

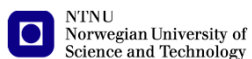
## The RILEM Approach to Mitigate Alkali Aggregate Reactions (AAR) in Concrete

### RILEM Technical Committee (TC) 258-AAA (2014–2019)

*Avoiding Alkali Aggregate Reactions in Concrete.  
Performance Based Concept.*

**Børge Johannes Wigum** (Chairman)

**Jan Lindgård** (Secretary)



## RILEM Technical Committees (TCs) on AAR

- TC 106 (1988–2001) - Accelerated Aggregate Tests
- TC 191-ARP (2001–2006) - Diagnosis/Appraisal & Specification
- TC 219-ACS (2006–2014) - Performance Testing & Modelling



Dr Philip Nixon – Chairman    Dr Ian Sims – Secretary



*International Union of Laboratories and Experts  
in Construction Materials, System and Structures*



## TC 258-AAA (2014 – 2019)

*(Avoiding Alkali Aggregate Reactions in Concrete – Performance Based Concept)*

The purpose of this Technical Committee (TC) is to **develop** and **promote** a performance based testing concept for the prevention of deleterious Alkali Aggregate Reactions (AAR) in concrete.

Strong emphasis will be put on the **implementation** of the RILEM methods and recommendations as national- and international standards.









Professor **Børge Johannes Wigum**  
**Chairman** – RILEM TC 258-AAA  
 HeidelbergCement Northern Europe




Dr **Jan Lindgård**  
**Secretary** – RILEM TC 258-AAA  
 SINTEF Building and Infrastructure

## RILEM TC 258 AAA (2014–2019)

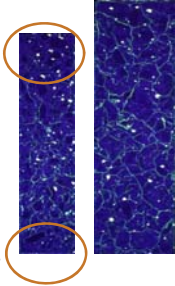


- **WP1 - Performance testing and accelerated testing in laboratory**  
– Dr **Terje F. Rønning**, (HeidelbergCement Northern Europe, Norway) 
- **WP2 - Performance testing and laboratory vs. field; Exposure site**  
– Professor **Benoît Fournier** (Université Laval, Québec, Canada) 
- **WP3 - Performance testing; Assessment of detailed alkali inventory in concrete, including internal aggregate release, recycling and external supply.**  
– Dr **Esperanza Menéndez Méndez** (Institute of Construction Science, "Eduardo Torroja" (CSIC), Spain) 
- **WP4 – Verification of alkalis released from aggregates**  
– Dr **Klaartje De Weerd** (Norwegian University of Science and Technology, NTNU, Norway)   


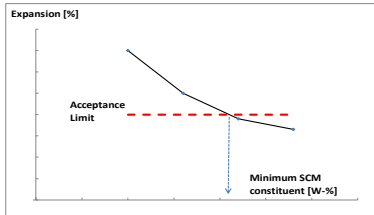
### WP1 - Performance testing and accelerated testing in laboratory

Dr **Terje F. Rønning** (HeidelbergCement Northern Europe, Norway) 

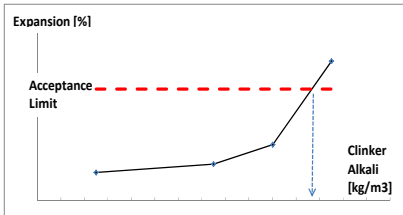
- **Develop performance test method(s):**
- "RILEM AAR-10" (38°C concrete performance test)
  - 2017: Draft test procedure agreed
    - Reduce leaching of alkalis → Increased prism size (100 mm)
  - Two applications
    1. Testing of specific aggregate combinations together with various binder combinations
    2. Determination of general binder composition together with a "worst case" aggregate



– Assessment of test results:



1. Minimum content of an SCM constituent



2. Maximum alkali content (from clinker and any alkalis added)



#### WP1 - Performance testing and accelerated testing in laboratory

##### ○ Develop performance test method(s):

- "RILEM AAR-10"
  - 2018: Arrange Round Robin Test (RRT) (part of the Norwegian KPN-ASR project)
- On-going work on two (possible) alternative test procedures
  - ("RILEM AAR-11": 60°C concrete performance test)
  - (Japanese test procedure "TC-Draft of JCI-TC115FS-2013"; alkali wrapping)

##### ○ Validate alkali-boosting

- Ensure sufficient range of potential variations from the concrete constituents
- How much? (potential side effects?)
- Limited test program (part of the Norwegian KPN-ASR project)

#### WP2 - Performance testing and laboratory vs. field; Exposure site

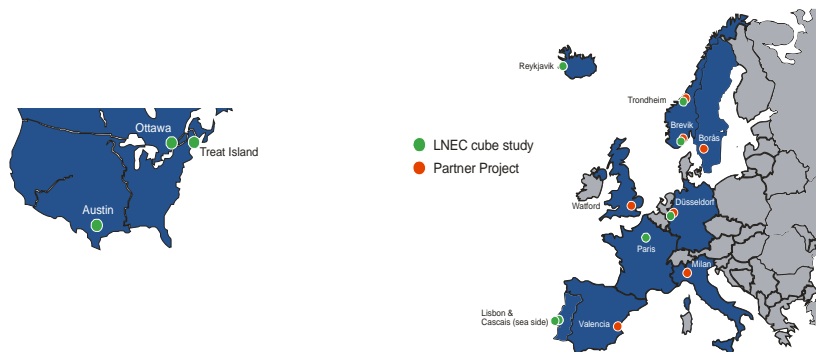
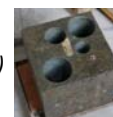
Professor **Benoît Fournier** (Université Laval, Québec, Canada)



- LNEC cube study (2015) – Document environmental effects

- PARTNER blocks (2004) – Post-documentation of field cubes (2017)

- STAR-report on the lab./field correlation (on-going)





**WP3 - Performance testing; Assessment of detailed alkali inventory in concrete, including internal aggregate release, recycling and external supply**



Dr [Esperanza Menéndez Méndez](#) (CSIC, Spain)

○ **Develop a procedure for measuring alkali release from aggregates**

- "RILEM AAR-8"
  - 2015: Draft test procedure agreed
  - 2016: RRT initiated (5 aggregates, 6 labs)
- **STAR-report** on "alkali inventory" (*on-going*)

**WP4 - Verification of alkalis released from aggregates** *[New activity 2017]*Dr **Klaartje De Weerd** (NTNU, Norway)

- **Validate** the test method for alkalis released by aggregates (AAR-8)
- **Verification** of potential alkali-release during lab. performance testing or in field structures

Draft topics:

1. How much of the total alkali from the cement is available in the pore solution?
2. Comparing methods to determine free alkali content? What is their accuracy?
3. Gathering results from on-going verification tests
4. Propose reference non-releasing aggregate for future studies

**Meetings of RILEM TC 258-AAA**1<sup>st</sup> Meeting in Oslo 2<sup>nd</sup> – 3<sup>rd</sup> October 20142<sup>nd</sup> Meeting in London 27<sup>th</sup> - 28<sup>th</sup> April 20153<sup>rd</sup> Meetings in Toronto 23<sup>rd</sup> - 25<sup>th</sup> September 20154<sup>th</sup> Meeting in Paris 7<sup>th</sup> - 8<sup>th</sup> March 2016



Meetings of RILEM TC 258-AAA



5<sup>th</sup> Meeting, São Paulo, Brazil, 7<sup>th</sup> July 2016



6<sup>th</sup> Meeting, Lyngby/Copenhagen 25<sup>th</sup> and 26<sup>th</sup> August 2016



7<sup>th</sup> Meeting Stockholm 11<sup>th</sup> and 12<sup>th</sup> May 2017



8<sup>th</sup> Meeting Vienna 15<sup>th</sup> and 16<sup>th</sup> November 2017