Template for comments and secretariat observations

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Organisation / Name: IETcc-CSIC / Peter Tanner

MB/ NC[1]	Line number (e.g. 17)	Clause/ Subclause (e.g. 3.1)	Paragraph/ Figure/ Table/ (e.g. Table 1)	Type of comment[2]	Comments	Proposed change	Observations of the secretariat
SP	7	2.1	p. 9	te	The future service period for existing structures is often shorter than for newly built structures. In such cases, smaller characteristic values for most variable loads may be used, consistent with the adopted reference period. Additionally, structural safety requirements may also be reduced accordingly. For existing structures they might be lowered further, inasmuch as application of the same performance level as for newly built structures might not be justified from an economic standpoint.	Performance requirements for existing structures are to be based on an acceptable level of risks to persons (individual and societal) and, simultaneously, on economic criteria including environmental aspects. In some cases, cultural and social aspects should also be taken into account.	
SP	16ff	2.2	p. 9	ge	The procedure outlined in clause 2.2 is based on the general flow chart for the assessment of existing structures according to the standard ISO 13822 *Bases for design of structures – Assessment of existing structures*. However, the staged procedure according to the original flow chart is only partially reproduced.	The complete assessment procedure from ISO 13822 should be reproduced and, in general, the contents from this ISO standard should be taken into account when preparing the document N2024.	
SP	32ff	2.3	pp. 9-10	te	For a given reference period, the target value of the reliability index depends on the consequences of structural failure.	Target values of the reliability index are to be defined for a given reference period, e.g. 1 year, depending on: • the risks to personas (individual and societal risks); • economic criteria (monetary values of the consequences of a possible failure and of the costs associated with the interventions needed to increase the reliability of the structure).	
SP	17	2.3	p. 10; NOTE	te	Codes, standards and recommendations that were in force at the time when a particular existing structure has been built contain very valuable information about usual conceptual designs at that time, applied loads in design,	Former codes and standards are not to be used as a basis for decisions about the acceptability of an existing structure in terms of its reliability.	
SP	22	2.3	p. 10	te			

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					materials used, etc. However, according to modern state of the art many assumptions, models, etc. used in these former standards may be antiquated or even completely wrong. Furthermore, performance requirements in terms of target reliabilities associated with former design rules are often unknown.		
SP	19	2.3	p. 10; NOTE	te	Models are available (or should be developed if they are not available) for estimating the performance of damaged structural members or structures affected by different deterioration mechanisms. The future evolution of mechanisms such as steel corrosion, fatigue crack growth, etc., may also be predicted by means of adequate models. Structural performance of damaged or deteriorating systems can and must therefore be assessed, even if conditions vary significantly, e.g. if velocity of deterioration is high.	Assessment of deteriorating structures (and possibly also non deteriorating structures; see comment concerning clause 3.2.1.4; line number 3) should be based on shorter reference periods than the design of new structures, e.g. 1 year, and the reliability assessment should be conducted by considering structural performance at the end of the established future service period, taking into account the evolution of deterioration.	
SP	13	3.1	p. 11	ed	The term “design” refers to the planning of new structures rather than to the assessment of existing structures.	In the context of structural assessment, the term “examination” should be used instead of “design”.	
SP	13	3.1	p. 11	ed	Terms such as “semi-probabilistic” methods or safety concepts are normally used in conjunction with the so-called partial factor method.	The term “partial factor method” should be used instead of “semi-probabilistic method”.	
SP	3	3.2.1.4	p. 13	te	The future service period for existing structures is often shorter than for newly built structures. In such cases, an adjusted (see comment concerning clause 2.1; line number 7) characteristic value should be used for most variable loads (ISO 2394:1998). Partial factors may also be reduced accordingly.	The models developed to assess existing structures should be based on a shorter reference period than those for the design of new structures. As mentioned in relation with deteriorating structures (see comment concerning clause 2.3; line number 19), a reference period of one year seems advisable, and the reliability assessment may be conducted by considering structural	

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						performance at the end of the future service period.	
SP	19	3.3.1	p. 14	te	In an ideal case, test samples should be representative and a sufficient number should be taken in order to determine variability with adequate certainty. In normal daily practice, however, only a limited number of tests can be carried out for economical, time or other reasons. In order to avoid that the updating of information by collecting site data may result expensive, time consuming or even ineffective, tests not only should be planned and executed to suit the characteristics of the structure under investigation. They should also carefully be evaluated under consideration of the available prior information.	Probabilistic methods should be mentioned to combine prior information about a variable with results from tests or measurements. The so-called prior distribution function must first be established for the unknown distribution parameters for random variable X. The distribution should reflect all the available information about these parameters (default probabilistic models should be developed for relevant load and resistance variables). This prior distribution (see comment concerning clause 4.3.2; line number 32ff), together with the statistical data obtained from tests and measurements, can be used to derive a posterior (updated) distribution for variable X (ISO 2394:1998). In case of probabilistic verifications, updated distributions are directly taken into account in the assessment. If the partial factor method is used, the updated characteristic value for a given variable is to be established on the basis of the updated distribution.	
SP	40ff	3.3.3	p. 15	te	When assessing the reliability of existing structures by using the partial factor method, updating information about a variable by gathering site-specific data to reduce the associated uncertainties affects both, the characteristic value of the variable considered and the respective partial factor.	Tools should be developed not only for the updating of characteristic values (see comment concerning clause 3.3.1; line number 19), but also for the corresponding partial factors taking into account all relevant parameters.	
SP	14ff	3.3.5	p. 16	ge	This paragraph refers to reinforced concrete structures.	The document “Assessment and retrofitting of existing structures” should be material independent. Material specific considerations should only be used to illustrate the generally valid	

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						specifications.	
SP	22	3.3.5	p. 16	ed	In relation with the term “design”, see comment concerning clause 3.1; line number 13.	See proposed change concerning clause 3.1; line number 13.	
SP	6	4.1	p. 18	te	In existing structures durability problems are usually easy to detect. Depending on their degree, deterioration mechanisms may affect serviceability or ultimate limit states and must be taken into account in the corresponding verifications.	If relevant, durability problems are to be explicitly taken into account in the assessment of structural reliability. The influence of deterioration mechanisms, e.g. the accumulation of damage, is to be considered within the framework of the verification of the serviceability and ultimate limit states (see comment concerning clause 2.3; line number 19). A “vague” durability limit state is not needed.	
SP	24ff	4.2	p. 18	te	The dependence of target reliabilities must be consistent with the general requirements for existing structures (see comment concerning clause 2.1; line number 7). The acceptable level of risks to persons might be decisive for short reference periods, not necessarily for situations with dominant wind actions.	Rewording.	
SP	31	4.2	p. 18	te	In relation with the consideration of deterioration mechanisms, see comment concerning clause 2.3; p. 10; line number 19.	See proposed change concerning clause 2.3; p. 10; line number 19.	
SP	6	4.3	p. 19	te	Non-linear finite element analysis is a very powerful tool. However, uncertainties associated with the results from such analysis are high and its application in conjunction with the partial factor method is not solved. Other generally valid methods for structural analysis may also be applied if minimum requirements for the application of resistance models from structural design codes are not met. The condition is that the effects of such non-compliances are adequately taken into account	Rewording without focusing on non-linear FEM. Admonition concerning the difficulties related with the verification format for non-linear finite element analysis.	

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					(just like in case of application of non linear FEM).		
SP	32ff	4.3.2	pp. 19-20	te	The level of structural reliability depends on the state of uncertainty associated with the load and resistance variables relevant to the investigated problem. Therefore, decision making (concerning the acceptability of an existing structure) based on a direct comparison of the outcome of a probabilistic analysis with predefined target values is, at least, uncertain.	The results from a probabilistic analysis should be interpreted in a comparative way. Alternatively, probabilistic models should be defined for the load and resistance variables that represent the state of uncertainty associated with the adopted target reliabilities. In the assessment of an existing structure, these models could be used as prior distribution functions (see comment concerning clause 3.3.1; line number 19).	
SP	13	4.3.2	p. 20	te	Model uncertainties are not yet well understood, they are difficult to model and can hardly be updated within the framework of the assessment of an existing structure (see comment concerning clause 4.3.3; line number 15ff).	Default models should be defined for model uncertainties (see proposed change concerning clause 4.3.3; line number 15ff).	
SP	15ff	4.3.3	pp. 20-21	te	While updating of partial factors for actions is relatively straightforward, the contrary is the case for model uncertainty partial factors. Therefore, in daily practice default values will normally be used for the latter whereas the former can be updated by using site data. What applies to the action effects also is true for the corresponding resistances: partial factors for material or product properties can be updated with relative ease, whereas in normal daily practice default values are to be used for the partial factors associated with the uncertainties of the resistance models since their updating is not an easy task. (See comment concerning clause 4.3.2; line number 13)	Partial factors for the action effects should be broken down into partial factors for the actions, which take account of the possibility of unfavourable deviations of the action values from the updated characteristic values, and a partial factor that takes account of the uncertainties associated with the action effect models and the simplified representation of actions. Since model uncertainties vary depending on the action effects considered, in lieu of taking into account one single partial factor for such uncertainties, different factors are to be introduced, e.g. depending on whether bending moments, shear forces or axial forces are to be calculated. The partial factor for resistance should be split into the partial factors for material or product properties, which can be updated, and a partial factor associated with the uncertainties of the resistance model. Also resistance model	

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						uncertainties vary depending on the failure mechanism considered, reason why different factors should be introduced. Since updating is difficult, default values should be defined for these factors. (See proposed change concerning clause 4.3.2; line number 13).	

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