

# New test procedures for solid and liquid deicer

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## 1. INTRODUCTION

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- Due to its good cost-benefit ratio sodium chloride is used as the major deicing material used in road winter maintenance
- For winter maintenance thawing capacity and thawing speed are the most important parameters together with the resulting costs
- Existing testing methods show various downsides
- Use of a special designed climate chamber allowing manual testing procedures inside without opening the chamber door
- As a result time- and temperature - dependent thawing capacity curves have been conducted for all common solid and liquid deicers
- Results of these test are given as well allowing a comparison of already existing products regarding performance and costs with any new de-icing product which may appear on the market

## 2. Requirements of deicing products

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To provide a good quality of the used chemicals according to the Austrian regulations a product must fulfil following requirements:

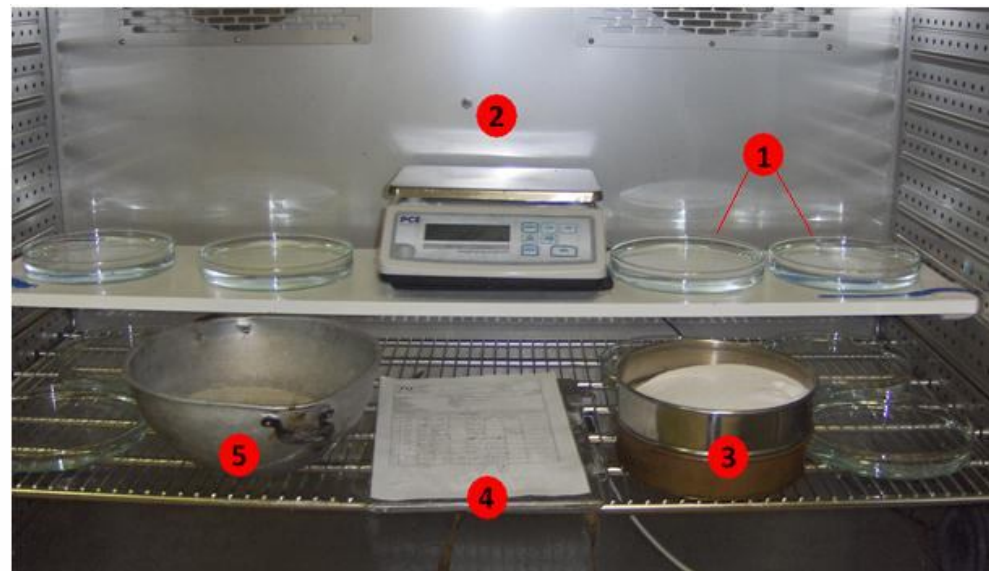
- High thawing capacity  
(includes sufficient rate and duration of thawing)
- Low environmental impact  
(Fauna, flora must not be damaged)
- Low impact on surrounding infrastructure  
(Road infrastructure e.g. bridges must not be damaged)
- Economic use  
(Costs for material must be too high)
- Ensure friction  
(must not lower friction to dangerous levels)

### 3. Test methods for solid deicers

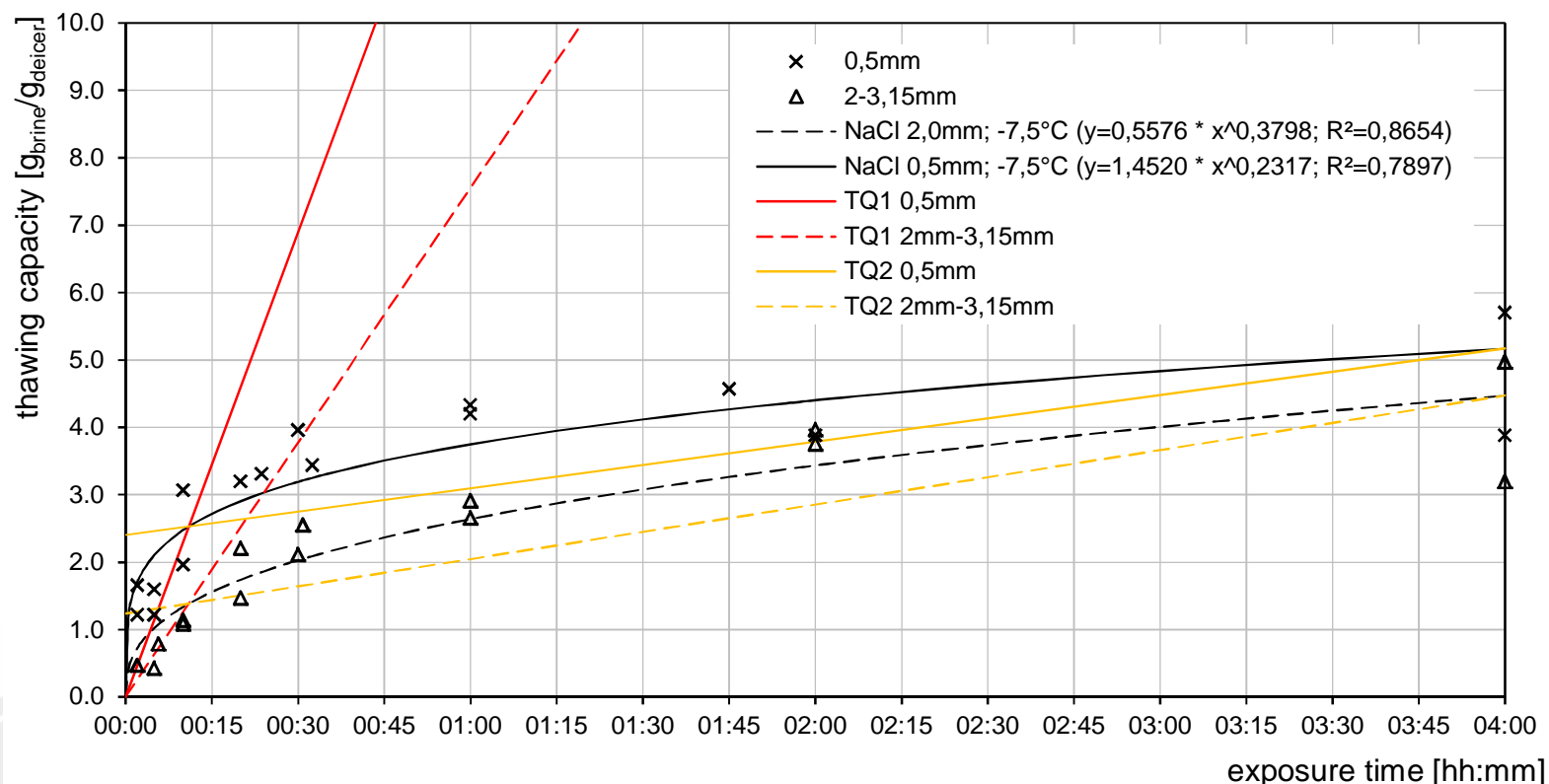
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Over all the common tests methods are well developed but have slight drawbacks each

The new test should also be able to measure the pure de-icing performance from either solid or liquid chemicals without huge funding

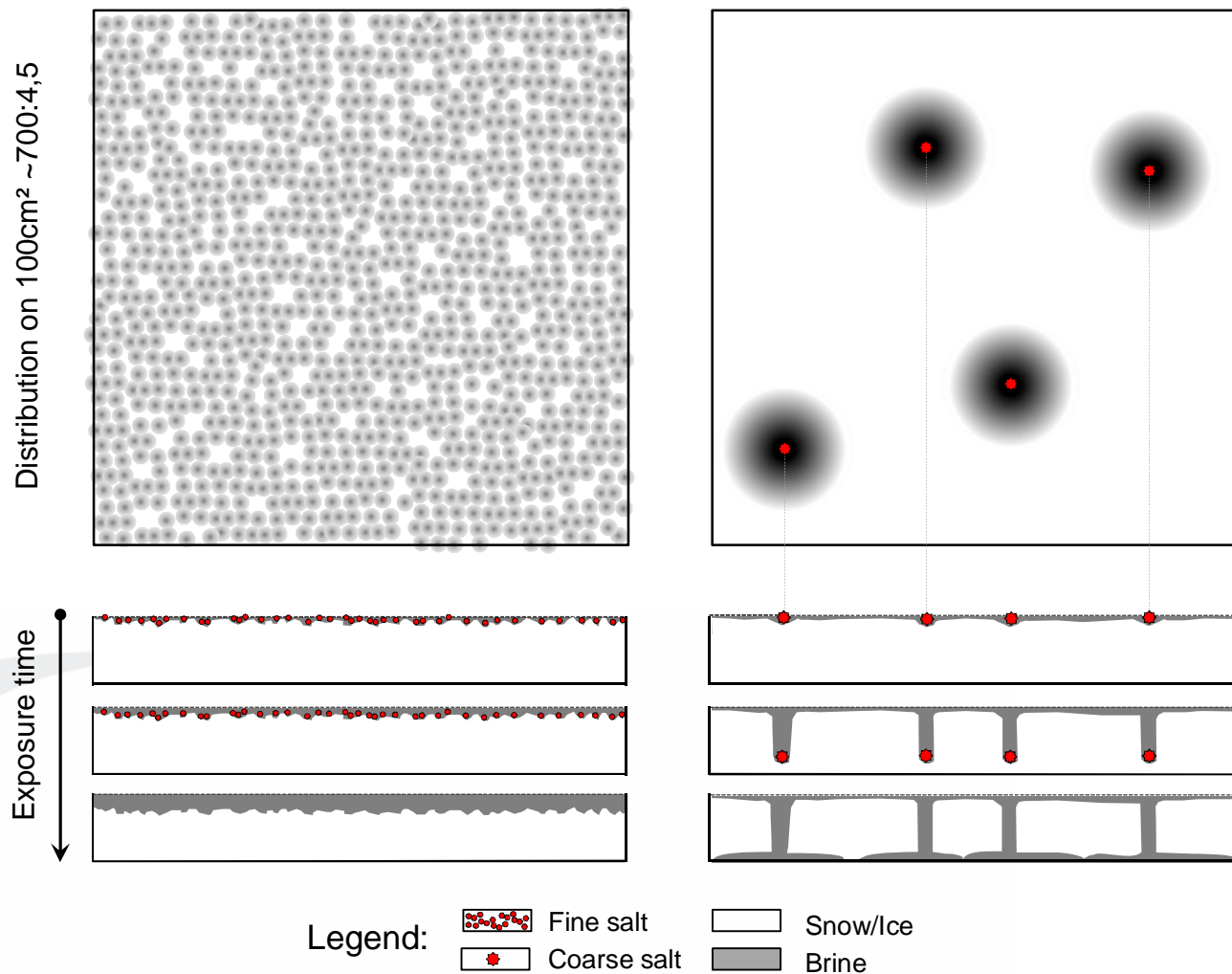


### 3. Resulting thawing capacity for solid deicers



Thawing capacity measurements from laboratory tests and calculated trends for sodium chloride with grain size 0.5mm and 2 mm at temperatures of -7.5°C including proposed thawing capacity quotients

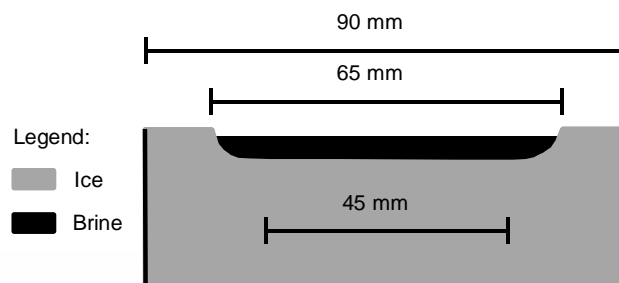
## 4. Impact of grain size



## 5. Test method for liquid deicers

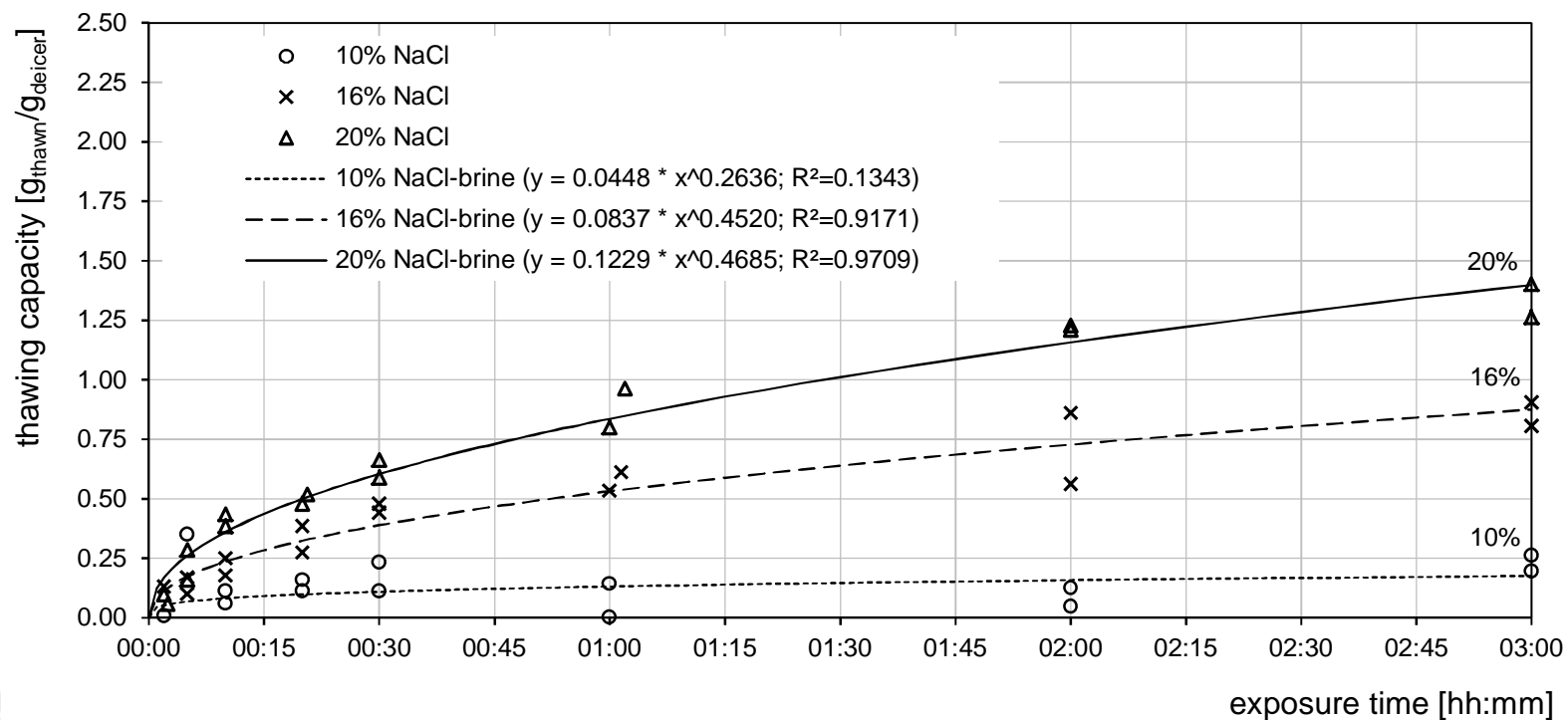
The testing procedure itself consists of applying the deicers, weigh the molten ice, weigh the remaining ice, calculate the ice thaw by the deicer

Test procedures and required materials and tools are mostly the same as for solid deicers.



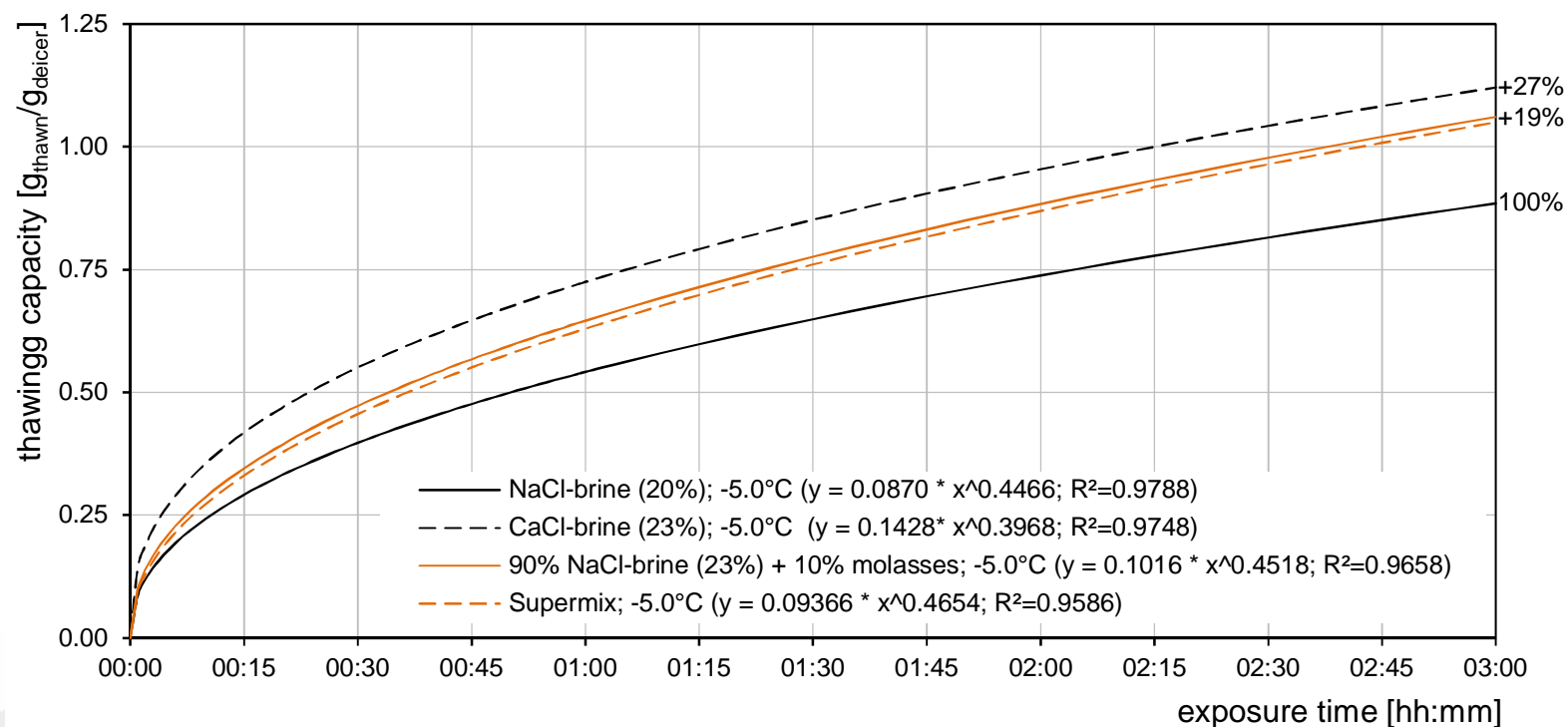


## 5. Resulting thawing capacity for liquid deicers I



Thawing capacity measured and calculated for sodium chloride with concentration of 10%, 16% and 20% at -2.5 °C

## 5. Resulting thawing capacity for liquid deicers II



Thawing capacity of 4 different deicers at -5.0°C as trend calculated with the equations based on measurements and shown in one figure

## 6. Conclusions and Outlook

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- The results show a strong related with practical experience and enable the shortcut from laboratory experiments to practical usage.
- Compared to the existing methods this new approach requires only a few laboratory facilities
- With the use of a modified climate chamber and the installed gloves there was no disruption in the test temperature during the procedure
- The chosen exposure times reproduce the practical effect of salt on the road with an high thawing rate at the beginning and further flattening
- Not reproducible with this laboratory test is the impact of traffic over time on the thawing capacity
- Nevertheless, the results already achieved using this test method allowed an optimization of prewetted salting in Austria