

ECISS/TC 104 N 166**ECISS/TC 104/WG 1 N 178**

Mr Vicente Leoz-Arguelles

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By e-mail and mail

Oslo and Turin, 22 January 2013

Dear Mr Leoz,

RE – Introducing classes in EN10080 and EN 10138 standards

We are writing to you in our role of convenors of CEN/T250/SC2 and of CEN/T250/SC2 WG1 – Eurocode 2 in charge of the revision of the current version of EN1992 (Eurocode 2). We wish to raise with you a matter related to the EU Classification of reinforcing and prestressing steel for concrete structures which may affect market competition.

As you may be aware, for some time CEN TC250/SC2 has been concerned with the unsatisfactory way of selection and specification of reinforcing steel provided by the present EN 10080 and EN 10138 standards. Currently, the process is based on specific product data and not on classes, a situation which is unsatisfactory not only for designers in their design and specification, but mostly for contractors in dealing with the execution specification and the procurement of the specified reinforcement in the market.

TC250/SC2 has adopted the following resolution (res 181; Milan, 2011-12-12/13)

CEN/TC 250/SC 2 asks ECISS TC 104 to specify requirements which enables user and designer to choose a defined class as given in EN 1992-1-1, Annex C, with defined properties. These requirements and therefore the CE-marking given in EN 10080 and EN 10138 shall fit to EN 1992-1-1. The resolution was adopted by unanimity.

One important objective of the proposal is to simplify the use of Eurocode 2, but even more important is to introduce a rational process where the type of reinforcing steel, steel grade (yield strength) and ductility can be chosen up front in the project by identifying classes, and the reinforcement classes then clearly stated in the execution specification and given on the drawings, prior to a contract with the contractor and subsequent procurement of reinforcement.

Procedures currently agreed by ECISS TC104, which use the CE-mark information provided by each single producer for each given product as the basic information for design, are in this context unacceptable for a rational design, and construction process, as that information comes far too late in the project and can only be used to confirm that the product is actually conforming to the execution specification.

A further objective is to ensure simple, safe Quality Management procedures on site, so that it is easy to verify that the reinforcement is in accordance with the execution specification. Today cut and bent

reinforcement can be supplied to the construction site by one or more subcontractors. These subcontractors can be supplied by multiple producers of reinforcing steel. For the various diameters of reinforcement, many makes of steel can therefore be used at a construction site at the same time. In this situation the ability to inspect and verify that the correct steel is used is simply imperative. Using a B400 rebar where a B600 bar is specified will jeopardize safety. A similar, if less extreme case, might be the use of a (low) ductility class A bar, where the ductility reserves for bending and straining of a (high) ductility class C bar is needed.

To show the feasibility of the request, an example of three strength classes and three ductility classes to be used in EN10080 is in the following tables, prepared by us as a possible amendment of Eurocode 2 current text. A similar table could be prepared for EN10138 standard.

Table X: Strength properties of reinforcement

Property	Strength class		
	B400	B500	B600
Characteristic yield strength f_{yk} or $f_{0.2s}$ (MPa)	400	500	600
Maximum actual yield strength (MPa) for each individual test-specimen ($f_{yk} + 150$) MPa	550	650	750
Fatigue stress range (MPa) for $N \geq 2 \times 10^6$ cycles with an upper limit of $0,6f_{yk}$	150 for bars and de-coiled rods 100 for wire fabrics		
Minimum relative rib area, $f_{R,min}$ or relative indentation area $f_{P,min}$ Nominal bar size (mm) 5 - 6 6,5 to 12 > 12	0,035 0,040 0,056		
Note: EN 10080 refers to a yield strength R_e , which relates to the characteristic, minimum and maximum values based on the long-term quality level of production. In contrast f_{yk} is the characteristic yield stress based on only that reinforcement used in a particular structure. There is no direct relationship between f_{yk} and the characteristic R_e . However the methods of evaluation and verification of yield strength given in EN 10080 provide a sufficient check for obtaining f_{yk} .			

Table Y: Ductility properties of reinforcement

Property	Ductility Class		
	A	B	C
Minimum value of $k = (f_y/f_{yk})_k$	$\geq 1,05$	$\geq 1,08$	$\geq 1,15$ <1,35
Characteristic strain at maximum force, ϵ_{uk} (%)	$\geq 2,5$	$\geq 5,0$	$\geq 7,5$
Bendability	Bend/Rebend test according to EN 10080		

Comments to the performances

- *Strength classes; the present EC2 allows reinforcement with yield strength ranging from 400 MPa to 600 MPa, the proposed classes bounds and represents the same range, while not excluding other classes within the range.*
- *Ductility Classes; the present EC2 defines three Ductility Classes, these are maintained unaltered.*

- *Fatigue strength; a minimum fatigue strength has to be documented. This is related to an increasing demand for robustness, a tendency for longer service lives and changes in the use of structures from sustainability reasons.*
 - *Relative rib area; a minimum value is required.*
 - *Bendability; for stirrups and links sharper bends represent a quality in the precision of the positioning and fixing of the reinforcement at site, improved bendability for typical diameters for stirrups and links i.e. from 12mm and down would be useful.*
 - *Weldability; all reinforcement should be of a weldable quality.*
- Marking; that show Strength Class and Ductility Class directly on the bars is essential for safety.*

In a recent meeting in Berlin we were informed by an ECISS TC104 representative, that this Committee is not prepared to specify a limited number of strength and ductility classes in EN 10080, unless required by a change to the Mandate. This means that problems such as those in the examples above will continue to arise.

We therefore ask for the introduction of classes in EN10080 and EN 10138 standards with CE marking showing both strength and ductility classes. While the above proposal may be developed in order not to exclude any product currently existing on the market, we believe that it is essential for safety and market competition, and that an updated CE marking referring to the required classes is technically feasible at the production stage.

We are aware that according to the Construction Product Regulation, while the producer can declare product characteristics without making reference to any class, the Commission (CPR article 3.3) may determine by "delegated acts", as described in article 60, which performance characteristics have to be declared by the producer. In Article 60 comma (a), levels and classes are introduced as a method for describing product characteristics.

We therefore ask that you consider whatever initiative is possible, ranging from a meeting with ECISS TC104 and CEN TC250/SC2 attending up to a delegated act for reinforcing and prestressing steel, introducing classes for strength and ductility as suggested.

Looking forward to hearing from you,

Yours sincerely,



(Giuseppe Mancini)

CEN TC250/SC2 Chairman



(Steinar Leivestad)

CEN TC250/SC2/WG1 Convenor

