabric
ISO 6934	1991	Steel for the prestressing of concrete

3. Detailing

3.1 Verification by calculation

Specific requirements will be given in the product standard itself.

3.2 Verification by testing

Specific measurement methods will be required in the product standard itself.

4. Resistance to fire - Loadbearing capacity, integrity, insulation

4.1 Verification by calculation

ENV 1992-1-2	1994	Eurocode 2 : Design of concrete structures - Part 1-2 : General rules - Structural fire design Clauses 4.3, 4.5 and 4.6

4.2 Verification by testing

Pertinent Supporting standards will be selected among test methods elaborated by CEN/TC 127 in accordance with their scope.

WI 45	Contribution to fire resistance of structural members - Part 3 : Concrete elements	(1999-12)
prEN 1187-1	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 1 : Simulated burning brands	(1999-12)
prEN 1187-2	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 2 : Simulated burning brands impressed radiant heat and wind	(1999-12)
prEN 1363-1	Fire resistance tests - Part 1 : General requirements	(1999-12)
prEN 1363-2	Fire resistance tests - Part 2 : Alternative and additional procedures	(1999-12)
prEN 1364-1	Fire resistance tests - Non-loadbearing elements - Part 1 : walls	(1999-12)
prEN 1365-1	Fire resistance tests - Loadbearing elements - Part 1 : Walls	(1999-12)
prEN 1365-2	Fire resistance tests - Loadbearing elements - Part 2 : Floors and roofs	(1999-12)
prEN 1365-3	Fire resistance tests - Loadbearing elements - Part 3 : Beams	(1999-12)
prEN 1365-4	Fire resistance tests - Loadbearing elements - Part 4 : Columns	(1999-12)

5. Direct airborne sound insulation index

Pertinent supporting standards will be selected among standards elaborated by CEN/TC 126 in accordance with their scope.

5.1 Verification by calculation

prEN 20717-1	Acoustics - Rating of sound insulation in buildings and of building elements Part 1 : Airborne sound insulation	(1997-02)
prEN 12354-1	Estimation of acoustic performance of buildings from the performance of products Part 1 : Airborne sound insulation between rooms	(1998-11)
prEN 12354-3	Estimation of acoustic performance of buildings from the performance of products Part 3 : Airborne sound insulation for outdoor noise	(1999-09)

5.2 Verification by testing

EN 20140-3:1995	Acoustics - Measurement of sound insulation in buildings and of building elements Part 3 : Laboratory measurements of airborne sound insulation of building elements (ISO/DIS 140-3)	
prEN 20140-4	Acoustics - Measurement of sound insulation in buildings and of building elements Part 4 : Field measurements of airborne sound insulation between rooms	(1999-02)
prEN 20140-5	Acoustics - Measurement of sound insulation in buildings and of building elements Part 5 : Field measurements of airborne sound insulation of facade elements and facades	(1999-02)

6. Impact noise transmission index

This characteristic is a matter for finished works and not for elements as a part of a whole. Therefore this characteristic has not to be covered by the harmonized product standard.

7. Loadbearing capacity

7.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

8. Mechanical strength

8.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 4
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clause 4

9. **Drying shrinkage** (only for LWC)

9.1 Verification by testing

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

10. **Thermal resistance** (only for LWC)

In case of intended use for thermal insulation applications, precast concrete products are completed with specifically thermal insulating materials. Therefore this characteristic is not relevant to bare precast concrete products.

11. **Density** (only for LWC)

11.1 Verification by testing

prEN 12363	(under preparation by CEN/TC 104) Hardened concrete - Determination of density (ISO 6275)	(1998-12)

(vii) Additional information, comments and remarks

All the mechanical characteristics are applicable to elements for floors, roofs or walls. The other relevant characteristics :

- for roofs are dealt with in the product standard "roof elements" (WI 000229015) ;
- for walls are dealt with in the product standard "loadbearing wall elements" (WI 000229013).

G Precast concrete slabs and beams, including beam and block systems, prestressed or reinforced hollow core elements, ribbed floor elements, floor slats

G.1 Shuttering slabs lattice girder elements for floors

G.1.1 Product standard

WI 00229009

(i) Title : Prestressed concrete floor plates Availability : 1999-12

(ii) Scope : Prestressed thin plate used as a shutter for the upper part of the slabs made of cast in situ concrete, to which it is structurally connected in the final composition of the floor.

(iii) Intended use : Floors, galleries, ceilings. Structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Compressive strength *(of concrete)*, **ultimate tensile and tensile yield strength** *(of steel)*, **detailing,** *(in the end use conditions)*, **resistance to fire R** *(only for loadbearing uses)*, **airborne sound insulation index** and **impact noise transmission index** *(for floors) (only when the product is intended also for acoustic applications)*

(In case of verification by testing) **loadbearing capacity**

(In case of verification by calculation) **mechanical strength**

(v) other aspects

The harmonized product standard will also contain :

a) clauses on evaluation of conformity and compliance criteria

- initial type testing ;
- factory production control :
  - . procedures and written policies ;
  - . verifications and tests ;
  - . sampling plans ;
  - . conformity criteria ;
  - . recording of operations and results ;
  - . corrections of non-conformity ;
- initial inspection of factory and of factory production control continuous surveillance, judgement and assessment ;

b) a reference to the Commission's Decision on attestation of conformity ;

c) guidance on the characteristics to be stated in the labelling accompanying the CE marking and on the way of expressing the determined values of these characteristics.

NOTE : This point will be detailed according to the Commission guidance to be finalized.

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Compressive strength (of concrete)

1.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.1
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2 and 3.1
ENV 1992-1-4	1994	Eurocode 2 : Design of concrete structures - Part 1-4 : Lightweight aggregate concrete with closed structure Clause 3.1

1.2 Verification by testing

ISO 4012	1978	Concrete - Determination of compressive strength of test specimens
ISO/DIS 7034	1983	Cores of hardened concrete - Taking, examination and testing in compression

2. Ultimate tensile and tensile yield strength of either reinforcing steel or prestressing steel

2.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.2 : Reinforcing steel Clause 3.3 : Prestressing steel
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2, 3.2 and 3.3

2.2 Verification by testing

prEN 10138	(under preparation by ECISS/TC 19)	
	1991	Prestressing steels
ISO 6935	1991	Steel for the reinforcement of concrete
ISO 10544	1992	Cold reduced steel wire for the reinforcement of concrete and the manufacture of welded fabric
ENV 10080	1995	Steel for the reinforcement of concrete - Weldable ribbed reinforcing steel B 500 - Technical delivery conditions for bars, coils and welded fabric
ISO 6934	1991	Steel for the prestressing of concrete

3. Detailing

3.1 Verification by calculation

Specific requirements will be given in the product standard itself.

3.2 Verification by testing

Specific measurement methods will be required in the product standard itself.

4. Resistance to fire - Loadbearing capacity, integrity, insulation

This characteristic is a matter for finished floors and not for the product considered separately. This precast concrete product contributes only for a part of the whole fire resistance of the floor.

4.1 Verification by calculation

ENV 1992-1-2	1994	Eurocode 2 : Design of concrete structures - Part 1-2 : General rules - Structural fire design Clauses 4.3, 4.5 and 4.6

4.2 Verification by testing

The sole product should not be tested.

5. Direct airborne sound insulation index

Pertinent supporting standards will be selected among standards elaborated by CEN/TC 126 in accordance with their scope.

5.1 Verification by calculation

prEN 20717-1	Acoustics - Rating of sound insulation in buildings and of building elements Part 1 : Airborne sound insulation	(1997-02)
prEN 12354-1	Estimation of acoustic performance of buildings from the performance of products Part 1 : Airborne sound insulation between rooms	(1998-11)
prEN 12354-3	Estimation of acoustic performance of buildings from the performance of products Part 3 : Airborne sound insulation for outdoor noise	(1999-09)

5.2 Verification by testing

EN 20140-3:1995	Acoustics - Measurement of sound insulation in buildings and of building elements Part 3 : Laboratory measurements of airborne sound insulation of building elements (ISO/DIS 140-3)	
prEN 20140-4	Acoustics - Measurement of sound insulation in buildings and of building elements Part 4 : Field measurements of airborne sound insulation between rooms	(1999-02)
prEN 20140-5	Acoustics - Measurement of sound insulation in buildings and of building elements Part 5 : Field measurements of airborne sound insulation of facade elements and facades	(1999-02)

6. Impact noise transmission index

This characteristic is a matter for finished works and not for elements as a part of a whole. Therefore this characteristic has not to be covered by the harmonized product standard.

7. Loadbearing capacity

7.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

8. Mechanical strength

8.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 4
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clause 4

G.1.2 Product standard

WI 00229009

(i) Title : Reinforced concrete floor plates Availability : 1999-12

(ii) Scope : Reinforced thin plate used as a shutter for the upper part of the slats made of cast in situ concrete, to which it is structurally connected in the final composition of the floor.

(iii) Intended use : Floors, galleries, ceilings. Structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Compressive strength *(of concrete)*, **ultimate tensile and tensile yield strength** *(of steel)*, **detailing,** *(in the end use conditions)*, **resistance to fire R** *(only for loadbearing uses)*, **airborne sound insulation index** and **impact noise transmission index** *(for floors) (only when the product is intended also for acoustic applications)*

(In case of verification by testing) **loadbearing capacity**

(In case of verification by calculation) **mechanical strength**

(v) other aspects

The harmonized product standard will also contain :

a) clauses on evaluation of conformity and compliance criteria

- initial type testing ;
- factory production control :
  . procedures and written policies ;
  . verifications and tests ;
  . sampling plans ;
  . conformity criteria ;
  . recording of operations and results ;
  . corrections of non-conformity ;
- initial inspection of factory and of factory production control continuous surveillance, judgement and assessment ;

b) a reference to the Commission's Decision on attestation of conformity ;

c) guidance on the characteristics to be stated in the labelling accompanying the CE marking and on the way of expressing the determined values of these characteristics.

NOTE : This point will be detailed according to the Commission guidance to be finalized.

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Compressive strength (of concrete)

1.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.1
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2 and 3.1
ENV 1992-1-4	1994	Eurocode 2 : Design of concrete structures - Part 1-4 : Lightweight aggregate concrete with closed structure Clause 3.1

1.2 Verification by testing

ISO 4012	1978	Concrete - Determination of compressive strength of test specimens
ISO/DIS 7034	1983	Cores of hardened concrete - Taking, examination and testing in compression

2. Ultimate tensile and tensile yield strength of either reinforcing steel or prestressing steel

2.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.2 : Reinforcing steel Clause 3.3 : Prestressing steel
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2, 3.2 and 3.3

2.2 Verification by testing

prEN 10138	(under preparation by ECISS/TC 19) 1991	Prestressing steels
ISO 6935	1991	Steel for the reinforcement of concrete
ISO 10544	1992	Cold reduced steel wire for the reinforcement of concrete and the manufacture of welded fabric
ENV 10080	1995	Steel for the reinforcement of concrete - Weldable ribbed reinforcing steel B 500 - Technical delivery conditions for bars, coils and welded fabric
ISO 6934	1991	Steel for the prestressing of concrete

3. Detailing

3.1 Verification by calculation

Specific requirements will be given in the product standard itself.

3.2 Verification by testing

Specific measurement methods will be required in the product standard itself.

4. Resistance to fire - Loadbearing capacity, integrity, insulation

This characteristic is a matter for finished floors and not for the product considered separately. This precast concrete product contributes only for a part of the whole fire resistance of the floor.

4.1 Verification by calculation

ENV 1992-1-2	1994	Eurocode 2 : Design of concrete structures - Part 1-2 : General rules - Structural fire design Clauses 4.3, 4.5 and 4.6

4.2 Verification by testing

The sole product should not be tested.

5. Direct airborne sound insulation index

Pertinent supporting standards will be selected among standards elaborated by CEN/TC 126 in accordance with their scope.

5.1 Verification by calculation

prEN 20717-1	Acoustics - Rating of sound insulation in buildings and of building elements Part 1 : Airborne sound insulation	(1997-02)
prEN 12354-1	Estimation of acoustic performance of buildings from the performance of products Part 1 : Airborne sound insulation between rooms	(1998-11)
prEN 12354-3	Estimation of acoustic performance of buildings from the performance of products Part 3 : Airborne sound insulation for outdoor noise	(1999-09)

5.2 Verification by testing

EN 20140-3:1995	Acoustics - Measurement of sound insulation in buildings and of building elements Part 3 : Laboratory measurements of airborne sound insulation of building elements (ISO/DIS 140-3)	
prEN 20140-4	Acoustics - Measurement of sound insulation in buildings and of building elements Part 4 : Field measurements of airborne sound insulation between rooms	(1999-02)
prEN 20140-5	Acoustics - Measurement of sound insulation in buildings and of building elements Part 5 : Field measurements of airborne sound insulation of facade elements and facades	(1999-02)

6. Impact noise transmission index

This characteristic is a matter for finished works and not for elements as a part of a whole. Therefore this characteristic has not to be covered by the harmonized product standard.

7. Loadbearing capacity

7.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

8. Mechanical strength

8.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 4
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clause 4

H Precast concrete slabs and beams, including beam and block systems, prestressed or reinforced hollow core elements, ribbed floor elements, floor slats

H.1 Beam/block floor units and elements

H.1.1 Product standard

WI 00229010-Part1

Availability : 1999-12

(i) Title : Precast concrete products - Beams for beam-and-block floor systems

(ii) Scope : This European standard presents all the requirements that the beams used in conjunction with blocks in compliance with EN YYY (WI 00229010-2 in preparation) and/or cast-in-situ concrete shall meet for the construction of beam and block floor systems. Annex A gives typology of different types of such floor systems.

The beams may be made of reinforced concrete (inverted "T" beams, or beams with lattice girders) or of pretensioned prestressed concrete (inverted "T").

Their depth shall not exceed 350 mm and beams shall be at centres of no more than 900 mm.

These beams shall be cast in factories by casting, slip-forming or extrusion. They shall be made from normal-weight concrete or closed-structure lightweight-aggregate concrete.

They may be placed singly or in twos or threes.

The scope of use covered by this European standard is that of floor systems whose loads are chiefly static, as well as those in circulation areas or parking areas for light vehicles corresponding to traffic category E of ENV 1991-2-4.

They may be used in seismic areas on condition that requirements specific to this usage have been drawn up in the country where they are to be used.

WI 00229010-Part2

Availability : 1999-12

(i) Title : Precast concrete products - Blocks for beam-and-block floor systems

(ii) Scope : This European standard presents all the requirements that the blocks in any material used in conjunction with beams in compliance with EN XXX (WI 00229010-1) and/or cast-in-situ concrete shall meet for the construction of beam-and-block floor systems. Annex A of EN XXX (WI 00229010-1 in preparation) gives the typology of different types of such floor systems.

(iii) Intended use : Floors, galleries, ceilings. Structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Compressive strength *(of concrete)*, **ultimate tensile and tensile yield strength** *(of steel)*, **detailing**, **resistance to fire R** *(only for loadbearing uses)*, **direct airborne sound insulation index** and **impact noise transmission index** *(only when the product is intended also for acoustic applications)*

(In case of verification by testing) **loadbearing capacity**

(In case of verification by calculation) **mechanical strength**

Additional characteristics for LWC :

- **drying shrinkage** *(in end use conditions) ;*
- **thermal resistance** *(only when the product is intended also for thermal applications) ;*
- *(in case of verification by calculation)* **density**.

(v) other aspects

The harmonized product standard will also contain :

a) clauses on evaluation of conformity and compliance criteria

- initial type testing ;
- factory production control :
  . procedures and written policies ;
  . verifications and tests ;
  . sampling plans ;
  . conformity criteria ;
  . recording of operations and results ;
  . corrections of non-conformity ;
- initial inspection of factory and of factory production control continuous surveillance, judgement and assessment ;

b) a reference to the Commission's Decision on attestation of conformity ;

c) guidance on the characteristics to be stated in the labelling accompanying the CE marking and on the way of expressing the determined values of these characteristics.

NOTE : This point will be detailed according to the Commission guidance to be finalized.

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Compressive strength (of concrete)

1.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.1
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2 and 3.1
ENV 1992-1-4	1994	Eurocode 2 : Design of concrete structures - Part 1-4 : Lightweight aggregate concrete with closed structure Clause 3.1

1.2 Verification by testing

ISO 4012	1978	Concrete - Determination of compressive strength of test specimens
ISO/DIS 7034	1983	Cores of hardened concrete - Taking, examination and testing in compression

2. Ultimate tensile and tensile yield strength of either reinforcing steel or prestressing steel

2.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.2 : Reinforcing steel Clause 3.3 : Prestressing steel
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2, 3.2 and 3.3

2.2 Verification by testing

prEN 10138	(under preparation by ECISS/TC 19) 1991	Prestressing steels
ISO 6935	1991	Steel for the reinforcement of concrete
ISO 10544	1992	Cold reduced steel wire for the reinforcement of concrete and the manufacture of welded fabric
ENV 10080	1995	Steel for the reinforcement of concrete - Weldable ribbed reinforcing steel B 500 - Technical delivery conditions for bars, coils and welded fabric
ISO 6934	1991	Steel for the prestressing of concrete

3. Detailing

3.1 Verification by calculation

Specific requirements will be given in the product standard itself.

3.2 Verification by testing

Specific measurement methods will be required in the product standard itself.

4. Resistance to fire

This characteristic is a matter for finished floors and not for the product considered separately. This precast concrete product contributes only for a part of the whole fire resistance of the floor.

4.1 Verification by calculation

ENV 1992-1-2	1994	Eurocode 2 : Design of concrete structures - Part 1-2 : General rules - Structural fire design Clauses 4.3, 4.5 and 4.6

4.2 Verification by testing

The sole product should not be tested

5. Direct airborne sound insulation index

Pertinent supporting standards will be selected among standards elaborated by CEN/TC 126 in accordance with their scope.

5.1 Verification by calculation

prEN 20717-1	Acoustics - Rating of sound insulation in buildings and of building elements Part 1 : Airborne sound insulation	(1997-02)
prEN 12354-1	Estimation of acoustic performance of buildings from the performance of products Part 1 : Airborne sound insulation between rooms	(1998-11)
prEN 12354-3	Estimation of acoustic performance of buildings from the performance of products Part 3 : Airborne sound insulation for outdoor noise	(1999-09)

5.2 Verification by testing

EN 20140-3:1995	Acoustics - Measurement of sound insulation in buildings and of building elements Part 3 : Laboratory measurements of airborne sound insulation of building elements (ISO/DIS 140-3)	
prEN 20140-4	Acoustics - Measurement of sound insulation in buildings and of building elements Part 4 : Field measurements of airborne sound insulation between rooms	(1999-02)
prEN 20140-5	Acoustics - Measurement of sound insulation in buildings and of building elements Part 5 : Field measurements of airborne sound insulation of facade elements and facades	(1999-02)

6. Impact noise transmission index

This characteristic is a matter for finished works and not for elements as a part of a whole. Therefore this characteristic has not to be covered by the harmonized product standard.

7. Loadbearing capacity

7.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

8. Mechanical strength

8.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 4
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clause 4

9. Drying shrinkage (only for LWC)

9.1 Verification by testing

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

10. Thermal resistance (only for LWC)

This characteristic is a matter for finished floors and not for the product considered separately.

11. Density (only for LWC)

11 .1 Verification by testing

prEN 12363	(under preparation by CEN/TC 104) Hardened concrete - Determination of density (ISO 6275)	(1998-12)

I Precast concrete slabs and beams, including beam and block systems, prestressed or reinforced hollow core elements, ribbed floor elements, floor slats

I.1 Ribbed floor elements

I.1.1 Product standard

WI 00229011

(i) Title : Precast ribbed floor elements Availability : 1998-12

(ii) Scope : This standard deals with precast concrete ribbed elements used in floors or roofs. The elements consist of a top slab and one or more (usually two) ribs, containing the main longitudinal reinforcement ; a bottom slab and transversal ribs may also be present.
The lateral edges may be shaped in form of shear key in order to realise a cast in-situ longitudinal shear joint and/or be provided with steel plates for welded connection on site.

(iii) Intended use : Floors, galleries, ceilings. Structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Compressive strength *(of concrete)*, **ultimate tensile and tensile yield strength** *(of steel)*, **detailing, resistance to fire R** *(only for loadbearing uses)*

(In case of verification by testing) **loadbearing capacity**

(In case of verification by calculation) **mechanical strength**

(v) other aspects

The harmonized product standard will also contain :

a) clauses on evaluation of conformity and compliance criteria

- initial type testing ;
- factory production control :
  . procedures and written policies ;
  . verifications and tests ;
  . sampling plans ;
  . conformity criteria ;
  . recording of operations and results ;
  . corrections of non-conformity ;
- initial inspection of factory and of factory production control continuous surveillance, judgement and assessment ;

b) a reference to the Commission's Decision on attestation of conformity ;

c) guidance on the characteristics to be stated in the labelling accompanying the CE marking and on the way of expressing the determined values of these characteristics.

NOTE : This point will be detailed according to the Commission guidance to be finalized.

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Compressive strength (of concrete)

1.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.1
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2 and 3.1
ENV 1992-1-4	1994	Eurocode 2 : Design of concrete structures - Part 1-4 : Lightweight aggregate concrete with closed structure Clause 3.1

1.2 Verification by testing

ISO 4012	1978	Concrete - Determination of compressive strength of test specimens
ISO/DIS 7034	1983	Cores of hardened concrete - Taking, examination and testing in compression

2. Ultimate tensile and tensile yield strength of either reinforcing steel or prestressing steel

2.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.2 : Reinforcing steel Clause 3.3 : Prestressing steel
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2, 3.2 and 3.3

2.2 Verification by testing

prEN 10138	(under preparation by ECISS/TC 19) 1991	Prestressing steels
ISO 6935	1991	Steel for the reinforcement of concrete
ISO 10544	1992	Cold reduced steel wire for the reinforcement of concrete and the manufacture of welded fabric
ENV 10080	1995	Steel for the reinforcement of concrete - Weldable ribbed reinforcing steel B 500 - Technical delivery conditions for bars, coils and welded fabric
ISO 6934	1991	Steel for the prestressing of concrete

3. Detailing

3.1 Verification by calculation

Specific requirements will be given in the product standard itself.

3.2 Verification by testing

Specific measurement methods will be required in the product standard itself.

4. Resistance to fire - Loadbearing capacity, integrity, insulation

4.1 Verification by calculation

ENV 1992-1-2	1994	Eurocode 2 : Design of concrete structures - Part 1-2 : General rules - Structural fire design Clauses 4.3, 4.5 and 4.6

4.2 Verification by testing

Pertinent Supporting standards will be selected among test methods elaborated by CEN/TC 127 in accordance with their scope.

WI 45	Contribution to fire resistance of structural members - Part 3 : Concrete elements	(1999-12)
prEN 1187-1	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 1 : Simulated burning brands	(1999-12)
prEN 1187-2	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 2 : Simulated burning brands impressed radiant heat and wind	(1999-12)
prEN 1363-1	Fire resistance tests - Part 1 : General requirements	(1999-12)
prEN 1363-2	Fire resistance tests - Part 2 : Alternative and additional procedures	(1999-12)
prEN 1364-1	Fire resistance tests - Non-loadbearing elements - Part 1 : walls	(1999-12)
prEN 1365-1	Fire resistance tests - Loadbearing elements - Part 1 : Walls	(1999-12)
prEN 1365-2	Fire resistance tests - Loadbearing elements - Part 2 : Floors and roofs	(1999-12)
prEN 1365-3	Fire resistance tests - Loadbearing elements - Part 3 : Beams	(1999-12)
prEN 1365-4	Fire resistance tests - Loadbearing elements - Part 4 : Columns	(1999-12)

5. Loadbearing capacity

5.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

6. Mechanical strength

6.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 4
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clause 4

J Prefabricated stairs - straight, curved and spiral

J.1 Stairs

J.1.1 Product standard

WI 00229004

(i) Title : Precast monolithic concrete stairs Availability : 1999-06

(ii) Scope : This standard gives specifications for materials, properties, requirements and methods of testing for precast concrete monolithic stair elements.

This standard is applicable to stairs for use indoors as well as outdoors in e.g. dwellings, schools and office and public buildings according to the building regulations for dimensions, fire, etc.

(iii) Intended use : Prefabricated systems for floors and galleries, stairs, ramps, raised access floors, balustrades and hand rails, including external works. Structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Compressive strength *(of concrete)*, **ultimate tensile and tensile yield strength** *(of steel)*, **detailing**, **resistance to fire R** *(only for loadbearing uses)*, **dimensioning**, *(only when the product is intended also for acoustic applications)* **impact noise transmission index** *(for floors)* and **durability of ultimate tensile and tensile yield strength against corrosion**

(In case of verification by testing) **loadbearing capacity** and its **durability against corrosion**

(In case of verification by calculation) **mechanical strength** and its **durability against corrosion**

Additional characteristics for specific use in part of fire compartment :

- **resistance to fire E** and **I** *(in the end use conditions)*

(v) other aspects

The harmonized product standard will also contain :

a) clauses on evaluation of conformity and compliance criteria

- initial type testing ;
- factory production control :
  . procedures and written policies ;
  . verifications and tests ;
  . sampling plans ;
  . conformity criteria ;
  . recording of operations and results ;
  . corrections of non-conformity ;
- initial inspection of factory and of factory production control continuous surveillance, judgement and assessment ;

b) a reference to the Commission's Decision on attestation of conformity ;

c) guidance on the characteristics to be stated in the labelling accompanying the CE marking and on the way of expressing the determined values of these characteristics.

NOTE : This point will be detailed according to the Commission guidance to be finalized.

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Compressive strength (of concrete)

1.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.1
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2 and 3.1
ENV 1992-1-4	1994	Eurocode 2 : Design of concrete structures - Part 1-4 : Lightweight aggregate concrete with closed structure Clause 3.1

1.2 Verification by testing

ISO 4012	1978	Concrete - Determination of compressive strength of test specimens
ISO/DIS 7034	1983	Cores of hardened concrete - Taking, examination and testing in compression

2. Ultimate tensile and tensile yield strength of either reinforcing steel or prestressing steel

2.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.2 : Reinforcing steel Clause 3.3 : Prestressing steel
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2, 3.2 and 3.3

2.2 Verification by testing

prEN 10138	(under preparation by ECISS/TC 19) 1991	Prestressing steels
ISO 6935	1991	Steel for the reinforcement of concrete
ISO 10544	1992	Cold reduced steel wire for the reinforcement of concrete and the manufacture of welded fabric
ENV 10080	1995	Steel for the reinforcement of concrete - Weldable ribbed reinforcing steel B 500 - Technical delivery conditions for bars, coils and welded fabric
ISO 6934	1991	Steel for the prestressing of concrete

2.3 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

3. Detailing

3.1 Verification by calculation

Specific requirements will be given in the product standard itself.

3.2 Verification by testing

Specific measurement methods will be required in the product standard itself.

4. Resistance to fire - Loadbearing capacity, integrity, insulation

4.1 Verification by calculation

ENV 1992-1-2	1994	Eurocode 2 : Design of concrete structures - Part 1-2 : General rules - Structural fire design Clauses 4.3, 4.5 and 4.6

4.2 Verification by testing

Pertinent Supporting standards will be selected among test methods elaborated by CEN/TC 127 in accordance with their scope.

WI 45	Contribution to fire resistance of structural members - Part 3 : Concrete elements	(1999-12)
prEN 1187-1	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 1 : Simulated burning brands	(1999-12)
prEN 1187-2	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 2 : Simulated burning brands impressed radiant heat and wind	(1999-12)
prEN 1363-1	Fire resistance tests - Part 1 : General requirements	(1999-12)
prEN 1363-2	Fire resistance tests - Part 2 : Alternative and additional procedures	(1999-12)
prEN 1364-1	Fire resistance tests - Non-loadbearing elements - Part 1 : walls	(1999-12)
prEN 1365-1	Fire resistance tests - Loadbearing elements - Part 1 : Walls	(1999-12)
prEN 1365-2	Fire resistance tests - Loadbearing elements - Part 2 : Floors and roofs	(1999-12)
prEN 1365-3	Fire resistance tests - Loadbearing elements - Part 3 : Beams	(1999-12)
prEN 1365-4	Fire resistance tests - Loadbearing elements - Part 4 : Columns	(1999-12)

5. Dimensioning

5.1 Verification by calculation

ISO 1006	1983	Building construction - Modular co-ordination - Basic module

5.2 Verification by testing

ISO 7976-1	1989	Tolerances for building - Methods of measurement of building and building products - Part 1: Methods and instruments
ISO 7976-2	1989	Tolerances for building - Methods of measurement of building and building products - Part 2: Position of measuring points

6. Impact noise transmission index

This characteristic is a matter for finished works and not for elements as a part of a whole. Therefore this characteristic has not to be covered by the harmonized product standard.

7. Loadbearing capacity

7.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

7.2 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

8. Mechanical strength

8.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 4
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clause 4

8.2 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

K Prefabricated structural units of precast concrete (dense, cellular, lightweight, AAC)

K.1 Roof elements

K.1.1 Product standard

WI 00229015

(i) Title : Roof elements Availability : 1999-12

(ii) Scope : Reinforced or prestressed concrete elements with special characteristics, used instead of the common types of floors for roofs, such as gutter girders, plate elements for long spans, skylight shells.

(iii) Intended use : Roofs. Structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Compressive strength *(of concrete)*, **ultimate tensile and tensile yield strength** *(of steel)*, **detailing,** *(in the end use conditions)* **resistance to fire R** *(only for loadbearing uses)*, **E** and **I**, *(only when the product is intended also for acoustic applications)* **airborne sound insulation index** and **durability of ultimate tensile and tensile yield strength against corrosion** and of **compressive strength against freeze-thaw** *(only for exposed applications)*

(In case of verification by testing) **loadbearing capacity** and its **durability against corrosion** and **freeze-thaw** *(only for exposed applications)*

(In case of verification by calculation) **mechanical strength** and its **durability against corrosion** and **freeze-thaw** *(only for exposed applications)*

Additional characteristics for specific materials :

- **drying shrinkage** *(in end use conditions and only for LWC)* ;
- **reaction to fire** *(only for synthetic aggregates and exposed applications) ;*
- **thermal resistance** *(only when the product is intended also for thermal applications) ;*
- *(in case of verification by calculation)*, **density** *(only for LWC).*

(v) other aspects

The harmonized product standard will also contain :

a) clauses on evaluation of conformity and compliance criteria

- initial type testing ;
- factory production control :
  - . procedures and written policies ;
  - . verifications and tests ;
  - . sampling plans ;
  - . conformity criteria ;
  - . recording of operations and results ;
  - . corrections of non-conformity ;
- initial inspection of factory and of factory production control continuous surveillance, judgement and assessment ;

b) a reference to the Commission's Decision on attestation of conformity ;

c) guidance on the characteristics to be stated in the labelling accompanying the CE marking and on the way of expressing the determined values of these characteristics.

NOTE : This point will be detailed according to the Commission guidance to be finalized.

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Compressive strength (of concrete)

1.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.1
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2 and 3.1
ENV 1992-1-4	1994	Eurocode 2 : Design of concrete structures - Part 1-4 : Lightweight aggregate concrete with closed structure Clause 3.1

1.2 Verification by testing

ISO 4012	1978	Concrete - Determination of compressive strength of test specimens
ISO/DIS 7034	1983	Cores of hardened concrete - Taking, examination and testing in compression

1.3 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

2. Ultimate tensile and tensile yield strength of either reinforcing steel or prestressing steel

2.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.2 : Reinforcing steel Clause 3.3 : Prestressing steel
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2, 3.2 and 3.3

2.2 Verification by testing

prEN 10138	(under preparation by ECISS/TC 19) 1991	Prestressing steels
ISO 6935	1991	Steel for the reinforcement of concrete
ISO 10544	1992	Cold reduced steel wire for the reinforcement of concrete and the manufacture of welded fabric
ENV 10080	1995	Steel for the reinforcement of concrete - Weldable ribbed reinforcing steel B 500 - Technical delivery conditions for bars, coils and welded fabric
ISO 6934	1991	Steel for the prestressing of concrete

2.3 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

3. Detailing

3.1 Verification by calculation

Specific requirements will be given in the product standard itself.

3.2 Verification by testing

Specific measurement methods will be required in the product standard itself.

4. Resistance to fire - Loadbearing capacity, integrity, insulation

4.1 Verification by calculation

ENV 1992-1-2	1994	Eurocode 2 : Design of concrete structures - Part 1-2 : General rules - Structural fire design Clauses 4.3, 4.5 and 4.6

4.2 Verification by testing

Pertinent Supporting standards will be selected among test methods elaborated by CEN/TC 127 in accordance with their scope.

WI 45	Contribution to fire resistance of structural members - Part 3 : Concrete elements	(1999-12)
prEN 1187-1	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 1 : Simulated burning brands	(1999-12)
prEN 1187-2	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 2 : Simulated burning brands impressed radiant heat and wind	(1999-12)
prEN 1363-1	Fire resistance tests - Part 1 : General requirements	(1999-12)
prEN 1363-2	Fire resistance tests - Part 2 : Alternative and additional procedures	(1999-12)
prEN 1364-1	Fire resistance tests - Non-loadbearing elements - Part 1 : walls	(1999-12)
prEN 1365-1	Fire resistance tests - Loadbearing elements - Part 1 : Walls	(1999-12)
prEN 1365-2	Fire resistance tests - Loadbearing elements - Part 2 : Floors and roofs	(1999-12)
prEN 1365-3	Fire resistance tests - Loadbearing elements - Part 3 : Beams	(1999-12)
prEN 1365-4	Fire resistance tests - Loadbearing elements - Part 4 : Columns	(1999-12)

5. Direct airborne sound insulation index

Pertinent supporting standards will be selected among standards elaborated by CEN/TC 126 in accordance with their scope.

5.1 Verification by calculation

prEN 20717-1	Acoustics - Rating of sound insulation in buildings and of building elements Part 1 : Airborne sound insulation	(1997-02)
prEN 12354-1	Estimation of acoustic performance of buildings from the performance of products Part 1 : Airborne sound insulation between rooms	(1998-11)
prEN 12354-3	Estimation of acoustic performance of buildings from the performance of products Part 3 : Airborne sound insulation for outdoor noise	(1999-09)

5.2 Verification by testing

EN 20140-3:1995	Acoustics - Measurement of sound insulation in buildings and of building elements Part 3 : Laboratory measurements of airborne sound insulation of building elements (ISO/DIS 140-3)	
prEN 20140-4	Acoustics - Measurement of sound insulation in buildings and of building elements Part 4 : Field measurements of airborne sound insulation between rooms	(1999-02)
prEN 20140-5	Acoustics - Measurement of sound insulation in buildings and of building elements Part 5 : Field measurements of airborne sound insulation of facade elements and facades	(1999-02)

6. Loadbearing capacity

6.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

6.2 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

6.3 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

7. Mechanical strength

7.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 4
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clause 4

7.2 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

7.3 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

8. Drying shrinkage (only for LWC)

8.1 Verification by testing

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

9. Reaction to fire (only for synthetic aggregates and exposed applications)

9.1 Verification by testing

Pertinent supporting standards will be selected among test methods elaborated by CEN/TC 127 in accordance with their scope.

WI 01	Reaction to fire - Non-combustibility	(1999-12)
WI 02	Reaction to fire - Ignitability	(1999-12)
WI 13	Reaction to fire - Determination of calorific value	(1999-12)
WI 26	Reaction to fire - General requirements for conditioning and specimen preparation	(1999-12)

10. Thermal resistance

In case of intended use for thermal insulation applications, precast concrete products are completed with specifically thermal insulating materials. Therefore this characteristic is not relevant to bare precast concrete products.

11. Density (only for LWC)

11.1 Verification by testing

prEN 12363	(under preparation by CEN/TC 104) Hardened concrete - Determination of density (ISO 6275)	(1998-12)

L Components for precast concrete frames

L.1 Linear structural elements (normal concrete only)

L.1.1 Product standard

WI 00229012

(i) Title : Linear precast concrete structural elements Availability : 1998-12

(ii) Scope : This standard identifies the requirements and the basic performance criteria and specifies minimum values where appropriate for precast linear elements made of reinforced or prestressed concrete such as beams for floors or roofs and beams and posts to be fit together so as to form bearing structures.

(iii) Intended use : Frame. Structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Compressive strength *(of concrete)*, **ultimate tensile and tensile yield strength** *(of steel)*, **detailing**, *(in the end use conditions)* **resistance to fire R** *(only for loadbearing uses)* and **durability of ultimate tensile and tensile yield strength against corrosion**

(In case of verification by testing) **loadbearing capacity** and its **durability against corrosion**

(In case of verification by calculation) **mechanical strength** and its **durability against corrosion**

(v) other aspects

The harmonized product standard will also contain :

a) clauses on evaluation of conformity and compliance criteria

- initial type testing ;
- factory production control :
  . procedures and written policies ;
  . verifications and tests ;
  . sampling plans ;
  . conformity criteria ;
  . recording of operations and results ;
  . corrections of non-conformity ;
- initial inspection of factory and of factory production control continuous surveillance, judgement and assessment ;

b) a reference to the Commission's Decision on attestation of conformity ;

c) guidance on the characteristics to be stated in the labelling accompanying the CE marking and on the way of expressing the determined values of these characteristics.

NOTE : This point will be detailed according to the Commission guidance to be finalized.

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Compressive strength (of concrete)

1.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.1
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2 and 3.1
ENV 1992-1-4	1994	Eurocode 2 : Design of concrete structures - Part 1-4 : Lightweight aggregate concrete with closed structure Clause 3.1

1.2 Verification by testing

ISO 4012	1978	Concrete - Determination of compressive strength of test specimens
ISO/DIS 7034	1983	Cores of hardened concrete - Taking, examination and testing in compression

2. Ultimate tensile and tensile yield strength of either reinforcing steel or prestressing steel

2.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.2 : Reinforcing steel Clause 3.3 : Prestressing steel
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2, 3.2 and 3.3

2.2 Verification by testing

prEN 10138	(under preparation by ECISS/TC 19) 1991	Prestressing steels
ISO 6935	1991	Steel for the reinforcement of concrete
ISO 10544	1992	Cold reduced steel wire for the reinforcement of concrete and the manufacture of welded fabric
ENV 10080	1995	Steel for the reinforcement of concrete - Weldable ribbed reinforcing steel B 500 - Technical delivery conditions for bars, coils and welded fabric
ISO 6934	1991	Steel for the prestressing of concrete

2.3 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

3. Detailing

3.1 Verification by calculation

Specific requirements will be given in the product standard itself.

3.2 Verification by testing

Specific measurement methods will be required in the product standard itself.

4. Resistance to fire - Loadbearing capacity, integrity, insulation

4.1 Verification by calculation

ENV 1992-1-2	1994	Eurocode 2 : Design of concrete structures - Part 1-2 : General rules - Structural fire design Clauses 4.3, 4.5 and 4.6

4.2 Verification by testing

Pertinent Supporting standards will be selected among test methods elaborated by CEN/TC 127 in accordance with their scope.

WI 45	Contribution to fire resistance of structural members - Part 3 : Concrete elements	(1999-12)
prEN 1187-1	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 1 : Simulated burning brands	(1999-12)
prEN 1187-2	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 2 : Simulated burning brands impressed radiant heat and wind	(1999-12)
prEN 1363-1	Fire resistance tests - Part 1 : General requirements	(1999-12)
prEN 1363-2	Fire resistance tests - Part 2 : Alternative and additional procedures	(1999-12)
prEN 1364-1	Fire resistance tests - Non-loadbearing elements - Part 1 : walls	(1999-12)
prEN 1365-1	Fire resistance tests - Loadbearing elements - Part 1 : Walls	(1999-12)
prEN 1365-2	Fire resistance tests - Loadbearing elements - Part 2 : Floors and roofs	(1999-12)
prEN 1365-3	Fire resistance tests - Loadbearing elements - Part 3 : Beams	(1999-12)
prEN 1365-4	Fire resistance tests - Loadbearing elements - Part 4 : Columns	(1999-12)

5. Loadbearing capacity

5.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

5.2 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

6. Mechanical strength

6.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 4
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clause 4

6.2 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

M Components for precast concrete frames

M.1 Bridge deck elements (normal concrete only)

M.1.1 Product standard

WI 00229017

(i) Title : Bridge deck elements Availability : 1999-12

(ii) Scope : Reinforced or prestressed concrete prefabricated components, such as beams, ribbed panels or plate elements for bridges.

(iii) Intended use : Frame. Structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Compressive strength *(of concrete)*, **ultimate tensile and tensile yield strength** *(of steel)*, **detailing, resistance to fire R** *(only for loadbearing uses)* and **durability of ultimate tensile and tensile yield strength against corrosion** and of **compressive strength against freeze-thaw**

(In case of verification by testing) **loadbearing capacity** and its **durability against corrosion**

(In case of verification by calculation) **mechanical strength** and its **durability against corrosion**

(v) other aspects

The harmonized product standard will also contain :

a) clauses on evaluation of conformity and compliance criteria

- initial type testing ;
- factory production control :
  . procedures and written policies ;
  . verifications and tests ;
  . sampling plans ;
  . conformity criteria ;
  . recording of operations and results ;
  . corrections of non-conformity ;
- initial inspection of factory and of factory production control continuous surveillance, judgement and assessment ;

b) a reference to the Commission's Decision on attestation of conformity ;

c) guidance on the characteristics to be stated in the labelling accompanying the CE marking and on the way of expressing the determined values of these characteristics.

NOTE : This point will be detailed according to the Commission guidance to be finalized.

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Compressive strength (of concrete)

1.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.1
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2 and 3.1
ENV 1992-1-4	1994	Eurocode 2 : Design of concrete structures - Part 1-4 : Lightweight aggregate concrete with closed structure Clause 3.1

1.2 Verification by testing

ISO 4012	1978	Concrete - Determination of compressive strength of test specimens
ISO/DIS 7034	1983	Cores of hardened concrete - Taking, examination and testing in compression

1.3 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

2. Ultimate tensile and tensile yield strength of either reinforcing steel or prestressing steel

2.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.2 : Reinforcing steel Clause 3.3 : Prestressing steel
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2, 3.2 and 3.3

2.2 Verification by testing

prEN 10138	(under preparation by ECISS/TC 19)	
	1991	Prestressing steels
ISO 6935	1991	Steel for the reinforcement of concrete
ISO 10544	1992	Cold reduced steel wire for the reinforcement of concrete and the manufacture of welded fabric
ENV 10080	1995	Steel for the reinforcement of concrete - Weldable ribbed reinforcing steel B 500 - Technical delivery conditions for bars, coils and welded fabric
ISO 6934	1991	Steel for the prestressing of concrete

2.3 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

3. Detailing

3.1 Verification by calculation

Specific requirements will be given in the product standard itself.

3.2 Verification by testing

Specific measurement methods will be required in the product standard itself.

4. Resistance to fire - Loadbearing capacity, integrity, insulation

This characteristic is not relevant to bridges decks.

5. Loadbearing capacity

5.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

5.2 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

6. Mechanical strength

6.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 4
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clause 4

6.2 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

N Masts and posts

N.1 Masts and posts

N.1.1 Product standard

WI 00229003

(i) Title : Posts and masts Availability : 1998-12

(ii) Scope : This standard applies to precast concrete poles and pole elements, reinforced and/or prestressed ; they may receive or include additional components (e.g. cross-arms, platforms, inserts and connections).

Structures made from such elements in mono- or multi-legged form are used for : overhead lines, telecommunication lines, overhead electrical lines for railways, supports for lighting and loudspeaker installations, antenna and telecommunication poles, supports for wind turbines and similar installations.

(iii) Intended use : Supply of electricity. Structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Compressive strength *(of concrete)*, **ultimate tensile and tensile yield strength** *(of steel)*, **detailing**, *(in the end use conditions)* **resistance to fire R** *(only for loadbearing uses)* and **durability of ultimate tensile and tensile yield strength against corrosion** and of **compressive strength against freeze-thaw**

(In case of verification by testing) **loadbearing capacity** and its **durability against corrosion** and **freeze-thaw** *(only for exposed applications)*

(In case of verification by calculation) **mechanical strength** and its **durability against corrosion** and **freeze-thaw** *(only for exposed applications)*

(v) other aspects

The harmonized product standard will also contain :

a) clauses on evaluation of conformity and compliance criteria

- initial type testing ;
- factory production control :
  . procedures and written policies ;
  . verifications and tests ;
  . sampling plans ;
  . conformity criteria ;
  . recording of operations and results ;
  . corrections of non-conformity ;
- initial inspection of factory and of factory production control continuous surveillance, judgement and assessment ;

b) a reference to the Commission's Decision on attestation of conformity ;

c) guidance on the characteristics to be stated in the labelling accompanying the CE marking and on the way of expressing the determined values of these characteristics.

NOTE : This point will be detailed according to the Commission guidance to be finalized.

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Compressive strength (of concrete)

1.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.1
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2 and 3.1
ENV 1992-1-4	1994	Eurocode 2 : Design of concrete structures - Part 1-4 : Lightweight aggregate concrete with closed structure Clause 3.1

1.2 Verification by testing

ISO 4012	1978	Concrete - Determination of compressive strength of test specimens
ISO/DIS 7034	1983	Cores of hardened concrete - Taking, examination and testing in compression

1.3 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

2. Ultimate tensile and tensile yield strength of either reinforcing steel or prestressing steel

2.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.2 : Reinforcing steel Clause 3.3 : Prestressing steel
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2, 3.2 and 3.3

2.2 Verification by testing

prEN 10138	(under preparation by ECISS/TC 19)	
	1991	Prestressing steels
ISO 6935	1991	Steel for the reinforcement of concrete
ISO 10544	1992	Cold reduced steel wire for the reinforcement of concrete and the manufacture of welded fabric
ENV 10080	1995	Steel for the reinforcement of concrete - Weldable ribbed reinforcing steel B 500 - Technical delivery conditions for bars, coils and welded fabric
ISO 6934	1991	Steel for the prestressing of concrete

2.3 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

3. Detailing

3.1 Verification by calculation

Specific requirements will be given in the product standard itself.

3.2 Verification by testing

Specific measurement methods will be required in the product standard itself.

4. Resistance to fire

This characteristic is not relevant to posts and masts.

5. Loadbearing capacity

5.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

5.2 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

5.3 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

6. Mechanical strength

6.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 4
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clause 4

6.2 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

6.3 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

O Junction boxes and elements for telecommunications

O.1 Junction boxes for telecommunications

O.1.1 Product standard

WI 00229024

(i) Title : Junction boxes for telecommunications Availability : 1999-12

(ii) Scope : Precast concrete boxes and their fittings intended to shelter telecommunication networks junctions.

(iii) Intended use : Communications. Non structural or light structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Loadbearing capacity *(in case of verification by testing)*, **watertightness** *(of joints)* and **durability of loadbearing capacity against corrosion** and of **watertightness against freeze-thaw**

(v) other aspects

The harmonized product standard will also contain :

a) clauses on evaluation of conformity and compliance criteria

- initial type testing ;
- factory production control :
  . procedures and written policies ;
  . verifications and tests ;
  . sampling plans ;
  . conformity criteria ;
  . recording of operations and results ;
  . corrections of non-conformity ;

b) a reference to the Commission's Decision on attestation of conformity ;

c) guidance on the characteristics to be stated in the labelling accompanying the CE marking and on the way of expressing the determined values of these characteristics.

NOTE : This point will be detailed according to the Commission guidance to be finalized.

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Loadbearing capacity

1.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

1.2 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

2. **Watertightness** (of joints), **water permeability or water vapour permeability** (for external walls), and their durability

2.1 Verification by testing

EN 60529	1992	Degrees of protection provided by enclosures (IP code)

2.2 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

P Boundary fences

P.1 Boundary fences

P.1.1 Product standard

WI 00229006

(i) Title : Concrete elements for fences Availability : 1998-12

(ii) Scope : This standard covers prefabricated concrete elements which can be used together or in combination with other elements to erect fences.
The current concrete elements include posts (reinforced, prestressed or post-tensioned concrete) solid or base or open panels, slabs, rails, spurs, struts and gravel boards.

(iii) Intended use : Circulation fixtures. Non structural or light structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Loadbearing capacity and its **durability against corrosion and freeze-thaw**

(v) other aspects

The harmonized product standard will also contain :

a) clauses on evaluation of conformity and compliance criteria

- initial type testing ;
- factory production control :
  . procedures and written policies ;
  . verifications and tests ;
  . sampling plans ;
  . conformity criteria ;
  . recording of operations and results ;
  . corrections of non-conformity ;

b) a reference to the Commission's Decision on attestation of conformity ;

c) guidance on the characteristics to be stated in the labelling accompanying the CE marking and on the way of expressing the determined values of these characteristics.

NOTE : This point will be detailed according to the Commission guidance to be finalized.

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Loadbearing capacity

1.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

1.2 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

1.3 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

Q Silos

Q.1 Silos

Q.1.1 Product standard

WI 00229019

(i) Title : Silos Availability : 1999-12

(ii) Scope : Monobloc unit or system of components made of reinforced or prestressed concrete used to contain loose or liquid materials.

(iii) Intended use : Storage fixtures. Structural.

(iv) According to the Mandate, characteristics covered by the standard will be :

Compressive strength *(of concrete)*, **ultimate tensile and tensile yield strength** *(of steel)*, **detailing**, *(in the end use conditions)* **rigidity of joints, resistance to fire R** *(only for loadbearing uses)*, **watertightness** *(of joints)* and **durability of ultimate tensile and tensile yield strength against corrosion** and of **compressive strength** and **watertightness against freeze-thaw**

(In case of verification by testing) **loadbearing capacity** and its **durability against corrosion** and **freeze-thaw** *(only for exposed applications)*

(In case of verification by calculation) **mechanical strength** and its **durability against corrosion** and **freeze-thaw** *(only for exposed applications)*

(v) other aspects

The harmonized product standard will also contain :

a) clauses on evaluation of conformity and compliance criteria

- initial type testing ;
- factory production control :
  . procedures and written policies ;
  . verifications and tests ;
  . sampling plans ;
  . conformity criteria ;
  . recording of operations and results ;
  . corrections of non-conformity ;
- initial inspection of factory and of factory production control continuous surveillance, judgement and assessment ;

b) a reference to the Commission's Decision on attestation of conformity ;

c) guidance on the characteristics to be stated in the labelling accompanying the CE marking and on the way of expressing the determined values of these characteristics.

NOTE : This point will be detailed according to the Commission guidance to be finalized.

(vi) Supporting standards

The following normative documents are proposed as test or calculation methods for the determination of the essential characteristics required by the Mandate and indicated in clause (iv) above :

NOTE : For some essential characteristics the product standard will recopy the useful parts of existing normative documents. Consequently, these ones are not indicated in the list of supporting standards.

1. Compressive strength (of concrete)

1.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.1
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2 and 3.1
ENV 1992-1-4	1994	Eurocode 2 : Design of concrete structures - Part 1-4 : Lightweight aggregate concrete with closed structure Clause 3.1

1.2 Verification by testing

ISO 4012	1978	Concrete - Determination of compressive strength of test specimens
ISO/DIS 7034	1983	Cores of hardened concrete - Taking, examination and testing in compression

1.3 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

2. Ultimate tensile and tensile yield strength of either reinforcing steel or prestressing steel

2.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 3.2 : Reinforcing steel Clause 3.3 : Prestressing steel
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clauses 2.3.3.2, 3.2 and 3.3

2.2 Verification by testing

prEN 10138	(under preparation by ECISS/TC 19) 1991	Prestressing steels
ISO 6935	1991	Steel for the reinforcement of concrete
ISO 10544	1992	Cold reduced steel wire for the reinforcement of concrete and the manufacture of welded fabric
ENV 10080	1995	Steel for the reinforcement of concrete - Weldable ribbed reinforcing steel B 500 - Technical delivery conditions for bars, coils and welded fabric
ISO 6934	1991	Steel for the prestressing of concrete

2.3 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

3. Detailing

3.1 Verification by calculation

Specific requirements will be given in the product standard itself.

3.2 Verification by testing

Specific measurement methods will be required in the product standard itself.

4. Rigidity of joints

4.1 Verification by testing

The product standard will not include requirements depending on work execution and on finished work.

5. Resistance to fire - Loadbearing capacity, integrity, insulation

5.1 Verification by calculation

ENV 1992-1-2	1994	Eurocode 2 : Design of concrete structures - Part 1-2 : General rules - Structural fire design Clauses 4.3, 4.5 and 4.6

5.2 Verification by testing

Pertinent Supporting standards will be selected among test methods elaborated by CEN/TC 127 in accordance with their scope.

WI 45	Contribution to fire resistance of structural members - Part 3 : Concrete elements	(1999-12)
prEN 1187-1	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 1 : Simulated burning brands	(1999-12)
prEN 1187-2	Fire resistance tests - Fire performance of roofs exposed to external fire - Part 2 : Simulated burning brands impressed radiant heat and wind	(1999-12)
prEN 1363-1	Fire resistance tests - Part 1 : General requirements	(1999-12)
prEN 1363-2	Fire resistance tests - Part 2 : Alternative and additional procedures	(1999-12)
prEN 1364-1	Fire resistance tests - Non-loadbearing elements - Part 1 : walls	(1999-12)
prEN 1365-1	Fire resistance tests - Loadbearing elements - Part 1 : Walls	(1999-12)
prEN 1365-2	Fire resistance tests - Loadbearing elements - Part 2 : Floors and roofs	(1999-12)
prEN 1365-3	Fire resistance tests - Loadbearing elements - Part 3 : Beams	(1999-12)
prEN 1365-4	Fire resistance tests - Loadbearing elements - Part 4 : Columns	(1999-12)

6. **Watertightness** (of joints), **water permeability or water vapour permeability** (for external walls), and their durability

The product standard will not include requirements depending on work execution and on finished work.

6.1 Verification by testing

Specific test methods will be required in the product standard itself.

6.2 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

7. Loadbearing capacity

7.1 Verification by testing

CEN/TC 229 will prepare a specific test method for the precast concrete product that will be included in a Normative Annex.

7.2 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

7.3 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

8. Mechanical strength

8.1 Verification by calculation

ENV 1992-1-1	1991	Eurocode 2 : Design of concrete structures - Part 1-1 : General rules and rules for buildings Clause 4
ENV 1992-1-3	1994	Eurocode 2 : Design of concrete structures - Part 1-3 : General rules - Precast concrete elements and structures Clause 4

8.2 Durability against freeze-thaw

Looking forward to referencing to a publicly available normative method of test, CEN/TC 229 will prepare a specific test method for exposed applications that will be included in a Normative Annex.

8.3 Durability against corrosion

Durability requirements assured by appropriate cover and detailing will be dealt with by the State of art at present in accordance with environmental conditions of the intended uses.

Secretariat CEN/TC 229
"Produits préfabriqués en béton"
"Precast concrete products"
"Vorgefertigte Betonerzeugniße"

CEN/TC 229 N 205 E

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Our References : M/SB/IH 06/11/95

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Liaisons with CEN/TC 229

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Liaisons with CEN/TC 229

Reference	Title	Secretary	Documents		Expert	
			•→	→•	→•	•→
CEN/TC 51	Cement and building lines	IBN				
CEN/TC 88	Thermal insulating materials and products	DIN	X	X		Mr BERNANDER
CEN/TC 89	Thermal performance of buildings and buildings components	SIS	X			Mr BERNANDER
CEN/TC 104	Concrete	DIN	X		Mr BERNANDER	Mr BERNANDER
CEN/TC 104/SC 1	Revision of ENV 206			X	Mr HIETANEN	Mr BERNANDER
CEN/TC 104/SC 2	Execution of concrete structures					Mr LEBLANC Mr TYDEMAN Mr BERNANDER
CEN/TC 125	Masonry	BSI		X		
CEN/TC 126	Acoustic properties of building products and of buildings	AFNOR				
CEN/TC 127	Fire safety in buildings	BSI	X			Mr VAN ACKER
CEN/TC 128	Roof covering products for discontinuous laying and products for wall cladding	IBN				
CEN/TC 154	Aggregates	BSI	X	X		
CEN/TC 156	Ventilation for buildings	BSI				
CEN/TC 164	Water supply	AFNOR				Mr DUTRUEL
CEN/TC 165	Waste water engineering	DIN		X		Mr DUTRUEL
CEN/TC 166	Chimneys	UNI				
CEN/TC 177	Prefabricated reinforced components of autoclaved aerated concrete or light weight aggregate concrete	DIN		X		Mr BERTRAM
CEN/TC 178	Paving units and kerbs	BSI				
CEN/TC 226	Road equipment	AFNOR				Mlle FOUARGE
CEN/TC 250	Structural eurocodes	BSI	X		Mr MENEGOTTO	Mr MENEGOTTO
CEN/TC 256	Railway applications	DIN/FSF				
ECISS/TC 19/SC 1/WG 3	Prestressing steels - Lattice girders	FES im DIN		X		
ISO/TC 71	Concrete, reinforced concrete and prestressed concrete	ANSI	X			
BIBM			X		Mr SIMONS	

74/89

EUROPEAN COMMISSION
DIRECTORATE-GENERAL III
INDUSTRY
Industrial affairs II: Capital goods industries
Construction

Brussels, 14-12-1995 023944
Fire./95120P006 AAP/cg

To : National Fire Regulators

Subject : **Finalised list of materials considered as reaction to fire class A without testing**

Following the unanimous agreement of the Regulators Group to the above list of materials at the meeting on the 23rd November, the Commission services have modified the document to take account of the comments made during the meeting.

The main changes have been to state, in the text of the Decision itself, that it is the name of class A that is "No contribution to fire", the replacement in the Notes to the table of "combustible" and "non-combustible" by "organic" and "non-organic", and the change from 1% to 1.0% on the quantity of organic material permitted. Other changes made to the version you received before the RG meeting were already included in document RG N78 rev. distributed during the meeting and pointed out to you at that time.

We have received a number of requests, both from Regulators and from industry, to make the finalised list available. You will therefore find it attached.

Yours faithfully

Encl.

Ph Jean

(8)
5-1-96

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ANNEX

Table 1: MATERIALS TO BE CONSIDERED AS REACTION TO FIRE CLASS A WITHOUT THE NEED FOR TESTING

GENERAL NOTES: Products should be made only of one or more of the following materials if they are to be considered as class A without testing. Products made by gluing one or more of the following materials together will be considered class A without testing provided that the glue does not exceed 0.1% by weight or volume (whichever is the lower).

Panel products (e.g. of insulating material) with one or more organic layers, or products containing organic material which is not homogeneously distributed (with the exception of glue) are excluded from the list.

Products made by coating one of the following materials with an inorganic layer (e.g. coated metal products) may also be considered as class A without testing.

None of the materials in the table is allowed to contain more than 1.0% by weight or volume (whichever is the lower) of homogeneously distributed organic material.

Material	Notes
Expanded clay	
Expanded perlite	
Expanded vermiculite	
Mineral wool	
Cellular glass	
Concrete	Includes ready-mixed concrete and precast reinforced and prestressed products.
Aggregate concrete (dense and lightweight mineral aggregates, excluding integral thermal insulation)	May contain admixtures and additions (e.g. PFA), pigments and other materials. Includes precast units.
Autoclaved aerated concrete units	Units manufactured from hydraulic binders such as cement and/or lime, combined with fine materials (siliceous material, PFA, blast furnace slag), and cell generating material. Includes precast units.
Fibre cement	
Cement	
Lime	
Blast furnace slag/pulverised fly ash (PFA)	
Mineral aggregates	
Iron, steel and stainless steel.	Not in finely divided form.
Copper and copper alloys	Not in finely divided form
Zinc and zinc alloys	Not in finely divided form.
Aluminium and aluminium alloys	Not in finely divided form.
Lead	Not in finely divided form.

Gypsum and gypsum based plasters	May include additives (retarders, fillers, fibres, pigments, hydrated lime, air and water retaining agents and plasticisers), dense aggregates (e.g. natural or crushed sand) or lightweight aggregates (e.g. perlite or vermiculite).
Mortar with inorganic binding agents	Rendering/plastering mortars and mortars for floor screeds based on one or more inorganic binding agent(s), e.g. cement, lime, masonry cement and gypsum.
Clay units	Units from clay or other argillaceous materials, with or without sand, fuel or other additives. Includes bricks, tiles paving and fireclay units (e.g. chimney liners).
Calcium silicate units	Units made from a mixture of lime and natural siliceous materials (sand, siliceous gravel or rock or mixtures thereof). May include colouring pigments.
Natural stone and slate products	A worked or non-worked element produced from natural stone (magmatic, sedimentary or metamorphic rocks) or slate.
Gypsum unit	Includes blocks and other units of calcium sulphate and water, that may incorporate fibres, fillers, aggregates and other additives, and may be coloured by pigments.
Terrazo	Includes precast concrete terrazotiles and in-situ flooring.
Glass	Includes heat strengthened, chemically toughened, laminated and wired glass.
Glass ceramics	Glass ceramics consisting of a crystalline and a residual glass phase.
Ceramics	Includes dust-pressed and extruded products, glazed or unglazed.

EUROPEAN COMMISSION
DIRECTORATE-GENERAL III
INDUSTRY
Industrial affairs II: Capital goods industries
Construction

Brussels, 7/11/1995

PROPOSAL FOR A DECISION OF THE COMMISSION IMPLEMENTING ARTICLE 20 OF DIRECTIVE 89/106 ON CONSTRUCTION PRODUCTS

The Commission of the European Communities

HAVING regard to the Treaty establishing the European Community,

HAVING regard to Directive 89/106 of 21 December 1988, on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products, and in particular its Articles 3, 6 and 20([1]),

HAVING regard to the "COMMUNICATION OF THE COMMISSION WITH REGARD TO THE INTERPRETATIVE DOCUMENTS OF COUNCIL DIRECTIVE 89/106/EEC([2]) and

HAVING regard to Commission Decision of the 9th September 1994 (94/611/EC) implementing Article 20 of Directive 89/106/EEC on construction products, and in particular its Annex on class A products([3])

WHEREAS Article 3.2 of the Directive states that in order to take account of different levels of protection for the construction works that may prevail at national, regional or local levels, each essential requirement may give rise to the establishment of classes in the interpretative documents and the technical specifications;

WHEREAS paragraph 4.2.1 of interpretative document n° 2 "Safety in case of fire" justifies the need for different levels of the Essential Requirement as a function of:

- the type, use and location of the construction work
- its layout
- the availability of the emergency facilities;

WHEREAS paragraph 2.2 of the interpretative document n° 2 lists a number of interrelated measures for the satisfaction of the Essential Requirement "Safety in case of fire" that together contribute to the definition of a fire safety strategy that can be developed in different ways in Member States;

(1) OJ No L 40, 11.2.1989, p. 12
(2) OJ No C 62, 28.2.1994, p. 23
(3) OJ No L 241, 16.9.1994, p. 25

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WHEREAS paragraph 4.2.3.3 of interpretative document n° 2 identifies one of these measures prevailing in Member States that consists of the limitation of the generation and spread of fire and smoke within the room of origin (or in a given area) by limiting the contribution to the full development of a fire of construction products;

WHEREAS the definition of classes of the Essential Requirement partially depends on the level of such a limitation;

WHEREAS the level of this limitation may be expressed only by different levels of reaction to fire performance of products in their end use conditions;

WHEREAS point 4.3.1.1 of the interpretative document n° 2 specifies that to enable the reaction to fire performance of products to be evaluated, a harmonised solution will be developed which may utilise full or bench scale tests that are correlated to relevant real fire scenarios;

WHEREAS this solution lies in a system of classes that are not included in the interpretative document but which were published in Commission Decision 94/611/EC;

WHEREAS this system of classes, identified for this purpose, refers in its Annex to a "list of non-combustible products" to be included in class A;

WHEREAS Article 20.2 of DIRECTIVE 89/106 of 21st December 1988 specifies the procedure to be followed for the adoption of the provisions necessary for the establishment of classes of requirements in so far as they are not included in the interpretative documents;

WHEREAS the Standing Committee for Construction was consulted, in accordance with the procedure laid down in article 20.3 of the Directive, and provided a positive opinion on ...

HAS ADOPTED THIS DECISION

Article 1

Table 1 of the Annex lists those materials, and sets conditions on products made from them, which have such a low level of combustibility that they can be considered as reaction to fire class A (entitled "No contribution to fire" in the Commission Decision 94/611/EC) without the need for testing.

Article 2

This Decision is addressed to the Member States.

Done at Brussels, ...

For the Commission

Martin BANGEMANN

Member of the Commission