La participación española en los Eurocódigos

Alejandro Pérez Caldentey
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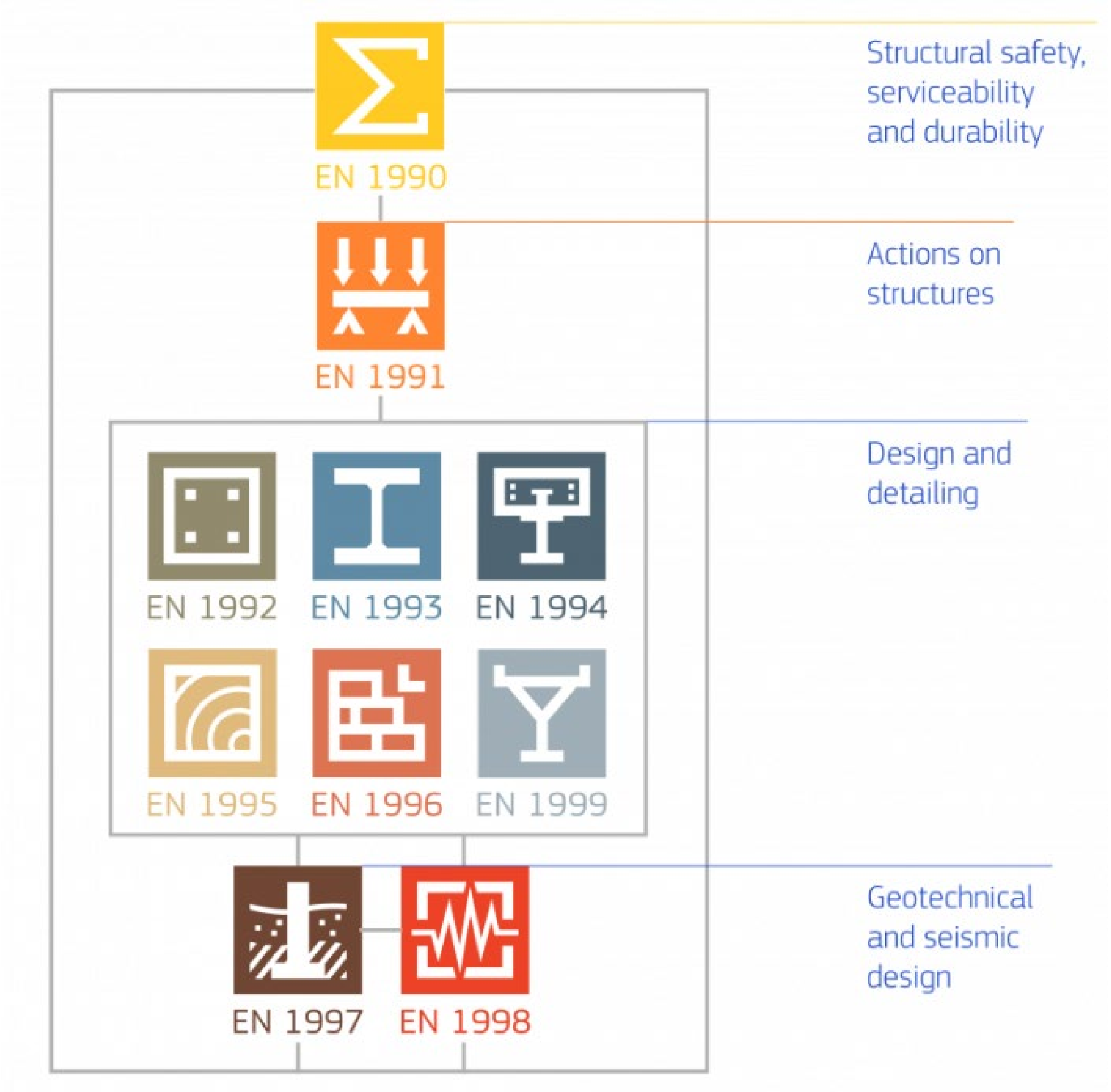
El milagro de los Eurocódigos



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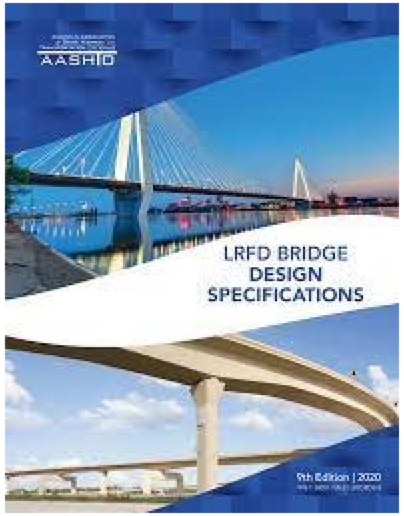
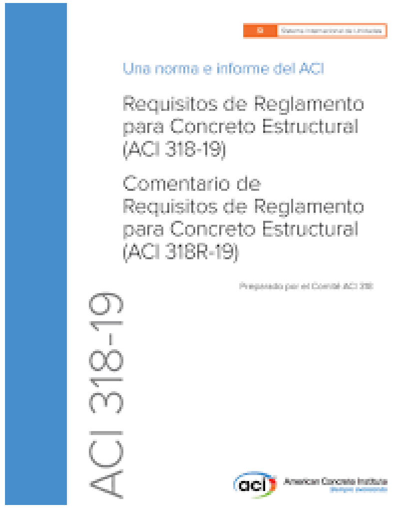
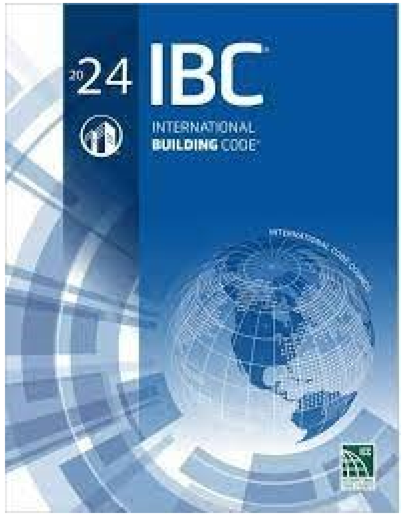
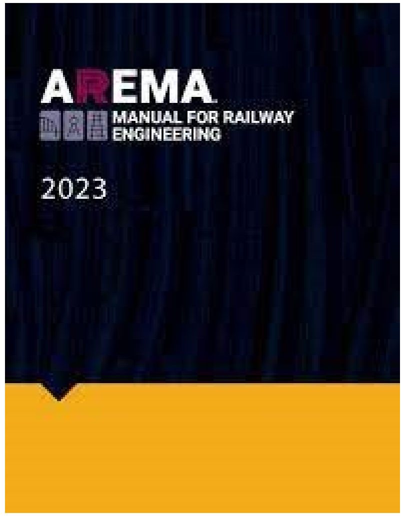








Participación Española en los Eurocódigos

¿Cómo llegamos aquí?

2008

Participación Española en EN 1991, EN 1993, EN 1997 y EN 1998

Participación Española en EN 1992:2023

	Grupo de Trabajo	Participante	Entidad
CEN TC 250/SC2	WG1 -Coordination and Editorial Panel	Alejandro Pérez Caldentey Jesus Rodríguez Santiago	FHECOR CTN-140/SC2
	WG101 - Strengthening and reinforcing with fibre reinforced polymers	Eva Oller	UPC
	WG102 - Fibre reinforced concrete	Gonzalo Ruiz	UCLM
	WG103 - Existing Structures	Carmen Andrade	IETCC
	WG104 - Shear, Punching Torsion	Miguel Fernández Antonio Cladera Antonio Marí	EPFL/UPM UIB UPC
	WG105 - Fire	Sergio Carrascón	IECA
	WG106 - Structural Analysis	Alejandro Pérez Caldentey	FHECOR
	WG107 - Time-dependent effects	Alejandro Pérez Caldentey	FHECOR
	WG108 - Fatigue Design	Carlos Ríos Juan Carlos Lancha	IDEAM CALTER
	WG109 - Bridges	Antonio Martínez Cutillas	CFC
	WG110 - Durabilidad	Carmen Andrade David Izquierdo	IETCC UPM
	PT.SC2.T1 New and modified content in EN 1992-1-1	Alejandro Pérez Caldentey	FHECOR
	PT.SC2.T3 New Annexes	Eva Oller	UPC

¿Qué se entiende por “facilidad de uso”?

FORMULACIONES MÁS SENCILLAS

Ayuda a calcular

DOS VISIONES CONTRAPUESTAS

FORMULACIONES CONSISTENTES

Ayuda a entender

La resistencia al cambio

CARTA Grupo Espejo alemán del SC2 (01/11/2012)

2. In the context of the revision, the existing basic principles and design models should be kept, improved or adjusted in details to remove inconsistencies and ambiguities (see also UK comment in **document N 32**). Extensive changes in basic models and principles shall only be performed, if there will be an essential benefit for the designers, contractors and authorities, considering

- safety,
- ease of use or
- clear cost effectiveness.

La resistencia al cambio

Comentarios de Grupo Espejo de SC2 del Reino Unido

Template for comments and secretariat observations | Date: 19 October 2012 | Document: **EN1992-1-1UK**

1	2	(3)	4	5	(6)	(7)
MB[1]	**Clause No./ Subclause No./ Annex** (e.g. 3.1)	**Paragraph/ Figure/Table/ Note** (e.g. Table 1)	**Type of com-ment**[2]	**Comment (justification for change) by the MB**	**Proposed change by the MB**	**Secretariat observations** on each comment submitted
UK	General	EN1992-1-1	Ge	• As requested by CEN/TC 250/SC2 we have provided comments on all parts of EN 1992. • The take up of Eurocodes has been slow in all countries. It is expected that it will improve with time. • Changeover to Eurocodes represents significant investment for many practicing Engineers not only in buying the codes, associated documents, computer programs and staff training. • The present comments are based on limited use which has confirmed that the current versions of the Codes are by and large are perfectly good documents but with some inconsistencies and lack of clarity in places. • It is critical that CEN does not change the complexion and content of the codes at this stage. This will be seen as pure indulgence on the part of code committees without any regard to the plight of the users. • UK therefore strongly recommends that initial amendments should be limited to the correction of technical errors and editorial changes to clarify ambiguities. • Significant technical amendments should be few and far between and should be limited to matters of safety or gross diseconomy. • Technical improvement to the codes should evolve after wide use of the code and their benefit to the industry should be carefully considered before implementing them.		

1 **MB** = Member body (enter the ISO 3166 two-letter country code, e.g. CN for China; comments from the ISO/CS editing unit are identified by **)
2 **Type of comment:** **ge** = general **te** = technical **ed** = editorial
NOTE Columns 1, 2, 4, 5 are compulsory.

page 1 of 29

ISO electronic balloting commenting template/version 2001-10

- It is critical that CEN does not change the complexion and content of the codes at this stage. This will be seen as pure indulgence on the part of code committees without any regard to the plight of the users.
- UK therefore strongly recommends that initial amendments should be limited to the correction of technical errors and editorial changes to clarify ambiguities.
- Significant technical amendments should be few and far between and should be limited to matters of safety or gross diseconomy.

La resistencia al cambio

¿CÓMO CONCILIAR ESTAS POSTURAS CON LA NECESIDAD DE PONERSE AL DÍA EN UN MUNDO QUE CAMBIA A TODA VELOCIDAD Y REQUIERE NUEVAS SOLUCIONES?

EVOLUTION, NOT REVOLUTION

CON UN NUEVO ESLOGAN, PERO, FINALMENTE EL PROCESO, SIN QUERERLO, POR NECESIDAD, Y BASADO EN ARGUMENTOS TÉCNICOS, HA LLEVADO A UNA NORMATIVA MUY CAMBIADA, MODERNA Y QUE PERMITE AFRONTAR EL RETO DE REDUCIR NUESTRA HUELLA DE CARBONO. PARA ELLO HACEN FALTA MÉTODOS MÁS FINOS

Los problemas de la fragmentación

EN 1992-1-1 Eurocode 2: Design of concrete structures – Part 1-1: General rules and rules for buildings	Consolidated Version Rev. 2 → 2015-12-23 (by WG1)

Annex B (informative): Creep and shrinkage strain

B.1 Basic equations for determining the creep coefficient

(1) The creep coefficient $\varphi(t,t_0)$ may be calculated from:

$$\varphi(t,t_0) = \varphi_0 \cdot \beta_c(t,t_0) \qquad \text{(B.1)}$$

where:

φ_0 is the notional creep coefficient and may be estimated from:

$$\varphi_0 = \varphi_{RH} \cdot \beta(f_{cm}) \cdot \beta(t_0) \qquad \text{(B.2)}$$

φ_{RH} is a factor to allow for the effect of relative humidity on the notional creep coefficient:

$$\varphi_{RH} = 1 + \frac{1 - RH/100}{0{,}1 \cdot \sqrt[3]{h_0}} \qquad \text{for } f_{cm} \le 35 \text{ MPa} \qquad \text{(B.3a)}$$

$$\varphi_{RH} = \left[1 + \frac{1 - RH/100}{0{,}1 \cdot \sqrt[3]{h_0}} \cdot \alpha_1\right] \cdot \alpha_2 \qquad \text{for } f_{cm} > 35 \text{ MPa} \qquad \text{(B.3b)}$$

RH is the relative humidity of the ambient environment in %;

$\beta(f_{cm})$ is a factor to allow for the effect of concrete strength on the

EN 1992-1-1:2004

ANNEX B
(informative)

Creep and shrinkage strain

The following clauses of EN 1992-1-1 apply for ordinary concrete, except for particular thick sections (see below).

B.1(1)
B.1(2)
B.1(3)
B.2(1)

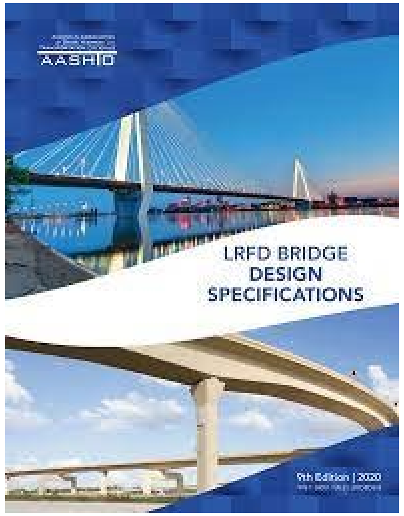
Section B.103 specifically applies to high performance concrete, made with Class R cements, of strength greater than C50/60 with or without silica fume. In general, the methods given in Section B.103 are preferred to those given in EN 1992-1-1 for the concretes referred to above and for thick members, in which the kinetics of basic creep and drying creep are quite different. It should be noted that the guidance in this Annex has been verified by site trials and measurements. For background information reference can be made to the following:

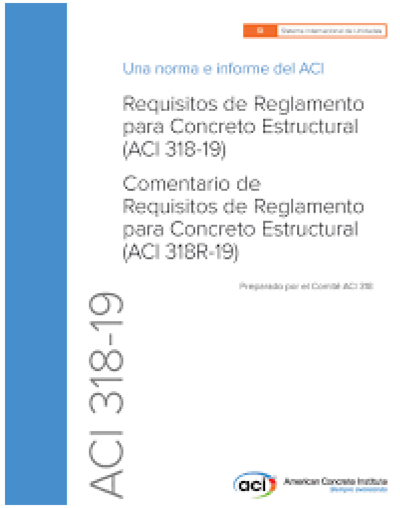
Le Roy, R., De Larrard, F., Pons, G. (1996) The AFREM code type model for creep and shrinkage of high performance concrete.

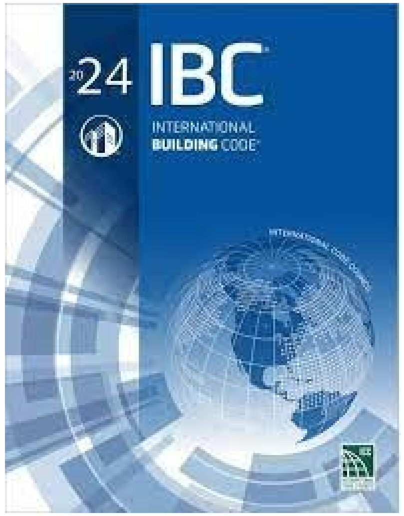
Toutlemonde, F., De Larrard, F., Brazillier, D. (2002) Structural application of HPC: a survey of recent research in France.

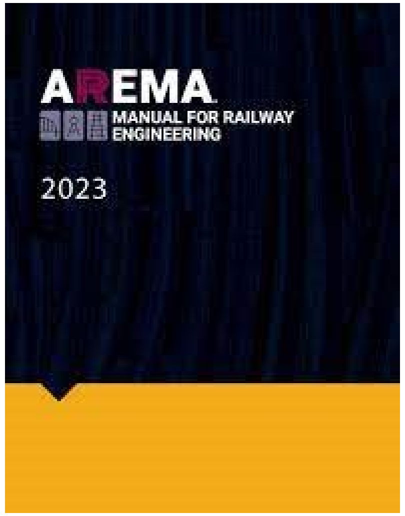
Le Roy, R., Cussac, J. M., Martin, O. (1999) Structures sensitive to creep :from laboratory experimentation to structural design - The case of the Avignon high-speed rail viaduct.

EN 1992-2:2005









Los problemas de la fragmentación

INCOHERENCIAS ENTRE EN 1992-1-1:2023 Y FprEN 1994-1-1:2024

EN 1992-1-1:2023

S.4 Simplified control of cracking

NOTE Clause S.4 is a simplification of 9.2.3. A conservative value is assumed for the effective tension area and tension stiffening effects are estimated as a 10 % reduction in the steel stress obtained considering a fully cracked section.

(1) The rules given in 9.2.3 may be complied with by restricting either the bar diameter ϕ according to Formula (S.6) or the bar spacing s_l according to Formula (S.7).

$$\phi \leq \frac{2{,}1 \cdot \rho_p}{\frac{a}{d} \cdot k_{fl,simpl} \cdot k_{b,simpl}} \left(\frac{w_{lim,cal}}{k_w \cdot k_{\frac{1}{r},simpl} \cdot 0{,}9 \frac{\sigma_s}{E_s}} - 1{,}5 \cdot c \right) \quad (S.6)$$

where

$$k_{fl,simpl} = \begin{cases} \left(1 - 3{,}5 \frac{a_y}{h}\right) & \text{if one face is in compresion} \\ 1{,}00 & \text{if both faces are in tension} \end{cases}$$

$$k_{1/r,simpl} = \begin{cases} 25\left(\frac{h}{d} - 1\right) \cdot \rho_p + 1{,}15 \cdot \frac{h}{d} - 0{,}15 & \text{for bending} \\ 1{,}00 & \text{for tension} \end{cases}$$

$$k_{b,simpl} = \begin{cases} 0{,}9 & \text{for good bond conditions} \\ 1{,}2 & \text{for poor bond conditions} \end{cases}$$

$$s_l \leq \frac{3{,}45 \cdot \rho_p}{\frac{a^2}{d} \cdot k_{fl,simpl}^2 \cdot k_{b,simpl}^2} \left(\frac{w_{lim,cal}}{k_w \cdot k_{1/r,simpl} \cdot 0{,}9 \cdot \frac{\sigma_s}{E_s}} - 1{,}5 \cdot c \right)^2 \quad (S.7)$$

where

$\rho_p = \frac{(A_s + \xi_1 A_p)}{b \cdot d}$ is the reinforcement ratio corresponding to the tensioned face under consideration. When considering the least tensioned face of an element with both faces in tension, $k_{1/r,simpl}$ may be set equal to 1,0 conservatively;

a is the distance from the concrete surface to the centre of the first layer of bars;

s_l is the bar spacing;

σ_s is the stress permitted in the reinforcement closest to the most tensioned concrete surface after formation of all cracks. σ_s may be taken as the calculated stress according to loads or a lower stress $\sigma_{s,lim}$ according to Formula (S.4);

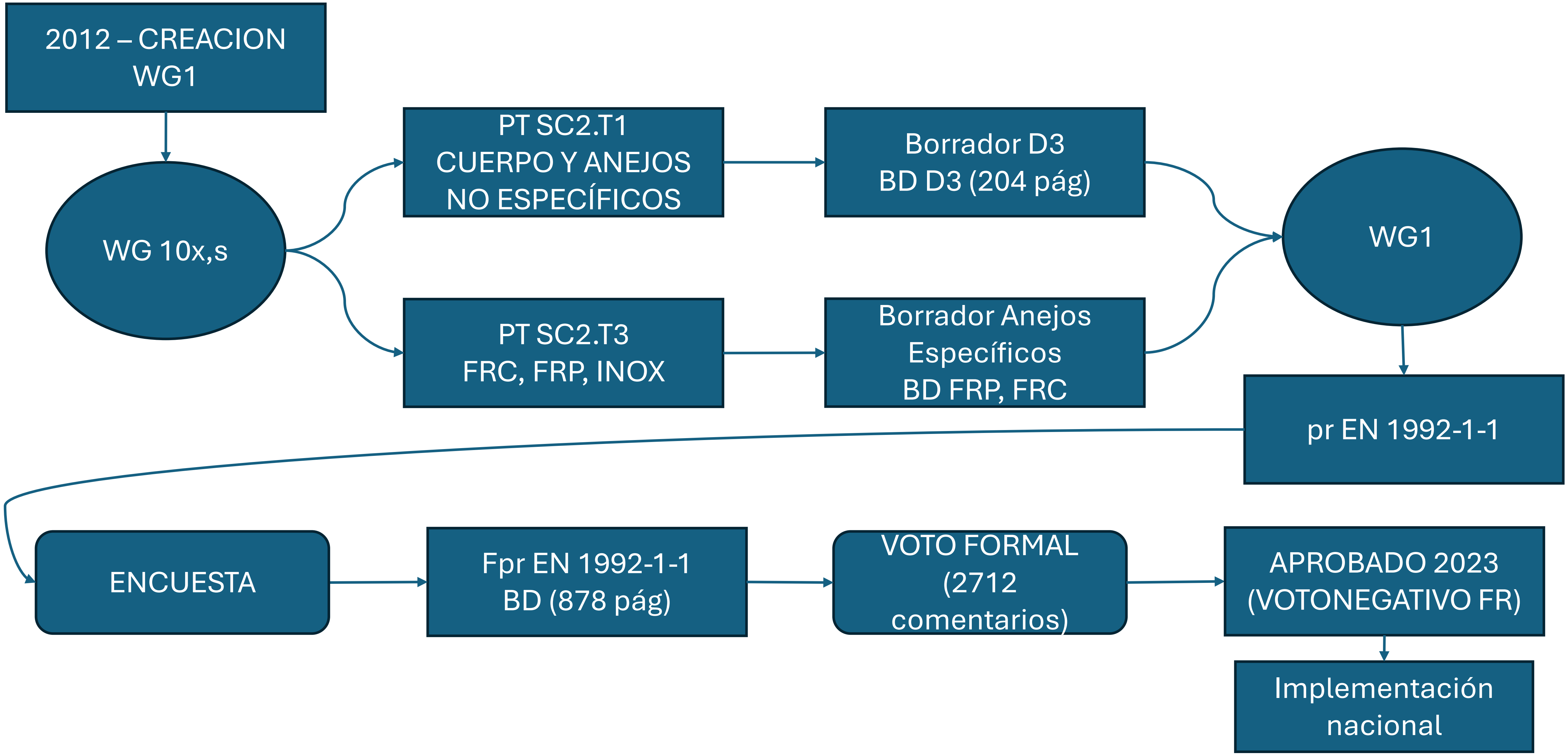
a_y cover to the centre of the external bar in the y -direction

FprEN 1994-1-1:2024

Table 9.1 — Maximum bar diameters for high bond bars

Steel stress σ_s (N/mm²)	Maximum bar diameter ϕ^* (mm) for design crack width $w_{lim,cal}$			
	$w_{lim,cal}$ = 0,4 mm	$w_{lim,cal}$ = 0,3 mm	$w_{lim,cal}$ = 0,2 mm	$w_{lim,cal}$ = 0,15 mm
160	40	32	25	20
200	32	25	16	13
240	20	16	12	9
280	16	12	8	7
320	12	10	6	5
360	10	8	5	4
400	8	6	4	3
450	6	5	-	3

El proceso EN 1992-1-1



El trabajo del PT SC2.T1

DEDICACIÓN - Aurelio Muttoni (Coordinador PT SC2.T1): 50%
APC: 25%

Actividad SC2.T1		
Fecha	**Actividad**	**Comentarios**
09/05/2016	Primer Borrador EN 1992-1-1 (Parcial)	
30/06/2016	Respuesta de los paises a 5 preguntas sobre el borrador	
10/12/2016	Segundo Borrador EN 1992-1-1	
30/12/2016	Se recibieron comentarios de UK (18 pág), FR (4 pág), PT and SE	
30/04/2017	Primer Borrador Completo (D1) - salvo anejos SC2.T3	
15/06/2017	Comentarios a D1	1780 comentarios
30/10/2017	Segundo Borrador Completo (D2) - salvo anejos SC2.T3	Con respuesta a comentarios
04/12/2017	*Documento de Respaldo* D2 - indica cambios y razones (192 pág)	
01/02/2018	Comentarios a D2	1476 comentarios
15/02/2018	Revisión técnica TC 250	
05/06/2018	Segundo Borrador Completo (D3) - salvo anejos SC2.T3	Con respuesta a comentarios
01/07/2018	*Documento de Respaldo* D3 - indica cambios y razones (203 pág)	

El trabajo del PT SC2.T1

NO TODO TERMINA, A NIVEL EUROPEO, EN 2023

ENMIENDA (2026)

AHG ANNEX K
DE, ES, GR, IT, CDG

EN 1992-1-1:2023 (E)

Annex K
(normative)

Bridges

K.1 Use of this annex

(1) This normative Annex contains additional provisions for design of bridges.

NOTE 1 NDPs in Clauses 1 to 14 and Annexes A to S can be given different values in the National Annex for bridge applications.

NOTE 2 More restrictive provisions to Clauses 1 to 14 and Annexes A to S can be given in the National Annex as set out in this annex, or as specified by the relevant authority.

ESTA NOTA ESTUVO A PUNTO DE PROVOCAR UN VOTO NEGATIVO DE ESPAÑA, ITALIA Y GRECIA