Road marking approval test
in Germany

Objectives

Historical review

Basics and regulations

Test engineering

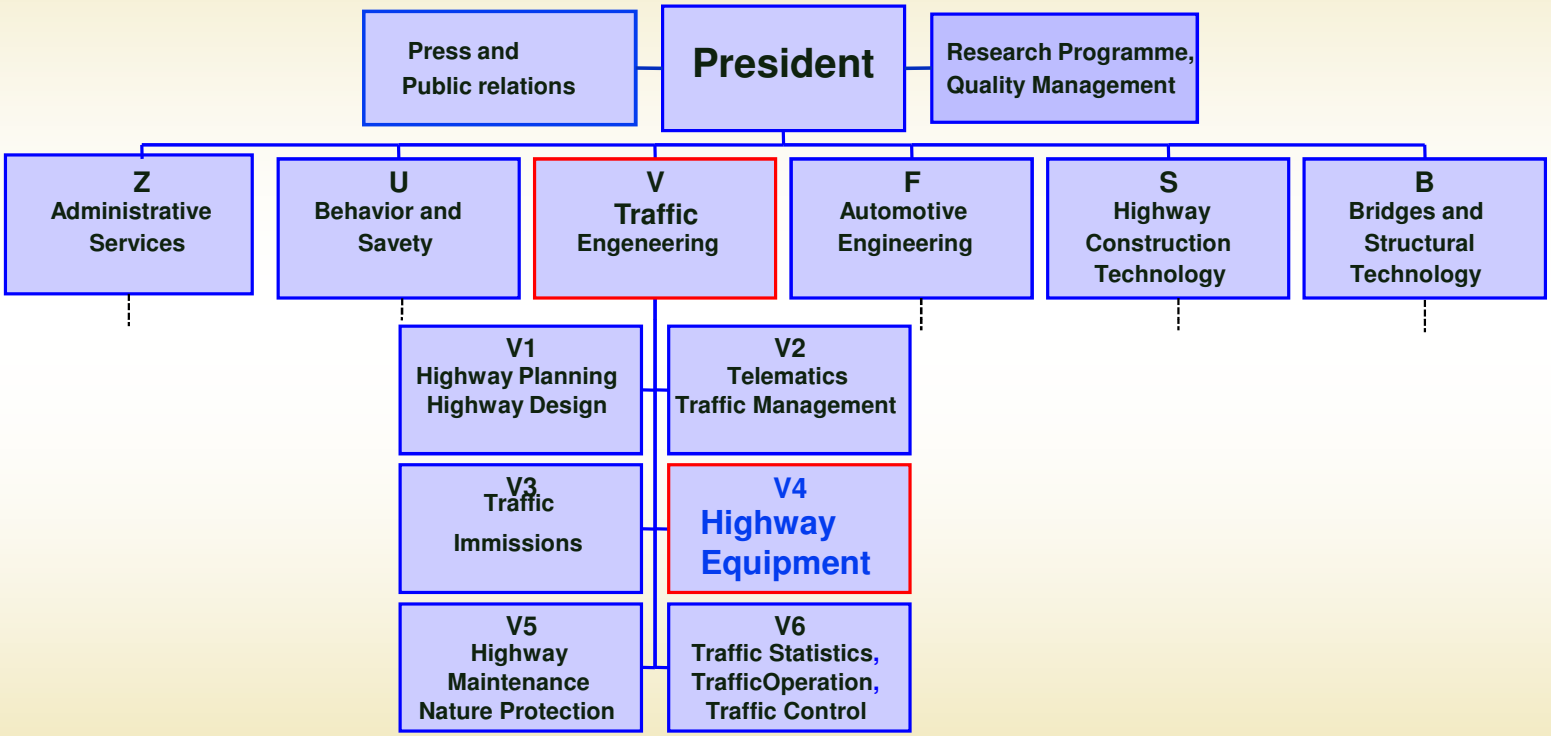
Test procedures

Results

1st Road Marking Symposium, Intertraffic 2008, Amsterdam, 3th of April 2008
Rudolf Keppler, Section Road Equipment - Federal Highway Research Institute (BASt), Bergisch Gladbach (Germany)

Federal Highway Research Institute (BASt)

Section V4 'Highway Equipment'



Section V4 'Highway Equipment'

Tasks

- Testing and certification body for circulation fixtures
- Fundamental analyses of vehicle restraint systems
- Fundamental analyses and testing of road marking materials
- Passive safety of circulation fixtures
- Technical requirements concerning materials and visibility characteristics of
  - vertical signs and traffic control devices,
  - vertical guidance elements,
  - traffic lights.
- Lighting of roads and tunnels

Objectives

for Improvement traffic safety concerning road markings

- Fulfillment of minimum requirements
- Improvement in the quality
- Maintenance of the achieved quality
- New and advanced developments
- Approval list of examined road marking systems

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Review

and development of the road marking tests

- 1957 ordinance from the ministry of transport
- 1969 first small tests on road trials
- 1972 extensive road trials (with problems)
- Giving up road trials ?
- Development of BASt-wear simulator (RPA)
- Test engineering and procedure today

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Basic elements of road marking tests

National standards

- ZTV M 02 — Additional technical conditions of contracts
- TL M 06 — Technical delivering conditions
- TP M 0x — Technical test conditions for road marking systems

European standards

- EN 14 36 — Requirements of road markings
- EN 1790 — Pre-formed road markings
- EN 13 197 — Wear simulators (RPA)
- EN 1423 (h) — Drop-on-Aggregates (CE-Mark)
- EN 1424 (h) — Premix glasbeads
- EN 1871 — Physical properties
- EN 12 802 — Laboratory methods for identification
- EN 18 24 — Road trials

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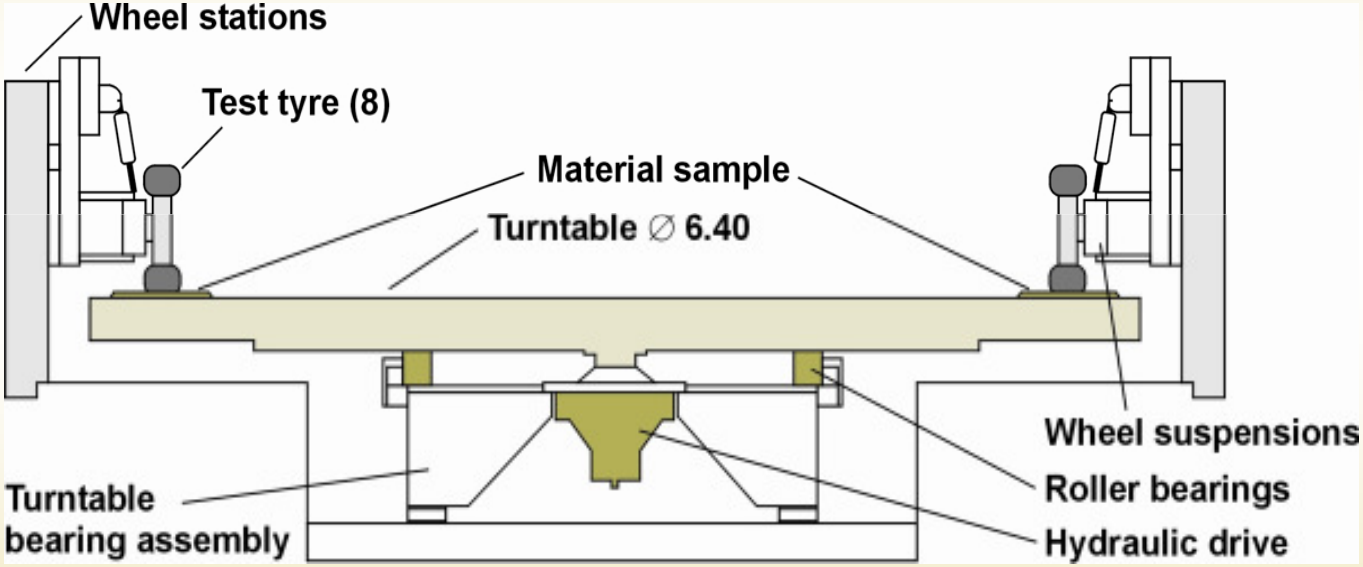
Test engineering today

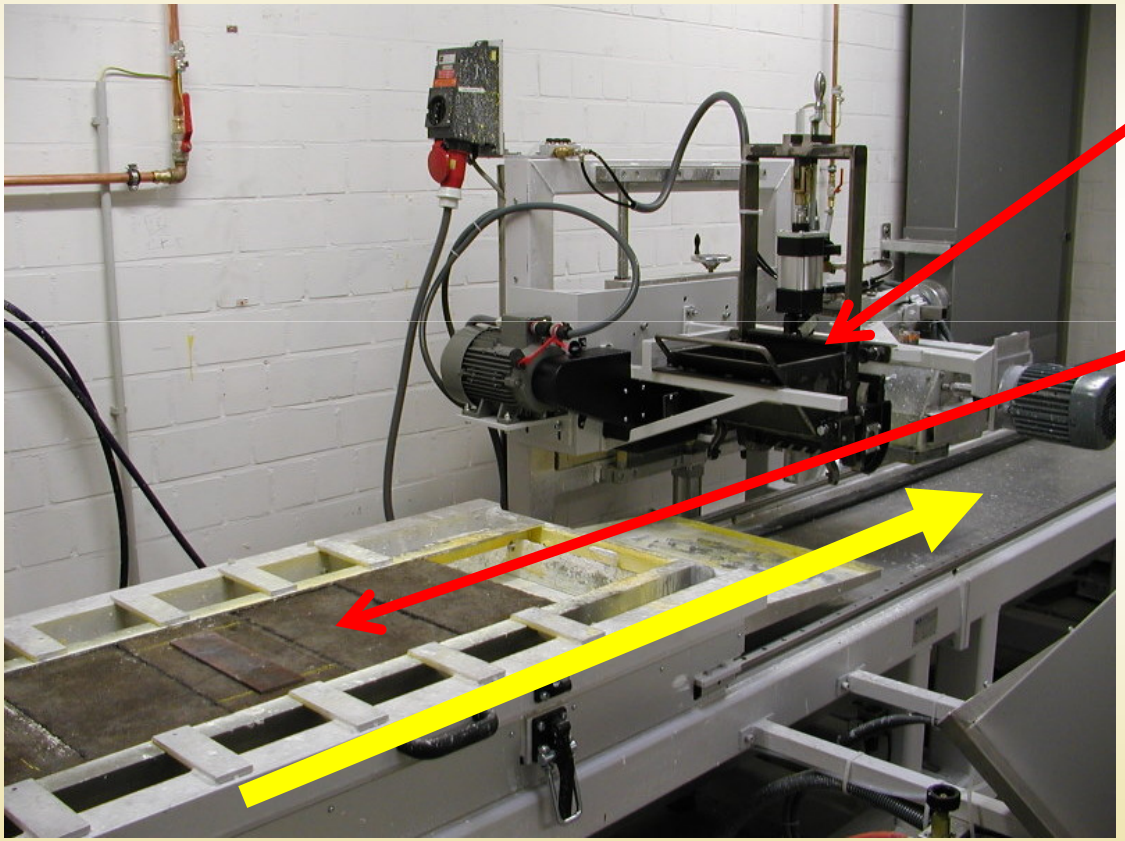
Wear simulator according to EN 13 197



Principle function picture

Test engineering today

Application equipment



using different application components

test Samples

Bituminous plates with applied road marking

test samples ready to test

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Test engineering today

Wear simulator according to EN 13 197

bast

Federal Highway Research Institute

Wear simulator according EN 13197

motion picture

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Approval test procedure

traffic classes according to EN 13197

P 0	0	--
P 1	*50.000*	--
P 2	100.000	temporary tape (only thin layers)
P 3	*200.000*	--
P 4	500.000	permanent and temporary, type I, paint, plastic and tape
P 5	1.000.000	permanent and temporary, type I, paint ,plastic and tape
P 6	2.000.000	permanent and temporary, type II, paint, plastic and tape
P 7	4.000.000	permanent and temporary, plastik and tape

Approval test procedure

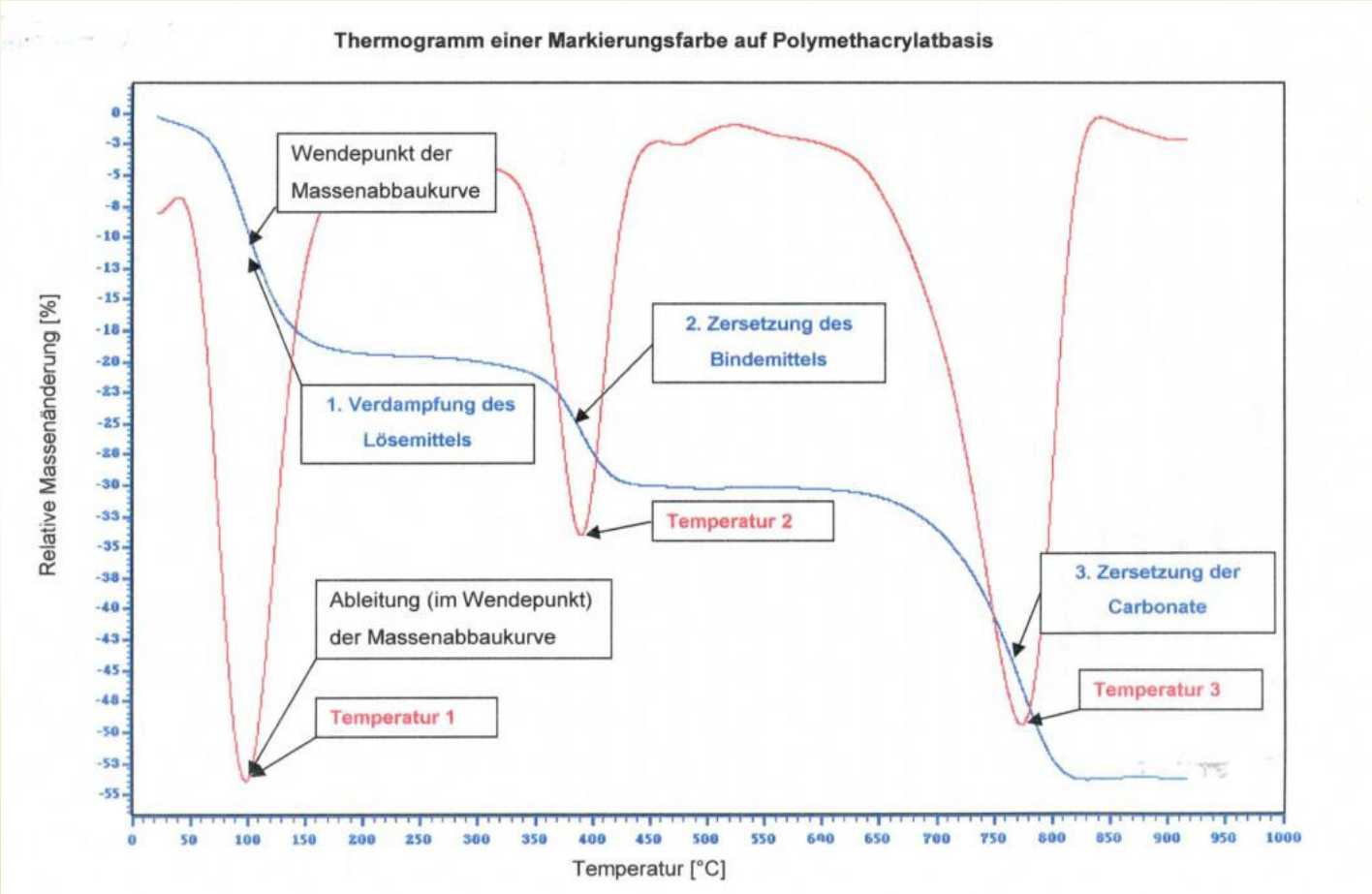
Wear simulator test (Quality system step 1)

fulfilling of all following minimum requirements according to EN 1436 resp. EN 13 197 in new conditions, during and on the end of the test

- night time visibility, dry
- night time visibility, wet/rain (type II)
- skid-resistance
- day time visibility
- chromaticity (white / yellow)
- wear, rest of wheel touched area min. 90%
- drying time at the application, max. 30 min.

Approval test procedure (Quality system step 2)

Chemical and thermograph prototype tests of the road marking materials



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Approval test results

for each sample

- Test data documentation summarised in a table
- issue of a test certificate, but only in case of fulfilling the minimum requirements during and after the test according EN 1436
- Test certificates for chemical/physical material analysis and documentation (finger print)
- Admission as an examined road marking systems in a national list according the national standard (ZTV M 02)

Quality system step 3

Tests outside during and after application for control the requirements according to the national Standard ZTV M 02

- **internal quality control**
  - inspection during application
  - inspection of applied road markings
- **Check tests**
  - Check tests during application (sampling storage materials)
  - Check tests on finished road markings
- **equivalence tests of the used materials (finger print)**
- **Additional check tests**
- **Arbitration investigations**

Advantages of wear simulator tests

according to EN 13 197 in opposite of test fields

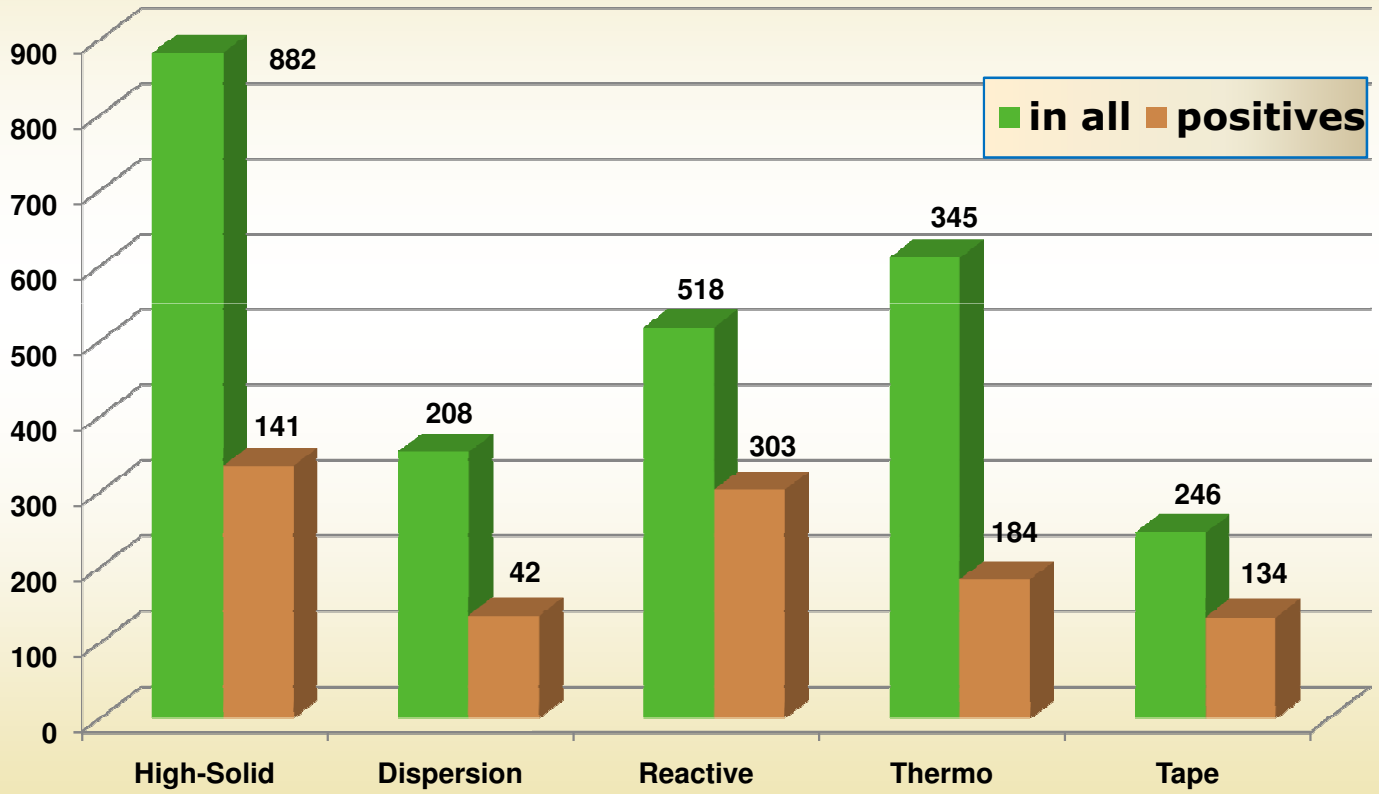
- **reducing of the (approval) test time app. 50 to 1**
- **repeatability**
- **comparability between different road marking systems**
- **accurate accounting of traffic circulation**
- **equal test conditions for all kinds of road marking systems**
- **Independent form whether conditions**

however, the most important points are

- **no interruption of traffic circulation**
- **no risk of accidents**

Results of road marking approval tests since 1989

Summary (∑ 2610, adjusted)



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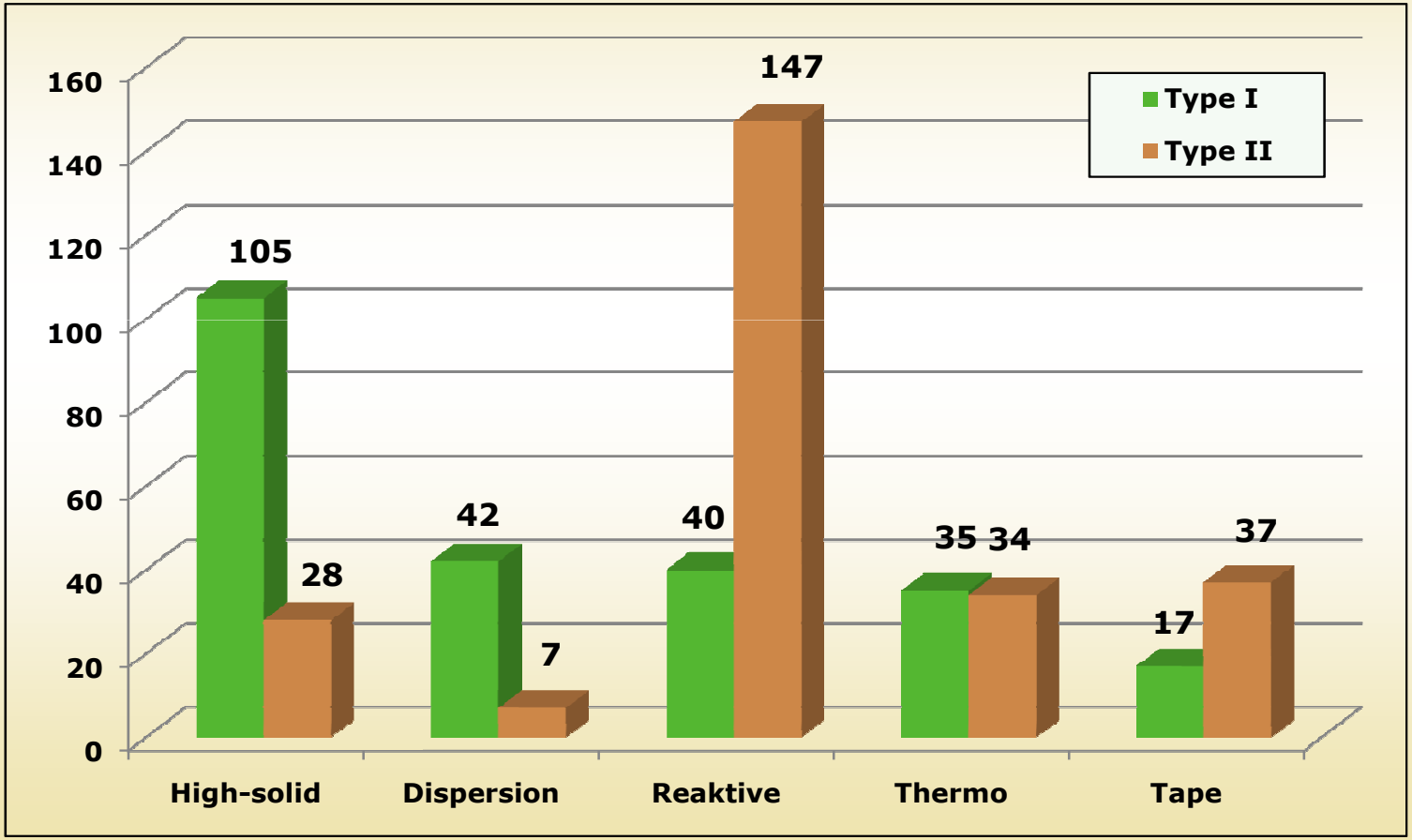
Admitted road marking systems

according to the German national standard ZTV M 02 (∑ 492)



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Many thanks for your attention …

… and …

… what a beautiful time before any tests for road markings …