



## Nordic Concrete Research Workshop

### ACCELERATED FREEZE-THAW TESTING OF CONCRETE

Wednesday 20 April 2022 at Technical University of Denmark (Kgs. Lyngby, Denmark)

#### Scope

There is a push for performance-based concrete design at the expense of deemed to satisfy approaches. This also pushes for more performance testing. There are several test standards that can be used to quantify concrete frost resistance, e.g. ASTM C666, ASTM C672, and CEN/TS 12390-9, where the later contains three different test methods to choose from. In addition, a number of product standards for concrete products also specify different accelerated freeze-thaw methods.

The aim of the workshop is to discuss the results of recent years' research in relation to accelerated freeze-thaw testing of concrete. For example:

- How well does specific methods represent field conditions?
- Even the test principle is similar, test methods differ in specific parameters. The three test methods in CEN/TS 12390-9 (slab test, cube test, and CDF test, respectively) e.g. differ with respect to
  - duration of capillary suction prior to freeze/thaw (slab: 3 days; cube: 1 day; CDF: 7 days)
  - type of liquid used for capillary suction (slab: pure water; cube & CDF: 3% NaCl)
  - amount of freezing medium relative to test surface (slab: 3 mm; CDF: 5 mm; cube > 10 mm)
  - Temperature cycle (slab: 24 h; cube: 24 h (not identical to slab cycle); CDF: 12 h)How does choice of specific parameters influence the test result?
- Are some test methods more or less favorable for concrete with supplementary cementitious materials (SCM)?
- How can reproducibility be improved and inter-laboratory variations be limited?

The workshop is not limited to the above questions – they are only meant as inspiration. All presentations related to the over-all topic “Accelerated freeze-thaw testing of concrete” are welcome.

#### Organizing committee

If you need further information on top of what is stated in the following pages, please contact the organizing committee:

- Associate professor Marianne Tange Hasholt ([matah@byg.dtu.dk](mailto:matah@byg.dtu.dk)),  
Dept. of Civil Engineering, Technical University of Denmark
- Associate professor Katja Frid ([katja.frid@mau.se](mailto:katja.frid@mau.se)),  
Dept. of Materials Science and Applied Mathematics, Malmö University



## Program, Wednesday 20<sup>th</sup> April 2022

In each time slot for presentations, there will be 2-3 presentations (15-20 minutes each) related to the overall topic, followed by time for discussion among all participants.

### Morning

9.00-9.30 Registration & coffee

9.30-9.45 Introduction

9.45-10.30 **Studies involving observations from the field**

*Frank Spörel*

Freeze-thaw attack and concrete resistance in the CIF-test and under field-conditions – a data-based view on relevant parameters

*Jukka Lahdensivu*

Freeze-thaw damage in existing Finnish concrete facades and balconies

10.30-10.45 Coffee break

10.45 -12.00 **The importance of Interactions with the surroundings, other than just the freezing temperature**

*Elisabeth Helsing & Peter Utgenannt*

Influence of carbonation on the salt-frost resistance and possibilities to incorporate this factor in freeze-thaw testing

*Matthias Müller*

Testing salt frost scaling resistance of XF2 concretes

*Marianne Tange Hasholt*

Interaction between concrete and freezing medium during accelerated freeze-thaw testing

12.00-13.00 Lunch

## Program, Wednesday 20<sup>th</sup> April 2022 (continued)

### Afternoon

13.00-15.30 **The importance of the temperature curve**

*Abdul Faheem*

Influence of thermal boundary conditions and temperature distribution in concrete on frost scaling (results from a recent PhD project)

*Terje Rønning*

Alternative temperature cycle during accelerated freeze-thaw testing

short break

### **The frost damage mechanism**

*Katja Frid*

Study that tells us how air voids really work

*Stefan Jacobsen*

Shape and size of particles scaled from concrete surfaces during salt frost testing and rapid freezing and thawing in water

15.30-16.00 Coffee break

16.00-17.00 Final discussion and closure

17.00-18.00 Mini-excursion to see old and new concrete structures in the vicinity of Copenhagen (the excursion is at the same time our transport to the workshop dinner venue)

18.00- Workshop dinner at Restaurant Tårnet in downtown Copenhagen (see "Practical details" next page for more information)

## Proceedings

There will be no workshop proceedings. It is planned to submit an extensive workshop summary to the journal "Nordic Concrete Research". All workshop presenters will be asked if they would like to co-author the summary.



## All the practical details

### Venue

Technical University of Denmark (DTU)  
Anker Engelunds Vej 1  
DK-2800 Kgs. Lyngby

### Registration

#### *Registration of presentations*

We already have a more or less full workshop program, but if you have something that you would like to present, please send a mail including

- Headline
- Short summary (100-200 words)

to Marianne Tange Hasholt ([matah@byg.dtu.dk](mailto:matah@byg.dtu.dk)) as soon as possible and no later than 20 March 2022. Then the workshop organizers will try to fit it in.

#### *Registration of workshop participation*

If you would like to participate in the workshop, please register here:

[www.conferencemanager.dk/ncr-2022](http://www.conferencemanager.dk/ncr-2022).

Fee: DKK 1500 (approx. 200 EUR).

The fee includes lunch and refreshments during the day at DTU, transport to the workshop dinner venue and workshop dinner.

In the ConferenceManager registration system, there is a textbox for comments. Please state in this textbox, if you have any food allergies, etc.

Deadline for registering your workshop participation is 20 March 2022.



### **Workshop dinner**

The workshop dinner will take place at restaurant Tårnet, situated in the tower of Christiansborg Castle. Christiansborg Castle is one of the oldest “large” buildings with a loadbearing structure of reinforced concrete in Denmark. Since the building also houses the assembly of the Danish parliament, there are stricter security measures than normally at Danish restaurants. We have to pass a security check (like at check-in in the airport), when we enter the tower, and all participants have to bring their passport (also Danish citizens).

### **Accommodation**

Accommodation is not included in the workshop fee. If you are looking for a hotel in the vicinity of DTU, please have a look at the following webpage:

[https://www.byg.dtu.dk/english/about/contact\\_and\\_practical\\_info/accomodation](https://www.byg.dtu.dk/english/about/contact_and_practical_info/accomodation)

### **How to get to DTU**

<https://www.dtu.dk/english/about/campuses/dtu-lyngby-campus/getting-there>

### **Note: COVID-19**

In case COVID-19 restrictions leads to travel restrictions, so it is not possible to travel to Denmark, or if the workshop format is in conflict with the COVID-19 guidelines of the Danish Health Authorities in April 2022, the workshop will be postponed.