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XIII INTERNATIONAL WINTER ROAD CONGRESS

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SUSTAINABLE WINTER SERVICE FOR ROAD USERS

The Importance of the Quality of Deicing Materials

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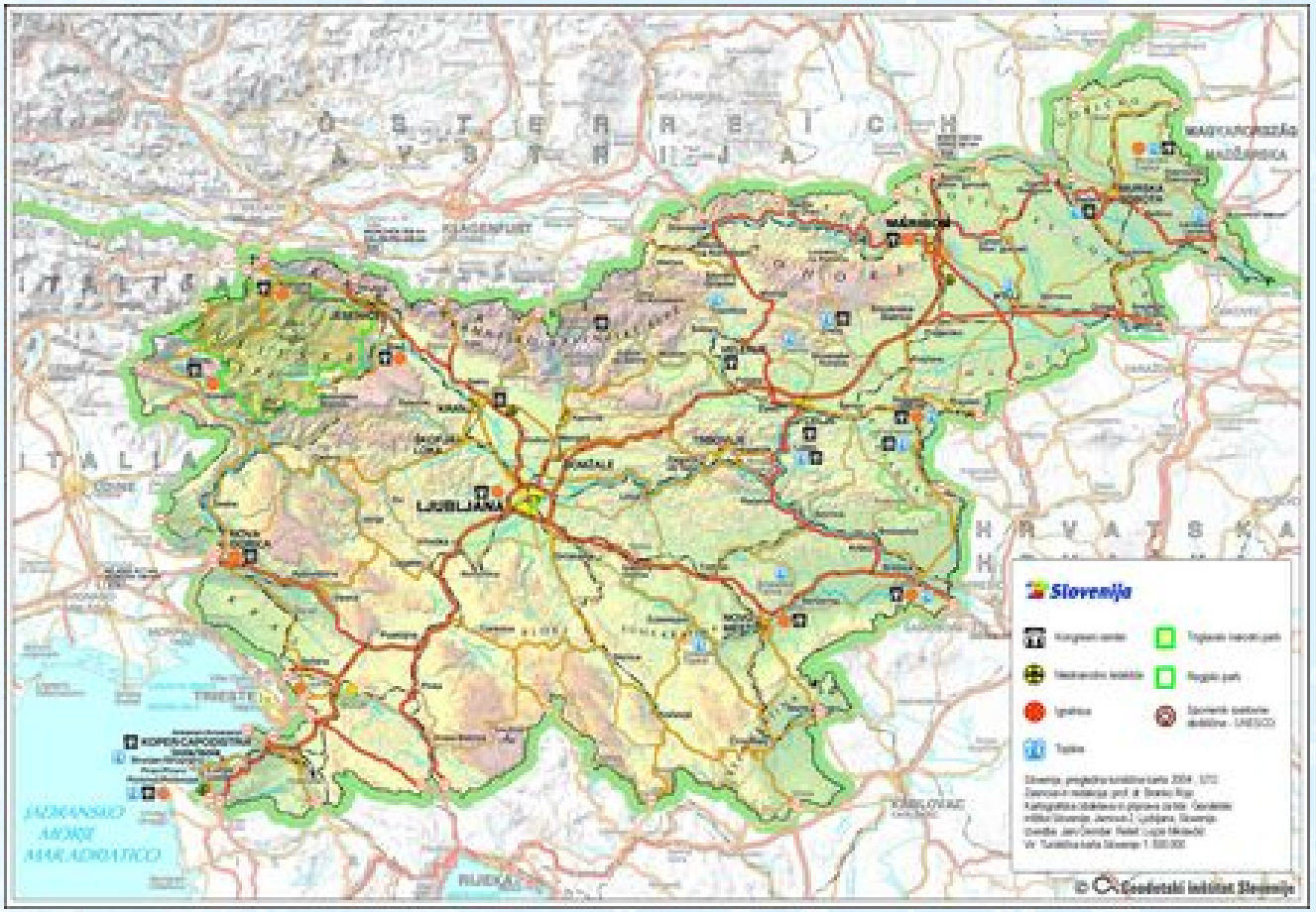
Introduction



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NO SMOKING

Emphasis

Laboratory testing of materials

Effect of salts on skid resistance

Salt spreading on mixed (asphalt and cement concrete) pavements

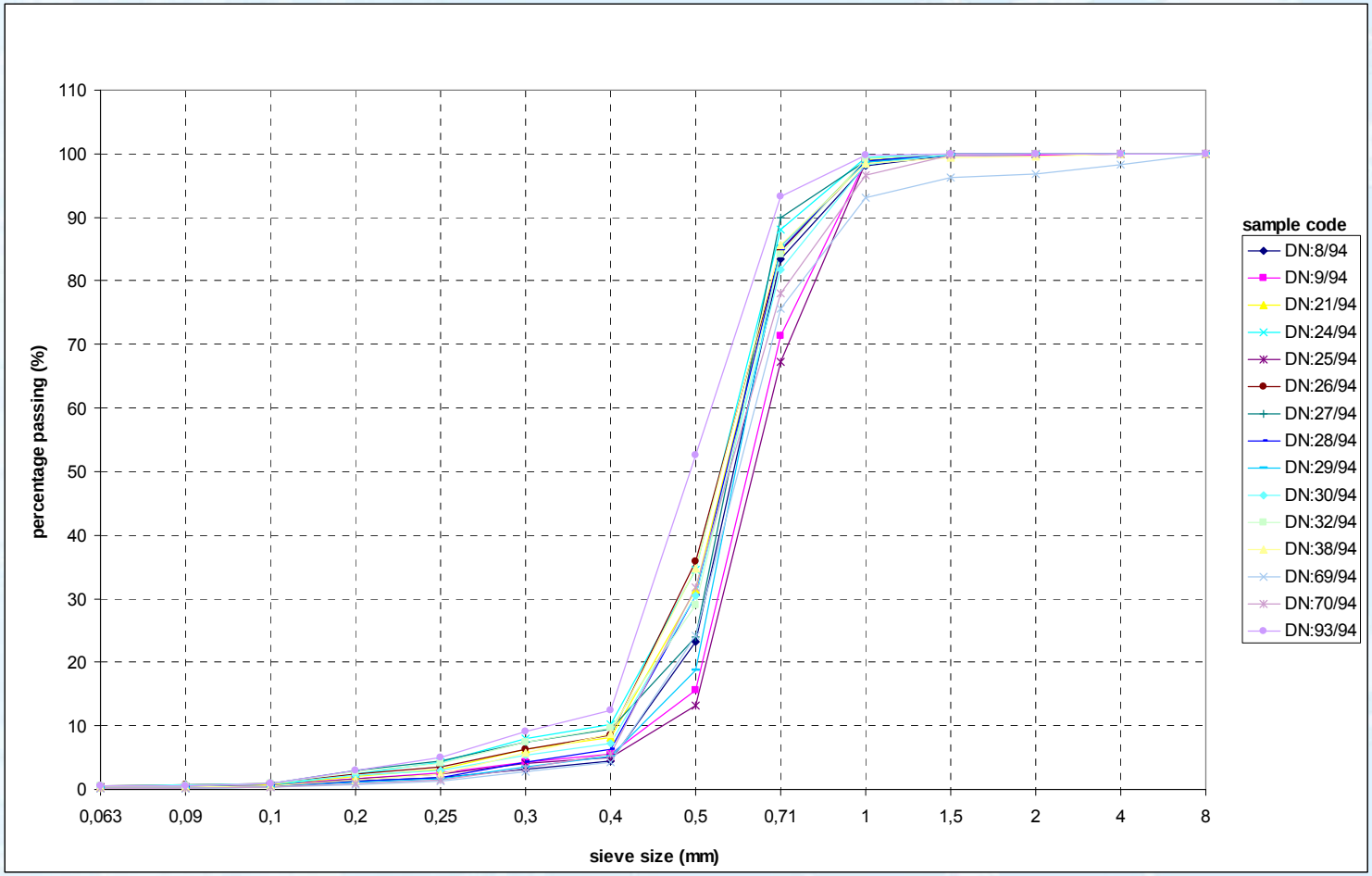
Further development

Laboratory testing 1

Physical analyses

- Perceptible properties
- Moisture content
- Hygroscopic properties
- Granulometric composition
- Effectiveness of melting ice
- Dissolving of salt after a set period
- Loose bulk density
- Strew angle

Example of the presentation of results of sieving analyses of 15 samples of salt with granulation of 0/2 mm.



Laboratory testing 2

Chemical analyses

- chlorides content
- content of insoluble substances
- anti-caking agent content

Proposed properties of NaCl upon delivery [1]

Property type	Required value
Moisture content	max. 4 m.-% (in bulk) max. 1 m.-% (for silos)
Content of chlorides expressed as NaCl	≥ 96 m.-%
Content of K4Fe(CN)6x3H2O	≤ 20 mg/kg

Proposed properties of NaCl upon delivery [2]

Property type	Required value
Granulometric composition:	
0/4 mm	
>4.00	≤ 10 %
2.00/4.00	20 - 40 %
0.40/2.00	40 - 70 %
<0.40	≤ 10 %
0/2 mm	
>2.00	≤ 5 %
1.00/2.00	30 - 60 %
0.20/1.00	30 - 60 %
<0.20	≤ 10 %
0/1 mm	
> 0.8	≤ 1 %
0.20/1.00	95 – 98 %
< 0.20	≤ 2 %

Proposed properties of NaCl upon delivery

Some changes were involved later

- for granulometric compositions and
- the content of anti-caking agent

- The main purpose of salt spreading is to improve traffic safety

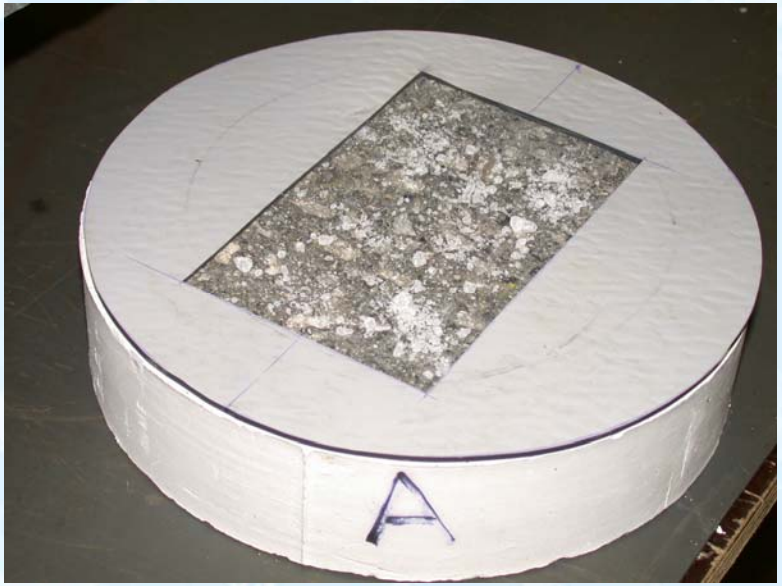
When salt is not mechanically removed from the roadway, it crystallises after it dries out and covers the roadway as dust. That can reduce skid resistance on an otherwise dry roadway

Test field surface for measuring skid resistance

Measuring of skid resistance

- Skid Resistance Tester

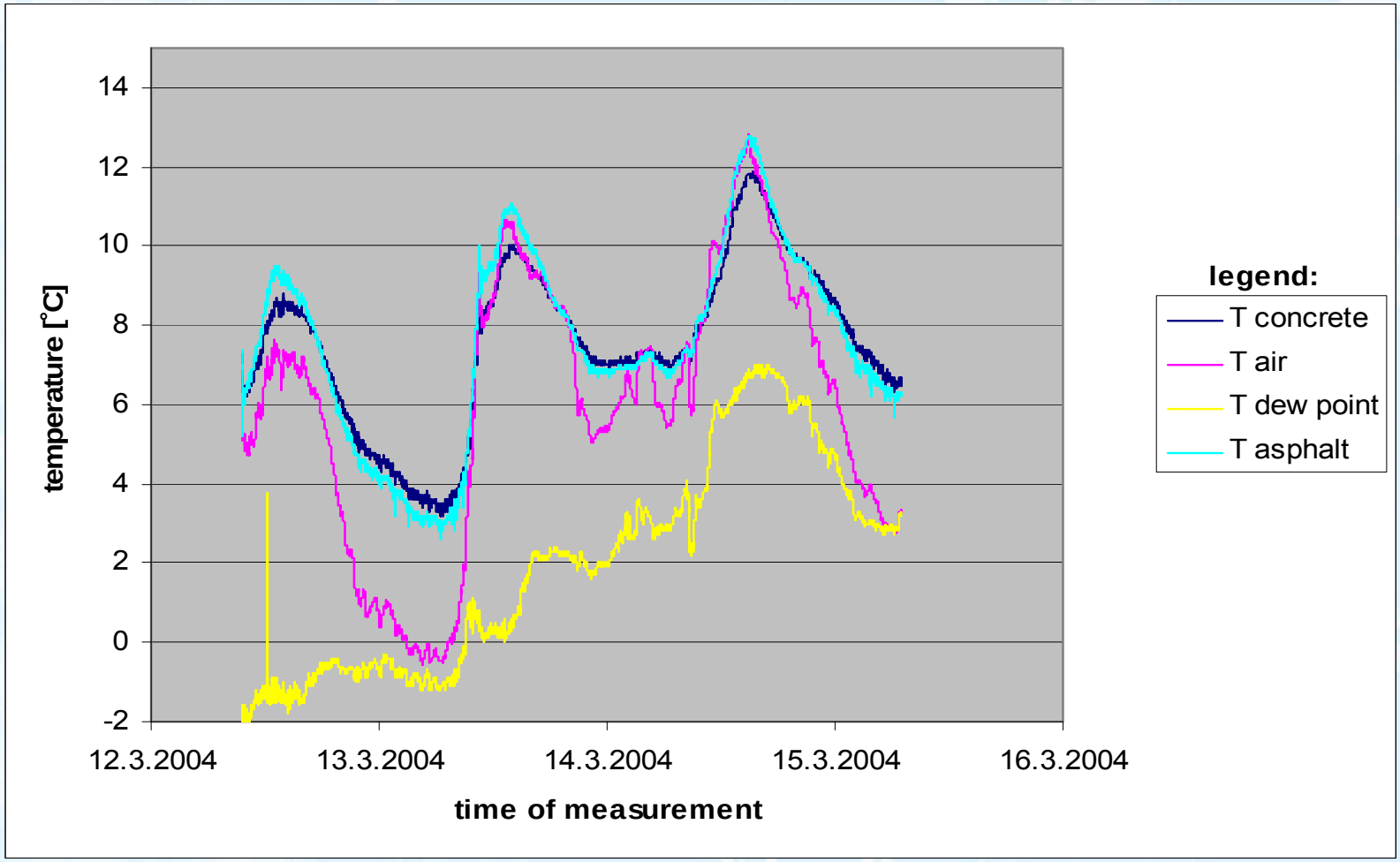
- Sample before testing



Description of sample surface	Types of samples							
	old asphalt pavement samples				new asphalt pavement samples			
	A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**
Non-spread, 24 °C	59	38	41	51	69	70	72	64
Initial condition, non-spread, 0 °C	60	42			75	66		
100g/m^2 NaCl 0/4, 0°C			41	48			70	62
200g/m^2 NaCl 0/4, 0°C			42	45			64	59
Initial condition, non-spread, -10°C	17	14			80	84		
100g/m^2 NaCl 0/4, -10 °C			34	48			80	65
200g/m^2 NaCl 0/4, -10 °C			35	47			63	51

Mixed pavements of crowler lines

Temperature measurement results on different surfaces



Theoretical quantities of the melting agent

Melting agent	Temperature of measurement					
	-5°C	**-6 °C**	**-7 °C**	**-8 °C**	**-9 °C**	**-10 °C**
Consumption of 96% NaCl in g for melting 1 kg of ice	**90.6**	**105.5**	**122.2**	**139.4**	**154.3**	**169.6**
Consumption of 24% $CaCl_2$ in g for melting 1 kg of ice	**422**	**488**	**541**	**606**	**650**	**701**

Further Development

Development goes primarily in the direction of preserving an adequate effectiveness of the known spreading materials with reduced pollution of the environment and, if possible, lower costs.

One of the options to get closer to that goal is the replacement of CaCl2 with NaCl solution, when and where it is possible.

Mixing plant 4,5 m3 and silo for solution 30000 liters

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Conclusions

- The basic principle in the use of melting materials is to use chemicals only there and then and in the quantity urgently necessary for road traffic safety.

- Implement all known advancements in winter maintenance
- Develop winter service information system
- Provide funds for further development

Thank you!

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