EMULSION BITUMEN APPLICATIONS

MICROSURFACING ON CONCRETE PAVEMENT

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Summary :

- Reminder Emulsion applications
- Slurry Surfacing EN 12273

  - Definition
  - Mix design constituents and target
  - Test method used
  - Machine type and synoptic
  - Slurry Surfacing uses and limits
  - Micro on concrete pavement
  - Performance of surface characteristic
  - Conclusion

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Bitumen Emulsion Applications

- Applications
  - Prime coats
  - Bond coats
  - Surface dressings (Chip Seal)
  - Slurry surfacing
  - Cold mixes
  - Cold recycling of pavement with bitumen emulsion

2- Bitumen Emulsion Application
Slurry Surfacing EN 12273

- DEFINITION

  Slurry Surfacing is a surface treatment consisting of a mixture of mineral aggregates, water , bituminous emulsion and additives which is mixed and laid in place .

  Slurry Surfacing product may consist of one or more layers.

- Note: Slurry Surfacing made with larger size of aggregates is often known as microsurfacing and when made with smaller aggregates , for example less than 4 mm size , is sometimes called slurry seal. Both are included in the European Standard

2- Bitumen Emulsion Application
Slurry Surfacing EN 12273

MIX DESIGN- CONSTITUENTS

- Aggregates
- Emulsion
- Water
- Breaking agent
- Additives

2-Bitumen Emulsion Application
Slurry Surfacing EN 12273

- TARGET OF THE MIX DESIGN

- Durable skid resistance
- Admissible noise emission
- Resistance to wear (traffic ,climatic and chemical agression)
- Waterproofing the support
- Ability to transersal reshaping

Having in mind

✓ Laying period

✓ Delay for opening to the traffic

Slurry Surfacing EN 12273 2- Bitumen Emulsion Application

TESTS BEFORE APPLICATION

- Consistency EN 12274-3
- Cohesion EN 12274-4
- Wear EN 12274-5
- Abrasion EN 12274-7

Consistency test

Breaking tets

TESTS DURING APPLICATION

- Sampling EN 12274-1
- Residual binder content EN 12274-2
- Rate of application EN 12274-6

Benedict Cohesion Meter measurement of the increase in cohesion of Microsurfacing

Cohesion test

Resistance to wear

TEST AFTER APPLICATION

- Evaluation of defects EN 12274-8

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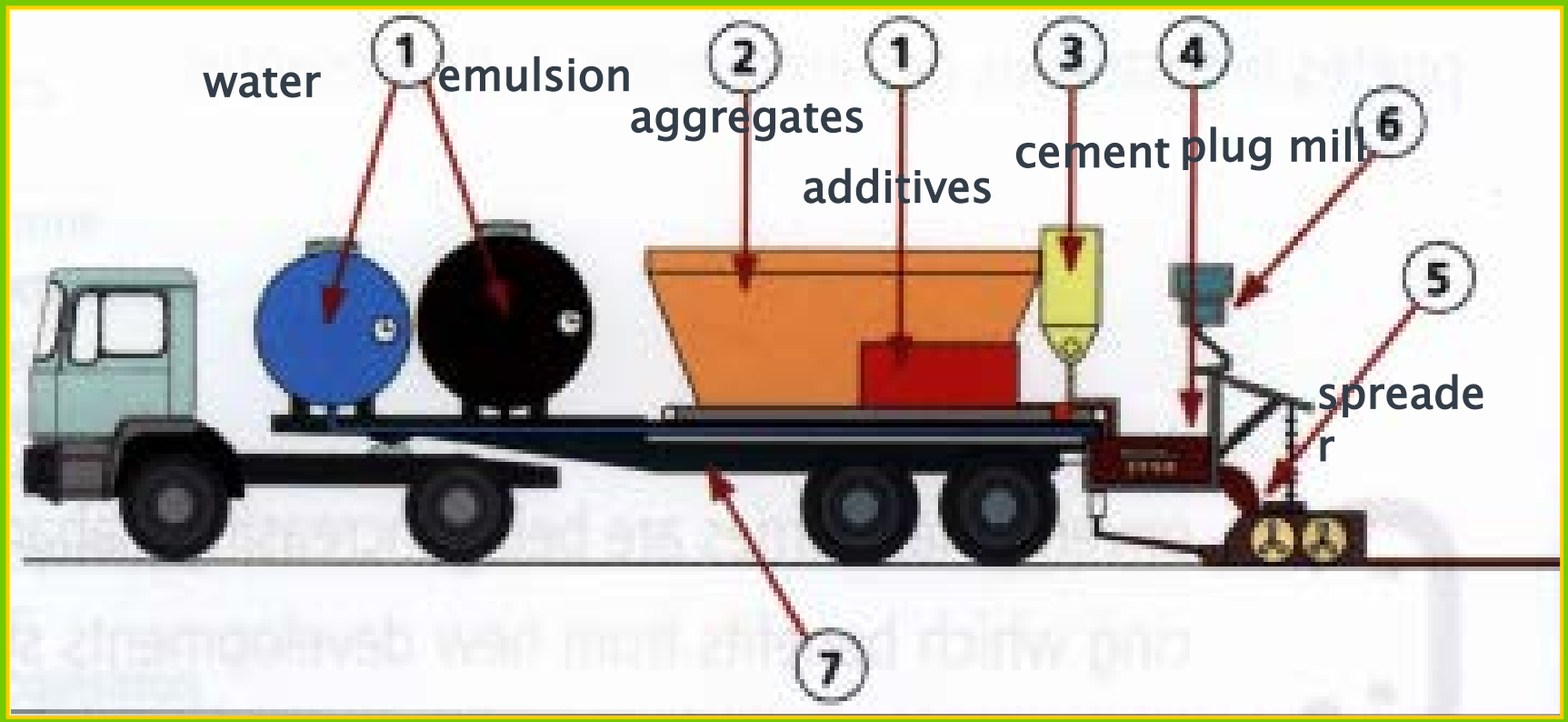
Slurry Surfacing EN 12273

Slurry machine synoptic



2- Bitumen Emulsion Application
Slurry Surfacing EN 12273

DOSING RATE

Average rate:

- 7 to 8 kg/m2 for 0/4
- 8 to 13 kg/ m2 for 0/6 or 0/8
- 13 to 20 kg/m2 for 0/10

RATE OF APPLICATION

- ✓ 4 to 8000m2/ day for batch machine
- ✓ Up to 30,000m2/day for frontal feeding machine

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Slurry Surfacing EN 12273

SLURRY SURFACING USES

Since 1986 a wide range of uses as :

- High performance thin surfacing systems for motorways
- Surface treatment for “Black Spot Areas”
- Surface course with high amount of RAP
- Crack inhibitor layer
- Bond coat
- Colored surfacing
- Surface maintenance of concrete pavement

Slurry Surfacing EN 12273

LIMIT OF USE

- Transversal deformation > 20mm
- Cracks >3mm or alligator fatigue cracks
- Structure defects
- High deflection of the pavement structure
- Temperature :pavement and air below 10°c and falling
  Shower rain
- Frost
- Season between April and October

Micro On Concrete Pavement

Traffic Load on Concrete Autobahn A5
A5 near Karlsruhe
Following a traffic censur 2014 there have been running:

143.394 vehicles /24 h = + 2.9 % compared to 2013
20.229 goods traffic / 24 h = + 1.6 %

Let‘s now talk about a Micro Surfacing treatment on the A5 Concrete Autobahn between Karlsruhe and Frankfurt - kilometer markers 601 > 591 - close to Karlsruhe.

Reason of this maintenance: lack in surface texture , grip and uneveness

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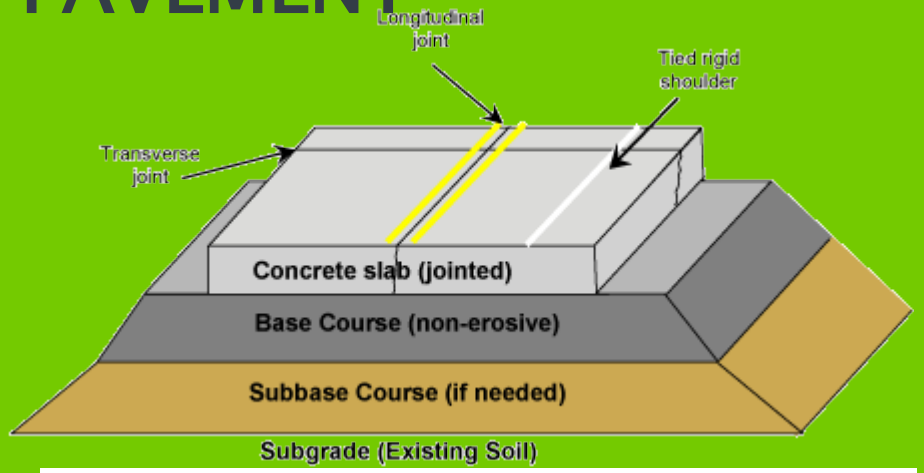
Micro On Concrete Pavement

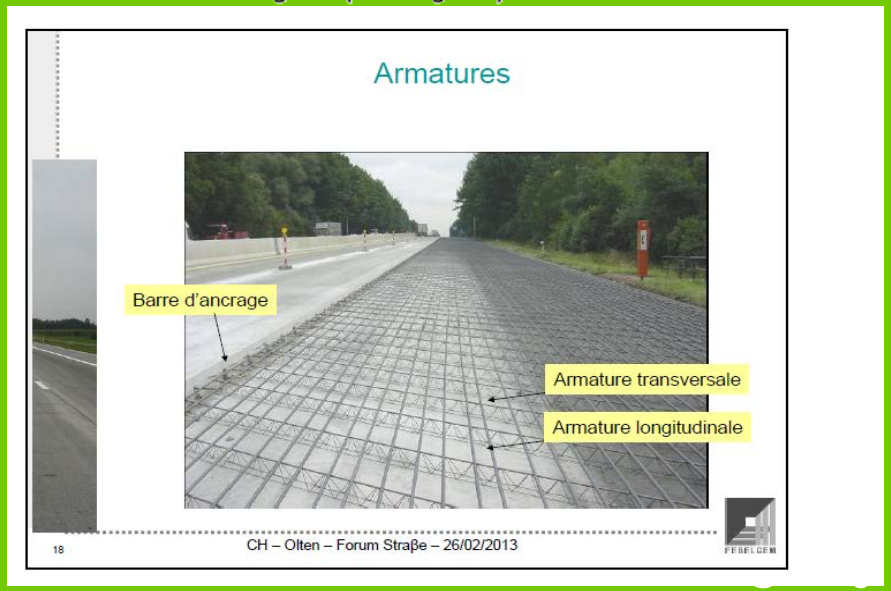
1. Type of concrete pavement ?
2. Support cleaning
3. Joint treatment
4. Spreading tack coat
5. First layer of Micro
6. Second layer of Micro
7. Sawing joints

Micro on Concrete Pavement

1-TYPE OF CONCRETE PAVEMENT

Plain concrete dowelled or undowelled ? Continuous reinforced concrete pavement? or Jointed reinforced concrete pavement?





Micro On Concrete Pavement

2. Cleaning the concrete surface

Sweper

High water Pressure

Micro On Concrete Pavement

3-Joints & cracks treatment

Micro On Concrete Pavement

Micro On Concrete Pavement

4-Next essential step before Micro Surfacing on Concrete: Tack-Coating

Micro On Concrete Pavement

5-Micro Application followed by compaction

Directly after tack-coating 12-13 kg/m2

Micro Surfacing

As soon as the breaking process of the mix starts the layer is additionally compacted by an 18 to rubber-tired roller. - Purpose: avoiding possible future pressure deformations in the surface.

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Micro On Concrete Pavement

6-Second Run of Micro Application

About 30 minutes after having applied the first layer the second one is applied as follows:

No Tack-coating

Micro Surfacing of 12-13 kg/m² Micro-Mix

Compaction by an 18 ton rubber-tired roller.

Micro on Concrete Pavement

Details of Micro Surfacing Mix

Composition of Micro Surfacing Mixture

Aggregare type:	Moraine
Max. aggregate size:	0/5 mm
Proportion > 2 mm:	55,6 M.-%
Proportion 0,063 - 2 mm:	38,0 M.-%
Proportion O - 0,063 mm:	6,4 M.-%
	100,0 M.-%

Selected Mixture:

Binder content of dry weight: 6,5 M.-%

Proportion of bitumen emulsion: 10,7 (of DSK-Emulsion of 65,0 % bitumen)

Type of Bitumen emulsion: C65BP1-DSK as per German TL BE-StB 07, Table 6

Micro On Concrete Pavement

7- Sawing and joint treatment

The final result: Micro on Concrete Motorway

Micro On Concrete Pavement

Final Application Data

While the first layer regulates the underlaying concrete surface, the second one ensures an even running surface and improved texture.

Job figures:
Maintained Concrete Autobahn : right hand lane for heavy load traffic Length of application: 12 Km
Width of lane: 3.5 m
Applied area: 40.000 m²
Application rate: 25 kg/m² in 2 runs
Duration of job: 4 days, restricted working hours – 10:00 am to 08:00 pm

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Slurry Surfacing EN 12273

REMINDER OF PERFORMANCE OF SLURRY SURFACING

DURABILITY OF SURFACE CHARACTERISTICS

1- Macrotexture

Texture depth	**3years**	**7years**
Motorway (A13 SL)	0,95mm	0,75mm
Motorway(A13 FL)	1,50mm	1,00mm

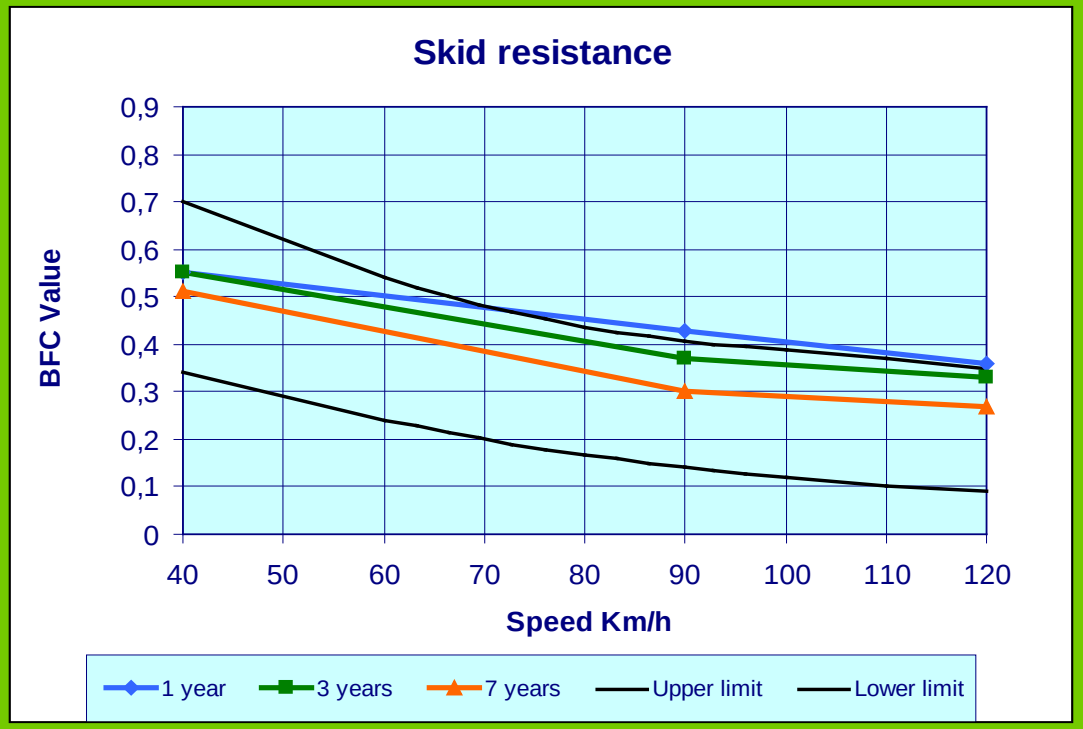
Motorway A46(UK)	**18 months**	**3 years**
	1,60mm	1,00mm

Slurry Surfacing EN 12273

REMINDER OF PERFORMANCE OF SLURRY SURFACING

DURABILITY OF SURFACE CHARACTERISTICS

2– Skid resistance



Conditions of measurement

- **smooth - Tyre (PIARC)**
- **1 mm of water**
- **locked Wheel**
- **Speed 40 to 120 km/h**

Standard NFP 98-220 -2

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The Advantages of Micro on Concrete Pavement

✓High installation performance due to fast application using modern Micro Surfacing machinery. Small, short traffic restrictions during the Micro Surfacing application.
✓Traffic release on the freshly laid surface about 20 min. after laying

✓The high deformation resistance of the concrete substructure minimizes the compressibility or deformation of the Micro Surfacing layer.
✓Reduction of road noise due to the relatively open structure of the Micro Surface. Improve of surface texture.

✓Temperature protection of the concrete surface thanks to the insulation by the Micro layer. Micro Surfacing seals the concrete surface, eliminates surface water penetrating into the concrete structure which reduces „Concrete Cancer“ – a chemical reaction within the concrete structure.

✓Finally: It increases the lifetime of the overall structure and saves money

THANK YOU FOR YOUR ATTENTION

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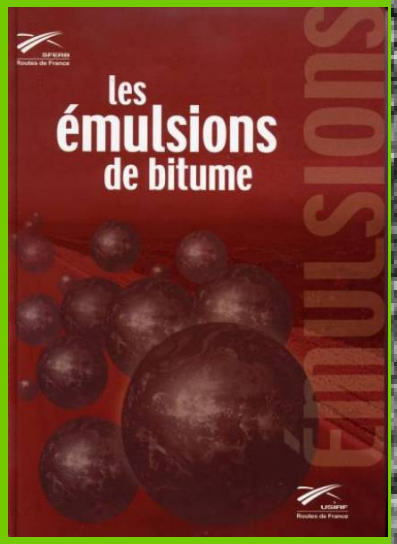
Merci de votre attention !!!!

Thanks for your attention !!!



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