

ROADS PAVEMENT FORUM

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Performance Grade Binder

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Overview

- ▶ Specification framework
- ▶ Implementation plan
- ▶ Supply to neighbouring countries
- ▶ Specifications in neighbouring countries
- ▶ Will SA Specifications influence neighbours?
- ▶ SA binder production
- ▶ Research
- ▶ Quality of testing
- ▶ Quality control and Acceptance

Proposed Specification Framework

Property	Proposed Classification							
	58S	64S	58H	64H	58V	64V	58E	64E
	-22	-16	-22	-16	-22	-16	-22	-16
Maximum pavement design temperature (°C)	58	64	58	64	58	64	58	64
Original binder								
G* / sinδ, 10rads/sec at T _{high} , minimum	1.0	1.0	N/A					
G*, δ, 0.05 to 20 rads/sec, at $[(T_{max} - T_{min})/2] + 4$ °C	Report							
Viscosity Pa.s, 135°C, Pa.s, maximum	3.0							
Flash Point (°C), minimum	230							
Storage stability, Max % difference, G* _T and G* _B	10							
RTFO binder								
Maximum Mass Change (m/m %)	1.0							
J _{nr} (ASTM D7405) @ T _{high} , maximum	4.5	4.5	2.0	2.0	1.0	1.0	0.5	0.5
G*, δ, 0.05 to 20 rads/sec, at $[(T_{max} - T_{min})/2] + 4$ °C	Report							
Ageing Ratio, G* _{RTFOT} /G* _{Original} , maximum (10rads/sec)	3.0							
PAV binder								
S(60s) at T _{min} + 10°C, MPa, maximum	300							
m(60s) at T _{min} + 10°C, minimum	0.300							
· T(c), ASTM D????, minimum	-5							
G*, δ, 0.05 to 20 rads/sec, at $[(T_{max} - T_{min})/2] + 4$ °C	Report							
Ageing Ratio, G* _{PAV} /G* _{Original} , maximum (10rads/sec)	6.0							



DSR REPORT – what next?

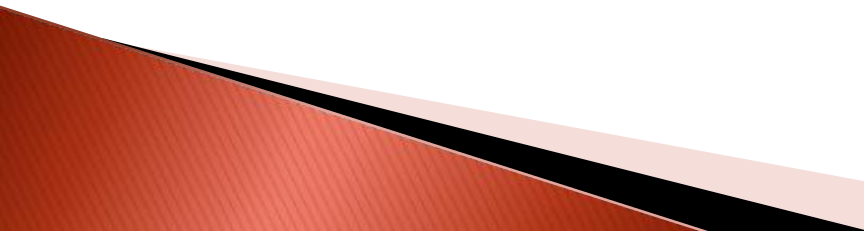
- ▶ Complex modulus, G^* [Pa]
- ▶ Phase angle, δ [°]
- ▶ Frequency, f [Hz] or [rad/sec]
 - Min $f = 62.83$ Hz (0.05 rad/sec)
 - Max $f = 0.314$ Hz (20 rad/sec)
- ▶ Temperature, T [°C] $\{T_{\max} - T_{\min}\} / 2 + 4)$
 - PG58-22 22 °C
 - PG64-16 28 °C

Calculate parameters and determine what to do with them

Clean sheet

- ▶ SA small market – do what is necessary
- ▶ SA proposed specification relied heavily on USA experience with Europe influence
- ▶ New knowledge, e.g. G-R and $\Delta(T_c)$
 - difficult to implement in USA – resistance to change
- ▶ SA starts from clean sheet
 - Approach with open mind
 - But SA limits on values required
- ▶ Great future

Benefits of PG Spec for SA?

- ▶ Binder selection based on traffic, climate
 - ▶ Product innovation reliably assessed eg PMBs
 - ▶ Permanent deformation reliably evaluated
 - ▶ Long Term Ageing finally assessed, for thin layers in SA context!!
 - ▶ Durability – stress relaxation holistically assessed (not fatigue versus LT fracture)
 - ▶ Resource economy in test apparatus & methods (but bitumen sample size IT and LT!)
 - ▶ No binder grade proliferation
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SARDS and PG SPECS

- ▶ Some research work already done under SAPDM (SARDS) project
- ▶ Future building of data base

- ▶ Link between SARDS and PG Specs essential

Implementation plan

- ▶ Introduction to industry on 25th January 2016
- ▶ Workshops to inform industry **March 2016**
 - 15th in Johannesburg
 - 16th in Cape Town
 - 17th in Durban
 - 18th in Port Elizabeth
- ▶ Bitumen Rheology Masterclass **June 2016**
 - 21–23 June 2016 in Johannesburg
 - International experts
 - Workshop with DSR UG
- ▶ Two-year parallel implementation
 - Include data analyses and research
- ▶ Final implementation
 - SANS

Supply to neighbouring countries

▶ Africa

- Kenya – drums and bitutainers
- Djibouti – drums
- Zambia – bulk (road), drums and bitutainers
- Namibia – bitutainers by ship to Walvis Bay
- Point Noire – drums
- Mozambique – bitutainers
- Zimbabwe – drums and bitutainers
- other

▶ Indian Ocean Islands

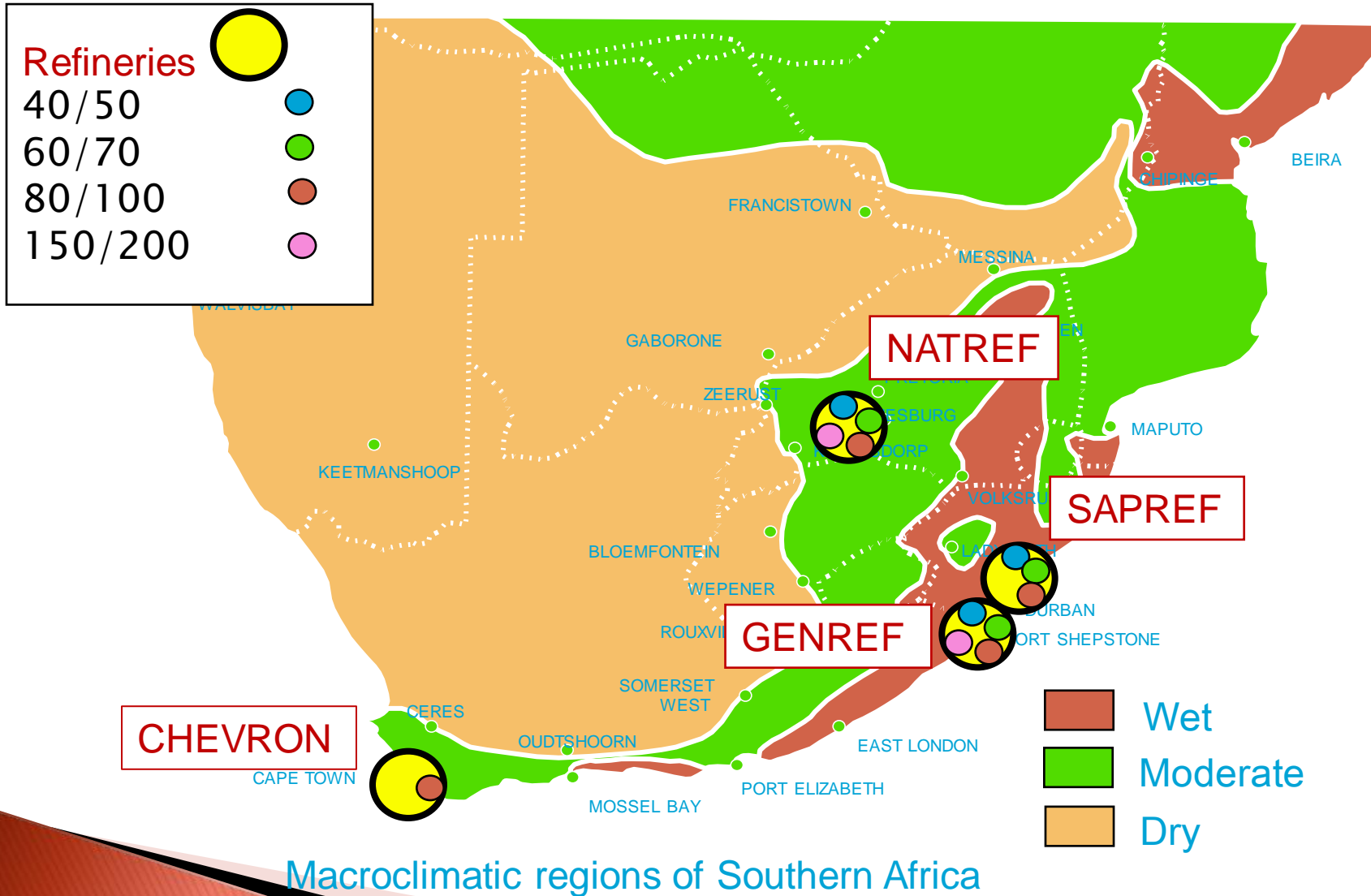
- Mayotte – bitutainers
- Reunion – bulk (sea) and bitutainers
- Madagascar – bitutainers

Specifications neighbouring countries

- ▶ Namibia – SANS
- ▶ ZAMBIA – SANS
- ▶ Mozambique – SANS
- ▶ Indian Ocean Islands – CEN
- ▶ Kenya – BS

Plus specifications from
Donor Countries

Binder Test Matrix from Refineries



Snapshot SA Binder Classification

40/50	60/70	80/100	150/200
X	PG64-16	PG58-22	X
PG64-16	PG58-22	PG58-22	X
PG64-16	PG64-22	PG58-16	PG52-22
PG70-22	PG64-16	PG58-22	PG52-22

Base bitumens remain the same – should not affect export of bitumen

Public/private partnership

- ▶ SANRAL already sponsored SAPDM
- ▶ SABITA sponsored initial research
- ▶ Private sector participation
- ▶ SANRAL to sponsor research now
 - Direct contribution for project work – R2.5m
 - Bursaries for M–students
- ▶ SABITA will contribute through its members
- ▶ Provinces and Metros indicated buy-in

Quality of Testing

- ▶ Master curves
 - Two decades max
- ▶ Inter-laboratory testing
- ▶ Standards refined
- ▶ Stay within limits of equipment
 - Compliance, compliance, compliance
 - Therefore, know your equipment
- ▶ Do not mix research and routine testing
- ▶ Qualified (certified) operators for routine tests
- ▶ etc

Site Quality Control and Acceptance

- ▶ DSR equipment too expensive for site
 - BUT, newer models are affordable
 - AND, new viscometers based on DSR
- ▶ Still use “conventional” tests
 - Ring & Ball
 - Viscosity
- ▶ Research effort during two years of parallel testing to establish norms
- ▶ Final decision to be made after two years

Binder/Mix Relationship

- ▶ Binder specification is a shopping tool
- ▶ Real test is mix performance
- ▶ Binder/mix performance relationship not well defined
- ▶ Influence of active filler
- ▶ Recycling bituminous materials (Shingles)
- ▶ **Research to focus on Binder to Mix**

Conclusion

- ▶ Implementation will be done over two years
- ▶ PG specifications introduced in workshops
- ▶ Advanced course to explain principals
- ▶ Quality of testing will be addressed
- ▶ Quality control and acceptance addressed
- ▶ Export should not be affected

THANK YOU

