International Union
of Laboratories and Experts
in Construction Materials,
Systems and Structures

2024
2025

TECHNICAL REPORT

About RILEM

The International Union of Laboratories and Experts in Construction Materials, Systems and Structures (RILEM, from the name in French – Réunion Internationale des Laboratoires et Experts des Matériaux, systèmes de construction et ouvrages) was founded in June 1947 in Paris, France, with the aim of promoting scientific cooperation and to stimulate new directions for research and applications, thus promoting excellence in construction worldwide.

This mission is achieved through the collaboration of leading experts in construction science and practice, including academics, researchers, industrialists, testing laboratories, and authorities.

Become a member

If you are interested in joining RILEM, please consult our website www.rilem.net to become a member.

Membership benefits include

- Participation in RILEM Technical Committees
- Access to the private Web directories restricted to RILEM Members and online version of the RILEM Directory of Members.
- Personal access after login online to the journal *Materials and Structures*, RILEM Proceedings and Springer/ Nature proceedings
- Reduced fees for RILEM events
- 20% discount on all Springer/Nature e-books
- Opportunity to publish selected articles as free OA paper in *Materials and Structures* and in *RILEM Technical Letters*

Individual fees in 2025

Young Member	€ 27	Retired Member	€ 80
Senior Member	€ 395		

Corporate fees in 2025

Associate Member	€1,340	Institutional Member	€2,540
Institutional-Plus Member	€4,660	Industrial Member	€4,660

Note that special discounts from 40% up to 90% on the membership fees may apply depending on your country of residence. Please consult the website membership.rilem.net for all details.

Editorial

by RILEM TAC Chair Enrico Sassoni

They say that time flies when you have fun. I must have had a very entertaining year; I feel time has indeed flown as I suddenly found myself to write again the editorial for the upcoming RILEM Technical Report. I do it with the same pleasure as last year, and eagerness to share with you the news and achievements of RILEM over the last 12 months.

This report presents 6 new Technical Committees (TCs) approved at the last two TAC meetings held in Toulouse, France, in August 2024, and in Mendrisio, Switzerland, in March 2025. A new feature of this report regards the terminology used to indentify the time of establishment of the TC: from this report onwards, the reference time is the month in which the TC is established, hence, in this report, August 2024 and March 2025.

Continuing with the new features of the Technical Committees, you will read on page 8 about the implementation of the new TC entry-figure of “observer”, to be promoted to “TC member” or “TC participant” according to their active engagement in the TC activities. This initiative is motivated by the growing number of people interested in being part of a TC, sometimes hard to manage for the TC Chairs. This solution does not compromise the spirit of welcoming everyone in a RILEM TC.

The section about the output of the “Recently closed TCs” on page 66 is astonishingly busy this year. Even a few years after their closure, some TCs continue to produce publications and reports. These are precious documents that concretise the mission of RILEM: to advance and spread the scientific knowledge of building materials and structures.

And talking about *Materials and Structures*...please do not miss the interview with Giovanni Plizzari, Editor-in-Chief of the flagship journal of RILEM, on page 19. The one offered in this report is a short version of the full interview available online. This report also includes a short version of the interview with Ravindra Gettu, 2018-2021 RILEM President, sharing his knowledgeable words on the association after 20 years in it, 19 of which spent as a RILEM officer.

Over the last 20 years, the association has never stopped to change and evolve. To highlight the rising importance of the impact of the carbon footprint of the built environment and of the Association itself, RILEM has released the Green Commitment. This statement points out the efforts and initiatives of the Association to contribute towards the reduction of the CO_2 emissions, like, for instance, the request of addressing, in the proposal of new TCs, the environmental impacts of their results, or the change in the schedule of the future RILEM Spring Convention. These and other useful and important pieces of information are available on page 22.

Finally, a sad note to finish this report: the premature departure of our friend Esperanza Menéndez Méndez. Esperanza has been a constant presence in this report since its first issue in 2019, being the convener of Cluster B until 2020 and then Chair of TC 300-ARM: Alkali-aggregate reaction mitigation. She was also an Expert in TAC, Deputy Chair of TC 251-SRT, and active member of many other TCs. Esperanza has been a presence in the association since 2003, contributing not only to the scientific documents of RILEM, as she was a highly respected member of the international scientific community, but also to its strategic growth and development. But more than this, Esperanza was a great friend to many RILEM members, and she will be terribly missed.

Esperanza Menéndez Méndez with some members of the RILEM TC 300-ARM. Image courtesy of L. Sanchez.

Contents

An overview

of the 2025 RILEM Spring Convention and Conference on Durability of Infrastructures

Mendrisio, Switzerland, 22-28 March 2025

The 8th RILEM Spring Convention was organized by Prof. Christian Paglia, Head of the Institute of Materials and Constructions with his team of the University of Applied Sciences and Arts of Souther Switzerland (SUPSI), and Dr Roberto Torrent, 2016 RILEM Honorary Member.

The first three days (22, 23, and 24 March) of the event drifted along through many RILEM Standing Committee and Technical Committee meetings, hosted at SUPSI. Here some highlights of these meetings are presented.

Board of Editors (BoE)

Materials and Structures

The journal welcomed the following new Associate Editors: Prof. Antonin Fabbri, Dr Augusto Cannone Falchetto, Prof. Céline Perlot, Dr Ellina Bernard, Dr Emmanuel Keita, Dr Gregor J. G. Gluth, Dr Qing-feng Liu, Prof. Rafael Giuliano Pileggi, Dr Roberto Nascimbene and Dr Tommaso D'Antino.

RILEM Technical Letters

The journal has a new Editor-in-Chief: welcome to Dr Mateusz Wyrzykowski!

Technical Activities Committee (TAC)

The following Technical Committees (TCs) have successfully completed their work:

- 291-AMC Use of Agro-Based Materials as Cementitious Additions in Concrete and Cement-Based Materials
- 288-IEC Impact and Explosion

The University of Applied Sciences and Arts of Southern (SUPSI), the location of the RILEM Spring Convention. Image courtesy of D. Ciancio.

- 289-DCM Long-term durability of structural concretes in marine exposure conditions

Three new RILEM TCs were approved:
- ASM Atomistic Simulations for Cement-Based Materials: Recommendations and link to experiments, in Cluster B
- IAQ Impact of Building Materials on Indoor Air Quality, in Cluster D
- MTZ Influence of Recycled Aggregates on Multi-Interfacial Transition Zones in Recycled Concrete, in Cluster B.

Development Advisory Committee (DAC)

Three new Regional Conveners were welcomed:
- Prof. Kolawole A. Olonade, University of Lagos, Nigeria, for the Sub-Saharan Africa region
- Dr Daniela Martinez Lopez, Universidad del Norte, Colombia, for the Latin America region
- Dr Taehwan Kim, UNSM Sydney, Australia, for the Pacific region.

A proposal to increase the number of RILEM activities taking place in Africa was approved. Stay tuned as you will soon learn more details about it!

Educational Activities Committee (EAC)

The mandate of many EAC members will end in September this year. The new officers will be nominated at the 2025 RILEM Annual Week. All EAC initiatives, like the ROC&TOK webinars and the Peer-to-Peer webinars to mention a few, continue to be very successful.

These first three days also hosted the meetings of the following RILEM TCs:
- 297-DOC Degradation of organic coating materials and its relation to concrete durability
- 317-ACP Active Control of Properties of Fresh and Hardening Cementitious Materials
- 312-PHC Performance testing of hydraulic cements
- CUC Carbon dioxide uptake by concrete during and after service life
- 311-MBC Magnesia-based binders in concrete
- CSA Calcium sulfoaluminate-based cement and concrete

On the left: a snapshot of the Board of Editors meeting of *Materials and Structures* (from the left: Prof. Giovanni Plizzari, Dr Luiza Miranda, Nathalie Jacobs, and Dr Arnaud Perrot). On the right a captured moment from the DAC meeting (from the left: Aurelie Martingale, Judith Hardy, and Dr Wolfram Schmidt). Image courtesy of D. Ciancio.

A snapshot of the RILEM Bureau meeting. From the left: Prof. Kei Ichi Imamoto, Prof. Sylvia Kessler, Prof. Giovanni Plizzari, Prof. Eshan Dave, and Prof. Enrico Sassoni. Image courtesy of D. Ciancio.

RILEM Standing Committee officers and TC Chairs and Deputy Chairs were treated with an unforgettable dinner at the Luini Restaurant at LAC Lugano Arte e Cultura, in Lugano, Switzerland.

From 25 to 28 March, the Conference on Durability of Infrastructures was hosted at the beautiful Hotel Coronado, in Mendrisio. Delegates from 30 different nations attended this event, which featured 145 presentations in total. The event developed through 19 keynote lectures, 4 parallel sessions per day, and a poster session.

From the left: Dr Nicolas Roussel, RILEM outgoing President, Prof. Christian Paglia, conference Chair, Prof. Nele De Belie, RILEM President, and Prof. Hans Beushausen, RILEM Vice-President. Image courtesy of D. Ciancio.

The opening session of the Conference on Durability of Infrastructures. © 2025 SUPSI.

Amongst the many interesting keynote lectures, the award session of the 2025 RILEM G. Colonnetti medals deserves a special attention:

- *Rheology Control of Cementitious Materials,* by Dr Dengwu Jiao.
- *Advancements on serviceability and sustainability of cement-based materials and structures*, by Dr Fragkoulis Kanavaris,

together with the presentations of the TCs that have recently completed their work:

- Outputs of the TC 290-IMC Durability of Inorganic Matrix Composites used for Strengthening of Masonry Constructions, by TC member Dr Bahman Ghiassi on behalf of TC Chair Prof. Antonietta Aiello
- Outputs of the TC 277-LHS Specifications for testing and evaluation of lime-based repair materials for historic Structures, by TC Chair Prof. Ioanna Papayanni.

The videos of these presentations are available on the RILEM YouTube channel.


On the left: Prof. Enrico Sassoni, TAC Chair, presenting the 2025 RILEM G. Colonnetti medal to Dr Dengwu Jiao; on the right, Prof. Enrico Sassoni presenting the 2025 RILEM G. Colonnetti medal to Dr Fragkoulis Kanavaris. © 2025 SUPSI.

Related to the activities of RILEM and worth a special mention are the following presentations:

- *Decarbonation pathways for cement and concrete*, by Prof. Karen Scrivener, awarded the SUPSI Institute of Materials and Constructions award 2025 by Martina Hirayama, Swiss State Secretary for Education, Research, and Innovation.
- *Augmented infrastructure condition diagnosis – from bridges to cathedrals,* by Prof. Ueli Angst and Prof. Robert Flatt, who invited the delegates to experience the human-computer interaction devices at the coffee breaks.
- Last but not least the presentation by Dr Wolfram Schmidt, DAC Chair, about GLOBE, the Global Consensus on Sustainability in the Built Environment. This is just one of many initiatives that RILEM is implementing and supporting to encourage the decarbonisation of the construction sector. On this matter, the proposals made at the last RILEM Strategic Workshop *Imagine - RILEM and Climate Change* were discussed at the Standing Committee meetings in Mendrisio and they are now implemented. The conference organisers also planned a “green” event, by utilising the following practices: bagdes, flyers, banners and posters made of recycled paper; no plastic bottles; vegetarian menu at the conference lunches; use of QR codes and digital information instead of printed

Starting from the left: Prof. Christian Paglia, Chair of the conference, Prof. Karen Scrivener, 2025 special award winner, and Dr Roberto Torrent, conference Co-Chair. © 2025 SUPSI.

Delegates experiencing the human-computer interaction devices of the keynote presentation “Augmented infrastructure condition diagnosis – from bridges to cathedrals". Image courtesy of D. Ciancio.

Dr Wolfram Schmidt, RILEM DAC Chair, presenting GLOBE. Image courtesy of D. Ciancio.

documents.
The gala dinner took place at the Hotel Coronado . On the last day, the delegates enjoyed two techincal visits: 1) Biaschina viaduct – Gotthard tunnel – Bellinzona UNESCO Castel, and 2) Verzasca Dam – Sanctuary of the Madonna del Sasso (founded in 1487).

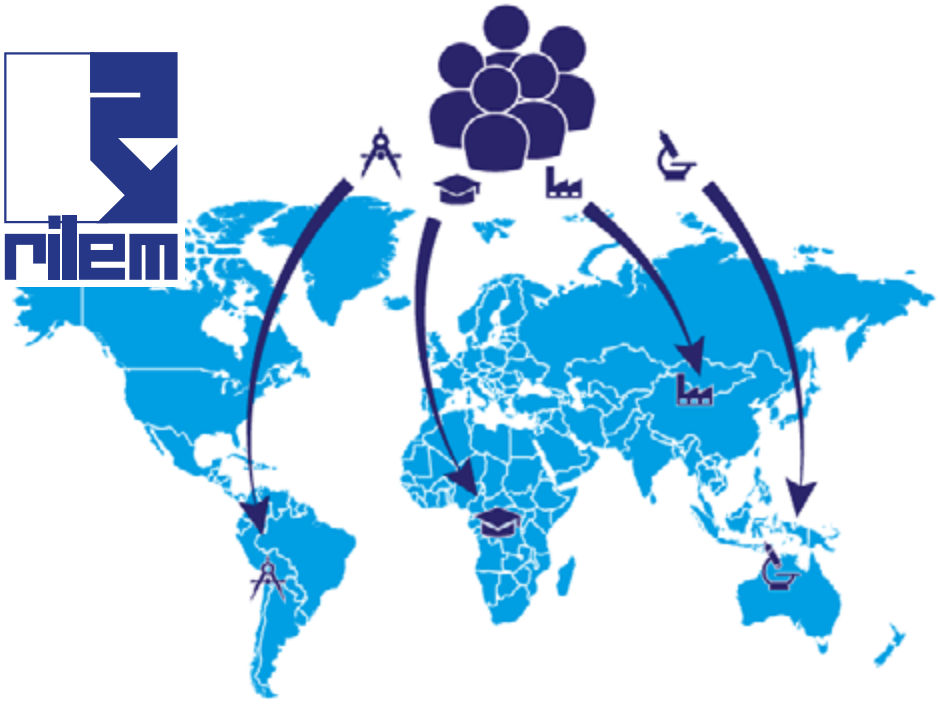
The next RILEM Spring Convention will take place on 13-17 April 2026 at Ghent University, Belgium. It will be organised jointly with the *Conference on Innovative Construction Materials and Processes for*

On the left: the RILEM desk with the RILEM/Springer publications. On the right: a moment during the poster session. Images courtesy of D. Ciancio.

The local organising committee members receiving flowers during the gala dinner in recognition of their hard work. Image courtesy of D. Ciancio.

Verzasca Dam, offered as a technical visit to the conference delegates on the last day of the event. Image courtesy of J. Hardy.

RILEM Technical Committees (TCs): the heart of RILEM



A RILEM Technical Committee (TC) is a group of international experts working together in a particular field in order to:

- Assemble and evaluate research data.
- Harmonise testing methods.
- Suggest new topics for research (also research not to be directly undertaken by RILEM TCs).
- Promote their conclusions.

Each RILEM TC is of utmost importance to the association since the building of scientific and technical expertise, and dissemination of recent results and development form the core of RILEM's mission.

HOW IS A RILEM TC CREATED?

An application is filled and signed by the proposed TC Chair, who has to be a RILEM Individual Member. This form is received by the RILEM General Secretariat that forwards it to the members of the RILEM Technical Activities Committee (TAC) for comments and discussion. If needed, a revised proposal might be drafted by the proposed TC Chair to fulfill the TAC recommendations.

After recommendation by TAC and approval by the RILEM Bureau,

which verifies that the terms of reference of the proposed TC fit into the technical programme of RILEM, the TC is officially created. Although a TC proposal can be received any time of the year, the final discussion and approval happens twice a year, during the RILEM Spring Convention (around March-April) and the RILEM Annual Week (around August-September), when TAC meetings are held.

ROLE OF RILEM CLUSTERS

Each RILEM TC is in direct connection with a RILEM Cluster that has the role of coordinating and monitoring the activities of its TCs and advising TAC. Each Cluster is chaired by a Cluster convener. The 6 fields of activities currently treated by the active RILEM TCs are:

- **Cluster A.** Material Processing and Characterization (Convener: Susan Bernal Lopez)
- **Cluster B.** Transport and Deterioration Mechanisms (Convener: Josée Duchesne)
- **Cluster C.** Structural Performance and Design (Convener: Kei-Ichi Imamoto)
- **Cluster D.** Service Life and Environmental Impact Assessment (Convener: Anya Vollpracht)
- **Cluster E.** Masonry, Timber and Cultural Heritage (Convener: Arun Menon)
- **Cluster F.** Bituminous Materials and Polymers (Convener: Eshan Dave)

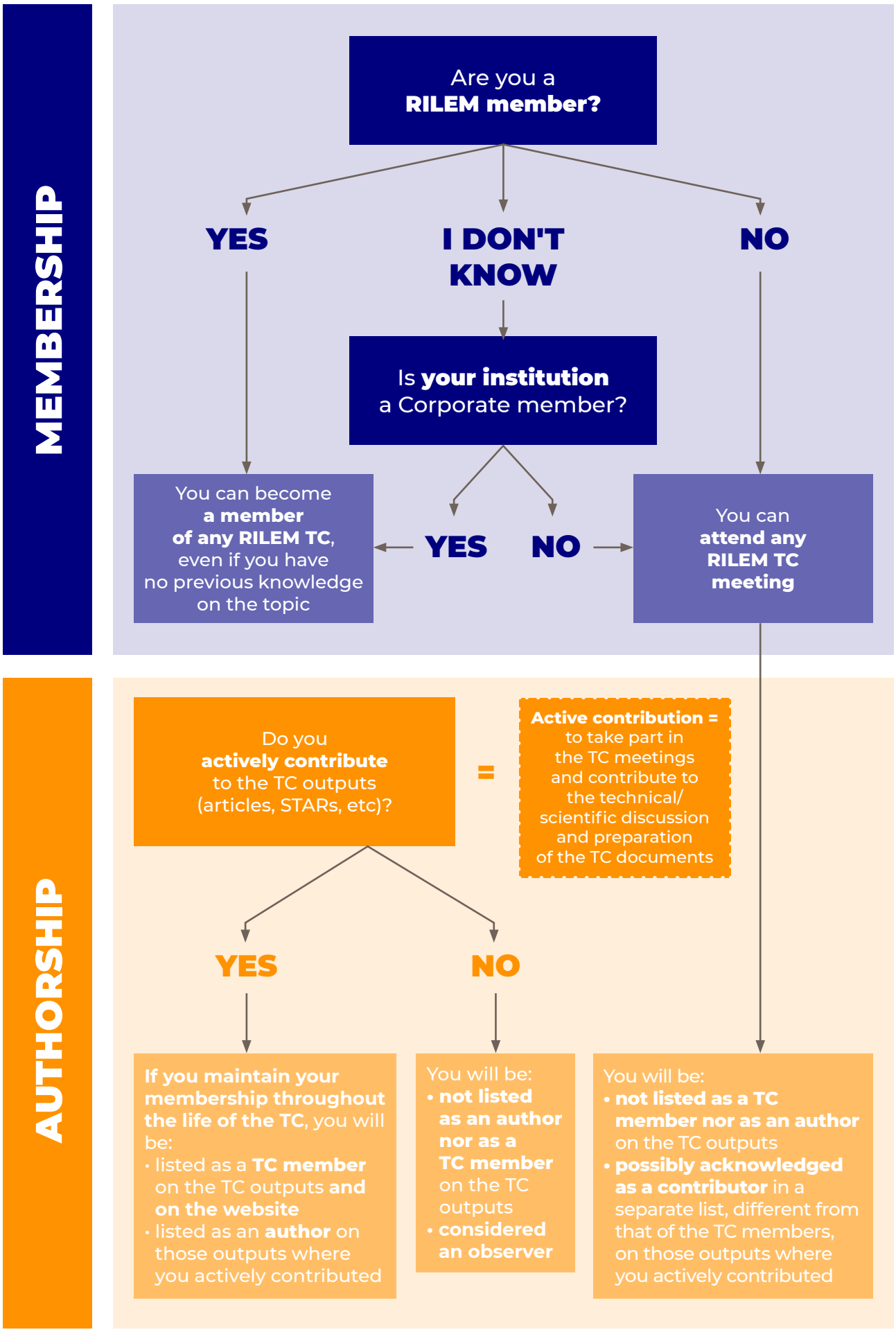
LIFESPAN OF A TC

The TC duration is usually limited to 5 years. Under certain circumstances, the lifespan of a TC might be stretched but it cannot be any longer than 7 years.

CAN I JOIN A TC?

Yes! Anyone is welcome to join a RILEM TC. RILEM values the contribution of everyone, no matter if you are a young PhD student, an experienced researcher, or an industry practitioner. You do not need to be a fee-paying member, as you can join a RILEM TC as a free registered user. Please note that, in this latter circumstance, certain limitations apply for the membership and authorship of the TC output.

In order to cope with the exponentially growing number of TC members (some TCs have more than 200 participants), and the consequent effort to manage such a big group of people, a distinction between “active member” and “observer” has been implemented. All participants to a RILEM TC must be a RILEM member or a registered user (if you have not registered, please click here). When joining a TC, everyone starts as “observer” and then, depending on the actual



TAC189REV1 - Scheme of TC membership and TC publications authorship.

proactive behaviour, the TC Chair can decide to change the status from "observer" to "TC member" or "TC participant":

- A "TC member" is a RILEM fee-paying member who actively contributes to the TC activities and outputs (articles, STARs, etc). This person will be: 1) listed as a TC member on the TC outputs and on the TC webpage; 2) listed as an author of those outputs they actively contributed to.
- A "TC participant" is a registered user (non-fee paying member who selected the option "CREATE YOUR FREE ACCOUNT" here). who actively contributes to the TC activities and outputs (articles, STARs, etc). This person will not be listed as a TC member nor as an author on the TC outputs. This person could possibly be acknowledged as a contributor in a separate list on those outputs where they actively contributed.

The TC Chair has also the capacity of demoting a person from "TC member" to "observer", if this person is not active. Observers have no say on the TC publications; only "TC members" can comment on the publications produced by the TC.

Background and age

During the first 3 years of the TC, TC Chairs should be inclusive and not refuse any request from anyone (RILEM members and not) wishing to become part of their TC. The only requirement is for the candidate to submit a motivation statement explaining why they wish to join the selected TC(s) and how they intend to contribute. This spirit aims to encourage as many minds as possible to engage in new topics and contribute to the research. RILEM would like to remind that young researchers, like PhD students, are strongly encouraged to join a TC.

How can I join a RILEM TC?

You can submit the registration form available on the RILEM website. Please, remember to login with your credential before filling in the "Join a TC registration form".

REWARDS FOR TC MEMBERS AND PARTICIPANTS

Joining a RILEM TC offers many valuable rewards. For young researchers, belonging to a TC means being in touch with the most knowledgeable experts of the areas of research covered by the TC and therefore working in a nourishing and stimulating environment. It also means creating an important network of contacts that can only be advantageous for their career. For senior members, the TC is also an opportunity to work with the best scientists in their field of expertise, to mentor younger people, to put their experience and knowledge at the service of a wider community and to share expertise for the benefit of the society.

OTHER BENEFITS WHEN JOINING A TC

Beside the above-mentioned benefits, joining a RILEM TC also means:

1. For RILEM subscribing members:

- Access to agendas and minutes of the TC. Those can be accessed through the private directory if uploaded by the TC Chair and/or Deputy-Chair.
- Access to any other document produced by the RILEM Technical Committee.
- Access to the Directory of Members.
- Publishing Open Access recommendations in *Materials and Structures* at zero cost.
- Invitation to submit a manuscript to *RILEM Technical Letters* and publishing an Open Access paper at zero cost.

2. For non-RILEM members:

- Access to the documents produced by the RILEM Technical Committee, sent by email.

EXPECTED ACHIEVEMENTS (DELIVERABLES) OF A TC

Each TC might produce at the end of its lifespan one or some of the following:

- A state-of-the-art report (STAR).
- One or more recommendations for test methods or construction practice.
- Conference or workshop proceedings, if organised by the TC.
- Technical reports and other educational material.
- A Topical Collection containing TC reports and TC papers.

For more details, see the chapter “RILEM Publications” in the following pages of this report.

TC outputs are the result of the collective effort of the TC members. To make sure that the publication reflects the view of the TC, the approval from all TC members must be obtained. This and other regulations are explained in the scheme “Guidelines for submission of TC papers".

Publications in *Materials and Structures* (M&S) and *RILEM Technical Letters* (RTL) by RILEM Technical Committees (TCs)

Check **definitions** and **guidelines** for the various types of publications (Link A)

State-of-the-art-report (STAR)	TC recommendation	TC paper	
		Original research	TC overview: TC Opening (rationale) and/or Closure (review and prospects)
STAR can be a **book** or **journal papers** in M&S	Check **guidelines** (Link B)		
Papers (e.g. TC research reports, TC recommendations or STAR) can be grouped in a **Topical Collection** in M&S (cf. point 4)		Papers published in RTL (max 4500 words)	

1 **Obtain approval by all TC members** (in the form of minutes of TC meeting or e-mail chain)

- ☑ All authors of the paper must be **RILEM members**
- ☑ All TC members (also non-authors) **must approve**
- ☑ The paper should report in a dedicated section: (1) the **approval by all TC members** (2) the **list of all TC members**
- ☑ Exemptions from **standard formatting rules** are available upon request (max 15'000 words and max 25 figures+tables for M&S, max 6000 words for RTL)

Check **examples** of **TC recommendation** (Link C) and **TC paper** (Links D)

2 **Send the manuscript and the proof of approval** by all the TC members to:

- ☑ **M&S** (materstruct@sheffield.ac.uk) or **RTL** (RTL@rilem.org)
- ☑ **Anne Griffoin** (a.griffoin@rilem.org)
- ☑ **RILEM Assistant** (assistant@rilem.org)
- ☑ **Cluster Convener**
- ☑ **TAC Chair**

3 **Obtain approval by** the General Secretariat about the TC membership reported in the manuscript

4 *For M&S submission only:* Decide whether to create a **Topical Collection** in M&S (at least 4 papers submitted in 2-3 years maximum)

Check **guidelines for** (Link E) **and examples of** (Link F) **Topical Collections**

- ☑ Propose a **Guest Editor** (= the Cluster Convener)
- ☑ Propose a **title** (most likely, same title as the TC) that should be approved by the Cluster Convener
- ☑ Notify **M&S** (materstruct@sheffield.ac.uk), the **General Secretariat** (Anne Griffoin, a.griffoin@rilem.org) and the **TAC Chair**

5 **Submit the paper** → Paper handled by the **TAC Chair** as **Deputy Editor-in-Chief of M&S** or by the **Editor-in-Chief of RILEM Technical Letters**

LINKS

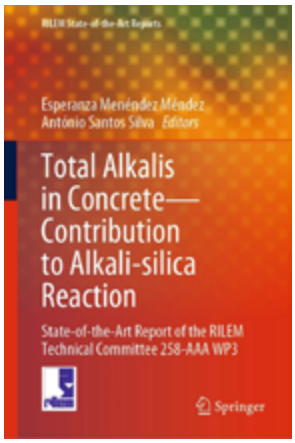
- **A) Types of publications and respective guidelines**: https://www.rilem.net/global/gene/link.php?doc_id=6217&fg=1
- **B) Guidelines for RILEM Recommendation (TAC-N183):** https://www.rilem.net/global/gene/link.php?doc_id=6359&fg=1
- **C) Example of TC recommendation**: https://link.springer.com/article/10.1617/s11527-017-1000-3
- **D) Example of TC paper in M&S**: https://link.springer.com/article/10.1617/s11527-022-01927-7 **RTL**: https://letters.rilem.net/index.php/rilem/issue/view/7
- **E) Guidelines for Topical Collection:** https://www.rilem.net/global/gene/link.php?doc_id=6360&fg=1
- **F) Examples of Topical Collection**: https://link.springer.com/journal/volumesAndIssues/11527?tabName=topicalCollections

TAC194REV2 - Guidelines for submission of TC papers.

RILEM PUBLICATIONS

RILEM Publications showcased at the 8th RILEM Spring Convention in Mendrisio, Switzerland, in 2025. Image courtesy of D. Ciancio.

The mission of RILEM is "to advance scientific knowledge related to construction materials, systems and structures and to encourage transfer and application of this knowledge worldwide". This mission is achieved through the outstanding work of the RILEM Technical Committees and the dissemination of their outcomes in the form of RILEM publications.



Cover of STAR of RILEM TC 258-AAA. Courtesy of Springer.

State-of-the-Art reports (STAR)

These reports constitute a critical appraisal of current knowledge on a specific research subject. They often identify gaps in knowledge, thereby contributing to the development of strategies and scenarios for future research. Since 2009, RILEM State-of-the-Art reports are published by Springer and they are indexed by SCOPUS, Google Scholar and SpringerLink.

Anyone can download for free from the RILEM web page the unedited version of each RILEM STAR, as PDF «unedited version».

A few years ago, RILEM initiated the series of "STARs in a Nutshell". These documents should not be considered as a summary of the exhaustive work of the RILEM Technical Committees, but more like a brief overview of the contents available in the STAR. The purposes of these "STARs in a Nutshell" are: 1) to provide some initial guidance to a non-expert reader, 2) to inspire more comprehensive reading of the STAR and 3) to clarify the relevance of the contents before downloading or purchasing the full document for further details.

Recommendations

More than 200 RILEM Technical Recommendations have been produced by the RILEM Technical Committees. Many of these

recommendations have been adopted in research and practice, and are used by international standardisation bodies, as a basis for their work. In the last few years, RILEM recommendations have been published in the form of FREE ACCESS journal papers in *Materials and Structures*. Recently, the members of RILEM TAC have accomplished the review of all the RILEM recommendations published between 1970 and 1994. 93 were withdrawn (in most cases with indication of more recent standards) and 91 were kept active. The next review process will deal with the recommendations between 1996 and 2005!

Recommendation of RILEM TC 208-CBE. Courtesy of Springer.

Proceedings

RILEM has been organising symposia and workshops since its foundation, with more than 100 proceedings published by RILEM Publications S.A.R.L. A quick glance at the RILEM website shows the diversity, importance and international scope of the topics. All proceedings published by RILEM Publications S.A.R.L. can be downloaded for free (even by non-RILEM members) from the RILEM website. Non-RILEM members need to create a "registered user" account (free of charge). The proceedings that are not published by RILEM Publications S.A.R.L. are published by Springer and can be downloaded for free by RILEM members through their private RILEM profile; non-RILEM members can purchase them online. There are currently 61 volumes in this RILEM Bookseries, available here.

RILEM Proceedings released in the last 12 months.

Cover page of RILEM flagship journal "*Materials and Structures / Matériaux et Constructions*" (MAAS). Courtesy of Springer.

Materials and Structures

Materials and Structures, the flagship journal of RILEM, provides a unique international and interdisciplinary forum for new research findings on the performance of construction materials. A leader in cutting-edge research, the journal is dedicated to the publication of high-quality, original papers examining the fundamental properties of building materials, their characterization and processing techniques, modeling, standardization of test methods, and the application of research results in building and civil engineering. *Materials and Structures* also publishes comprehensive reports and recommendations prepared by the RILEM Technical Committees. This journal publishes the articles of the Robert L'Hermite Medallists.

Topical collections in *Materials and Structures*

Recently, TC members have been given the choice of publishing the outcomes of their TCs in the form of a minimum of 4 papers grouped in a Topical Collection. The papers must be submitted in a short time frame of 2-3 years maximum. *Materials and Structures* presents at the moment 13 open Topical Collections (6 more than last year):

- RILEM TC 266-MRP - Round-Robin Rheological Tests on high performance mortar and concrete with adapted rheology (Bethune, France, 2018).
- RILEM TC 267 TRM: Development and Validation of Tests for Measuring the Reactivity of Supplementary Cementitious Materials.
- RILEM TC 275-HDB: Testing Methods for Determination of the Hygrothermal and Capillary of Vegetal Concrete.
- RILEM TC 280-CBE: Multiphase Characterisation of Cold Bitumen Emulsion Materials.
- RILEM TC 281-CCC - Carbonation of Concrete with Supplementary Cementitious Materials.
- RILEM TC 282-CCL, Calcined Clays as Supplementary Cementitious Materials.
- RILEM TC 295-FBB: Fingerprinting bituminous binders using physico-chemical analysis.
- RILEM TC 298-EBD: Test Methods to Evaluate Durability of Blended Cement Pastes Against Deleterious Ions.
- RILEM TC 299-TES: Thermal energy storage in cementitious composites.
- RILEM TC 301-ASR: Risk Assessment of Concrete Mixtures with ASR Aggregates.
- RILEM TC 303-PFC and TC 304-ADC: Testing and Assessment of Printable and Printed Concrete.
- RILEM TC 309-MCP: Mineral Carbonation for the Production of Construction Materials.
- RILEM TC 315-DCS: Recent Advances in Data-Driven Concrete Science and Applications.

The following Topical Collections have been closed:

- RILEM TC 258-AAA: Recommendations for Avoiding Alkali Aggregate Reactions in Concrete – Performance Based Concept (7 articles).
- RILEM TC 265-TDK, development and assessment of a RILEM Recommendation: Testing methods for determination of the double-K criterion for crack propagation in concrete (4 articles).

Logo of *RILEM Technical Letters*. Courtesy of RILEM Publications S.A.R.L.

RILEM Technical Letters

The *RILEM Technical Letters* Journal was launched in March 2016 as a sister journal of RILEM's flagship, the 50-year-old *Materials and Structures*, published by Springer/Nature. *RILEM Technical Letters* is published as a *Diamond Open Access* journal available online free of charge. The articles are submitted on invitation by the Editorial Board, but the journal has recently also opened the possibility of submitting spontaneous contributions. Many articles are technical reports of the activities of the RILEM TCs. *RILEM Technical Letters* is indexed in Scopus, Scimago, Sherpa Romeo, and in the Directory of Open Access Journals. This journal publishes the articles of the Gustavo Colonnetti Medallists. It also features some special regional papers, describing and detailing the state of the art of a topic in a certain geographical area. More recently, the journal also publishes short letters when a RILEM TC is established or it terminates its activities.

Interview

with Prof. Ravindra Gettu, 2018-2021 RILEM President

Prof. Ravindra Gettu, Indian Institute of Technology Madras, India, officially joined RILEM in 2005. Prof. Gettu became TAC expert in 2006, and he covered that role until 2010; he was a Bureau member from 2007 to 2011, and TAC Chair from 2010 to 2014. He became RILEM fellow in 2012. and RILEM honorary member in 2024. Prof. Gettu was also Deputy Chair of the RILEM TCs 187-SOC Experimental determination of the stress-crack opening curve for concrete in tension, and QFS Size effect and scaling of quasibrittle fracture. He has been member of several RILEM TCs. He was elected RILEM Vice President in 2015; he was then President from 2018 to 2021. This interview took place in June 2024, when Prof. Gettu was RILEM Outgoing President. His Presidency mandate terminated that same year in September.

Dr Daniela Ciancio - RILEM Implementation Manager (RIM): I have the pleasure and honour today to interview Prof. Ravindra, Gettu, RILEM Past President! Your RILEM Presidency mandate is coming to an end this year. Time to look back and make a summary of the last 9 years?

Prof. Ravindra Gettu (Ravindra): Well, there are some thoughts that I put together already in 2021 for the RILEM 75th History Booklet, but I think it's time to look at it afresh, from a less formal perspective. There are many things that have changed in RILEM from the time I got involved in the administration...

RIM: When was this time?

Ravindra: I think we're talking about 18 years ago. There was not much involvement from India at that time. There would have been maybe just one or two members. So... I think Prof. Suru Shah *(Editor's note: Prof Suru Shah, 2010 RILEM Honorary member)* mentioned to the members of Bureau "why don't you get this guy involved?" and since the idea at that time was to make RILEM much broader than just Europe, they called me, and I became a member of the TAC *(Editor's note: Prof. Gettu became TAC expert in 2006)*.

RIM: I understand you were already familiar with RILEM at that stage.

Ravindra: Yes, but frankly, my opinion of RILEM was that it was an old boys' club. But when they asked me to come, I said "yes!". When 4 years later I became TAC Chair, I learned a lot about RILEM. At that time, I could see how RILEM was changing. One of the great things of that period was the growth of the footprint and the decision to have a Director of Development: this person would have the mission to grow RILEM beyond Europe.

RIM: That person was Geert De Schutter, wasn't he?

Ravindra: Yes! We were very lucky to have Geert De Schutter *(Editor's note: Prof. De Schutter, Ghent University, Belgium, 2023 RILEM honorary member)* who was already a very well-known researcher. I would attribute, with little bit exaggeration, most of the footprint we have in China to him. Big efforts were put in also by Pascale *(Editor's note: Pascale Ducornet, 2007-2019 RILEM Secretary General)*, and Anne *(Editor's note: Anne Griffoin, 2015-present RILEM Publications and Communication Manager)*. I think Anne joined RILEM at about the time that I became Vice President. Another interesting thing is about the RILEM presentation used in the General Council presentation and other events: Anne and I put together that format and I think that has been used almost with no change until now!

RIM: I confirm it is still the same format! What else happened in that period?

Ravindra: We, Mark Alexander, Johan Vyncke and I *(Editor's note: Prof. Mark Alexander and Johan Vyncke were RILEM Presidents respectively in 2012-2015 and 2015-2018),* tried to make things systematic: looking forward, bringing young people, etc... Johan and Mark changed things a lot. I would also credit Johan for giving a five-year or seven-year strategy for finances. Another thing that came out from the strategic plan was opening a position for the RILEM Implementation Manager...

RIM: Presente!

Ravindra: Going back to the footprint: India now has a lot of members coming from the time that there was just one. Having an Indian President helped to send the message that you can also do something in RILEM, it's not something far away; the online events, and the online participation in TCs also took away the barrier of distance.

RIM: I find I find it noteworthy that it was an Indian President that revitalised the relationship with Latin America.

Ravindra: It really started much earlier! We have to thank Carmen Andrade *(Editor's note: Dr Carmen Andrade, 2000-2003 RILEM President),* who was always pushing Lat-RILEM in the recent past. Since I knew Spanish, I always thought that I should make at least one trip to South America and participate in events there. That certainly helped. I think our footprint in China, India, and Latin America has

increased. There's also a special relation between Japan and RILEM. I would speak about the RILEM team, too. We have a good team in the Secretariat and I think that one of the legacies of my mandate would be the hiring of amazing people who are there. People matter! There was a nice transition from Pascale, with whom I had a very nice relationship with, to Judith *(Editor's note: Judith Hardy, 2019-present RILEM Secretary General)*.

RIM: Do you regret that COVID happened during your mandate? Do you think that you did many things, but even more could be done without the pandemia?

Ravindra: I don't think so because it's a long engagement I have had with RILEM. I have been in Bureau for 18 years, nine years as Vice President, President and past President put together. I don't think, if I look back, I would have done anything greater than what I've done. And, also I am sort of happy that I was able to steady the ship during COVID. There was no panic. That is something that I think I'll always be proud of: that the online transition happened very nicely in RILEM. If not for COVID, we may never have done it.

RIM: Where do you think RILEM is going?

Ravindra: One thing we have to keep track on is the multinational or the multiracial, multilinguistic strength of RILEM. We should not lose that emphasis. RILEM should not be again considered as just a European organisation. This is difficult because we don't have many members from different places who could come into administration; so sometimes the obvious choice is not representative of the whole globe. It has been told to me by many people that I have been the first and only Asian President, or even further, the first and only non-Caucasian President.

The full interview with Prof. Gettu is available here in English and here in Spanish.

Interview

with Prof. Giovanni Plizzari, Editor-in-Chief of *Materials and Structures*

Prof. Giovanni Plizzari, University of Brescia, Italy, officially joined RILEM in 2004. Prof. Plizzari became TAC expert in 2013; he covered that role until 2018. He was then Convener of Cluster C between 2018 and 2023. Prof. Plizzari has been a member of several RILEM Technical Committees. He became RILEM fellow in 2023. Prof. Plizzari was an Associate Editor of *Materials and Structures* from 2012 to 2018; he became Deputy Editor-in-Chief of this journal in 2018. In 2024, he succeeded Prof. John Provis as Editor-in-Chief of *Materials and Structures*. This interview, done in March 2025, is an opportunity to reflect upon the flagship journal of RILEM.

Dr Daniela Ciancio - RILEM Implementation Manager (RIM): Good morning, Giovanni! Your RILEM experience started before you joined TAC in 2013! The RILEM database tells me that you joined the Association as a member of a Technical Committee (TC) in 2004 *(Editor's note: Technical Committee 208-HFC: High performance fibre reinforced cementitious composites, running between 2004 and 2011).*

Giovanni: Yes! I contributed to several Technical Committees as a structural engineer, because although RILEM today is predominantly oriented to materials' topics, we don't have to forget the structural engineering side of the association. I feel happy to contribute to this area of RILEM themes, which concerns structural applications, structural engineering, etc...

RIM: As the name of the journal highlights, *Materials and Structures* covers these two areas. Can you please tell us something more about the scope of the journal? Is it strictly related to the activities of the RILEM TCs, or it expands to any hot and trendy topic in vogue within the civil engineering scientific community?

Giovanni: Very good question! *Materials and Structures* is an international journal for disseminating scientific information among the RILEM community; the scope of the journal is to provide the service of dissemination of activities which are mainly done within the RILEM TCs. But I think that it is a duty of the Editor-in-Chief and the management of the journal to shed some new lights on new

themes in order to activate new RILEM TCs that meet research needs, and that need advancements in the field of materials and structures. So, to answer your question, the scope of the journal is within the RILEM TC activities, but also open to new important topics for the scientific community.

RIM: Do Associate Editors need to be RILEM members?

Giovanni: By RILEM regulations, they must be RILEM members.

RIM: You have spent almost 1 year in this position. How has it been so far?

Giovanni: It is a busy job but I am having a huge help from the management of the journal, and in particular from the Managing Editor and from the Deputy Editor-in-Chief *(Editor's note: they are respectively Dr Luiza Miranda, Managing Editor, and Prof. Arnaud Perrot, Deputy Editor-in-Chief)*. We are a team working together because the work is a lot! Last year we received about 2600 papers! We have to handle these submissions in a reasonable time, which means giving an answer to the authors in a short time. If the paper is out of scope for RILEM or not respecting the editorial rules, the authors have an answer in about one week.

RIM: What about the acceptance time? How long does it take?

Giovanni: The acceptance of the paper requires one or two or sometimes three rounds of reviews for having a top-quality result. This takes time. But in a few months, we are usually able to accept papers, which is very good. Good reviewers are good researchers, and they are busy people. It is difficult to have a top-level review done in a short time. *Materials and Structures* gives 4 weeks for a reviewer to find some hours to read the paper and review it. We want to complete the review process as quick as possible but without losing the quality of the review.

RIM: Could you please describe the ideal/perfect paper that you would like to receive now as Editor-in-Chief?

Giovanni: I would like to receive papers from all over the world, from female and male authors, representing collaborations between different groups and different universities. I would like a paper that starts from the knowledge in the field before the specific research is presented, a paper that explains very well what was done for advancing in the knowledge through experimental work or numerical work, and that provides some concluding remarks that highlight these advancements. This is the ideal paper! It would be nice also to have comparisons with previous results to confirm or to modify some information or knowledge or assumptions.

RIM: Are you concerned about the use of artificial intelligence (AI)? What is your view on this matter?

Giovanni: I think that we have to use artificial intelligence in the right way. But the definition, in my opinion, of machine learning or artificial

intelligence or whatever you want to call it, is that the product of this work is based on what you already know. So, for example, if you use artificial intelligence for better analysing complex data and for selecting from these data important information, artificial intelligence is very welcome. But if you need artificial intelligence for taking contents from other papers, and for composing a new paper, this is not fair. This is, by definition, opposite to the concept of new scientific contribution.

RIM: What would you say to an author out there considering to submit their work to *Materials and Structures*?

Giovanni: I would say: first check if the topic of the article is within the scope of *Materials and Structures*. If yes, please consider this journal because it is a top-level journal. It provides, as I said, a quick answer for your submission and it is a platform to have your research results known within an important international community.

RIM: Thank you, Giovanni! I think you gave a very exhaustive insight of the work of an Editor-in-Chief. Thank you also for sharing many aspects and figures of *Materials and Structures* that are not always visible to everyone!

Giovanni: My pleasure!

The full interview is available here.

RILEM Green Commitment

Since 1946, one of the missions of RILEM is "to promote sustainable and safe construction, and improved performance and cost benefit for society". This mission has gained importance over the last years, with the rising concerns related to the carbon footprint of the construction industry, and its social and economic consequences.

RILEM wishes to re-state its commitment towards the decarbonisation of the construction sector; on this matter, the following actions have been implemented so far:

Contributions of the RILEM Technical Committees

Since 2022, when applying to establish a new RILEM Technical Committee (TC), applicants are requested to state how the focus of the TC is related/relevant to the environment. All proposals present the expected scientific, social, economic, and environmental impacts of the TC results. Here come a few examples:

- *Economically, it will facilitate the broader adoption of eco-friendly materials in the construction industry, potentially reducing the carbon footprint and promoting sustainable building practices,* MBB: Mechanical behaviour of bio-aggregates based buildings materials.
- *This also helps enable the reduction of carbon emission and energy consumption associated with raw material production and construction, contributing towards achieving net-zero*

practices, QPA: Quality and performance assurance of additively manufactured cementitious composites by advanced non-invasive techniques.

- *The results from the state of the art report and in particular the laboratory as well as the field investigations will have a direct impact on a scientific level, and economic benefits for the cementitious / recycling / waste industry as well as a relevant environmental impact reduction by partially substituting relative energy-rich bituminous binders with mineral hydraulic binders,* RCC: Rolled compacted concrete for pavement applications.
- *Through its bearing on estimates of CO_2 uptake, the work of the TC supports the further development of environmental product declarations (EPD) for cementitious materials and can help to create a consensus about best practices for issuing EPDs,* CUC: Carbon dioxide uptake by concrete during and after service life.

2024 Strategic Workshop

At the 78th RILEM Annual Week, in Toulouse, France, RILEM members were invited to participate to the Workshop *Imagine - RILEM and Climate change*. RILEM is currently implementing many of the ideas that were proposed that day, to give an answer to the following questions:

- What is your vision for a sustainable RILEM in the future?
- How can RILEM work in ten years from now?
- How to have RILEM events for the community with limited carbon footprint?
- How to rationalize our contribution to society and how to communicate the result of TCs' outputs?

The workshop focused on how RILEM can reduce its climate impact while continuing to foster high-quality scientific exchange.

Since air travel is a major contributor to greenhouse gas emissions, one important point of debate was if RILEM should refrain from organising the Spring Convention as an in-person meeting. Due to the importance of this decision, RILEM members were consulted through a poll. Based on the outcome, it was decided to reduce the frequency of Spring Conventions. From 2028 onward, a biennial model will be implemented, and the Convention will only be organized every other year. In addition, conference organizers will be encouraged to arrange the on-site meetings in hybrid mode. This solution represents a balanced approach that furthers our sustainability objectives while preserving opportunities for meaningful interactions across the RILEM community.

The Spring Convention and Annual Week guidelines have also been updated to promote eco-friendly practices. For examples, RILEM suggests using eco-certified venues that are accessible by public transport and offsetting carbon emissions where travel is

necessary. Sustainable transport options, such as trains for shorter trips, are encouraged, along with shared transportation. Digital alternatives should be prioritized over printed materials, and reusable or compostable items should be used for catering and signage. Engaging local businesses and leaving a positive community impact are also emphasized.

GLOBE

In 2021, RILEM, together with 5 leading international construction engineering associations, created the Joint Committee on the GLOBE Consensus (GLOBE), a committee dedicated to reducing Green House Gas (GHG) emissions from construction. The objective of GLOBE is to direct the attention of the global community, politicians, industry leaders, and societal decision-makers to the critical importance of the built environment for sustainable development at global and local scales.

To support or get involved in GLOBE complete the following form: Joint Committee on the GLOBE Consensus – Membership. Membership in GLOBE is individual, voluntary, and free, and does not require affiliation with a member organization. This form allows individuals to confirm their interest, opt out of future communications, or express their willingness to actively contribute to GLOBE activities.

Material Processing and Characterization

Foreword

▶ from Cluster A Convener,
Susan BERNAL LOPEZ

There are currently eleven active RILEM Technical Committees that fall in Cluster A: *Material Processing and Characterization*. The Technical Committees in Cluster A advance knowledge and applications in the fields of emerging material processing technologies. This includes performance evaluation of conventional and alternative cement-based materials and composites, aggregates, polymers, and expansive agents, and identifying and addressing pressing research needs to enable the widespread uptake of novel technologies such as CO_2 mineralization and digital fabrication. In the last 12 months, the TCs 282-CCL *Calcined Clays as Supplementary Cementitious Materials*, and 291-AMC *Use of Agro-Based Materials as Cementitious Additions in Concrete and Cement-Based Materials* completed their activities, and one new TC was established: CSA -*Calcium sulfoaluminate-based cement and concrete*.

The specific focus areas of the technical committees in Cluster A include: reactive MgO-based expansive agents to reduce the risk of crack formation (TC 284-CEC); assessment of electrical materials to study corrosion of steel in concrete (TC 296-ECS); carbon based nanomaterials for multifunctional cementitious matrices (TC 302-CNC); performance requirements and testing of fresh printable cement-based materials (TC 303-PFC); assessment of additively manufactured concrete materials and structures (TC 304-ADC); pumping of concrete (TC 305-PCC); mineral carbonation of construction materials (TC 309-MCP); assessment of magnesia-based binders in concrete (TC 311-MBC); performance testing of hydraulic cements (TC 312-PHC); investigation of active control of properties of fresh and hardening cementitious materials (TC317-ACP) and reviewing the existing knowledge on calcium sulfoaluminate-based clinkers and cements (CSA).

This cluster is comprised of the largest number of TCs within RILEM, which reflects the necessity and drive of the scientific community to create innovative solutions to address technical and environmental challenges. A couple of the Cluster A TCs have attracted particularly significant interest from the scientific community, having more than 200 members each. The committees have a diverse and international membership, which has facilitated the organisation of meetings, workshops, and doctoral courses around the world, online, in person and in hybrid modes, fostering inclusiveness and collegiality. The TC activities have opened opportunities for engagement, knowledge transfer, and networking for design engineers, industry professionals, academics, scientists, and researchers at all career stages. The research outcomes are disseminated to the broad scientific and industrial community through the publication and professional development activities. Outcomes of TC work, particularly data derived from interlaboratory testing campaigns, are also used by standardization bodies to facilitate the development of codes, guidelines and standards in the field of material processing and characterization.

I am delighted to serve the RILEM organisation and its community as Convenor of Cluster A. This is my first year in this role, which was previously held by Professor Daman Panesar.

Current TCs in Cluster A

CODE TITLE	CHAIR DEPUTY CHAIR	OPENED IN	NO. OF MEMBERS
CSA Calcium sulfoaluminate-based cement and concrete	Eric BESCHER Frank WINNEFELD	**NEW** August 2024	20
284-CEC Controlled expansion of concrete by adding MgO-based expansive agents taking the combined influence of composition and size of concrete elements into consideration	Jiaping LIU Ole Mejlhede JENSEN	2018	33
296-ECS Assessment of electrochemical methods to study corrosion of steel in concrete	Sylvia KESSLER Ueli ANGST	2020	62
302-CNC Carbon-based nanomaterials for multifunctional cementitious matrices	Florence SANCHEZ Marco LIEBSCHER	2021	79
303-PFC Performance requirements and testing of fresh printable cement-based materials	Nicolas ROUSSEL Dirk LOWKE	2021	206
304-ADC Assessment of Additively Manufactured Concrete Materials and Structures	Viktor MECHTCHERINE Freek BOS	2021	82
305-PCC Pumping of concrete	Dimitri FEYS Geert DE SCHUTTER	2021	60
309-MCP Accelerated Mineral Carbonation for the production of construction materials	Ruben SNELLINGS Thomas MATSCHEI	2022	190
311-MBC Magnesia-based binders in concrete	Paivo KINNUNEN Ellina BERNARD	2022	42
312-PHC Performance testing of hydraulic cements	Karen SCRIVENER Laurent IZORET	2022	81
317-ACP Active Control of Properties of Fresh and Hardening Cementitious Materials	Geert DE SCHUTTER Jay SANJAYAN	2023	98

New

CSA Calcium sulfoaluminate-based cement and concrete

Chair Eric BESCHER
Deputy Chair Frank WINNEFELD
Activity started in 2024

Members of TC CSA during the kick-off meeting in March 2025. Image courtesy of E. Bescher.

Significance

CSA cements differ from Portland cement in that the main reactive compound in these cements is Ye'elimite, a fast-hydrating compound. Several types of ye'elimite-containing clinkers and cements are manufactured and available commercially worldwide. In spite of commercial success, classification, standards, and specifications are in their infancy and where they do exist, they are usually ad hoc. Therefore, despite the attractiveness of CSA cements as a low-carbon alternative to Portland cement, agency and industry specifications and understanding lag behind commercial use.

Progress

The main incentive for the use of CSAs is the decrease in construction time, compared to Portland cement. They are frequently used for rapid construction or repair of highway or airport pavements, or as accelerating additives in dry mix mortars. The literature reports a reduction in Global Warming Potential of up to 30% compared to Portland cement. The impact of the TC will be to assemble a compendium of what is known of CSA technology, its use and practice worldwide, its shortcomings, and to identify research needs. The users targeted by the outcomes of the TC will be academia, industry, and the general public.

Goals

The scope of the TC will include a review of the mineralogy and performance of all types of CSA-containing cements in fresh and hardened states (blended or unblended with OPC and/or SCMs). The TC will review the knowledge base on the mineralogy of the CSA clinkers and cements, summarize hydration mechanisms, assess what is known of the durability of CSA mortars and concrete, review field applications, and identify knowledge and research gaps.

Methodology

The TC is structured into 5 workgroups:

- WG1: Clinkering and characterization, including thermodynamics of clinkering.
- WG2: Hydration mechanisms, which will include blends with PC, SCMs and admixtures (excluding fresh mortar/concrete properties), and thermodynamics of hydration.
- WG3: Physical properties of CSA-based construction materials, including fresh mortar/concrete properties.
- WG4: Durability and applications.
- WG5: Nomenclature, standardization, and testing.

Progress

- RILEM TC CSA has been approved by the RILEM Technical Activities Committee (TAC) in August 2024. Its kick-off meeting took place in Mendrisio, Switzerland, during the 8th RILEM Spring Convention in March 2025.
- The TC Chair and Deputy Chair are preparing a TC opening letter to be published in *RILEM Technical Letters*.
- Next TC meeting at the 2025 RILEM Annual Week, Hanoi, Vietnam.

284-CEC Controlled expansion of concrete by adding MgO-based expansive agents taking the combined influence of composition and size of concrete elements into consideration

Chair Jiaping LIU
Deputy Chair Ole Mejlhede JENSEN
Activity started in 2018

Significance

MgO-based expansive agents have proven to be effective in compensating shrinkage and mitigating cracking of concrete. In addition to the characteristics of MgO itself, the composition and size of concrete element also have strong influence on expansion of concrete with MgO-based additives, which is still not fully understood.

Progress

- Last (6th) annual TC meeting held in hybrid form in August 2024.
- A state-of-the-art report on properties of MgO concrete and its engineering applications is under revision and planned to be submitted in 2025.
- Two journal papers to be submitted by 2025:
  - > round-robin tests results on hydration reactivity and expansion of MEA.
  - > guidelines for quality control of MgO expansive agent.

The 6th meeting of 284-CEC held in August 2024 (Courtesy of Hua Li).

- Aiming to present TC outputs during the 2026 RILEM Annual Week, in Nairobi, Kenya.
- The International Symposium & Doctoral Course on Volume Changes of Hardening Concrete will be held on 4-10 November 2025, in Nanjing, China.

296-ECS Assessment of electrochemical methods to study corrosion of steel in concrete

Chair Sylvia KESSLER
Deputy Chair Ueli ANGST
Activity started in 2020

Significance

Corrosion of steel in concrete is major reason for deterioration of concrete structures. The corrosion process of the reinforcement itself is of electrochemical nature. Therefore, electrochemical measurements are an essential tool in order to be able to assess and scientifically study the corrosion behaviour of metal-concrete-systems. Besides the assessment of the corrosion behaviour, electrochemical measurements form the basis to predict/model the time of corrosion initiation and the propagation period.

Progress

- Aiming to present TC outcomes during the 2026 RILEM Spring Convention, in Ghent, Belgium.

Advanced corrosion of reinforced concrete structural elements (column and slab). Image courtesy of U. Angst.

302-CNC Carbon-based nanomaterials for multifunctional cementitious matrices

Chair Florence SANCHEZ
Deputy Chair Marco LIEBSCHER
Activity started in 2021

Significance

Carbon-based nanomaterials - such as graphene, carbon nanotubes or carbon black - have gained recently a significant interest in research and development for civil engineering applications. When successfully dispersed in cementitious matrices, they have shown to improve strength, ductility, and fracture resistance; reduce cracking; decrease permeability; and increase durability, while providing innovative properties such as electrical and thermal conductivity. However, despite a large number of research activities, the application of nanocarbon modified cementitious matrices in concrete construction remains to date limited in part due to challenges related with scale-up implementations and a lack of a clear understanding of usually multiple, overlapping mechanisms.

Lecturers and some participants of the Workshop organised by TC 302-CNC in Italy in July 2024. Image courtesy of F. Sanchez.

Publications

- Workshop outcomes from NICOM8 on carbon-based nanomaterials in concrete are being summarized for publication.
- Collaboration with the America Concrete Institute (ACI).
- Topical Collection in *Materials and Structures* RILEM TC 302-CNC: Carbon-Based Nanomaterials for Smart, Durable, and High-Performance Cementitious Materials is open for submissions.

303-PFC Performance requirements and testing of fresh printable cement-based materials

Chair Nicolas ROUSSEL
Deputy Chair Dirk LOWKE
Activity started in 2021

Significance

3DCP (3D Concrete Printing) is an Additive Manufacturing process. The geometric quality of manufactured parts is not only affected by the precision of the printing but also by the deformation under self-weight during manufacture. Fresh material must initially remain fluid enough to facilitate deposition and inter-layer bonding, but materials that are too fluid can lead to buckling and collapse of structures. The importance of these mechanisms has driven significant efforts in: determining the rheological requirements of the fresh material; quantifying buildability; and predicting structural failure. Being able to measure, assess and benchmark process and material performance using standardised and internationally accepted approaches is therefore essential for the industrial future of the technology.

Progress

- Aiming to present TC outcomes at the 2026 RILEM Annual Week, in Nairobi, Kenya.
- Topical Collection in *Materials and Structures* RILEM TC 303-PFC and TC 304-ADC: Testing and Assessment of Printable and Printed Concrete is open for submissions.
- Preparation of STAR.

Close up of extrusion-based 3D Concrete Printing process at Eindhoven University of Technology. Image courtesy of Rob Wolf.

304-ADC Assessment of Additively Manufactured concrete materials and structures

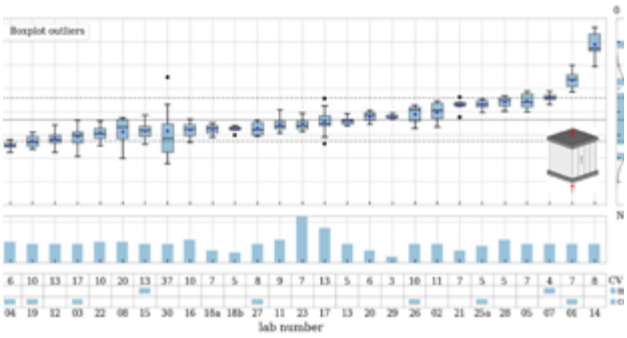
Chair Viktor MECHTCHERINE
Deputy Chair Freek BOS
Activity started in 2021

Significance

Additive manufacturing (AM) of concrete structures is revolutionizing the construction sector with its efficient material use, architectural freedom, and high automation and productivity. Products created through AM often exhibit considerable anisotropy, attributable to their layer-by-layer manufacturing process. These unique characteristics of AM necessitate a critical reassessment of all relevant material characterization test methods to establish new, universally accepted standards.

Progress

- Four papers published in the Topical Collection RILEM TC 303-PFC and TC 304-ADC: Testing and Assessment of Printable and Printed Concrete of *Materials and Structures*:
  - Robens-Radermacher, A., Kujath, C., Bos, F. et *al.* Mechanical properties of 3D printed concrete: a RILEM TC 304-ADC interlaboratory study-Design and implementation of a database system for querying, sharing, and analyzing experimental data. *Mater Struct* **58**, 184 (2025).
  - Bos, F., Menna, C., Robens-Radermacher, A. et *al.* Mechanical properties of 3D printed concrete: a RILEM TC 304-ADC interlaboratory study — approach and main results. *Mater Struct* **58**, 183 (2025).
  - Mechtcherine, V., Muthukrishnan, S., Robens-Radermacher, A. et *al.* Mechanical properties of 3D printed concrete: a RILEM 304-ADC interlaboratory study – compressive strength and modulus of elasticity. *Mater Struct* **58**, 181 (2025).
  - Wolfs, R., Versteege, J., Santhanam, M. et *al.* Mechanical properties of 3D printed concrete: a RILEM TC 304-ADC interlaboratory study — flexural and tensile strength. *Mater Struct* **58**, 182 (2025).
- Co-organization of the annual International PhD Summer School on Additively Manufactured Concrete Structures, in July 2025.



RILEM TC 304-ADC interlaboratory study on mechanical properties of 3D printed concrete: Relative compressive strength results (print over cast, in percentage) in the U direction in ascendent order for each laboratory. Image courtesy of TC 304-ADC.

305-PCC Pumping of concrete

Chair Dimitri FEYS
Deputy Chair Geert DE SCHUTTER
Activity started in 2021

Significance

- Current international documents on pumping of concrete are substantially aged and need modifications to incorporate the results on modern concrete mixtures.
- With the further development of specialty, flowable and high-performance concrete, this knowledge is crucial to be spread to the industry to maintain the competitive advantage of concrete in the construction industry.
- The need exists to create a State-of-the-art report on pumping of concrete, incorporating the developments made in the last 20 years.
- To the knowledge of the proposers, there is no such document available which includes the latest developments.

Progress

- Mikhalev, D.; Fakhrayee Nejad, S.; Ng, S.; Bose, B.; De Schryver, R.; Brunčič, A.; Mohan, M. K.; Wang, Y.; Rahul, A.; Rehman, A. U.; Jiao, D.; Mechtcherine, V.; De Schutter, G.; Feys, D. Practical Insights and Advances in Concrete Pumping. *RILEM Tech Lett* **2024**, 9, 1-9.
- STAR and recommendations in preparation
- RILEM TC 305-PCC is actively communicating with ACI TCs 211-P and 304 promoting information exchange on more practical topics, such as proportioning pumpable concrete and concrete pumping processes.

On the left: concrete pumping on a small construction site. On the right: large-scale concrete pump test on a major construction site. Image courtesy of G. De Schutter.

309-MCP Accelerated Mineral Carbonation for the production of construction materials

Chair Ruben SNELLINGS
Deputy Chair Thomas MATSCHEI
Activity started in 2022

Significance

- The conversion and use of CO_2 into solid, stable mineral carbonates (mineral carbonation) as a means to produce construction materials is an innovative and rapidly developing field that is expanding in various application domains.
- As an emerging field there is a lack of common terminology, material characterisation test methods and reliable process impact data and assessments. Therefore, there is a need for sharing experiences and understanding and for developing best practices and test method recommendations to build a common knowledge base.

Delegates of the 1st RILEM International Conference on Mineral Carbonation for Cement and Concrete. Image courtesy of T. Matschei/RWTH.

Progress

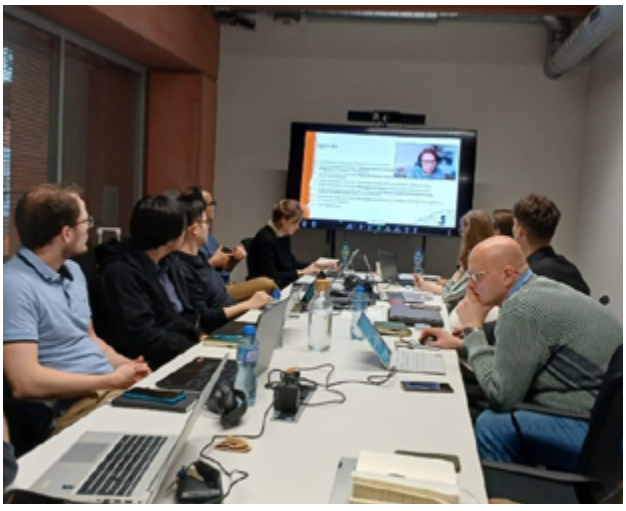
- Snellings, R., Matschei, T. RILEM TC 309-MCP: recommendation on terminology for mineral carbonation construction products. *Mater Struct* **58**, 57 (2025).
- Villagran-Zaccardi, Y., Ellwood, L., Perumal, P. et *al*. Carbonated recycled concrete aggregates in construction: potential and bottlenecks identified by RILEM TC 309-MCP. *Mater Struct* **58**, 20 (2025).
- Topical Collection in *Materials and Structures* RILEM TC 309-MCP: Mineral Carbonation for the Production of Construction Materials is open for submissions.

311-MBC Magnesia-based binders in concrete

Chair Paivo KINNUNEN
Deputy Chair Ellina BERNARD
Activity started in 2022

Significance

Magnesia-based cements are relatively unstudied systems. MgO is found as magnesium silicates in Earth's crust, and therefore constitutes a potentially zero-CO_2 raw material for its uncarbonated form. The scientific as well as technological viability and scalability related to the MgO-based binders' utilization are still open questions to a large degree. The understanding of the potential of these binders is still in its infancy and the research is scattered and relatively uncoordinated.



Members of TC 311-MBC during the TC meeting in Mendrisio, Switzerland, in March 2025. Image courtesy of D. Ciancio.

Progress

- Last TC meeting held during the 2025 RILEM Spring Convention.

312-PHC Performance testing of hydraulic cements

Chair Karen SCRIVENER
Deputy Chair Laurent IZORET
Activity started in 2022

Significance

To accommodate new "blended" or "composite" cements, the current "prescriptive" cement standards are getting more and more complex. In view of the diversifying range of cementitious constituents and their expanding levels of incorporations, the number of combinations as cements is bound to exponentially increase if current prescriptive approaches are maintained. Moving away from specifications based on cement composition to a performance-based approach could rigorously resolve the issue, align with policy expectations and enable a more rapid introduction of new sustainable cements. The aim of this committee will be to prepare the way for performance approaches to defining cements suitable for application and look at existing and new test methods of performance.

Members of TC 312-PHC at the TC meeting in March 2025. Image courtesy of D. Ciancio.

Progress

- Last TC meeting held during the 2025 RILEM Spring Convention.
- Testing on different criteria are on-going: round robin test on mechanical strength measurement (standardized sand versus locally recomposed), minimum C-S-H content, dimensional stability and durability (resistance to carbonation, external sulphate attack, chloride diffusion). These durability issues are treated in coordination with RILEM TC 298-EBD.
- Next meeting during the 2025 RILEM Annual Week, Hanoi, Vietnam.

317-ACP Active Control of Properties of Fresh and Hardening Cementitious Materials

Chair Geert DE SCHUTTER
Deputy Chair Jay SANJAYAN
Activity started in 2023

Significance

Active Control of Concrete Properties is a recently identified subfield within concrete technology. The new concept of Active Control of concrete properties is based on the application of external signals to trigger an intended response in the material. Several challenges remain, like the stability and functioning of the responsive material in a cementitious environment, the applicability of the control signal in a cementitious material, and the cost, logistics and safety of a control system on a construction site or in precast industry. Finding solutions to these challenges will lead to marvellous opportunities in general, and for concrete 3D printing more particularly.

Progress

- De Schutter, G.; Abidi, I.; Korda, E.; Boshoff, B.; Olonade, K. A.; Snoeck, D.; Muthukrishnan, S.; Zhang, Y.; Tao, Y.; Ghodke, S. B.; Mohan, M. K.; Yardimci, M. Y.; Jiao, D.; Sanjayan, J. Active Control of Properties of Fresh and Hardening Concrete. *RILEM Tech Lett* **2024**, 8, 198-203.

TC members attending the hybrid meeting in Mendrisio, Switzerland, in Marchl 2025. Image courtesy of D. Ciancio.

- Next TC meeting at the 2025 RILEM Annual Week, Hanoi, Vietnam.
- STAR and recommendations in preparation.

Transport and Deterioration Mechanisms

Foreword

▶ from Cluster B Convener, Josee DUCHESNE

Cluster B coordinates the activities of the Technical Committees dealing with *Transport and Deterioration Mechanisms*. This topic is related to the properties of the construction materials and their chemical, physical, mechanical and durability behaviour. The use of traditional and novel construction materials is conditioned by their properties. The service life of the structures is conditioned by these properties as well as by environmental and exposure conditions. The development of test methods, modelling and validation are among the topic addressed by this cluster.

Currently, Cluster B has seven active TCs dealing with different aspects of traditional and novel construction materials, their properties, and the durability behaviour and combination of actions. The active technical committees include: Test method for concrete durability under combined role of sulphate and chloride ions (285-TMS); Test methods for gas diffusion in porous media (286-GDP); Degradation of organic coating materials and its relation to concrete durability (297-DOC); Test methods to evaluate durability of blended cement pastes against deleterious ions (298-EBD); Modelling and experimental validation of moisture state in bulk cementitious materials and at the steel-concrete interface (313-MMS); and the two recently established TCs on Atomistic simulations for cement-based materials (ASM) and Influence of recycled aggregates on interfacial transition zones (MTZ). Over 250 RILEM members currently participate in Technical Committees co-ordinated under Cluster B.

Cluster B's technical committees have published numerous recommendations, state-of-the-art reports, journal articles, and conference papers to disseminate information and contribute to Rilem's visibility.

Since September 2020, it has been a privilege to coordinate the activities of Cluster B. I took over the role previously held by Dr Esperanza Menendez Mendez, who sadly passed away in 2024. Esperenza played a major role in the work of RILEM, and TC 258-AAA dedicated the STAR report Total Alkalis in Concrete - Contribution to Alkali-silica Reaction to her, in recognition of her lasting impact.

Current TCs in Cluster B

CODE TITLE	CHAIR DEPUTY CHAIR	OPENED IN	NO. OF MEMBERS
ASM Atomistic Simulations for Cement-Based Materials: Recommendations and link to experiments	Tulio HONORIO DE FARIA Aslam KUNHI MOHAMED	**NEW** March 2025	21
MTZ Influence of Recycled Aggregates on Multi-Interfacial Transition Zones in Recycled Concrete	Jianzhuang XIAO Belen GONZALEZ FONTEBOA	**NEW** March 2025	24
285-TMS Test method for concrete durability under combined role of sulphate and chloride ions	Changwen MIAO Geert DE SCHUTTER	2018	36
286-GDP Test Methods for Gas Diffusion in Porous Media	Bruno HUET Philippe TURCRY	2019	34
297-DOC Degradation of organic coating materials and its relation to concrete durability	Takafumi NOGUCHI Kei-Ichi IMAMOTO	2020	34
298-EBD Test methods to evaluate durability of blended cement pastes against deleterious ions	William WILSON Prannoy SURANENI	2020	55
313-MMS Modelling and experimental validation of moisture state in bulk cementitious materials and at the steel-concrete interface	Zhidong ZHANG Chunsheng ZHOU	2022	59

New

ASM Atomistic Simulations for Cement-Based Materials: Recommendations and link to experiments

Chair Tulio HONORIO DE FARIA
Deputy Chair Aslam KUNHI MOHAMED
Activity started in 2025

Logo of the RILEM TC ASM. Image courtesy of TC ASM.

Significance

Molecular scale modeling has been widely adopted in the past two decades for studying cementitious materials, producing fruitful knowledge of fundamental physio-chemical processes. Nevertheless, the modeling approaches from different research groups remain largely varied, to the extent that algorithms with unreasonable atomic structures, force fields (FF), boundary conditions or sampling methods are still often reported. There is a need to review and recommend a baseline for molecular modeling work in cementitious systems. Given the rapid increase in the digitalization of technology and science, alongside the growing reliance on data-driven approaches that demand standardized databases, it is essential to address the current fragmentation in molecular modeling work within cementitious systems and establish a reliable baseline.

Relevance

- TC activity will support fundamental research and deliver insights for applied research, offering direct relevance to industrial stakeholders by elucidating fundamental phenomena, corroborating experimental data and testing hypotheses in complex cement systems.
- Participation from industry and practitioners will be actively encouraged by leveraging existing links with cement, additives and admixtures producers. These connections will be invited to be involved in TC meetings, encourage their membership in the TC, and explore opportunities for implementing and testing recommended techniques in their activities.

Goals

- This TC aims to comprehensively review the atomic structures and force fields used in the modeling of cementitious materials, review and recommend the tools and algorithms for different modeling purposes, and to benchmark the modeling results with experimental data.
- Deliverables will include comprehensive review articles and an open-access database, ultimately fostering a more cohesive modeling community and improving consistency across molecular simulations in cement-based systems.

Methodology

- The committee will focus on bibliographical research, database construction, and benchmarking comprised in the activities of specific Work Groups.
- In conjunction with the organization of conferences, educational activities—such as tutorials on generating structures, surfaces, and computing properties—can be envisioned.
- The TC will operate through online and hybrid meetings twice per year with the entire TC, synchronized preferentially with RILEM events and the (biennial) International Conference on Atomistic Simulation of Cementitious Materials (ICASCM).

Progress

RILEM TC ASM has been approved by the RILEM Technical Activities Committee (TAC) in March 2025. Its kick-off meeting will take place during the 79th RILEM Annual Week, in Hanoi, Vietnam.

New

MTZ Influence of Recycled Aggregates on Multi-Interfacial Transition Zones in Recycled Concrete

Chair Jianzhuang XIAO
Deputy Chair Belen GONZALEZ FONTEBOA
Activity started in 2025

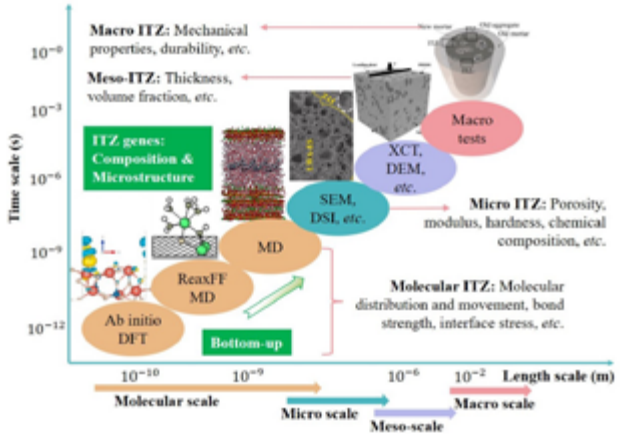


Illustration of muti-scale interfacial transition zones in recycled concrete. Image courtesy of TC MTZ.

Significance

Recycled concrete, recognized as a green and low-carbon material, plays a significant role in reducing environmental impact. The variability in the age and spatial distribution of the parent concrete, along with micro-cracks induced during the crushing process, leads to the complex formation of multiple interfacial transition zone (MITZ), recognized as the weakest region in the material. Existing studies on ITZs in recycled concrete are fragmented and often limited. Further in-depth research and analysis of ITZs are essential for advancing the understanding of the material behavior and impact on mechanical properties, long-term performance, durability, and functional aspects such as thermal and acoustic properties in recycled concrete.

Relevance

The study of this TC is relevant across various fields, including civil engineering, materials science, nanotechnology, chemical and environmental engineering.

Goals

To achieve a better understanding of ITZs in recycled concrete, this Technical Committee (TC) aims to:

- Investigate the formation mechanisms and damage evolution of MITZ in recycled concrete.
- Characterize the anisotropic and heterogeneous characteristics of MITZ across different scales.
- Develop advanced multi-characterization techniques, integrating experimental and numerical methods.
- Explore the effects of aggregate particle size, aggregate type, curing age, admixtures, environmental conditions, and other key variables on ITZ performance in recycled concrete.
- Quantify the influence of MITZ on the macro properties of recycled concrete.
- Propose innovative technologies to strengthen MITZ properties and improve the overall performance of recycled concrete.
- Establish quantitative models for MITZ evolution, incorporating time-dependent effects and multi-scale interactions.

Methodology

It is important to note that this TC focuses exclusively on MITZ within recycled concrete, and this study will be limited to recycled concrete materials only. The research will include a thorough literature review, the publication of a state-of-the-art report, with potentially the development of new equipment and techniques for MITZ characterization. This will be followed by a detailed evaluation of the test/simulation results and the formulation of recommendations.

Progress

- RILEM TC MTZ has been approved by the RILEM Technical Activities Committee (TAC) in March 2025.
- Its kick-off meeting will be held in hybrid mode at the 2025 RILEM Annual Week, Hanoi, Vietnam.

285-TMS Test method for concrete durability under combined role of sulphate and chloride ions

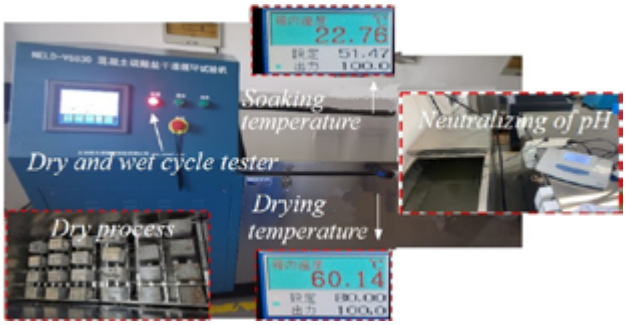
Chair Changwen MIAO
Deputy Chair Geert DE SCHUTTER
Activity started in 2018

Significance

Deterioration processes of combined sulphate and chloride attack are rather complex for reinforced concrete. Under the combined role of sulphate and chloride ions, service life of reinforced concrete structures can be shortened considerably.

Progress

- Revised version of Bibliography sent to TC members in Sept. 2024.
- State-of-the-Art report (STAR) on test methods will be submitted to *Materials and Structures* in 2025.



Samples and equipment for the Dry-Wet cycles test. Image courtesy of TC 285-TMS.

- 1,400 data sets on concrete degradation under multi-ion coupling were collected.
- Completion of experimental campaign and drafting of recommendations expected to be done by 2025.

286-GDP Test methods for gas diffusion in porous media

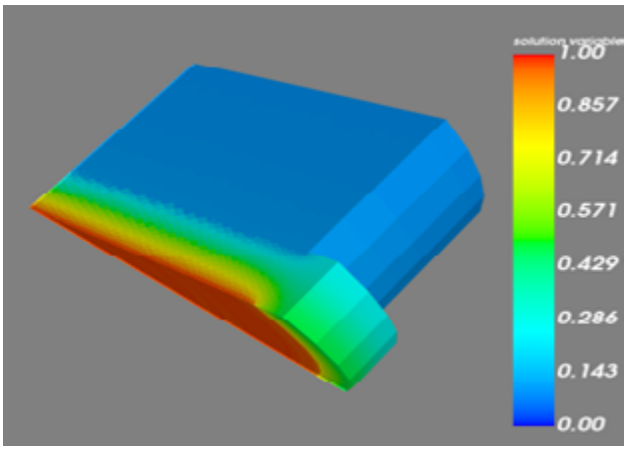
Chair Bruno HUET
Deputy Chair Philippe TURCRY
Activity started in 2019

Significance

Rebar corrosion and other detrimental phenomena for concrete are linked to oxygen, carbon dioxide and water vapor mass transfer. The gas diffusion coefficient is a general indicator of the resistance to gas transfer. Different methods for measuring gas diffusion coefficient of cementitious materials have been developed but no technical consensus exists on those methods.

Progress

- Test campaign finished for all involved laboratories.
- Analysis of results and Parametric studies: done.
- Article on experimental benchmark: in revision.
- Article on calculation benchmark: in preparation.
- Recommendation on gas diffusion testing for the transient accumulation method in preparation.



3D - Oxygen concentration map during a diffusion test to illustrate transient effect in sample and in downstream volume as well as side effects because of sealing joints. This work contributes to defining the right analytical solution for interpreting gas diffusion test results. Image courtesy of B. Huet.

297-DOC Degradation of organic coating materials and its relation to concrete durability

Chair Takafumi NOGUCHI
Deputy Chair Kei-Ichi IMAMOTO
Activity started in 2020

Significance

Coating materials contributes to extend the lifetime of concrete structures by acting not only as texture of a building but also as protection of reinforced concrete structures from harmful substances. Organic coating material such as multi-layer coating material will degrade by ultraviolet light and/or heat and its barrier effect might be reduced. The effect of coating materials to prevent the ingress of CO_2 have been extensively verified throughout accelerated tests in laboratory conditions. However, the degradation of coating materials under real environmental conditions and its relation to the durability of concrete structures still need further investigation.

Progress

- Last TC meeting held during the 2025 RILEM Spring Convention.

A moment of the TC 297-DOC meeting held in hybrid mode in Mendrisio, Switzerland, in March 2025, during the RILEM Spring Convention. Image courtesy of D. Ciancio

- Collaboration with Japan Concrete Institute, RILEM partner.
- Next TC meeting to take place at the 2025 RILEM Annual Week, Hanoi, Vietnam.

298-EBD Test methods to evaluate durability of blended cement pastes against deleterious ions

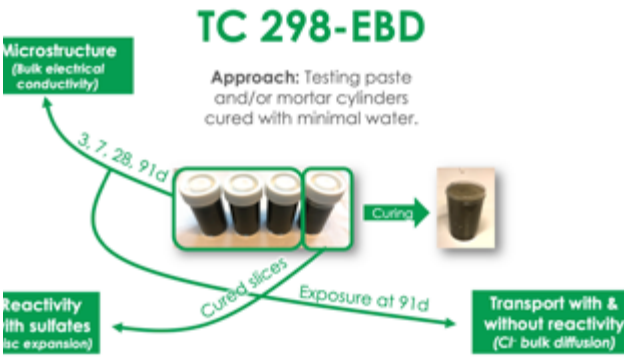
Chair William WILSON
Deputy Chair Prannoy SURANENI
Activity started in 2020

Significance

The CO_2 reduction targets of the cement industry necessitate the development of alternative supplementary cementitious materials (SCMs) to reduce the global clinker factor of cements. The adoption of novel SCMs requires efficient and reliable test methods to investigate the effect of SCMs on long-term concrete durability. As long-term concrete durability tests are laborious and time consuming, this TC focusses on paste-level durability tests for chloride and sulfate.

Progress

- Topical Collection in *Materials and Structures* RILEM TC 298-EBD: Test Methods to Evaluate Durability of Blended Cement Pastes Against Deleterious Ions is open for submissions.
- Three journal publications have been submitted; one more will be submitted before the end of 2025.
- Analysis and synthesis of data from literature is ongoing.



Overview of TC 298-EBD testing approaches. Image courtesy of TC 298-EBD.

- Phase 1 of interlaboratory bulk electrical conductivity testing: completed. Launching new interlaboratory phases for bulk electrical conductivity, sulfate-disc expansion, and chloride bulk diffusion testing.
- Preliminary interlaboratory trials established the protocol for sulfate-expansion measurements on paste discs.
- Next TC meeting at the 2025 RILEM Annual Week, Hanoi, Vietnam.

313-MMS Modelling and experimental validation of moisture state in bulk cementitious materials and at the steel-concrete interface

Chair Zhidong ZHANG
Deputy Chair Chunsheng ZHOU
Activity started in 2023

Significance

Various scientific studies found that the key parameter controlling the corrosion rate of steel in carbonated concrete is the water content at the steel surface; other showed that only when water front reached the steel surface, the measured corrosion rate became significant. This implies that, by controlling the "right" water condition at the steel surface, the risk of steel corrosion can be kept low. The consequence of this is that the moisture ingress through the (carbonated) concrete cover becomes a highly important mechanism to ensure corrosion resistant structures. Methods to measure and model this process at the engineering level are thus needed. A prevailing key question is the identification of moisture transport models that can capture the key features of moisture transport and moisture state that are directly related to steel corrosion, while keeping the degree of complexity such that needed input parameters can be measured or otherwise made available in engineering practice.

Workshop on moisture-related durability issues for low-carbon binders organized by TC 313-MMS. Image courtesy of U. Angst.

Progress

- Last 2 TC meetings held in August 2024 and April 2025.
- Working on preparing a general review paper for the *RILEM Technical Letters*.
- Each WG is working on reviewing literature and collecting available experimental and in-situ data.

Structural Performance and Design

Foreword

► from Cluster C Convener, Kei-Ichi IMAMOTO

Material and structural behaviour are closely connected since the optimization starts from structural performance which significantly depends on material behaviour. Indeed, structural behaviour should carefully look at material performance as well as material behaviour to be oriented to a better structural response.

For this reason, RILEM activated Cluster C, which coordinates the activities of the Technical Committees (TCs) dealing with “Structural Performance and Design”.

Currently, in the Cluster C eight TCs are active in: early age and long-term crack width analysis in RC Structures (287-CCS), mechanical characterization and structural design of textile reinforced concrete (292-MCC), mechanical properties of alkali-activated concrete (294-MPA), concrete during fire (306-CFR), on-site corrosion condition assessment, monitoring and prediction (314-OCM), rolled compacted concrete for pavement applications (RCC), and recently in mechanical behaviour of bio-aggregates based buildings materials (MBB) and non-invasive techniques to asses additively manufactured cementitious composites (QPA).

Structural behaviour should be supported by reliable numerical models that are particularly useful for better understanding structural performance as well as structural design. Therefore, TCs active in “numerical modelling” of materials and structures are an important component of Cluster C as it may use experimental data to better predict structural performance.

The first TC belonging to Cluster C was established in 1996 and it was *“175-SLM: Computer bases on service life methodology”*. Since then, 26 TCs have worked under the coordination of the convener of Cluster C, service that I have the honour to have held since late 2023, after Prof. Giovanni Plizzari.

Current TCs in Cluster C

CODE TITLE	CHAIR DEPUTY CHAIR	OPENED IN	NO. OF MEMBERS
MBB Mechanical behaviour of bio-aggregates based buildings materials	Sofiane AMZIANE Yassin DA GLORIA	**NEW** August 2024	22
QPA Quality and performance assurance of additively manufactured cementitious composites by advanced non-invasive techniques	Tomoki SHIOTANI Hwa Kian CHAI	**NEW** August 2024	23
287-CCS Early age and long-term crack width analysis in RC Structures	Miguel AZENHA Fragkoulis KANAVARIS	2019	85
292-MCC Mechanical Characterization and Structural design of Textile Reinforced Concrete	Barzin MOBASHER Flávio DE ANDRADE SILVA	2019	77
294-MPA Mechanical properties of alkali-activated concrete	Guang YE Frank DEHN	2019	81
306-CFR Concrete during Fire - Reassessment of the framework	Hitesh LAKHANI Robert JANSSON MC NAMEE	2022	63
314-OCM On-site Corrosion Condition Assessment, Monitoring and Prediction	Carmen ANDRADE Pedro CASTRO BORGES	2022	81
RCC Rolled compacted concrete for pavement applications	Christian PAGLIA Corey ZOLLINGER	2023	30

New

MBB Mechanical behaviour of bio-aggregates based buildings materials

Chair Sofiane AMZIANE
Deputy Chair Yassin DA GLORIA
Activity started in 2024

Cross section of wood concrete specimen after shear test.
Image curtesy of Yassin Da Gloria.

Significance

The term "bio-aggregates" specifies the eco-materials derived from agricultural products used as aggregates in vegetal concrete. Several studies have been carried out on different agricultural resources, but predicting the mechanical behaviour of plant-based concrete remains complex due to the various factors that influence its behaviour. It is therefore essential to bring together a wide range of different information scattered in the literature on the properties of plant aggregates, the properties of mineral matrices and their association as composites materials.

Relevance

The expected impact includes both scientific and economic benefits. Scientifically, the standardization will lead to more consistent and comparable research outcomes, fostering further innovations. Economically, it will facilitate the broader adoption of eco-friendly materials in the construction industry, potentially reducing the carbon footprint and promoting sustainable building practices.

Goals

- The ultimate aim of this committee is to unify the way in which the mechanical properties of bio-concrete are measured, based on the various factors that influence its mechanical behaviour.
- Based on the protocol of the previous Technical Committees 236-BBM and 275-HDB, this TC proposes to harmonise the approach of writing recommendations following an interlaboratory test on compressive/flexural/shear strength of vegetal concrete.

Methodology

- This TC will have a duration of 4 years.
- Work packages are as follows:
  - > WP 0: bibliographic review of the procedure for performing compression, flexural and tensile tests and obtaining Young's and shear modulus.
  - > WP 1: Description and test protocols of bio-based building materials (BBMs) compressive/flexural/shear behaviour.
  - > WP 2: Young/Shear modulus and Poisson factor determination.

Progress

- Kick-off meeting held online on 18 of March of 2025.
- Amziane, S.; Rajiv da Gloria, M. Y. Mechanical Behavior of Bio-Aggregates Based Buildings Materials. RILEM Tech Lett 2025, 9, 87-92.

New

QPA Quality and performance assurance of additively manufactured cementitious composites by advanced non-invasive techniques

Chair Tomoki SHIOTANI
Deputy Chair Hwa Kian CHAI
Activity started in 2024

Outline of TC working program. Image courtesy of TC QPA.

Significance

Robust inspection and evaluation methods for initial quality control, and for continuous assurance of the long-term service performance of 3D printed structures are highly sought after. The currently missing inspection and evaluation methods should be developed and standardized to adapt with the stringent criteria for laboratory investigations and in-situ applications, respectively. This TC is proposed as a suitable successor to TC 212-ACD, TC 239-MCM and TC 269-IAM which had addressed successfully development and application of cutting-edge NDT techniques for assessment of masonry and concrete structures. This TC will contribute to resolving the issues pertinent to quality and performance assurance of 3D printed structures using cementitious composites.

Relevance

The outcome of this TC will impact positively not only the concrete design and construction community, but potentially initiates significant revolution in sensing and health monitoring technology of relevant infrastructure sectors in near future. the proposed TC will help achieve a significant step towards accelerating widespread adoption of 3D printing technology for cementitious composite construction, which shall bring forth significant impacts in various aspects: 1) Reduced Labor Costs; 2) Faster Construction Speed; 3) Material Saving; 4) Design Flexibility and Customizability; 5) Highly skilled Job Creation and Development; 6) Sustainable Infrastructure and Urban Development.

Goals

The outcomes of the proposed TC will provide standardized methodologies on the use of non-destructive testing protocols for inspection, evaluation and assessment of 3D printed cementitious composite structures at the initial casting phase, which can also be adapted for fixed-interval monitoring purposes during the structure's service lifetime.

Methodology

- Literature Survey, Topical Presentations and Discussions: the TC will engage in extensive literature survey to grasp the latest development in 3D printing technology for cementitious materials and composite based structures.
- Testing and Analytical Studies: this TC will involve physical and numerical works aiming at developing practical methodologies for assessing quality and performance of 3D printed cementitious composite materials and structures using non-destructive testing techniques.
- Outreach Activities: throughout the duration of this TC, several symposia and workshops will be organized.
- Reporting: the results of the literature survey and discussions will be compiled as a state-of-the-art report by the proposed TC.

Progress

- RILEM TC QPA has been approved by the RILEM Technical Activities Committee (TAC) in August 2024. Its kick-off meeting took place in December 2024 in hybrid mode in Edinburgh, UK.
- The 2nd TC QPA meeting took place in April 2025, at TU Wien, Austria.
- Chai, H. K.; Shiotani, T. Opening Letter of RILEM TC QPA - Quality and Performance Assurance of Additively Manufactured Cementitious Composites by Advanced Non-Invasive Techniques. *RILEM Tech Lett* **2025**, 9, 127-133.

287-CCS Early age and long-term crack width analysis in RC structures

Chair Miguel AZENHA
Deputy Chair Fragkoulis KANAVARIS
Activity started in 2019

Significance

Cracking due to restrained shrinkage and thermal effects is still an ongoing serviceability issue in concrete structures. Understanding and improving current approaches require a strong element of interdisciplinarity, focusing on the interplay between materials science and structural engineering. This entails the need to adequately combine the fundamental material behaviour of concrete since casting with experimental substantiation and advanced numerical and analytical modelling of cracking in structures.

The 2nd International RILEM conference on early-age and long-term cracking in RC structures - CRC2025 is organised by RILEM TC 287-CCS.

Progress

Organization of the 2nd International RILEM conference on early-age and long-term cracking in RC structures - CRC2025.

292-MCC Mechanical characterization and structural design of textile reinforced concrete

Chair Barzin MOBASHER
Deputy Chair Flávio DE ANDRADE SILVA
Activity started in 2019

Significance

Textile reinforced concrete (TRC) materials have the potential to be used as structural components taking tensile, flexural, cyclic and impact loads. The advancements in the textile technology specifically directed at their use in cement-based materials has led to composites with an order of magnitude higher in strength and two orders of magnitude higher in ductility than fiber reinforced concrete (FRC). The common areas of application of TRC, such as ultra-high performance concrete, UHPC, 3D printing, FRCM and repair of infrastructure to mention a few, are in urgent need to develop and implement design tools and applications for strain hardening cement composites.

Progress

- A TC meeting and several technical sessions were organized during the BEFIB2024 International Symposium on Fibre Reinforced Concrete.

Discussion during the TC meeting in Dresden (before BEFIB 2024). Image courtesy of F. de Andrade Silva.

- A special session on TRC and the presentation of the TC outputs will be held during the RILEM Spring Convention in 2026.
- The STAR has been revised and it should be published by the Spring Convention in 2026.

294-MPA Mechanical properties of alkali-activated materials

Chair Guang YE
Deputy Chair Frank DEHN
Activity started in 2019

Significance

Alkali-activated concrete is considered as an environment-friendly construction material with a great potential for construction. However, at this moment it is not fully clear whether existing design codes for structural concrete can be fully applied in case of alkali-activated concrete. Although short term behaviour (28 days) might be similar, this might not be the case for the long-term behaviour and simply applying existing codes for conventional concrete to design alkali-activated concrete structures could be problematic. Another key point of focus is creep and shrinkage of alkali-activated concrete as the application of traditional creep and shrinkage laws has not still been defined suitable.

Some pictures of the PhD Training Course on Alkali-Activated Concrete (AAC) organised by RILEM TC 294-MPA. Image courtesy of G. Ye.

Progress

- State-of-the-art report STAR finalised and to be published soon.
- Three manuscripts summarizing the work of RRT completed and submitted to *Materials and Structures*.
- RILEM TC 294-MPA Closure Seminar: Mechanical Properties of Alkaline-activated Materials, in May 2025.
- Alkali-activated Materials (AAM) PhD Training Course on Alkali-Activated Concrete (AAC): From Design and Material Properties to Structural Behavior and Engineering Applications, in May 2025.
- TC outcomes presented at the 2025 RILEM Annual Week, Hanoi, Vietnam.

306-CFR Concrete during Fire - Reassessment of the framework

Chair Hitesh LAKHANI
Deputy Chair Robert JANSSON MC NAMEE
Activity started in 2022

Significance

No real assessment of the whole framework "concrete at high temperature" has been done in the last decades. This new committee will:

- review the existing framework based on the Eurocode regarding prediction of real behaviour of concrete elements and structures during fire exposure,
- make a detailed study of one or two reference mixes from material characterization and modelling to real behaviour during fire exposure,
- create a database with fire spalling of concrete test results.

Members of TC 306-CFR and the handing over of the chairmanship at the TC meeting in April 2025, held at the Technical University of Braunschweig (East Campus). Image courtesy of TC 306-CFR.

Progress

- The 6th and 7th plenary TC meetings were held in Ljubljana, Slovenia in Sept 2024 and Braunschweig, Germany in April 2025, respectively.
- STAR *"Spalling of concrete due to fire exposure State-Of-The-Art Report"*, is in its final stage of preparation.

314-OCM On-site Corrosion Condition Assessment, Monitoring and Prediction

Chair Carmen ANDRADE
Deputy Chair Pedro CASTRO BORGES
Activity started in 2022

Significance

- Reinforcement corrosion is one of the major causes of the deterioration of structural concrete. Nevertheless, its assessment in real structures still lacks standardized procedures.
- A comprehensive approach for the corrosion condition assessment has not been found yet. A procedure of the implementation of this approach into the actual trend is also missing.
- The prediction of evolution of the corrosion in different environments and the calculation of the remaining life until the ad-hoc structural limit state are not contained in present Codes. A gap exists which needs pre-normative documents which could be used to gain experience with the aim to have rules incorporated into the future structural codes.

Severe damage in inspection need to identify critical zones. Image courtesy of C. Andrade.

Progress

- Two TC meetings held in 2024. Next one to be held in hybrid mode during the 2025 RILEM Annual Week, Hanoi, Vietnam.
- Collaboration with *fib*, RILEM partner.

RCC Rolled compacted concrete for pavement applications

Chair Christian PAGLIA
Deputy Chair Corey ZOLLINGER
Activity started in 2023

Significance

in the last decade, roller compacted concrete has been increasingly applied for heavy duty pavements, rather than for exclusively gravity dams. Despite the existing application guides, most of the knowledge is still strongly based on field experience without a systematic scientific approach. Moreover, a wide, constant and well-structured sharing of the knowledge in the topic is missing.

Progress

- Last TC meeting: online in October 2024.
- The next hybrid meeting is scheduled during the 2025 RILEM Annual Week, Hanoi, Vietnam.

A trial along a roadway with RCC and a replacement of natural aggregates with RAP (reclaimed asphalt pavement 0-22 mm) of 20%. Image courtesy of C. Paglia.

Service Life and Environmental Impact Assessment

Foreword

► from Cluster D Convener,
Anya VOLLPRACHT

Cluster D coordinates the activities of the Technical Committees (TCs) dealing with “Service life” and “environmental impact” of structures, mainly reinforced concrete structures. Currently, Cluster D comprises eight TCs. The most recent one is IAQ Impact of Building Materials on Indoor Air Quality, established in March 2025.

One major topic in Cluster D is alkali-silica reaction (ASR), which is explored in two committees from different perspectives (TC 300-ARM and TC 301-ASR). With respect to the environmental issues, TC 299-TES investigates different methods to store thermal energy in order to improve the energy efficiency of buildings, TC 321-UMW focuses on the use of mineral wastes in cement matrices, including the recycling of these new concretes and TC CUC explores the carbon dioxide uptake by concrete considering the large variety of application scenarios. TC 315-DCS aims to gather, analyze and present the state-of-the-art on the use of AI algorithms (machine learning and deep learning) in concrete structures, and TC SDM will help scientists to manage scientific metadata of construction materials. TC 289-DCM has terminated its activities on the service life and durability of marine structures.

The first TC belonging to Cluster D was established in 1998 and it was *“183-MIB Microbial impacts on building materials – weathering and conservation”*. Since then, 30 TCs have worked under the coordination of the convener of Cluster D, a title that I have the honour to hold since September 2021.

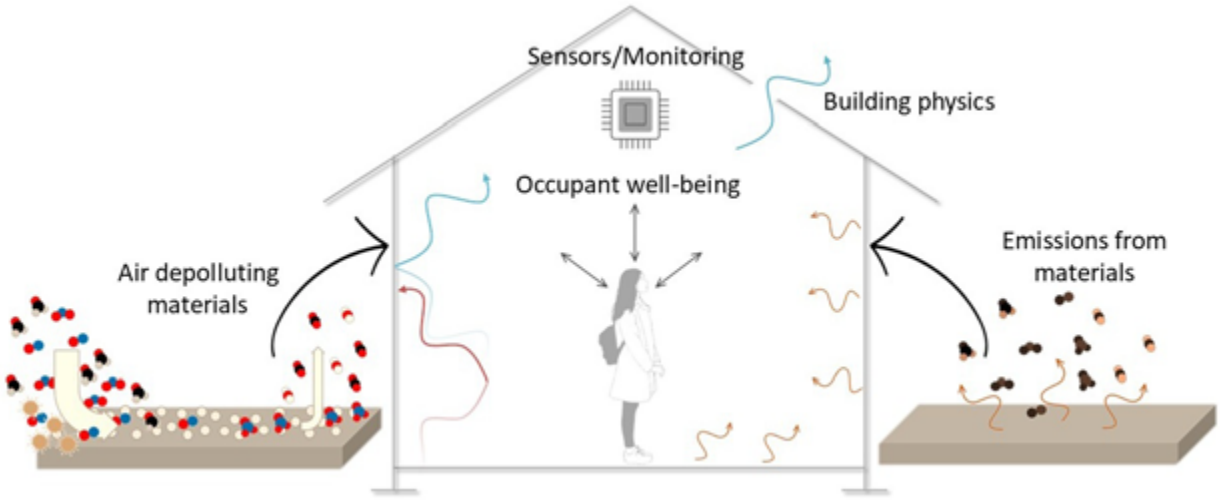
Current TCs in Cluster D

CODE TITLE	CHAIR DEPUTY CHAIR	OPENED IN	NO. OF MEMBERS
IAQ Impact of Building Materials on Indoor Air Quality	Julie HOT Driss LAHEM	**NEW** March 2025	10
299-TES Thermal energy storage in cementitious composites	Jorge Sánchez DOLADO Antonio CAGGIANO	2020	63
300-ARM Alkali-aggregate reaction mitigation	Leandro SANCHEZ Antonio SANTOS SILVA	2020	68
301-ASR Risk assessment of concrete mixture designs with alkali-silica reactive (ASR) aggregates	Jason H. IDEKER Maxime RANGER	2020	76
315-DCS Data-driven concrete science	Sandra NUNES Moncef NEHDI	2022	42
321-UMW Upcycling Powder Mineral “Wastes” into Cement Matrices	Antonis KANELLOPOULOS Luca VALENTINI	2022	168
CUC Carbon dioxide uptake by concrete during and after service life	Gregor GLUTH Susan BERNAL LOPEZ	2024	55
SDM Scientific Metadata Management of Construction materials	Tanja MANNINGER Fabien GEORGET	2024	15

New

IAQ Impact of Building Materials on Indoor Air Quality

Chair Julie HOT
Deputy Chair Driss LAHEM
Activity started in 2025



Schematics of research activities of TC IAQ. Image courtesy of TC IAQ.

Significance

Indoor air is an important vector of pathogens – cocktails of chemicals, particulates and bio-aerosols – which impact health, comfort and productivity. The importance of reducing energy consumption, which has led to more insulated buildings with reduced "fresh" air volume, raises the question of the impact of increased airtightness on indoor air quality (IAQ). Similarly, the increasing use of materials with low environmental impact, such as bio- or geo-sourced materials and recycled-content materials, can lead to chemical emissions and microorganism proliferations on surfaces, thus negatively affecting IAQ. In a context where energy savings in buildings, eco-friendly materials and occupant well-being are of utmost importance, some clearness about the quality of indoor air is adamant.

Relevance

Health in the building sector is a multi-criteria, interdisciplinary issue that requires the involvement of all construction actors at every stage of a project, from design to operation, and at every scale, from materials to buildings. IAQ is therefore a topic that can bring researchers and industrialists from various backgrounds, and be approached from different perspectives: building materials, nanomaterials, metrology, ventilation systems, social and human sciences, architecture, microbiology, coating formulation, to name the main ones.

Goals

- This RILEM TC will aim to compile information on IAQ from the point of view of materials/pollutants interaction and ventilation systems/pollutants interaction. Technologies to mitigate indoor air pollution, methods to assess indoor air pollution and emissions from materials will notably be discussed. IAQ challenges and research needs for healthier buildings in the future will be highlighted.
- The results of the TC's work will be prepared in the form of a state-of-the art report. Discussion of the perspectives.
- Publications of the results of the working groups in the form of articles/reports.

Methodology

This TC will focus on four main topics in order to collect qualitative and quantitative data:

- State of the art of sources of indoor air pollution, nature of pollutants, pollution levels, guidelines and objectives.
- Methods to assess indoor air pollution.
- Technologies to mitigate indoor air pollution.
- Emissions from materials/products.

Progress

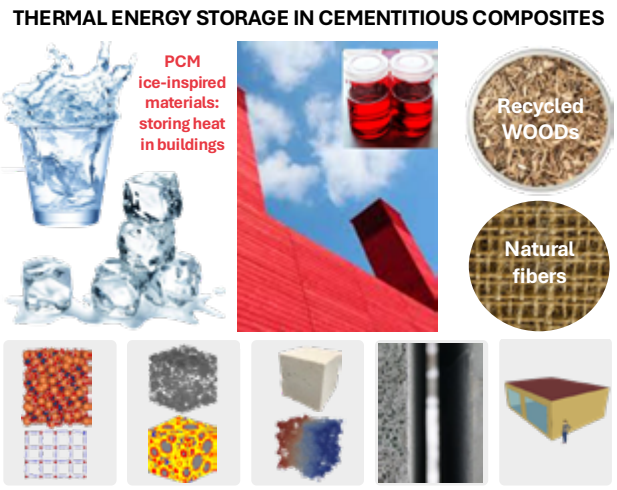
RILEM TC IAQ has been approved by the RILEM Technical Activities Committee (TAC) in March 2025. Its kick-off meeting will take place remotely in September 2025. The face-to-face meeting will take place during the 2026 RILEM Spring Convention, in Ghent, Belgium.

299-TES Thermal energy storage in cementitious composites

Chair Jorge SANCHEZ DOLADO
Deputy Chair Antonio CAGGIANO
Activity started in 2020

Significance

Energy supply is a major concern, especially due to greenhouse gas emissions and the need to reduce fossil fuel use. In this context, buildings in the EU account for almost 40% of total energy demand, meaning one third of the CO_2 emissions. Therefore, improving energy efficiency and adopting new technologies and materials are key to reducing consumption in both new and existing buildings. A main challenge of renewable sources like wind and solar is the mismatch between energy supply and demand, which requires effective storage systems. Concrete and cement-based materials are promising for Thermal Energy Storage (TES), as they are widely available, low-cost, and have suitable thermal properties.



Thermal energy storage in cementitious composites. Image courtesy of TC 299-TES.

Progress

- Fachinotti, V.D., Álvarez-Hostos, J.C., Peralta, I. et al. Reviewing numerical studies on latent thermal energy storage in cementitious composites: report of the RILEM TC 299-TES. *Mater Struct* **57**, 247 (2024).
- Rahjoo, M., Caggiano, A., Berardi, U. et al. Reviewing numerical studies on sensible thermal energy storage in cementitious composites: report of the RILEM TC 299-TES. *Mater Struct* **58**, 40 (2025).
- Fabiani, C., Erkizia, E., Snoeck, D. et al. Reviewing experimental studies on latent thermal energy storage in cementitious composites: report of the RILEM TC 299-TES. *Mater Struct* **58**, 58 (2025).
- Two more papers in preparation on: 1) Reviewing Numerical Studies on Thermochemical Energy Storage in Cementitious Composites, and 2) Reviewing Experimental Studies on Thermochemical Energy Storage in Cementitious Composites.
- All papers are and will be published in the *Mater Struct* Topical Collection RILEM TC 299-TES: Thermal Energy Storage in Cementitious Composites.

300-ARM Alkali-aggregate reaction mitigation

Chair Leandro SANCHEZ
Deputy Chair Antonio SANTOS SILVA
Activity started in 2020

Significance

Alkali-aggregate reaction (AAR) is one of the most harmful distress mechanisms affecting the durability and serviceability of aging structures worldwide. Several approaches, recommendations, and test procedures have been developed to assess the potential alkali-reactivity of concrete aggregates and the efficiency of preventive measures prior to AAR development in the field. There is currently no consensus about the most efficient method(s) that should be implemented, and when, for the mitigation of AAR-induced damage. This situation is extremely critical for some structures whose AAR-associated risks are extremely high since they cannot be easily rehabilitated nor replaced such as dams, nuclear power plants, tunnels, bridges, etc.

Last TC meeting chaired by Esperanza Menéndez Méndez, who passed away in November 2024. Image courtesy of L. Sanchez.

Progress

- STAR on “techniques enabling AAR mitigation in the field and alternative products able to decrease induced expansion and deterioration in affected concrete” is in preparation and first draft should be ready by the end of 2025.
- Round-robin test results shall be published in *Materials and Structures* (two contributions).

301-ASR Risk assessment of concrete mixture designs with alkali-silica reactive (ASR) aggregates

Chair Jason H. IDEKER
Deputy Chair Maxime RANGER
Activity started in 2020

Significance

Alkali-silica reaction (ASR) is a well-known concrete durability problem. However, the industry needs clear guidance on how to design and specify concrete mixtures that are resistant to ASR. The TC will develop a framework for risk assessment of mixture designs for concrete prone to ASR. This framework would allow the user to determine a pathway for mixture designs with reduced risk for deleterious ASR.

Progress

- de Weerdt, K., Ranger, M., Krüger, M.E. et al. Report of RILEM TC 301-ASR: Modelling the impact of SCMs, alkali level and w/b ratio on alkali concentration in pore solution. *Mater Struct* **58**, 86 (2025).

TC members at the 2025 TC meeting at SmartMinerals in Vienna, Austria. Image courtesy of T. Manninger.

- The paper "Report of RILEM TC 301-ASR: Relation between pore solution composition and ASR expansion", by B. Lothenbach et al. has been accepted in *Materials and Structures* and it will soon be available.
- All papers (two currently under review of TC members) produced by this TC will be published in the *Materials and Structures* Topical Collection RILEM TC 301-ASR: Risk Assessment of Concrete Mixtures with ASR Aggregates.

315-DCS Data-driven concrete science

Chair Sandra NUNES
Deputy Chair Moncef NEHDI
Activity started in 2022

Significance

The concrete industry is increasingly in need of intelligent tools to further develop and use concrete in important structures. It also needs more advanced simulation tools for concrete performance validation and uncertainty quantification. Such requirements are well aligned with recent developments in data-driven models based on artificial intelligence (AI). A better use of existing data, as well as the availability of more structured and validated information of the materials and components, are essential for the ability to reliably simulate options and make sound decisions. Open data sharing among the concrete research community is still in its infancy and actions at various levels are required.

Progress

- Taffese, W.Z., Hilloulin, B., Villagran Zaccardi, Y. et al.

First Special Session of TC 315-DCS organized within the RILEM Conference on Sustainable Materials & Structures (SMS 2024), Toulouse, France. Image courtesy of S. Barbosa Nunes.

Machine learning in concrete durability: challenges and pathways identified by RILEM TC 315-DCS towards enhanced predictive models. *Mater Struct* **58**, 145 (2025).

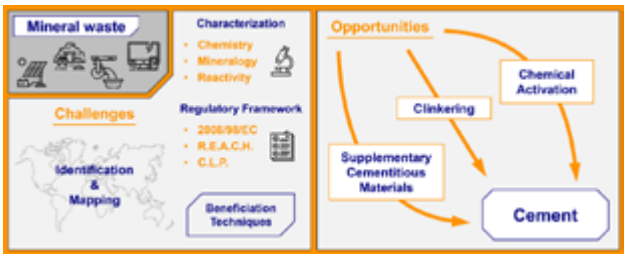
- Three more papers are in preparation and to be finalised before the end of 2025; they will be included in the *Materials and Structures* Topical Collection RILEM TC 315-DCS: Recent Advances in Data-Driven Concrete Science and Applications.
- Collaboration with ACI Committee 135 - Machine Learning-Informed Construction and Design.

321-UMW Upcycling Powder Mineral "Wastes" into Cement Matrices

Chair Antonis KANELLOPOULOS
Deputy Chair Luca VALENTINI
Activity started in 2022

Significance

Mineral wastes are typically rich in SiO_2, Al_2O_3, CaO, MgO, and Fe_2O_3, making them very attractive candidates to be used in the production of cementitious materials. In the last several years there is a growing interest in utilising such wastes in the manufacture of cement-based composites, particularly alkali-activated binders. Mineral wastes can offer a natural solution to the need to switch to alternative raw materials and at the same time be diverted from landfill while their own environmental impact is mitigated. Upcycling such wastes in the production of cements is the most promising way to improve resource efficiency and material circularisation while maintaining our natural reserves of raw materials.



Schematics of the activities of TC UMW. Image courtesy of M. Davolio.

Progress

- Two TC meetings held in the last 12 months.
- Peys, A.; Valentini, L.; Baral, A.; Babaahmadi, A.; Perumal, P.; Davolio, M.; Ferrara, L.; Kanellopoulos, A.; Hanein, T. Opening Letter of RILEM TC UMW: Upcycling Powder Mineral Wastes into Cement Matrices — Challenges and Opportunities. *RILEM Tech Lett* **2025**, 10, 33-43.
- Three more papers in preparation.

CUC Carbon dioxide uptake by concrete during and after service life

Chair Gregor GLUTH
Deputy Chair Susan BERNAL LOPEZ
Activity started in 2024

Significance

The carbonation of cementitious materials is not only important in the context of their durability and lifetime predictions but also because carbonation means incorporation of atmospheric CO_2 in solid reaction products, which partly compensates for the CO_2 released during cement production (recarbonation). Estimates of recarbonation rely on the carbonation rate (or the coefficient of carbonation, kc) and other material parameters of concretes or mortars, which are, however, difficult to predict. The values originally proposed two decades ago for such estimates, with the suggestion to be verified or adjusted, have propagated into the most recent assessments of global CO_2 uptake by cement carbonation, while the values themselves have seldom been scrutinized. Thus, there is an urgent need to review and, if necessary, revise and extend available compilations of those values.

Members of TC CUC at the TC meeting held in March 2025 in Medrisio, Switzerland, during the RILEM Spring Convention. Image courtesy of TC CUC.

Progress

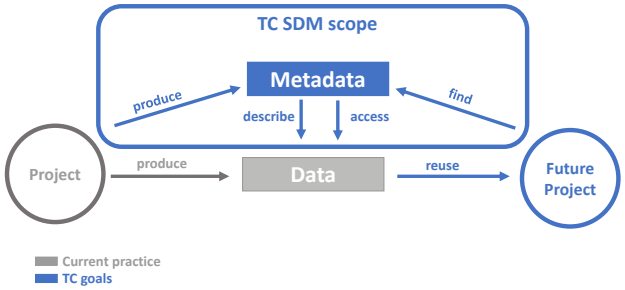
- Gluth, G.; Bernal, S. RILEM TC CUC: Carbon Dioxide Uptake by Concrete During and After Service Life – Opening Letter. *RILEM Tech Lett* **2025**, 9, 61-67.
- Three TC meetings held in the last 12 months; the last one was held during the 2025 RILEM Spring Convention, in Mendrisio, Switzerland.

SDM Scientific Metadata Management of Construction materials

Chair Tanja MANNINGER
Deputy Chair Fabien GEORGET
Activity started in 2024

Significance

Digitalization of the concrete industry is constantly progressing, this is also the case for academic research in the field. The findability, accessibility and reusability of data especially for simulation and modelling is currently insufficient. RILEM TCs usually include the measurement and publication of high-quality data; it is essential to make these data reusable. We want to improve the situation by helping the researchers to create metadata information and giving them a tool to do so. Additionally, the use of repositories should be encouraged. Open data sharing and adherence to the FAIR (Findability, Accessibility, Interoperability, and Reusability of data) principle is still in its infancy among many research communities. To ensure that this becomes a widespread practice to benefit the scientific community, and by extension the entire society, actions at various levels are required.



Schematics of the scope of TC SDM. Image courtesy of TC SDM.

Progress

- Three TC meetings held in the last 12 months.
- TC Opening Letter in *RILEM Technical Letters* in preparation.
- Development of a metadata scheme: tool will be tested by end of 2025.

Masonry, Timber and Cultural Heritage

Foreword

► **from Cluster E Convener,**
Arun MENON

Cluster E coordinates the activities of the Technical Committees (TCs) dealing with “Masonry, Timber and Cultural Heritage”. At the moment, it comprises seven TCs, working on masonry reinforcement (290-IMC) and masonry tests (CTM), bamboo (322-MCB), timber joints (310-TPT), and on earthen-materials (318-BEC, 319-MAE, 320-PEM).

Several of these topics have been addressed by RILEM TCs since a long time, but only recently was a dedicated Cluster established. In fact, the first recommendations on masonry date back to 1988, on timber to 1990, on rammed earth to 1997 and on historic mortars to 2000.

As a general trend, the aim of the TCs has moved from the characterization of the historic substrates (e.g., mortar, masonry, timber) to the development of testing methods to assess the performance of conservation and reinforcement strategies for these substrates (e.g., repair mortars, composite materials applied to masonry and timber). To evaluate the suitability of the new conservation strategies, not only their effectiveness is addressed, but also their compatibility with the historic substrates, their durability over time and their environmental sustainability are gaining increasing attention by the TCs. The recent decision to establish a Cluster specifically dedicated to the building materials constituting our Cultural Heritage has a twofold meaning. On the one hand, it is an important recognition of the value that RILEM attributes to research on these historic materials and to the urgency to develop successful strategies for their conservation. On the other hand, it highlights the importance that the research and the practice of cultural heritage conservation be carried out with the same rigorous scientific approach that RILEM applies to all the other fields of building materials and structures.

I have been Convener of Cluster E since September 2021, when I took over the role previously filled by Prof. Enrico Sassoni, (University of Bologna, Italy).

Current TCs in Cluster E

CODE TITLE	CHAIR DEPUTY CHAIR	OPENED IN	NO. OF MEMBERS
290-IMC Durability of Inorganic Matrix Composites used for Strengthening of Masonry Constructions	Antonietta AIELLO Catherine PAPANICOLAOU	2019	87
310-TPT Tests methods for a reliable characterization of resistance, stiffness and deformation properties of timber joints	Jorge BRANCO Andreas RINGHOFER	2021	20
318-BEC Bio-stabilised earth-based construction: performance-approach for better resilience	Ana BRAS Céline PERLOT	2022	107
319-MAE Mechanical performance and durability assessment of earthen elements and structures	Antonin FABBRI Christopher BECKETT	2022	118
320-PEM Processing of earth-based materials	Emmanuel KEITA Arnaud PERROT	2022	121
322-MCB Mechanical Characterisation of Bamboo	Kent HARRIES Luisa MOLARI	2023	26
CTM Testing Methods for Masonry Cores	Rita ESPOSITO Francesca FERRETTI	2024	5

290-IMC Durability of inorganic matrix composites used for strengthening of masonry constructions

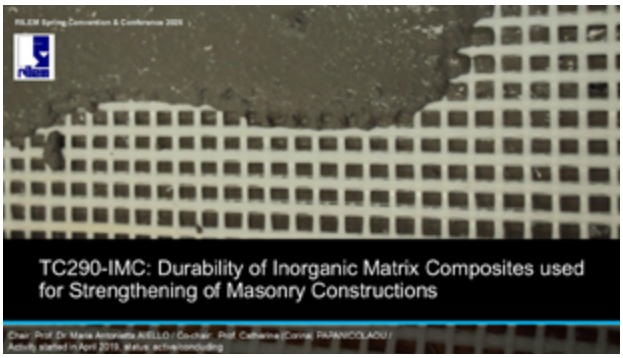
Chair Maria Antonietta AIELLO
Deputy Chair Catherine PAPANICOLAOU
Activity started in 2019

Significance

Fiber Reinforced Polymer (FRP) materials do not always provide an efficient strengthening solution for masonry structures. Inorganic Matrix Composites (IMC) have been studied as an affordable solution, especially for historical masonry. The study of the long-term behaviour, currently missing, is necessary in order to provide complete design guidelines for practitioners.

Progress

- Interlaboratory experiments were finalised with the involvement of several academic and industrial institutes.
- State-of-the-art Report (STAR) and 2 papers finalised before the end of 2025.



TC presentation at the 2025 RILEM Spring Convention. Background image courtesy of C. Papanicolaou.

- TC outcomes presented at the 2025 RILEM Spring Convention. Presentation available on the RILEM YouTube channel.

310-TPT Tests methods for a reliable characterization of resistance, stiffness and deformation properties of timber joints

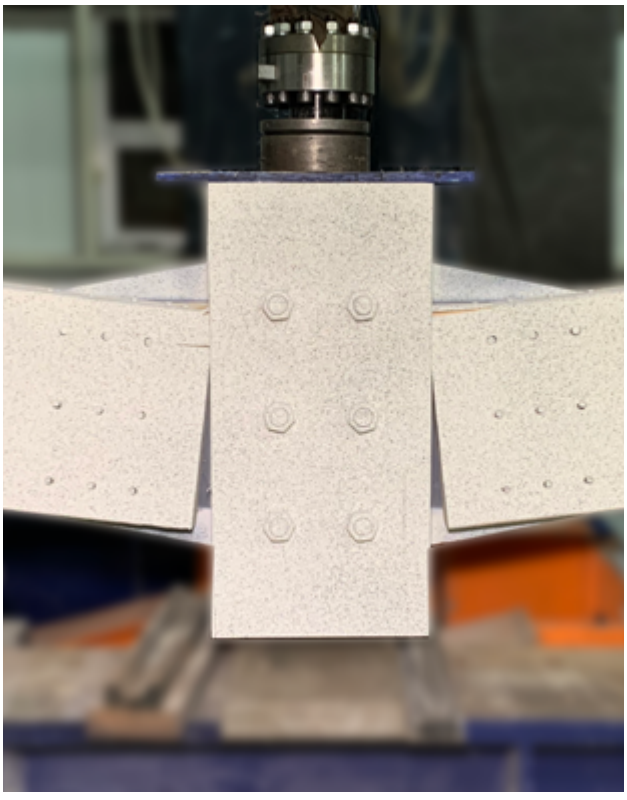
Chair Jorge BRANCO
Deputy Chair Andreas RINGHOFER
Activity started in 2021

Significance

- Existing test standards and protocols on timber joints are limited to the very simplistic nature of traditional connections.
- Although experimental campaigns provide important information on the mechanical behaviour of modern connections, the non-standardization of the test procedures often precludes the comparison between the obtained results.
- In order to allow for a better future evaluation and reusability of experimental data, existing testing protocols for timber joints should be discussed and reviewed.
- Reliable and well-established assessment methods are required, to support the safe and economic design of timber joints.

Progress

- One paper in preparation.
- TC meeting planned in Ghent, Belgium, during the 2026 RILEM Spring Convention.
- Aiming to present TC outcomes at the 2026 RILEM Annual Week, Nairobi, Kenya.



Laboratory testing of a timber joint. Image courtesy of J. Branco.

318-BEC Bio-stabilised earth-based construction: performance-approach for better resilience

Chair Ana BRAS
Deputy Chair Céline PERLOT
Activity started in 2022

Significance

- The main weakness of Earth-based construction materials is their sensitivity to liquid water. To overcome this, the materials could be reinforced through stabilisation methods.
- The most frequent hydraulic binders (lime or cement) are used as chemical stabilisers, but they have the disadvantage of increasing the carbon footprint of the earthen materials.
- Alternative bio-sourced methods with low environmental impact are increasingly used.
- There is no fully established classification of bio-additives and bio-stabilisation methods.

Progress

- State-of-the-art Report (STAR) in progress.
- Aiming to present TC outcomes at the 2027 RILEM Annual Week, Bali, Indonesia.
- Organization of the 3rd International Conference on Earthen Construction – ICEC2026.
- Collaboration with PROTERRA, RILEM partner.
- TC Deputy Chair co-lecturing the pre-conference doctoral courses at the 2026 RILEM Annual Week, Nairobi, Kenya.

Members of this TC are engaged in the organization of the 3rd International Conference on Earthen Construction – ICEC2026. Image courtesy of NOVA University Lisbon.

319-MAE Mechanical performance and durability assessment of earthen elements and structures

Chair Antonin FABBRI
Deputy Chair Christopher BECKETT
Activity started in 2022

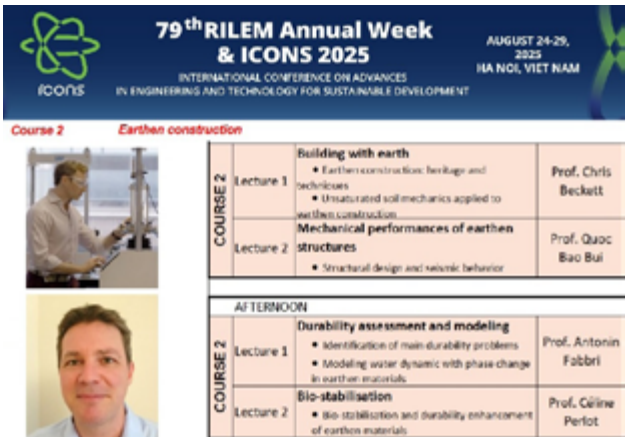
Significance

The relevance of building with earth in the 21st century has already been shown in showcase examples built in Switzerland (by Martin Rauch), France (by Nicolas Meunier) and China (by Lu Wenyu and Wang Shu - 2012 Pritzker Prize). However, the prospects of earthen and bio-based materials of entering mainstream construction, and *a fortiori* as the main structural materials, are limited notably due to the lack of knowledge on the assessment of their performance and durability.

A good understanding of the behaviour of crude earth is also crucial to develop proper methodologies for the rehabilitation and maintenance of buildings constructed more than 50 years ago.

Progress

- State-of-the-art Report (STAR) in progress and to be finalized before the end of 2025.



The TC Chair and Deputy Chair of RILEM TC 319-MAE are lecturing the pre-conference doctoral course at the 2026 RILEM Annual Week. Image courtesy of Hanoi University of Civil Engineering – HUCE.

- Organization of the 3rd International Conference on Earthen Construction – ICEC2026.
- TC Chair and Deputy Chair co-lecturing the pre-conference doctoral courses at the 2026 RILEM Annual Week, Nairobi, Kenya.

320-PEM Processing of earth-based materials

Chair Emmanuel KEITA
Deputy Chair Arnaud PERROT
Activity started in 2022

Significance

- The building sector contributes by a significant share to the entropic carbon emissions. In this context, earth appears as a promising solution for low carbon emission, recycling, and reuse in the construction field.
- In recent years, various rheometric and characterisation tests have been developed for earth-based building materials. However, some large scope aspects are often lacking.
- There is a need to understand the underlying physics behind the additives effect in order to have mix-design strategies not only based on trials and errors or empirical methods.
- This TC will deal with the behaviour of earth-based material in its fresh state and during hardening.

Cast, extruded and compacted earth samples: examples of some of the many processing routes. Image courtesy of A. Perrot.

Progress

- State-of-the-art Report (STAR) in progress and to be finalized before the end of 2025.
- Organization of the 3rd International Conference on Earthen Construction – ICEC2026.

322-MCB Mechanical Characterisation of Bamboo

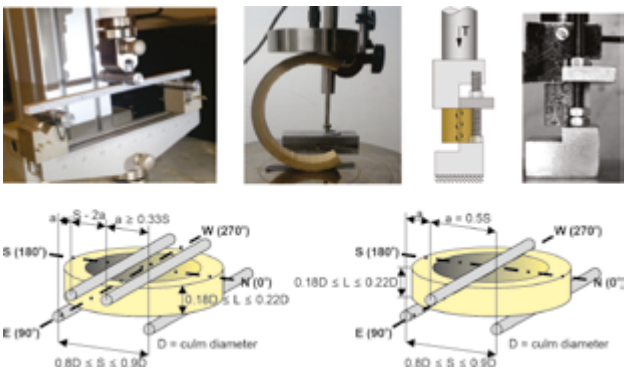
Chair Kent HARRIES
Deputy Chair Luisa MOLARI
Activity started in 2023

Significance

Bamboo is receiving considerable interest as a material for construction. Bamboo has remarkable potential to reduce the environmental impact of the construction sector and has the demonstrated potential for promoting social and economic equity. Nonetheless, bamboo construction remains largely a marginal material, viewed as being of lower quality and suited only to temporary applications. This could not be further from the truth. Although important advances have been made to standardise the use of bamboo, it is still necessary to provide builders, engineers, and architects with tools to allow them to select bamboo in construction design.

Progress

- Bamboo Glossary (dynamic document) approved by ballot and available to all TC members. Copy also available upon request to TC Chair.



New bamboo test methods being developed will be reported in planned STAR. Image cortesy of K. Herries and L. Molari.

- State-of-the-art Report (STAR) in progress and to be finalized before the end of 2025, for early 2026 publication.
- Collaboration with RILEM partner INBAR.
- Next TC meeting at the 2025 RILEM Annual Week, Hanoi, Vietnam.

CTM Testing Methods For Masonry Cores

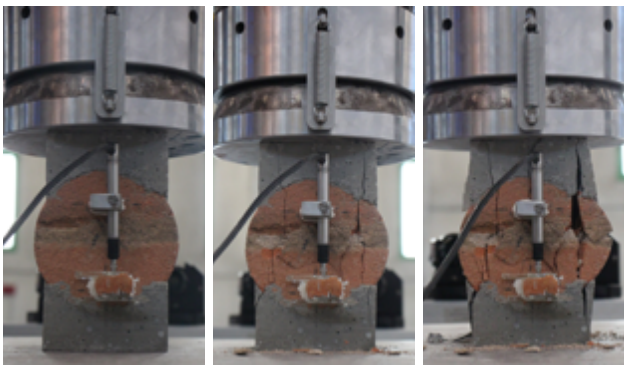
Chair Rita ESPOSITO
Deputy Chair Francesca FERRETTI
Activity started in 2024

Significance

For an accurate assessment of unreinforced brick masonry structures and infrastructure, the estimation of mechanical performance of masonry material is of importance. The core testing represents a promising methodology, used over the last 80 years, but it shows some inconsistencies for the reliable estimation of compression and shear properties of unreinforced brick masonry. The harmonization of the testing procedures and the development of standard guidelines are needed to improve the reliability of structural assessment and thus the sustainable maintenance of the existing assets.

Progress

- Database of compressive properties obtained from previous tests established and currently analysed.
- Database of shear properties obtained from previous tests is being built up.
- Ad-hoc group to study the feasibility of core testing methods for concrete block masonry established.



Compressive test on a masonry core. Image courtesy of F. Ferretti.

- Two TC online meetings held in the last 12 months.
- In person meeting planned to take place in September 2025 during the 14th International Conference on Structural Analysis of Historical Constructions - SAHC 2025.
- Esposito, R. .; Ferretti, F. Testing Methods for Masonry Cores: A Way Forward to Increase Reliability of Mechanical Properties Evaluation. RILEM Tech Lett 2025, 9, 93-97.

Cluster F

Bituminous Materials and Polymers

Foreword
▸ from Cluster F Convener,
Eshan DAVE

Since the late 1960s, RILEM activities in the field of Bituminous Materials and Polymers have been focusing on design and technical development of bituminous (asphalt) pavement infrastructures, that are mainly built from natural aggregate and asphalt binders derived from crude oils. Use of non-petroleum-based binders and additives as well as recycled asphalt materials in bituminous pavement infrastructures is also on a steady rise. The use of environmental product declarations to support decarbonization of transportation infrastructure is a significant interest area for pavement professionals.

Facing the need for increased sustainability and resilience for road infrastructure, around 27 Technical Committees have been treating the challenging objectives to characterize and steadily develop the complex performance of these materials as well as to optimize design, construction, rehabilitation and recycling technologies to achieve most sustainable life cycles and to adapt to climate change. Currently, Cluster F, chaired by Eshan V. Dave, University of New Hampshire, USA, engages approximately 150 experts from 25 countries, and is composed of 7 Technical Committees (TCs).

These committees are and have always been most efficient research and development platforms for connecting professionals from all over the world in the field of bituminous materials research to share their expertise, to develop recommendations on testing and evaluation approaches and to publish state-of-the-art reports and papers in the RILEM Journals of *Materials and Structures* and *RILEM Technical Letters*. Activities under the umbrella of RILEM have contributed a lot to strengthen the asphalt research community, and to steadily remind all members of being united people, researching together for a prosperous and sustainable future.

The next Cluster F Annual Meeting 2025 will be hosted on 1-3 October 2025 in Limoges, France.

RILEM and ISAP - International Society for Asphalt Pavements have been partners for a long time. To strengthen the collaboration between these institutions, RILEM have co-sponsored the ISAP annual conferences during which the meetings of some TCs of Cluster F usually take place; further, there have been co-sponsored workshops and other knowledge dissemination and technology transfer activities.

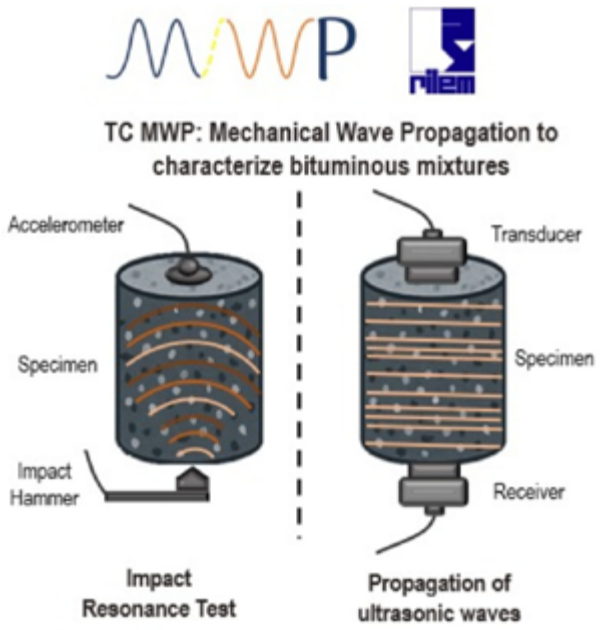
Current TCs in Cluster F

CODE TITLE	CHAIR DEPUTY CHAIR	OPENED IN	NO. OF MEMBERS
MWP Mechanical Wave Propagation to characterize bituminous mixtures	Jean-Claude CARRET Lucas BABADOPULOS	**NEW** August 2024	14
295-FBB Fingerprinting bituminous binders using physico-chemical analysis	Bernhard HOFKO Katerina VARVERI	2020	74
307-PPB Physicochemical effects of polymers in bitumen	Hinrich GROTHE Sayeda NAHAR	2021	50
308-PAR Performance-based Asphalt Recycling	Gabriele TEBALDI Eshan V. DAVE	2022	82
316-FEE Fume Emissions Evaluation for Asphalt Materials	Johan BLOM Laurent POROT	2021	28
323-APD Alternative Paving Materials - Design and Performance	Augusto CANNONE FALCHETTO Fan YIN	2023	76
APS Alternative Paving Materials - Sustainability	Davide LO PRESTI Emmanuel CHAILLEUX	2023	62

New

MWP Mechanical Wave Propagation to characterize bituminous mixtures

Chair Jean-Claude CARRET
Deputy Chair Lucas BABADOPULOS
Activity started in 2024



Schematics of use ultrasonic testing and impact resonance testing. Image courtesy of TC MWP.

Significance

Traditional quasi static characterization techniques for bituminous mixtures (BM) are time consuming and costly. Mechanical wave propagation (MWP) methods are less expensive and more cost-efficient than conventional methods, and they offer a valid alternative to determine properties across wide temperature and frequency ranges. However, the use of such methods remain marginal in the asphalt community, mainly because of the absence of standardized guidelines for applying them to viscoelastic BM. The TC MWP specifically addresses this gap and it is expected that it will contribute to the wider adoption of MWP methods in pavement engineering.

Relevance

MWP methods have the potential to considerably lower the costs associated with conventional characterization of BM, while also being credible options to improve the quality control of BM, or for field testing in the future. The TC will provide guidelines about laboratory procedures and analysis of the results that are essential for the future standardization. Consequently, the outcome of this TC will be of high interest for the whole asphalt community, including academics, industrials, road authorities, standardization committees, testing laboratories and material producers.

Goals

This RILEM TC will intend to provide guidelines to use ultrasonic testing (UT) and impact resonance testing (IRT) to characterize bituminous mixtures at the laboratory scale. More specifically, the main objectives of the TC are:

- To collect and summarize the current practices.
- To propose and validate laboratory procedures.
- To define basis candidate protocols for transducer characterization and equipment calibration.
- To evaluate different methods of interpretation of the results.
- To establish a first internationally shared database of UT and IRT data.

Methodology

- This TC will comprise two task groups (TG): TG1 – Ultrasonic testing to characterize bituminous mixture, and TG2 – Impact resonance testing to characterize bituminous.
- A literature survey will be conducted to map existing UT and IRT practices, identify key knowledge gaps, and design interlaboratory studies.
- Interlaboratory round robin campaigns will be performed to validate the selected procedures and assess reproducibility across partner labs .
- Strong links will be established with the other TCs of Cluster F, for round robin testing and other experimental works.
- A TC workshop bringing together experts and industrials from the asphalt community will be organised, to present preliminary findings of the TC and to publicize the potential of MWP methods.

Progress

The TC was formally approved in September 2024. It was officially introduced to RILEM cluster F members during the RILEM Cluster F annual meeting in October 2024, and its kick-off meeting was held online in March 2025. The opening letter of the TC was published in April 2025:

- Carret, J.-C.; Babadopulos, L. Opening Letter of RILEM TC MWP: Mechanical Wave Propagation to Characterize Bituminous Mixtures. *RILEM Tech Lett* 2025, 10, 15-21.

295-FBB Fingerprinting bituminous binders using physico-chemical analysis

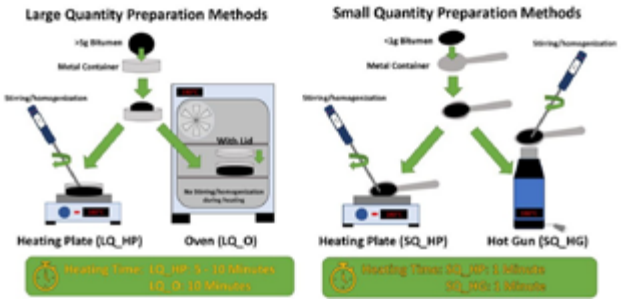
Chair Bernhard HOFKO
Deputy Chair Katerina VARVERI
Activity started in 2020

Significance

Bitumen is an organic material and as such it is prone to aging. Oxidative aging causes an increase of brittleness and stiffness, resulting in higher risk for cracking. We need to track bitumen oxidation to ensure long-lasting and sustainable road infrastructure. Enhanced long-term performance can also be achieved by modifying bitumen with various polymers, rejuvenators or other additives. However, simple and standardized analysis methods to detect these additives in bitumen are missing.

Progress

- Next TC meeting planned at the RILEM Cluster F annual meeting in October 2025.



Schematic drawing of the different solid sample preparation techniques involving common laboratory equipment. Image courtesy of J. Mirwald.

- TC has arrived near the end with successful completion of most objectives. Experimental campaign finished – data analysis is ongoing.
- Publications are underway; all publications should be submitted to *Materials and Structures* within 2025 and 2026.

307-PPB Physicochemical effects of polymers in bitumen

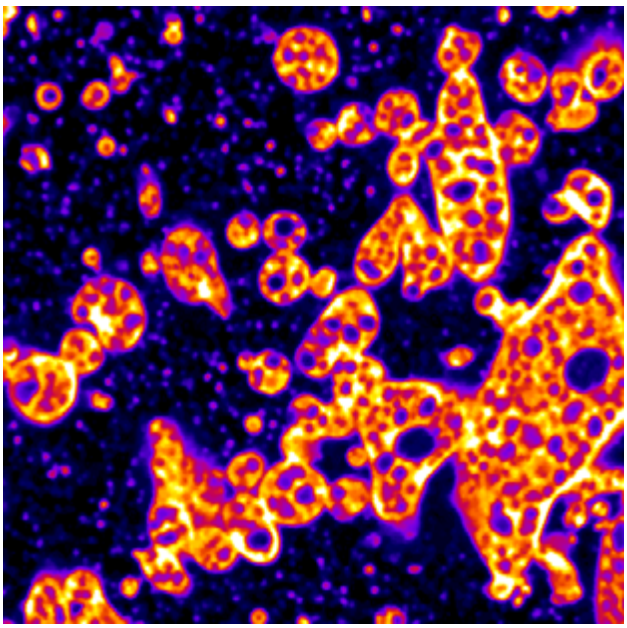
Chair Hinrich GROTHE
Deputy Chair Sayeda NAHAR
Activity starting in 2021

Significance

Research on polymer-modified binders (PMBs) has significantly advanced pavement engineering by addressing critical performance challenges in asphalt mixtures. Modern spectroscopic and microscopic techniques are available to characterise the chemical and microstructural changes of bitumen from a more intrinsic aspect. The goal of this TC is to identify and compare available methods for fingerprinting and quantification of certain additives and judge their benefits.

Progress

- Two interlaboratory tests have been conducted and completed and the results are under evaluation.
- A literature review manuscript has been written and is in the final stage of copy editing.
- The outcomes of this TC will be presented at ISBM, in Padova, Italy, 2026.



Fluorescence micrograph of phase separation in highly polymer-modified. Image courtesy of M. Miljković.

308-PAR Performance-based Asphalt Recycling

Chair Gabriele TEBALDI
Deputy Chair Eshan V. DAVE
Activity started in 2022

Significance

Although the significant efforts underway to develop and implement balanced mix design tools for bituminous mixtures that adopt performance related laboratory tests to support proportioning of mixture, there is a lack of consensus on the selection of laboratory tests as well as their thresholds.
The outcomes of this TC will have balance between fundamental developments and knowledge disseminations to aid in improved mixture design methods and use of life-cycle analysis tools.

Progress

- Two TC meetings in the last 12 months held at the 2024 RILEM Cluster F annual meeting in October, and at the 11th Conference of the European Asphalt Technology Association (EATA) in June 2025.

TC meeting at the 11th EATA conference, in June in Ancona, Italy. Image courtesy of A. Grilli.

- Next TC meeting to be held during the 2025 RILEM Cluster F annual meeting in October.
- Experimental campaigns well underway. TG-1 is finalizing a *RILEM Technical Letters* contribution of review of practices.
- Collaboration with RILEM Partner ISAP: International Society for Asphalt Pavements (ISAP).

316-FEE Fume emission evaluation for asphalt materials

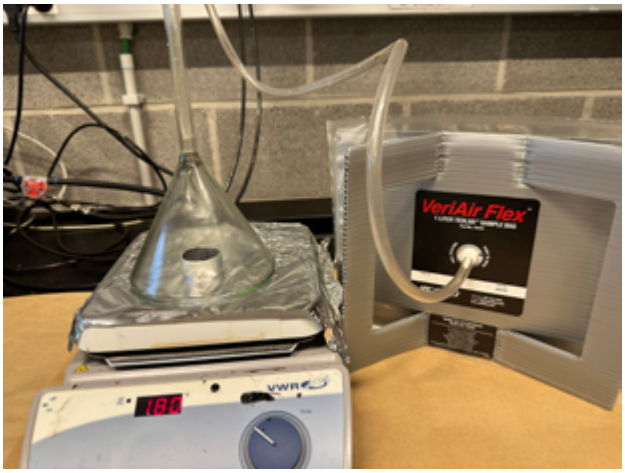
Chair Johan BLOM
Deputy Chair Laurent POROT
Activity starting in 2021

Significance

Bituminous materials are extensively utilized in paving and roofing applications due to their durability and performance characteristics. However, their processing requires elevated temperatures, which leads to the emission of fumes, including volatile organic compounds (VOCs). These emissions are of increasing concern due to their potential environmental and health impacts. Despite the growing attention to this issue, there is currently no standardized methodology for the qualification and quantification of fume emissions from asphalt materials. Various approaches exist, but the lack of harmonization hinders comparability and regulatory alignment.

Progress

- Preparation of a scientific paper titled *Characterization and environmental impact assessment of bitumen volatile organic compounds (VOCs) using SIFT-MS-based direct and fume bag sampling*, intended for submission to *Materials and Structures* and/or *RILEM Technical Letters*.



Equipment used for the collection of air and gas samples from asphalt materials. Image courtesy of J. Blom.

- Interlaboratory experiment currently underway ending in September 2025.
- Last TC meeting held in June 2025 at the 11th Conference of the European Asphalt Technology Association (EATA).
- A major symposium is planned, with a dedicated workshop on fume emissions at the EATA 2028 meeting in Antwerp, Germany.

323-APD Alternative Paving Materials - Design and Performance

Chair Augusto CANNONE FALCHETTO
Deputy Chair Fan YIN
Activity started in 2023

Significance

As the awareness and focus on the sustainability of road infrastructure have grown over time, exploring the potential for utilizing recycled, marginal, and secondary materials in pavement has emerged as a crucial challenge in road engineering. Identifying an urgent imperative to advance and extensively demonstrate solutions that transcend conventional bituminous materials, along with the promotion of their widespread adoption, is of paramount importance.

Progress

- Two TC meetings held in the last 12 months at the 2024 RILEM Cluster F annual meeting in October, and at the 11th Conference of the European Asphalt Technology Association (EATA) in June 2025.

Logo of TC 323-APD. Image courtesy of TC 323-APD.

- Next TC meetings to be held during the 2025 RILEM Cluster F annual meeting in October in hybrid mode, and online around late November or early December 2025.
- Cannone Falchetto , A.; Yin, F. et al. On the New RILEM Technical Committee TC APD: Alternative Paving Materials – Design and Performance. *RILEM Tech Lett* **2025**, 9, 68-75.
- Collaboration with RILEM Partners: ISAP -International Society for Asphalt Pavements- and PIARC - World Road Association.

APS Alternative Paving Materials - Sustainability

Chair Davide LO PRESTI
Deputy Chair Emmanuel CHAILLEUX
Activity started in 2023

Significance

Material scientists and road pavement technologists are fully aware that end-of-life products can be engineered and re-used and/or recycled. However, the road pavement industry, society and governing bodies are still considering these end-of-life products as waste and secondary materials. The proposed TC offers a clear shift in terminology. Rather than focusing on waste and/or secondary materials, the terminology will consider paving material 'alternatives' to the conventional components of bituminous mixtures: Alternative Paving Materials (APMs). TC APS is structured to fill some of the research gaps highlighted from the former TC-279 WMR and ensures that a structure is in place that allows for continuity and follow ups.

Progress

- TC APS was launched within a dedicated workshop at the 2024 RILEM Cluster F annual meeting.
- Last TC meetings held at the 11th Conference of the European Asphalt Technology Association (EATA) in June 2025.

Extraction of old pavement containing alternative materials, shared through TC APS labs to assess their recyclability. Image courtesy of E. Chailleux.

- Lauch of RILEM TC APS Webinars: first event organised in May 2025.
- Next TC meeting to be held during the 2025 RILEM Cluster F annual meeting in October.
- *RILEM Technical Letters* TC opening paper in preparation (final draft).
- TC APS LinkedIn Page created to facilitate interaction and communication.
- Collaboration with RILEM Partner ISAP -International Society for Asphalt Pavements.

Recently closed TCs

In the last 12 months, the TCs presented in the table below have been officially closed as they completed their work or reached the end of their lifespan.

CODE TITLE	CHAIR DEPUTY CHAIR	TC OPENED IN TC CLOSED IN
280-CBE Multiphase characterisation of cold bitumen emulsion materials	Andrea GRAZIANI Alan CARTER	2017 August 2024
282-CCL Calcined Clays as Supplementary Cementitious Materials	Fernando MARTIRENA-HERNANDEZ Manu SANTHANAM	2018 August 2024
288-IEC Impact and Explosion	Marco DI PRISCO Ezio CADONI	2018 March 2025
289-DCM Long-term durability of structural concretes in marine exposure conditions	Kefei LI Junjie ZENG	2019 March 2025
291-AMC Use of Agro-Based Materials as Cementitious Additions in Concrete and Cement-Based Materials	Said KENAI Mike B. OTIENO	2018 March 2025

More details of these recently closed TCs can be found in the previous editions of the RILEM Technical Report or by visiting the page "Index of past TCs" on our website. The activities over the last 12 months of these TCs is presented in the following lines:

▸ 280-CBE Multiphase characterisation of cold bitumen emulsion materials

> Two papers added to the *Mater Struct* Topical collection RILEM TC 280-CBE: Multiphase Characterisation of Cold Bitumen Emulsion Materials:

- Miljković, M., Graziani, A. Recommendation of RILEM TC 280-CBE: Standardised design and analysis of the multiphase composition of bitumen emulsion–cement composites. *Mater Struct* **58**, 121 (2025).
- Sangiorgi, C., Balzano, F., Tataranni, P. *et al.* Recommendation of RILEM TC 280-CBE: test method to assess the bonding of microsurfacing mixtures using the shear bond testing (SBT) apparatus. *Mater Struct* **58**, 87 (2025).

▸ 282-CCL Calcined Clays as Supplementary Cementitious Materials

> Two papers added to the *Mater Struct* Topical collection RILEM TC 282-CCL: Calcined Clays as Supplementary Cementitious Materials:

- Parashar, A., Avet, F., Canut, M. *et al.* Industrialisation of calcined clay cements: past, present, and future: a paper of RILEM TC 282-CCL. *Mater Struct* **57**, 211 (2024).
- Dhandapani, Y., Machner, A., Wilson, W. *et al.* Performance of cementitious systems containing calcined clay in a chloride-rich environment: a review by TC-282 CCL. *Mater Struct* **57**, 154 (2024).

> Presentation of TC outcomes at the 2024 RILEM Annual Week. Video available here.

> Presentation of TC outcomes during the ACI 24 hours of concrete knowledge, in July 2025.

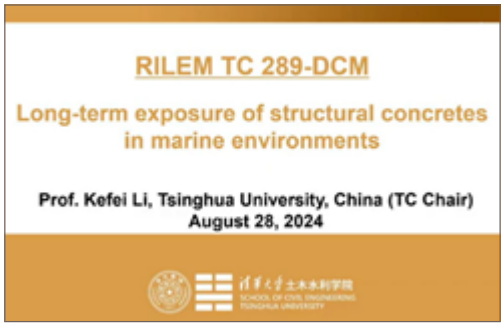
▸ 288-IEC Impact and Explosion

> Cadoni, E., Pérez Caldentey, A., Colombo, M. *et al.* State-of-the-art on impact and explosion behaviour of concrete structures: report of RILEM TC 288-IEC. *Mater Struct* **58**, 62 (2025).

▸ 289-DCM Long-term durability of structural concretes in marine exposure conditions

> Presentation of TC outcomes at the 2024 RILEM Annual Week. Video available here.

> Presentation of TC outcomes during the ACI 24 hours of concrete knowledge, in July 2025.

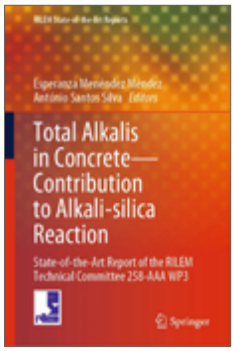


▸ 291-AMC Use of Agro-Based Materials as Cementitious Additions in Concrete and Cement-Based Materials

> Presentation of TC outcomes at the 2024 RILEM Annual Week. Video available here.

The publications and videos released over the last 12 months of some TCs closed more than 12 months ago are presented here:

258-AAA Avoiding alkali aggregate reactions in concrete - Performance based concept



> State-of-the-Art Report: Total Alkalis in Concrete — Contribution to Alkali-Silica Reaction, State-of-the-Art Report of RILEM Technical Committee 258-AAA WP3, Edited by Esperanza Menéndez Méndez and António Santos Silva.

269-IAM Damage Assessment in Consideration of Repair/ Retrofit-Recovery in Concrete and Masonry Structures by Means of Innovative NDT

> Shiotani, T., Watabe, K. & RILEM Technical Committee. Recommendation of RILEM TC 269-IAM: damage assessment in consideration of repair/retrofit-recovery in concrete and masonry structures by means of innovative NDT. *Mater Struct* **58**, 45 (2025).

272-PIM : Phase and Interphase behaviour of bituminous Materials

> Phase and Interphase behaviour of bituminous Materials - Final draft State-of-the-art Report of the RILEM Technical Committee 272-PIM; Edited by Emmanuel Chailleux, Christiane Raab, Laurent Porot, Cédric Sauzéat, Francesco Canestrari - Report Volume 43 published by Springer.

273-RAC Structural behaviour and innovation of recycled aggregate concrete

> Structural behaviour and innovation of recycled aggregate concrete - Final draft State-of-the-Art Report of the RILEM Technical Committee 273-RAC; Edited by Jianzhuang Xiao, Yamei Zhang, Amardeep Singh, Zengfeng Zhao - Report Volumes 41 & 42 published by Springer.

274-TCE Testing and characterisation of earth-based building materials and elements

> Fabbri, A., Colinart, T., Auger, S. *et al.* Recommendation of RILEM TC 274-TCE: test method to determine the apparent water vapor transfer coefficient of earthen materials. *Mater Struct* **58**, 159 (2025).

> Perlot, C., Prime, N., Aubert, JE. et *al.* Recommendation of TC RILEM TC 274-TCE: 3-point bending test procedure for earthen bricks—quality control of earth bricks for structural masonry by flexural strength. *Mater Struct* **58**, 185 (2025).

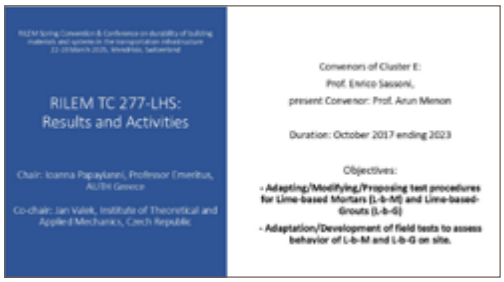
▸ 275-HDB Hygrothermal behaviour and Durability of Bio-aggregate based building materials

> Four papers added to the *Mater Struct* Topical collection RILEM TC 275-HDB: Testing Methods for Determination of the Hygrothermal and Capillary of Vegetal Concrete:

- Picandet, V., da Gloria, M.Y.R. & Marceau, S. RILEM TC 275-HDB: results of interlaboratory testing for determining capillarity properties of hemp concrete. *Mater Struct* **58**, 88 (2025).
- Colinart, T., Magniont, C. RILEM TC 275-HDB: results of round-robin testing for the vapor permeability of hemp concrete. *Mater Struct* **58**, 117 (2025).
- Collet, F., Mertens, S. & Faria, P. RILEM TC 275-HDB round-robin tests and proposals: moisture buffer value of vegetal concrete. *Mater Struct* **58**, 36 (2025).
- Amziane, S., Toussaint, E. & Collet, F. RILEM TC 275-HDB: presentation of TC 275-HDB and mechanical performances of the hemp concrete specimens of the interlaboratory comparison. *Mater Struct* **58**, 162 (2025).

▸ 277-LHS Specifications for testing and evaluation of lime-based repair materials for historic Structures

> Presentation of TC outcomes at the 2025 RILEM Spring Convention. Video available here.



▸ 279-WMR Valorisation of Waste and Secondary Materials for Roads

> Poulikakos, L. D.; Pasquini , E. .; Tušar, M. . .; Pais , J. .; Cannone Falchetto , A. .; Moreno Navarro , F. .; Lo Presti , D. .; Jiménez del Barco Carrion, A. .; Wang , D. . Summary of Rilem Technical Committee TC 279-WMR Activities. *RILEM Tech Lett* **2024**, *8*, 176-181.

▸ 281-CCC Carbonation of concrete with supplementary cementitious materials

> Four papers added to the *Mater Struct* Topical collection RILEM TC 281-CCC: Carbonation of Concrete with Supplementary Cementitious Materials:

- Etcheverry, J.M., Alderete, N., Sakoparnig, M. *et al.* Report of RILEM TC 281-CCC: phase assemblage alterations and carbonation potential of mortar with blended cements induced by long duration carbonation exposure. *Mater Struct* **58**, 70 (2025).

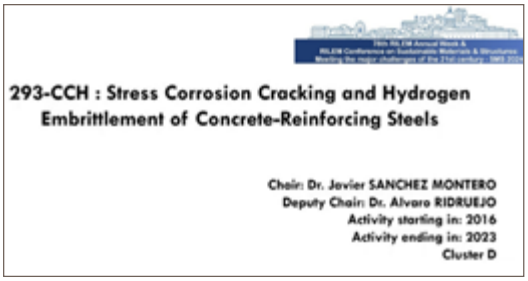
- Vanoutrive, H., Alderete, N., De Belie, N. *et al.* Report of RILEM TC 281-CCC: outcomes of a round robin on the resistance to natural carbonation of Portland, Portland-fly ash and blast-furnace cements and its relation to accelerated carbonation. *Mater Struct* **57**, 209 (2024).
- Vollpracht, A., Gluth, G.J.G., Rogiers, B. *et al.* Report of RILEM TC 281-CCC: insights into factors affecting the carbonation rate of concrete with SCMs revealed from data mining and machine learning approaches. *Mater Struct* **57**, 206 (2024).
- Bernal, S.A., Dhandapani, Y., Elakneswaran, Y. *et al.* Report of RILEM TC 281-CCC: A critical review of the standardised testing methods to determine carbonation resistance of concrete. *Mater Struct* **57**, 173 (2024).

> TC Closing letter: De Belie, N.; Bernal, S. Closing Letter of RILEM TC 281-CCC: Carbonation of Concrete With Supplementary Cementitious Materials. *RILEM Tech Lett* **2025**, *10*, 22-32.

▸ 283-CAM Chloride transport in alkali-activated materials

> Presentation of TC outcomes at the 2024 RILEM Annual Week. Video available here.

▸ 293-CCH Stress Corrosion Cracking and Hydrogen Embrittlement of Concrete-Reinforcing Steels



> Presentation of TC outcomes at the 2024 RILEM Annual Week. Video available here.

RILEM TCs in the pipeline

Image courtesy of W. Weiser.

RILEM TCs are extremely open environment, where everyone is welcome to join. However, it might happen that a potential member finds out about the TC when the work has already been set up and scheduled, and for the potential member it is hard to find a role in the TC activities.

Establishing a contact in the early stage, i.e. expressing the interest in being part of a future TC during its development process or at the TC kick-off meeting, could be an opportunity to find one's own role inside a TC; furthermore, the interested person could take part in the process of writing the TC's proposal, could start to be acquainted with the TC Chair and Deputy-Chair, contribute with their own knowledge, and promote the TCs within their network. For these reasons, and also to attract the interest of the scientific community in general, RILEM collects topics for which the creation of a new TC is being discussed. These potential TCs are called "Future TCs" and they are listed on the RILEM website.

Currently the following topics are proposed:

- **World catalogue of masonry types, mechanical characterisation through on-field and laboratory testing and numerical modelling**
- **Long-term performance and durability of masonry under a changing climate**
- **Reuse of Brick Masonry for Circular Economy and Sustainability**

Any additional input to these topics or expression-of-interests by scientists and researchers are highly welcome! To receive more information about the work in progress on a specific topic, to propose any addition to the topic description and to express your interest in participating to a new TC, please get in contact with RILEM.

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Cluster F: Prof. Eshan DAVE, University of New Hampshire, USA

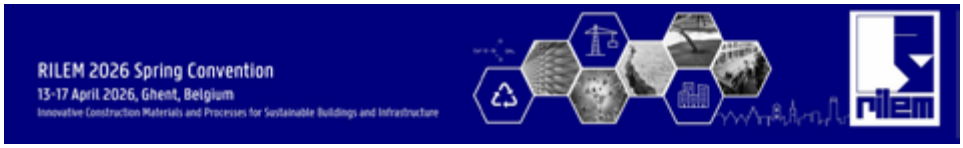
Concluding remarks

It is an honour for me, in my role of RILEM President, to write the concluding remarks of this year's issue of the RILEM Technical Report. Being the President of an association like RILEM is a real privilege. For the reader who is not familiar with the history, RILEM was founded almost 80 years ago, with the aim of building bridges between researchers around the world, and sharing their knowledge on construction materials and structures. Today, RILEM continues to inspire collaboration that transcends geographical and academic boundaries. These efforts are instrumental in driving progress across the materials and construction sectors, ensuring that our collective knowledge is leveraged to address the pressing challenges of our time. This report presents some of this knowledge, produced by RILEM members over the last 12 months.

The built environment generates a huge portion of the CO_2 emissions that is causing so many problems to our planet. RILEM acknowledged this important issue a few years ago, supporting in September 2020 *the Global Consensus on Sustainability in the Built Environment* GLOBE, and establishing in December 2021 the *Joint Committee on the GLOBE Consensus* JCGC. More recently, RILEM launched more initiatives on this matter. You might have read about them on page 22 of this report. Amongst them, the re-scheduling of the most important annual RILEM events, namely the Spring Convention and the Annual Week, from 2028 onwards, has been a tough decision. We all suffered from the lack of in-person meetings during COVID-19 pandemic, and we are aware of the importance of these gatherings: organising the Spring Convention once every two years, rather than every year, is however a good compromise that safeguards the benefits of getting together, but with a significant reduction of the air travel related carbon footprint. Furthermore, both RILEM flagship events will aim at reducing their environmental impact, by satisfying as much as possible the new guidelines that RILEM has implemented on this matter, like, for instance: selection of locations accessible by public

transport, reusable or compostable materials for catering and signage, energy-efficient lighting and equipment, etc. It is with pride that, as one of the conference Chairs, I confirm that the Spring Convention in Ghent, Belgium, next year, will be following these guidelines!

The 2026 Spring Convention & Conference on Innovative Construction Materials and Processes for Sustainable Buildings and Infrastructure, organised by the Faculty of Engineering and Architecture of the University of Ghent, will take place on 13-17 April. Maybe not everyone knows that the city of Ghent has been leading the way with its sustainability projects and eco-minded tourism approach. My colleague Geert De Schutter and I look forward to greeting you in our university's hometown! We welcome contributions on the following topics: Innovation, Materials, Processes, Sustainability, Buildings, and Infrastructure.



The RILEM Spring Convention in 2026 will be organised in Ghent, Belgium. Image courtesy of University of Ghent.

Like mentioned by our *Materials and Structures* Editor-in-Chief, Giovanni Plizzari, on page 19 RILEM is not only covering a whole range of "construction materials" but also "structures". There is an additional very interesting point that our Editor-in-Chief has raised in his interview, that is the unstoppable, increasing, overwhelming use of Artificial Intelligence (AI) in our lives. Who would be able to say if even this closing word has been written by a person or by AI? In some scientific activities, like writing an academic paper, we must remain vigilant about maintaining the integrity, accuracy, and ethical standards that underpin academic research. Discussions around AI's role in our field will undoubtedly grow in importance, and we may need RILEM guidelines for regulating this matter.

In closing, let us carry forward the spirit of collaboration, innovation, and responsibility that defines the RILEM community. Together, we are shaping a future where shared knowledge and sustainable practices pave the way for progress.

From the left: Nicolas Roussel – RILEM Past-President, Nele De Belie - RILEM President, and Hans Beushausen – RILEM Vice President.

Nele De Belie, RILEM President, on behalf of the RILEM Presidency

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