



# AAPA 2012 Study tour visiting EAPA and Eurobitume

**Egbert Beuving**

Director EAPA

European **A**sphalt **P**avement **A**ssociation

Visit EAPA head quarters

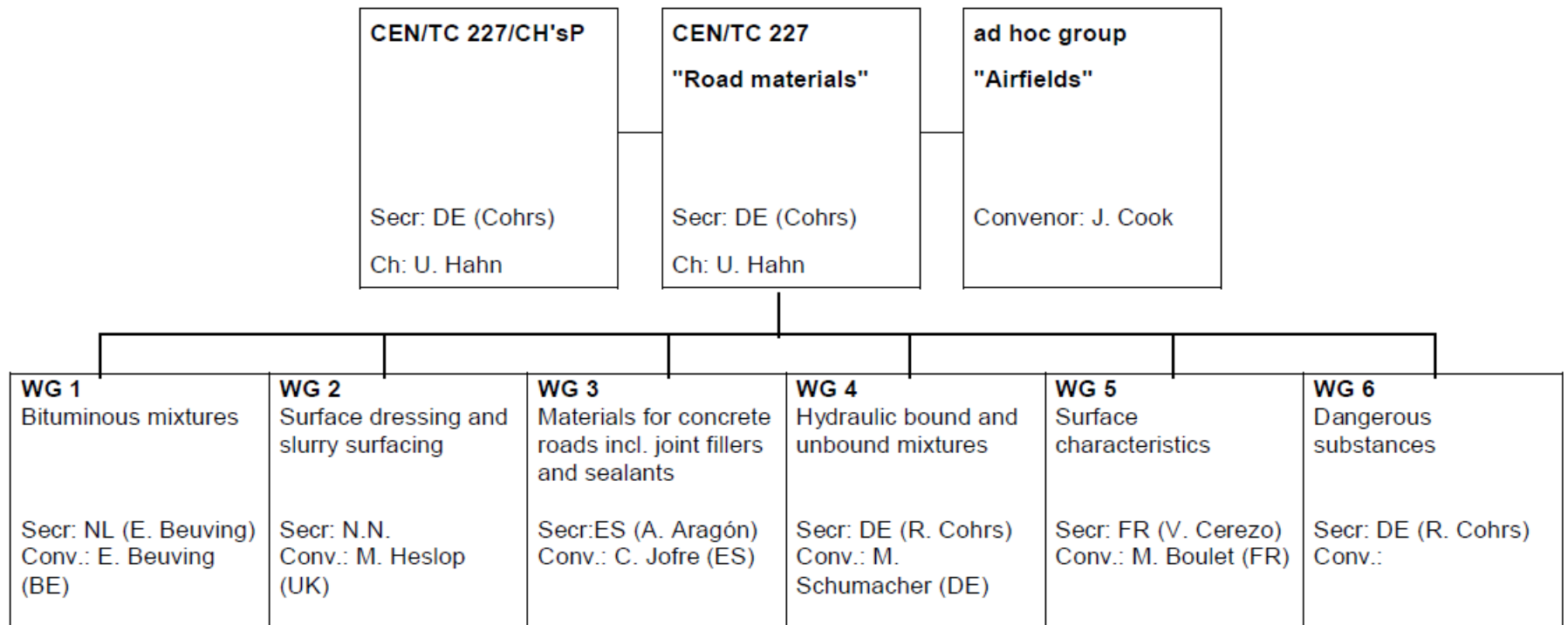
- Binders specification harmonisation,
- Health and safety regulations around bitumen, REACH and purchasing models,
- Delivery of high performance pavement systems and products



# Overview Presentation

- **European asphalt and bitumen standards**
- **Environmental items in these standards**
- **Work Zone Safety**
- **EAPA Environment Group**
- **Delivery of high performance pavement systems and products**
- **Purchasing models**
  
- Health and safety regulations around bitumen and REACH and

## Organization of the work of CEN/TC 227 "Road materials"





# EU Asphalt Standards

## **CEN TC227 WG1**

- **TG 2 Test Methods**
- **TG3 Product Standards**
- **TG 4 Conformity Assessment Standards + RAP**

## **12697 series**

- **-1 Soluble Binder Content**
- **-2 Particle Size Distribution**
- **-3 Bitumen recovery**
- **-12 Water sensitivity of bituminous specimens**
- **-16 Resistance against studded tyres**
- **-22 Wheel tracking test**
- **-24 Resistance to fatigue**
- **- 26 Stiffness**
- **-43 Resistance to fuel**



# TG2 TEST METHODS

**Several Test methods in 5-year review process**

**New standards (being developed)**

- **45 : Saturation Ageing Tensile Stiffness (SATS) Conditioning Test**
- **46 : Low temperature cracking and properties**
- **47 : Determination of the ash content of natural asphalts**
- **48 : Bond strength**
- **49 : Friction After Polishing**
- **50 “Scuffing resistance” the ARTe test method was chosen based on blind testing, but ...**



# TG 3 PRODUCT STANDARDS

## Product standards in 5-year Review Process

### Bituminous mixtures - Material specifications

13108- Part 1: Asphalt concrete

13108- Part 2: Asphalt concrete for very thin layers

13108- Part 3: Soft asphalt

13108- Part 4: Hot rolled asphalt

13108- Part 5: Stone mastic asphalt

13108- Part 6: Mastic asphalt

13108- Part 7: Porous asphalt

13108- Part 8: Recycled asphalt

13108- Part 9: Asphalt for Ultra Thin Layers





# TG 3 PRODUCT STANDARDS

**In April 2011 it was decided to work only on the ‘normal approach’ for the next generation of product standards, where the options for the two approaches (‘open’ and ‘prescriptive’) are available within one standard, such that individual countries can choose which criteria they wish to adopt**



# TG 3 PRODUCT STANDARDS

**So for Asphalt Concrete**

- **the ‘prescriptive’ (Empirical-approach) and**
  - **the ‘open’ (Performance-approach)**
- will be merged.**

**For Porous Asphalt and SMA some**

**“performance requirements” will be added to the existing standard.**

**A line (in careful wording) will be added to avoid over specification.**



# TG 4 CONFORMITY ASSESSMENT STANDARDS

**EN 13108-8 RAP**

**EN 13108-20 Type Testing**

**EN 13108-21 FPC**

- **In 5 Year Review Process**



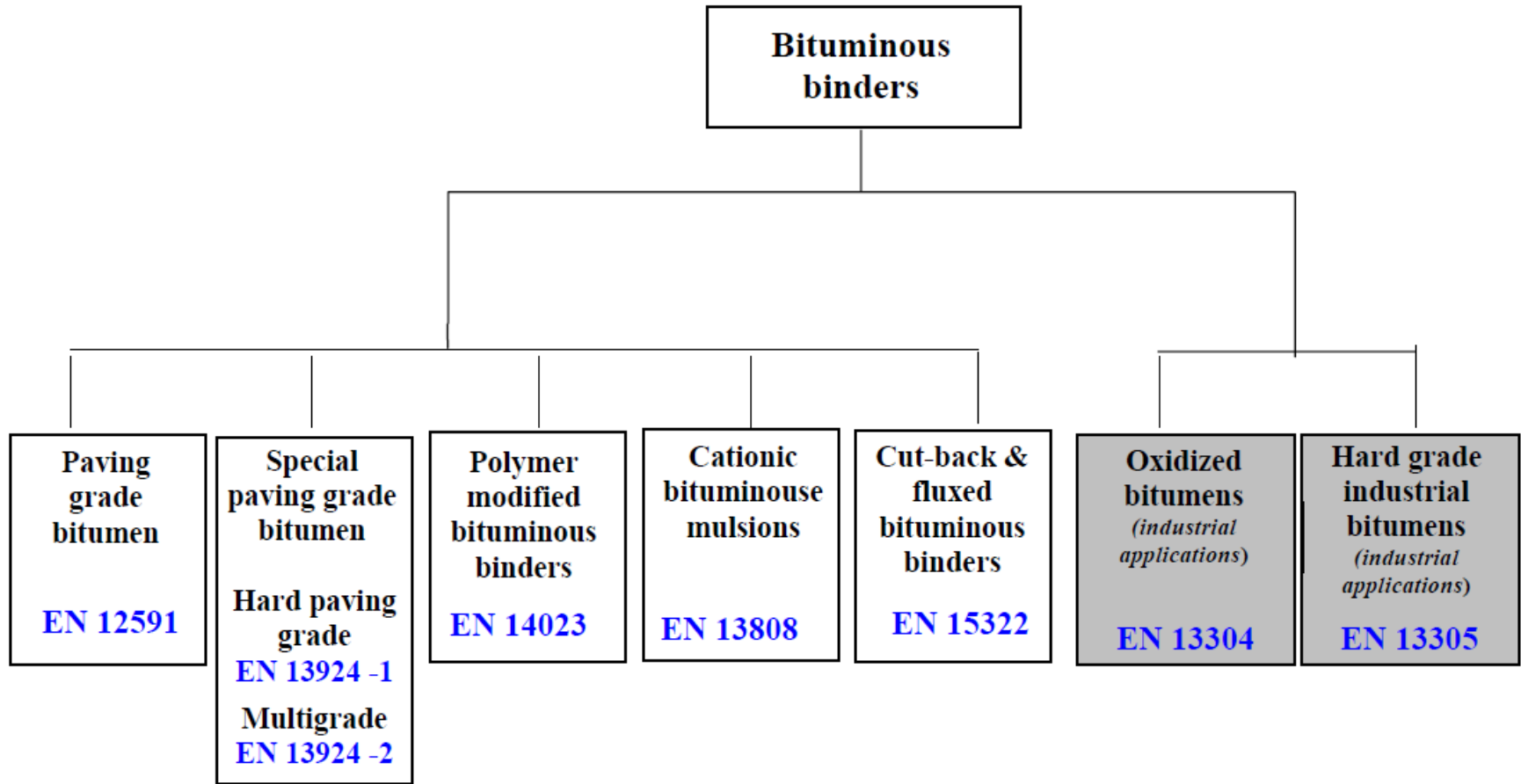
# CHALLENGES

- **A condition procedure to age asphalt samples**
- **Specifications for cold mixtures:**
  - emulsion mixtures
  - foam mixtures
- **Conditioning procedures for (Foamed) Warm Mixes**
- **Test methods for Warm and half Warm Mixes**



# EU Bitumen Standards

- **CEN TC336**
- **CEN TC336 WG1**





# Bitumen Standards

- **EN 12591 “Specifications for paving grade bitumen”**
- **EN 13924 “Specifications for hard paving grade bitumens”**
- **EN13924-2 “Multi-grades”**
- **EN 14023 “Specifications for PMB”**
- **EN 13808 “Framework for specifying cationic bituminous emulsions”**
- **EN 15322 “Framework for specifying cut-back and fluxed bituminous binders”**
- **EN 13808 “Bituminous Emulsions”**

# Paving Grade

**Table 1A — Paving grade bitumen specifications for grades from 20 x 0,1 mm to 220 x 0,1 mm penetration — Properties applying to all paving grade bitumen listed in this table**

Property	Test method	Unit	20/30	30/45	35/50	40/60	50/70	70/100	100/150	160/220	
Penetration at 25 °C	EN 1426	0,1 mm	20 – 30	30 – 45	35 – 50	40 – 60	50 – 70	70 – 100	100 – 150	160 – 220	
Softening point	EN 1427	°C	55 – 63	52 – 60	50 – 58	48 – 56	46 – 54	43 – 51	39 – 47	35 – 43	
Resistance to hardening at 163 °C	EN 12607-1										
Retained penetration		%	≥ 55	≥ 53	≥ 53	≥ 50	≥ 50	≥ 46	≥ 43	≥ 37	
Increase in softening point, - <i>Severity 1</i> or Increase in softening point, - <i>Severity 2</i> <sup>a</sup>		°C	≤ 8 or ≤ 10	≤ 8 or ≤ 11	≤ 8 or ≤ 11	≤ 9 or ≤ 11	≤ 9 or ≤ 11	≤ 9 or ≤ 11	≤ 10 or ≤ 12	≤ 11 or ≤ 12	
Change of mass <sup>b</sup> (absolute value)		%	≤ 0,5	≤ 0,5	≤ 0,5	≤ 0,5	≤ 0,5	≤ 0,5	≤ 0,8	≤ 0,8	≤ 1,0
Flash point		EN ISO 2592	°C	≥ 240	≥ 240	≥ 240	≥ 230	≥ 230	≥ 230	≥ 230	≥ 220
Solubility	EN 12592	%	≥ 99,0	≥ 99,0	≥ 99,0	≥ 99,0	≥ 99,0	≥ 99,0	≥ 99,0	≥ 99,0	
<sup>a</sup> When Severity 2 is selected it shall be associated with the requirement for Fraass breaking point and/or penetration index measured on the unaged binder (see Table 1B) <sup>b</sup> Change in mass can be either positive or negative.											

The properties in Table 1A shall be specified for all paving grade bitumens listed in this table. They are associated with regulatory or HSE requirements and shall be included in all specifications.





**Table 2A — Paving grade bitumen specifications for grades from 250 x 0,1 mm to 900 x 0,1 mm penetration - Properties applying to all paving grade bitumen listed in this table**

Property	Test method	Unit	250/330	330/430	500/650	650/900
Penetration at 25 °C <i>or</i>	EN 1426	0,1 mm	250 – 330	–	–	–
Penetration at 15 °C	EN 1426	0,1 mm	70 – 130	90 – 170	140 – 260	180 – 360
Dynamic viscosity at 60 °C <i>or</i>	EN 12596	Pa.s	≥ 18	≥ 12	≥ 7,0	≥ 4,5
Softening point	EN 1427	°C	30 - 38	–	–	–
Resistance to hardening at 163 °C	EN 12607-1					
Viscosity ratio at 60 °C <i>or</i>		–	≤ 4,0	≤ 4,0	≤ 4,0	≤ 4,0
Increase in softening point		°C	≤ 11	–	–	–
Change of mass <sup>a</sup> (absolute value)		%	≤ 1,0	≤ 1,0	≤ 1,5	≤ 1,5
Flash point	EN ISO 2719	°C	≥ 180	≥ 180	≥ 180	≥ 180
Solubility	EN 12592	%	≥ 99,0	≥ 99,0	≥ 99,0	≥ 99,0
<sup>a</sup> Change in mass can be either positive or negative.						

properties in Table 2A shall be specified for all paving grade bitumens listed in this table. They are associated with regulatory or HSE requirements and shall be included in specifications.

**Table 2B — Paving grade bitumen specifications for grades from 250 x 0,1 mm to 900 x 0,1 mm penetration - Properties associated with regulatory or other regional requirements**

Property	Test method	Unit	250/330	330/430	500/650	650/900
Fraass breaking point	EN 12593	°C	≤ - 16 <i>or</i> NR <sup>a</sup>	≤ - 18 <i>or</i> NR <sup>a</sup>	≤ - 20 <i>or</i> NR <sup>a</sup>	≤ - 20 <i>or</i> NR <sup>a</sup>
Kinematic viscosity at 135 °C	EN 12595	mm <sup>2</sup> /s	≥ 100 <i>or</i> NR <sup>a</sup>	≥ 85 <i>or</i> NR <sup>a</sup>	≥ 65 <i>or</i> NR <sup>a</sup>	≥ 50 <i>or</i> NR <sup>a</sup>
<sup>a</sup> NR. No Requirement may be used when there are no regulations or other regional requirements for the property in the territory of intended use.						

properties in Table 2B are required to meet specific regional conditions. They are associated with regulatory or other regional requirements.

Table 1A — Framework specifications for polymer modified bitumens – Properties applying to all polymer modified bitumens

PROPERTY		TEST METHOD	UNIT	Classes for all polymer modified bitumens									
				2	3	4	5	6	7	8	9	10	11
Penetration at 25 °C		EN 1426	0,1 mm	10-40	25-55	45-80	40-100	65-105	75-130	90-150	120-200	200-300	
Softening Point		EN 1427	°C	≥ 80	≥ 75	≥ 70	≥ 65	≥ 60	≥ 55	≥ 50	≥ 45	≥ 40	
Cohesion <sup>a</sup>	Force ductility <sup>a</sup> (50 mm/min traction) Or	EN 13589 followed by EN 13703	J/cm <sup>2</sup>	≥ 3 at 5 °C	≥ 2 at 5 °C	≥ 1 at 5 °C	≥ 2 at 0 °C	≥ 2 at 10 °C	≥ 3 at 10 °C	≥ 0,5 at 15 °C	≥ 2 at 15 °C	≥ 0,5 at 20 °C	≥ 0,5 at 25 °C
	Tensile test <sup>a</sup> (100 mm/min traction) Or	EN 13587 followed by EN 13703	J/cm <sup>2</sup>	≥ 3 at 5 °C	≥ 2 at 5 °C	≥ 1 at 5 °C	≥ 3 at 0 °C	≥ 3 at 10 °C					
	Vialit pendulum <sup>a</sup> (Impact test)	EN 13588	J/cm <sup>2</sup>	≥ 0,7									
Resistance to hardening	Retained Penetration	EN 12607-1	%	≥ 35	≥ 40	≥ 45	≥ 50	≥ 55	≥ 60				
	Increase in Softening point		°C	≤ 8	≤ 10	≤ 12							
	Change of mass <sup>c</sup>		%	≤ 0,3	≤ 0,5	≤ 0,8	≤ 1,0						
Flash Point		EN ISO 2592	°C	≥ 250	≥ 235	≥ 220							

<sup>a</sup> One cohesion method shall be chosen based on end application. Vialit cohesion (EN 13588) shall only be used for surface dressing binders.

<sup>b</sup> The main test is the RTFOT at 163°C. For some highly viscous polymer modified bitumens where the viscosity is too high to provide a moving film it is not possible to carry out the RTFOT at the reference temperature of 163°C. In such cases the procedure shall be carried out at 180°C in accordance with EN 12607-1.

<sup>c</sup> Change of mass can be positive or negative.

**Table 1B — Framework specifications for polymer modified bitumens – Properties associated with regulatory or other regional requirements**

PROPERTY		TEST METHOD	UNIT	Classes for regional requirements										
				0	1	2	3	4	5	6	7	8	9	10
Fraass Breaking Point		EN 12593	°C	NR <sup>a</sup>	TBR <sup>b</sup>	≤ 0	≤ - 5	≤ - 7	≤ - 10	≤ - 12	≤ - 15	≤ - 18	≤ - 20	≤ - 22
Elastic recovery	25 °C	EN 13398	%	NR <sup>a</sup>	TBR <sup>b</sup>	≥ 80	≥ 70	≥ 60	≥ 50					
	10 °C	EN 13398	%	NR <sup>a</sup>	TBR <sup>b</sup>	≥ 75	≥ 50							
<p><sup>a</sup> NR. No Requirement may be used when there are no regulations or other regional requirements for the property in the territory of intended use.</p> <p><sup>b</sup> TBR. To Be Reported may be used when there are no regulations or other regional requirements for the property in the territory of intended use, but the property has been found useful to describe polymer modified bitumens.</p>														

The properties in Table 1B are required to meet specific regional conditions. They are associated with regulatory or other regional requirements.



Table 1C — Framework specifications for polymer modified bitumens – Additional properties

PROPERTY	TEST METHOD	UNIT	Classes for the additional properties of polymer modified bitumens								
			0	1	2	3	4	5	6	7	
Plasticity range	sub-clause 5.2.8.4	°C	NR <sup>a</sup>	TBR	≥ 85	≥ 80	≥ 75	≥ 70	≥ 65	≥ 60	
Drop in softening point after EN 12607-1	EN 1427	°C	NR <sup>a</sup>	TBR	≤ 2	≤ 5					
Elastic recovery at 25 °C after EN 12607-1	EN 13398	%	NR <sup>a</sup>	TBR	≥ 70	≥ 60					≥ 50
Elastic recovery at 10 °C after EN 12607-1	EN 13398	%	NR <sup>a</sup>	TBR	≥ 50						
Storage stability <sup>b</sup> Difference in softening point	EN 13399 EN 1427	°C	NR <sup>a</sup>	TBR <sup>b</sup>	≤ 5						
Storage stability <sup>b</sup> Difference in penetration	EN 13399 EN 1426	0,1 mm	NR <sup>a</sup>	TBR <sup>b</sup>	≤ 9	≤ 13	≤ 19	≤ 26			

<sup>a</sup> NR. No Requirement may be used when there are no requirements for the property in the territory of intended use.

<sup>b</sup> Storage conditions of the polymer modified binder shall be given by the supplier. Homogeneity is necessary for polymer modified bitumens. The tendency of polymer modified bitumens to separate during storage may be assessed by the storage stability test (see EN 13399). If the product does not fulfil the properties in Table 1C classes 2 to 5, information shall be given by the supplier regarding storage conditions for the polymer modified bitumen to avoid separation of the components and to ensure the homogeneity of the product.

NOTE The following data may be given by the supplier of the polymer modified bitumen in the product data sheet:

- polymer dispersion (see EN 13632 [5]);
- solubility (see EN 12592 [4] using the appropriate solvent declared by the supplier);
- handling temperatures;
- minimum storage and pumping temperatures;
- maximum and minimum mixing temperatures; for comparison purposes, EN 13702-1 or EN 13702-2 should be used;
- density (see EN 15326).

The properties in Table 1C are additional properties, which are non-mandated, but have been found useful in some countries to describe polymer modified bitumens.



# Multi grade - draft

**Table 1 — Specifications for multigrade bituminous binders: properties applying to all multigrade paving grade bitumens<sup>a</sup>**

Property	Test method	Unit	Class			
			1	2	3	4
Penetration at 25 °C	EN 1426	0,1 mm	DV <sup>b</sup>	20 to 30	35 to 50	50 to 70
Softening point	EN 1427	°C	DV <sup>b</sup>	54 to 63	57 to 66	63 to 72
Resistance to hardening at 163°C	EN 12607-1					
Retained penetration	EN 1426	%	DV <sup>b</sup>	≥ 50	≥ 60	
Increase in softening point	EN 1427	°C	DV <sup>b</sup>	≤ 8	≤ 10	≤ 12
Change in mass		%	< 0.5	< 0.5	< 0.5	<0.5
Penetration Index $I_p$	Annex A		DV <sup>b</sup>	+0,1 to +1,5	+0,3 to +2,0	+1.5 to +4.0
Flash point	EN ISO 2592	°C		≥ 220	≥ 235	≥ 250
Solubility	EN 12592	m-%	TBR <sup>c</sup>	≥ 99,0		

# Multi Grades (positive PI)

**Table 2 — Specifications for multigrade paving grade bitumens: properties associated with regulatory or other regional requirements**

Property	Test method	Unit	Class					
			0	1	2	3	4	5
Fraass breaking point	EN 12593	°C	NR <sup>a</sup>	TBR <sup>b</sup>	≤ - 8	≤ - 12	≤ - 15	≤ - 17
Dynamic viscosity at 60 °C	EN 12596	Pa · s	NR <sup>a</sup>	TBR <sup>b</sup>	≥ 300	≥ 600	≥ 900	≥ 1 500
Kinematic viscosity at 135 °C	EN 12595	mm <sup>2</sup> /s	NR <sup>a</sup>	TBR <sup>b&lt;</sup>	≥ 200	≥ 300	≥ 700	≥ 1 200

<sup>a</sup> NR. No Requirement may be used when there are no regulations or other regional requirements for the property in the territory of intended use.

<sup>b</sup> TBR. To Be Reported may be used when there are no regulations or other regional requirements for the property in the territory of intended use, but the property has been found useful to describe multigrade bitumens.



# Problems / challenges

- **Adhesion**
- **Constancy / consistency of quality (ITT)**
- **Long Term Ageing**





# CEN TC336 WG1 TG5

- **PRS for complex binders**

- **PRS process will be without “field validation”**
- **“Move forward and fill the current gaps”**
- **Simple binders described by EN 12591, and complex binders by future PRS**
- **CEN Data Collection to be incorporated**
- **The new PRS: a separate standard or something linked to each current bitumen standard ?**

- **Which test for which property?**
  - **TG1 – High Service Temperatures**
  - **TG2 – Low Service Temperatures**
  - **TG3 – Ageing-conditioning**



# TG1 HIGH SERVICE TEMP

Rutting - Method	Suggestion	Comments
DSR G*/sin (delta)	Yes/no	for addressing only linear zone
DSR MSCR test		Relevant for addressing also non linear zone
DSR LSV-EVT1		Not suitable for high mod PMBs
DSR ZSV at 60°C creep mode		Not suitable for high mod PMBs
stiffness at service temp	Suggestion	Comments
DSR Complex mod		To clarify temp & freq



# TG2

# LOW SERVICE TEMP / CRACKING

Method	Suggestion	Comments (3 different properties)
BBR	Yes/no	Not the most suitable for continuous network PMBs (stiffness at low temp)
Fracture Tough.		In due course for EN (crack propagation)
Fraass		Not the suitable for continuous network PMBs ( crack formation)



# TG3

# AGEING-CONDITIONING

Method	Suggestion for reference method	Comments
RTFOT	Yes	Short term
PAV	yes	Long term
RCAT	?	Short/long/both
Modified RTFOT	?	short



# OTHER REQUIREMENTS

Property	Method	Suggestion	Comments
Mixing-handling	Viscosity EN 12595	Yes/no	available
Storage stability	EN 13399		available
Safety	EN ISO 2592 Cleveland		available
-----	-----		

# PRS FORMAT

Option 1		Option 2	
EN12591		EN12591	Yes
EN 13924-1		EN 13924-1 including empirical and PRS	Avoid overspecification
EN 13924-2		EN 13924-2 including empirical and PRS	
EN 14023		EN 14023 including empirical and PRS	
New Standard			





# Challenges

- **Takes a lot of time**
- **Moving forward (very slowly)**
- **Good test methods are needed**

# Environmental issues

## **CEN TC351**

- **Release of dangerous substances to air and groundwater**

## **CEN TC350 Sustainability of construction works**

- **Environmental product declarations - Core rules for the product category of construction products: **EN 15804****



# Work Zone Safety

- **ERF and CEN TC226**
- **CEDR**
- **EAPA**

# WORK ZONE SAFETY

ERF Working Group

## OBJECTIVES

Raise the safety level for road workers and road users dealing with work zones on public roads  
by contributing to European guidelines for use of road equipment in work zones

## ERF WZS Working Group



## WORK ITEMS

- produce an overview and synthesis of national guidelines, legislations and practices in selected European countries
- detect and transfer good practices
- identify improvements adapted to the state of the art
- propose uniform approach throughout Europe

## DELIVERABLES

- format of a TR – Technical report
  - “Technical info not included in a standard”

### CEN TC226 Resolution:

Group with o.a. ERF to prepare for the next plenary meeting in June 2013, a proposal on a draft guide(s) for safe work zones for the products covered by CEN/TC 226.



Conférence Européenne  
des Directeurs des Routes

Conference of European  
Directors of Roads

## Description of Research Needs (DoRN)

May 2012

### **CEDR TRANSNATIONAL ROAD RESEARCH PROGRAMME**

**Call 2012**

#### **Safety:**

- **Safety of road workers and interaction with road users**
- **Use of vehicle restraint systems**

**The task of the EAPA Task Group is to:**

- **provide member states with good examples of raising awareness of the safety of the road workers**
- **create a document that can be used by the EAPA members to start their own campaign at company level or at national level**
- **create a document that can be used as a lobbying tool for EAPA at European level.**
- **collect data to show how big the problem is (data of fatalities caused by general public).**



# Examples



**PAS PÅ  
MIN FAR**  
- HAN ER  
VEJARBEJDER

En væsentlig årsag til ulykker ved vejarbejde er hastighed. Og det er ikke kun din sikkerhed, der står på spil. Derfor skal hastigheden ned og opmærksomheden op.

Vejdirektoratet

Du kan læse mere om Vejdirektoratets kampagne for bedre trafikikkerhed ved vejarbejde på [www.vd.dk/paspaaminfar](http://www.vd.dk/paspaaminfar)



My dad works  
on this site

Please  
Drive  
Carefully

10

Colas

- **In the Netherlands about 2% of the total number of people killed in traffic accidents are in Work Zones.**
- **In the USA it is also around 2% (2010: 1,75%; 2009: 2,00% and 2008: 1,91%)**
- **In Europe 50.000 peopled killed in accidents would result in an estimate of : 1.000 per year.**
- **In Europe-27 countries in 2009: 34.550.**
- **2% would be: about 700 in Work Zones.**











# EAPA Environment Group

## Work plan 2012-2014

### Sustainability

- **Warm Mix Asphalt** Stimulating use of WMA
- **Recycling** EAPA TC is leading
- **Carbon Footprint**
- **Energy Reduction** Following the EU developments
- **Rolling Resistance**
- **EU ETS**
- **Waste Framework Directive** with EPRA
- **Green Public Procurement** (not a main priority)

- **Example of Environmental Product Declaration as developed in Norway was presented and explained**
- **Each asphalt producer can produce its own EPD and he can show the environmental advantages of his product.**
- **In the future this EPD will play a role in tendering, but not yet (in Norway).**
- **The EPD produced in Norway is following the European Standard ( EN 15804 of CEN TC350).**
- **EAPA will translate Norwegian EPD as an example / template**





# CO<sub>2</sub> CALCULATORS - LCI

- **Update asPECT (UK - for free). Adding maintenance**
- **Update SEVE (Système d'Evaluation des Variantes Environnementales) (France – not free / fee). v2.0**
- **Need revision of the LCI of 2000 discussed**
- **Germany UK France have national data, so for them there is no update needed.**
- **No LCI updated need but: Guidance document “Carbon Footprint Calculators”**
  - **How to calculate - input data - use – tips and tricks**
- **Goal to have it ready in 2013.**

- **EU Emission Trade System**
- **$\geq 35$  MW: in EU-ETS**
- **$> 20 - < 35$  depends on member state**
- **update regarding EU-ETS by Simon van der Byl**
- **In the UK it is often a plant by plant decision.**
- **Some mentioned that it might be good to be in the exemption group. It was also mentioned that the quota trade is complex and more like a nightmare**
- **It is impossible to say what is the right decision.**

- Roar Telle explained the Warm Mix Asphalt studies they did on 11 test sections in Norway in 2011
- USIRF WMA Recommendation



# Climate Change

- **Adapting road system to climate change is primary task of the road owners.**
- **Good drainage, sewerage systems and ditches along the road are important to keep the road structure dry.**
- **Norway is using adhesion promoters in every project**
- **The EAPA members are ready.**
- **We have the techniques and knowledge to adapt to the climate change consequences.**



# WASTE FRAMEWORK DIRECTIVE

- **Update**
- **European Platform for Recycled Aggregates – EPRA**
- **Mostly regulated at national level**
- **We keep it in the agenda**

- **Update TC 154 TG13 / CEN TC227 WG6**
- **Release of Regulated Dangerous Substances (CEN TC 351)**
- **We get Mandate: ± 2015**
- **EPD (CEN TC350): ± 2018**

# ROLLING RESISTANCE

- At a certain moment a response is needed regarding this document
- EAPA needs a plan and a budget
- Next meeting

An advertisement for EUPAVE (European Concrete Paving Association) featuring a line of heavy trucks on a concrete road. The text highlights fuel savings on concrete pavements.

TC-12-N816 - HSE-12-N824

**EUPAVE**  
EUROPEAN CONCRETE PAVING ASSOCIATION

**Concrete pavements contribute to decarbonising of transport**

**UP TO 6% FUEL SAVINGS**  
*for heavy trucks riding on concrete pavements.  
This can already make the difference today!*

- Delivery of high performance pavement systems and products
- Purchasing models





# PHILIPPE DEWEZ

- Health and safety regulations around bitumen
- REACH