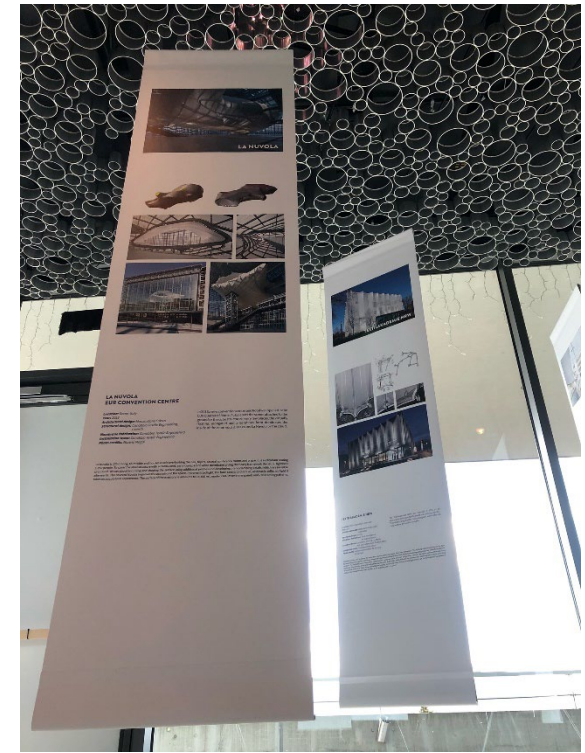




TensiNet & Friends

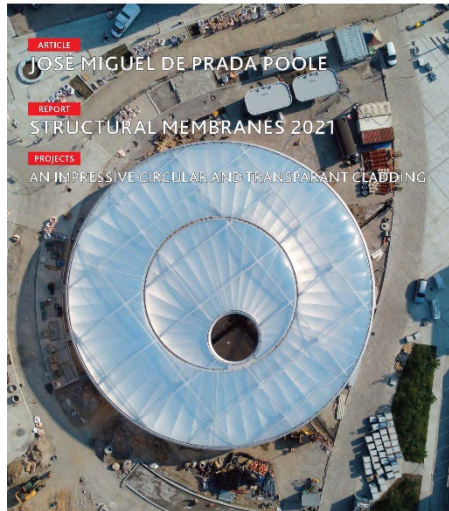


- **Welcome & introduction** - Bernd Stimpfle
- **WG Sustainability & Comfort** - Carol Monticelli
- **WG Eurocode** - Bernd Stimpfle & Marijke Mollaert
- **TensiNet at ABS 2022** - Bernd Stimpfle
- **Announcements** - Bernd Stimpfle
- **Conclusions & questions** - Bernd Stimpfle



Welcome & introduction

Bernd Stimpfle





- 1999 – 2004** European research project on tensile structures
- 2004 – 2020** cooperation is continued and TensiNet is founded as a network of experts under the wings of the Vrije Universiteit Brussel
- 2020 – current** TensiNet became an international non-profit association

Aim

The aim of TensiNet is to enable its members to contribute more effectively, within the scope of their activities, to

- Provide information and advice in the field of tensile membrane buildings;
- Inform about research and other technical studies necessary to support such advice;
- Inform about the application of research findings;
- Improve the quality of tensile membrane buildings;
- Increase the range of architectural applications;
- Get scientific results into practice and
- Stimulate research initiatives.



Members of TensiNet subscribe a Code of Good Practice, encourage and facilitate exchange of information and joint working, in order to increase the quality of tensile architecture.

Objectives

TensiNet is an association or platform for all parties interested in tensioned membrane structures



- supports teaching and training activities
- supports workshop organised by one of its members and provides information about events.
- disseminates information about ongoing research.
- publishes the TensiNews newsletter twice a year.
- **organises every three year the TensiNet Symposium – TENSINANTES 2023.**
- publishes reference documents, Working Group publications and proceedings of the TensiNet symposium.
- maintains the website www.tensinet.com, containing a projects database, reference documents, research reports etc
- launched several Working Groups focusing on specific topics

Working Groups

TensiNet discusses specific issues and prepares state of the art documents in the appropriate Working Groups

- WG analysis & materials
- WG ETFE
- **WG Sustainability & Comfort**
- WG Pneumatic structures
- **WG Specifications & EUROCODE**
- WG Specifications GOOD PRACTICE

TensiNet European
Design Guide for
Tensile Structures
Appendix A5



DESIGN
RECOMMENDATIONS
FOR ETFE FOIL
STRUCTURES

TensiNet ETFE Working Group

WG Sustainability & Comfort

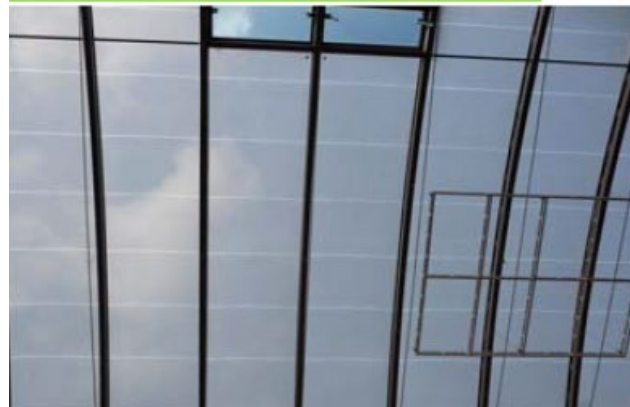
Carol Monticelli

PCR Guidance-Texts for Building-Related Products and Services

From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU)

Part B: Requirements on the EPD for ETFE construction element

www.ibu-epd.com



PCR Guidance-Texts for Building-Related Products and Services

From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU)

Part B: Requirements on the EPD for Technical Textiles

www.ibu-epd.com



WG Sustainability & Comfort

Year 2022

3 meetings focused on the LCA of membranes and PCRs

- the EDP and IBU subscription ✓
- Organization of the WG in subgroups

IN PROGRESS

one PCR on membranes OR PCRs for the three main membrane materials

WG Sustainability & Comfort

- o the EDP and IBU subscription ✓

Under agreement:

agreement with the companies, with an ongoing registration with IBU, for paying the extra costs for the IBU membership to TensiNet (from 1500€/2022-2023 to 7200€/next years)

WG Sustainability & Comfort

- Organization of the WG in subgroups

AIM

Collecting the state of the art of the LCA data available in the existing EPDs of the 3 main products: *films, PES/PVC, Glass/PTFE and structural and fixing components.*

IN ORDER to set up a TENSINET document on the range of values (*EE, kgCO2 emissions, ...*) to be used by LCA Analysts during the design process to choice appropriate solutions



WG Sustainability & Comfort

Subgroups

AIM

Set up the first draft of the PCR / PCRs

Deadline for submission to IBU: Mid November 2022

WG Sustainability & Comfort

TOPICs under discussion:

key question of the future of EPDs under the new Construction Products Regulation 305/2011 (CPR)

In the future, EPD-like information will be part of the Declaration of Performance, and the verification will be similar to today's EPD verification. The draft CPR says explicitly that this information in the DoP may be provided in the form of a permalink to an EPD (art. 15 (3)).

!!!! Some doubts came out in-between the participants of the WG, but no specific answer and solution at moment, being the regulation's changes in progress.

WG Sustainability & Comfort

TOPICs under discussion:

the advantages of creating common EPDs/PCRs in the framework of TensiNet

- from 2024 EU will ask mandatory for the CPR and consequently the EPD will be needed.
- within 2026 the steel category and the concrete category will harmonize their EPDs to the CPRs.
- it will be not comfortable for this harmonization to have groups of products ruled by different CPRs.

!!!! IT SEEMS THE RIGHT TIME TO PROCEED WITH THE PCRs FOR MEMBRANES IN ARCHITECTURE

WG Sustainability & Comfort

...overcoming the technicalities and the numbers **THE NEED** is

clear suggestion and clear teaching about the use of the data from the users (designers, architects and engineers).

It means to work also teaching that **the design perspective has to change**

There is no winning product, but the choice has to be a consequence of the design, the life span of the building, the function of the building, of the context and of the LCA datas

INTEROPERABILITY WILL HELP

WG Eurocode - Technical Specifications document

Marijke Mollaert, Bernd Stimpfle



EUROCODES

prCEN/TS19102:2021-04(E)

Design of membrane structures



WGs working together

The CEN TC250 WG 5 Membrane Structures, its sub-groups and the TensiNet WG Eurocode - Technical Specifications worked together



Renzo Piano, Château Lacoste

The conversion of the Science and Policy Report to the TS occurred in different steps

- **A final draft available 8/11/2021**
Technical review by CEN TC250 (Mariapia Angelino),
- **November 2021**
Remaining comments, especially with respect to Annex H have been discussed
and have been taken into account in the version available at <https://www.tensinet.com/index.php/partner-group-working-groups/wg-specifications-and-eurocode>

10 clauses, 11 Annexes (6 normative), 104 pages

1. Scope
2. Normative references
3. Terms, definitions and symbols
4. Basis of design
5. Materials
6. Durability
7. Structural Analysis
8. Ultimate Limit States
9. Serviceability Limit States
10. Connections

Annex A (informative)	Classification of structural membranes
Annex B (normative)	Procedures for determination of modification factors
Annex C (Informative)	Modification factors
Annex D (normative)	Test procedures considering crease folds sensitive fabrics
Annex E (normative)	Test procedures to determine foil properties
Annex F (normative)	Special provisions with regards to fire
Annex G (informative)	Fire performance of membrane structures exposed to fire
Annex H (informative)	Technical management measures for the implementation of membrane structures
Annex I (normative)	Structural foils – Determination of tensile properties under monoaxial stress states
Annex J (normative)	Structural coated fabrics – Determination of tensile properties under monoaxial stress states
Annex K Bibliography	

- **CEN TC250 WG 5 members** were asked to give their consensus to submit the updated final draft of the TS to Formal Vote (FV)
- The **consensus was reached** at the WG 5 meeting held on **12/05/2022**
- The revised final draft of the TS was submitted to CEN TC 250 on **16/05/2022**

Annex H (informative)

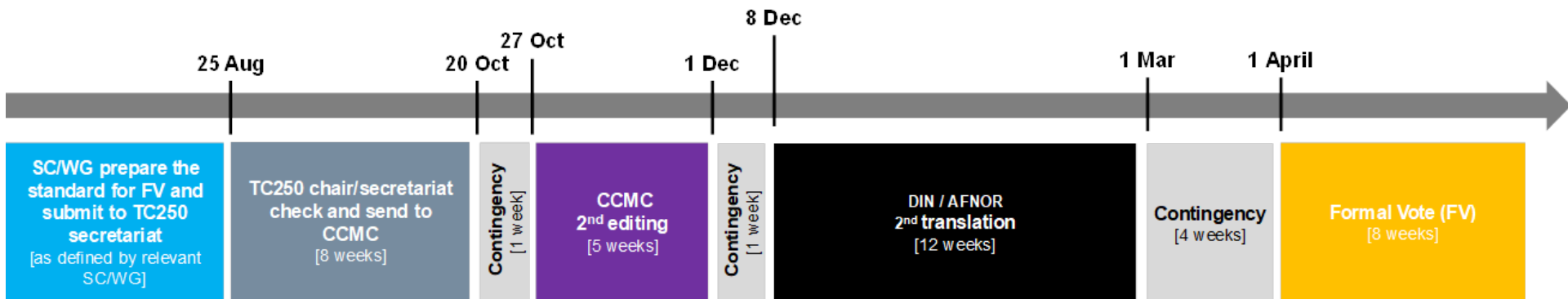
Technical management measures for the implementation of membrane structures



Main discussion in CEN TC 250 meeting [19-20/5/2022](#):

- In the absence of a product standard, it could be acceptable for a TS to include [execution rules](#) content into an [informative annex](#) (considering a TS does not have the status of an EN).
- The view of the CEN/TC 250 Management Group is that the informative annex is a credible approach, if it has a clause [stating the expectation that the material is likely to move into a different document in due course](#).

Formal Vote for the FprCEN TS19102: **April 2023**





TensiNet at ABS 2022

Bernd Stimpfle

TensiNet at ABS 2022 20st October – 16.15

Architectural Membranes for High-performance Building Skins

Chair Marijke Mollaert

Fabric façades from recycled PET bottles - *Katja Bernert, Mehler Technologies*

Special grades of ETFE film for unique projects - *Ben Runhaar, AGC Chemicals Europe*

Prediction of rain noise in large halls covered by structural skins - *Monika Rychtarikova, KULeuven*

Transparent ETFE cushion roof - *Fridolin Mall, formTL*

Moveable structures as 5th skin - *Christoph Paech, schlaich bergemann partner*

The long way to 1000m³ ETFE-Cloud - *Thomas Toepfer, se cover*

TensiNet at ABS 2022 21st October – 08.30 & 10.45

Life Safety and Fire Prevention in Façades

Chair Zomraude Chantal Chalouhi

Classification of façade structures regarding fire safety - *Carl Maywald, Vector Foiltec*

Non-combustible vertical façade membranes - *Allan Hurdle, Serge Ferrari*

Building a Sustainable World

Chair Carl Maywald

Membrane structures and embodied carbon reduction - *Marijke Mollaert, Vrije Universiteit Brussel*

How can teaching influence the understanding of sustainable construction? - *Heidrun Bögner-Balz, Stuttgart University of Applied Sciences*



Announcements

Bernd Stimpfle





TENSINANTES2023 : TensiNet Symposium 2023
at Nantes Université

Membrane architecture: the seventh established building material.
Designing reliable and sustainable structures for the urban
environment.

TENSINANTES 2023

**Membrane architecture: the seventh established building material.
Designing reliable and sustainable structures for the urban
environment**

Wednesday 7 till Friday 9 June 2023

Faculty of Science and Technology, Nantes Université, France

TENSINANTES 2023

TOPICS

STRUCTURAL MEMBRANE: contemporary, innovative, adaptive daring and impactful solutions In Jules Verne's hometown, with its focus on innovation and futuristic issues, membrane architecture can provide answers to current problems, especially for ever denser cities and for a world that is always on the move.

TENSIONED MEMBRANE STRUCTURES: the seventh building material Recent advances in the design of membrane structures, development of a Eurocode dedicated to structural membranes: the word membrane must now be part of the daily vocabulary of architects, designers and decision-makers, and the specificities of membrane design must be part of the knowledge of all structural engineers.

STRUCTURAL MEMBRANE: an answer to issues of the 21st century Lightweight design, well-being, environmental impact, energy and acoustic performance, life cycle of materials and structures, end of life of membrane structures: these keywords are part of the current and future construction challenges and are an important message for the younger generations.



TENSINANTES 2023

CONFIRMED KEYNOTE SPEAKERS

Dominique Perrault Architecture

AZC Atelier & Ramon Sastre

Carol Monticelli





TENSINANTES 2023

ABSTRACT SUBMISSION

more than 50 abstracts reviewed by the Scientific Committee

Next steps

- Paper submission December 2022
- Paper acceptance or feedback February 2023
- Revised paper submission March 2023

Scientific Committee: Prof Adriana Angelotti (Politecnico di Milano), Ass Prof Paolo Beccarelli (University of Nottingham), Dipl Ing Arch Katja Bernert (Low and Bonar), Dr Alexis Bloch (Méca), Prof Heidrun Bögner-Balz (Hochschule für Technik Stuttgart), Dr Rabah Bouzidi (Université de Nantes), Roberto Canobbio (Canobbio Textile Engineering), Prof John Chilton (University of Nottingham), Prof Jan Cremers (Hochschule für Technik Stuttgart), Prof Lars De Laet (Vrije Universiteit Brussel), Dr Olivier Flamand (Centre Scientifique et Technique du Bâtiment), Prof Gunther Filz (Aalto University), Dr Ing Ann-Kathrin Goldbach (Technical University of Munich), Prof Anh Le Van (Université de Nantes), Dr Laurent Gornet (École Centrale de Nantes), Prof Peter Gosling (Newcastle University, School of Engineering), Prof Josep Llorens (Universitat Politècnica de Catalunya), Prof Marijke Mollaert (Vrije Universiteit Brussel), Prof Arch Carol Monticelli (Politecnico di Milano), Prof Nicolas Pauli (Ecole Nationale Supérieure d'Architecture de Montpellier), Ass Prof Arno Pronk (Eindhoven University of Technology), Dr Monica Rychtáriková (KU Leuven, Belgium / STU Bratislava), Prof Franck Schoefs (Université de Nantes), Dipl Ing Bernd Stimpfle (formTL), Prof Natalie Stranghöner (Universität Duisburg-Essen), Ass Prof Martin Tamke (Royal Danish Academy), Prof Patrick Teuffel (Teuffel Engineering Consultants), Dr Jean-Christophe Thomas (Université de Nantes), Dr Ing Jörg Uhlemann, (Universität Duisburg-Essen), Adjunct Prof Salvatore Viscuso (Politecnico di Milano) and Prof Alessandra Zanelli (Politecnico di Milano).



TENSINANTES 2023

SPONSORING

Opportunity to sponsor the TensiNet 2023 symposium.

4 categories with corresponding benefits:

PLATINUM sponsorship (€4000,00)

GOLD sponsorship (€3000,00)

SILVER sponsorship (€2000,00)

COPPER sponsorship (€1000,00)



**TENSINANTES2023 : TensiNet Symposium 2023
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Membrane architecture: the seventh established building material.
Designing reliable and sustainable structures for the urban
environment.



Conclusion & questions

Bernd Stimpfle



Thank you and enjoy attending ABS 2022!
Visit our booth and our website www.tensinet.com