Progress of Performance Graded Binder Specifications for SA

Working Group on PG Specs, of RPF Binder Spec Committee

RPF Gateway, KZN

20th to 21st May 2014

Stellenbosch

THE SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD

Reg. No.1998/009584/06


Fit for purpose?

Performance Grading

Thermal Cracking | *Fatigue Cracking* | *Rutting* | *Production*




DTT

BBR

DSR

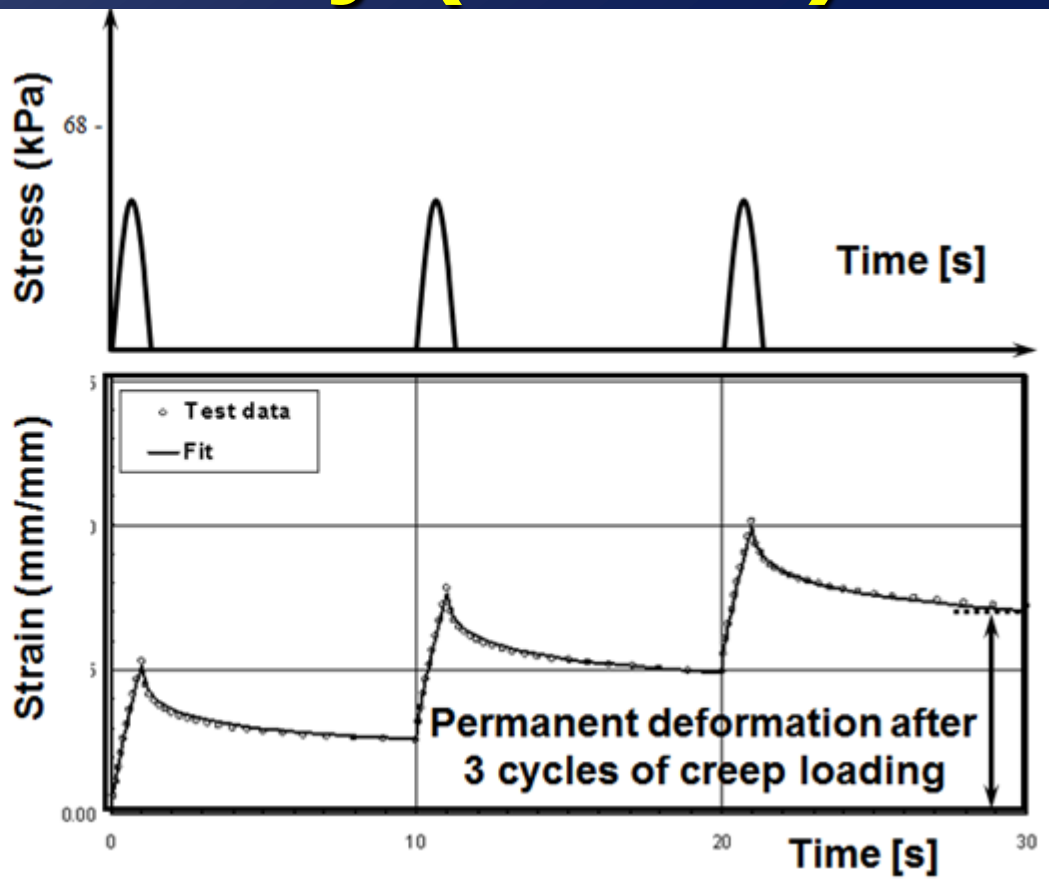
RV

- 20 ^{0}C | 20 ^{0}C | 60 ^{0}C | 135 ^{0}C

Pavement Temperature

The new tests : Creep and Recovery (MSCR)

Repeated Creep Loading

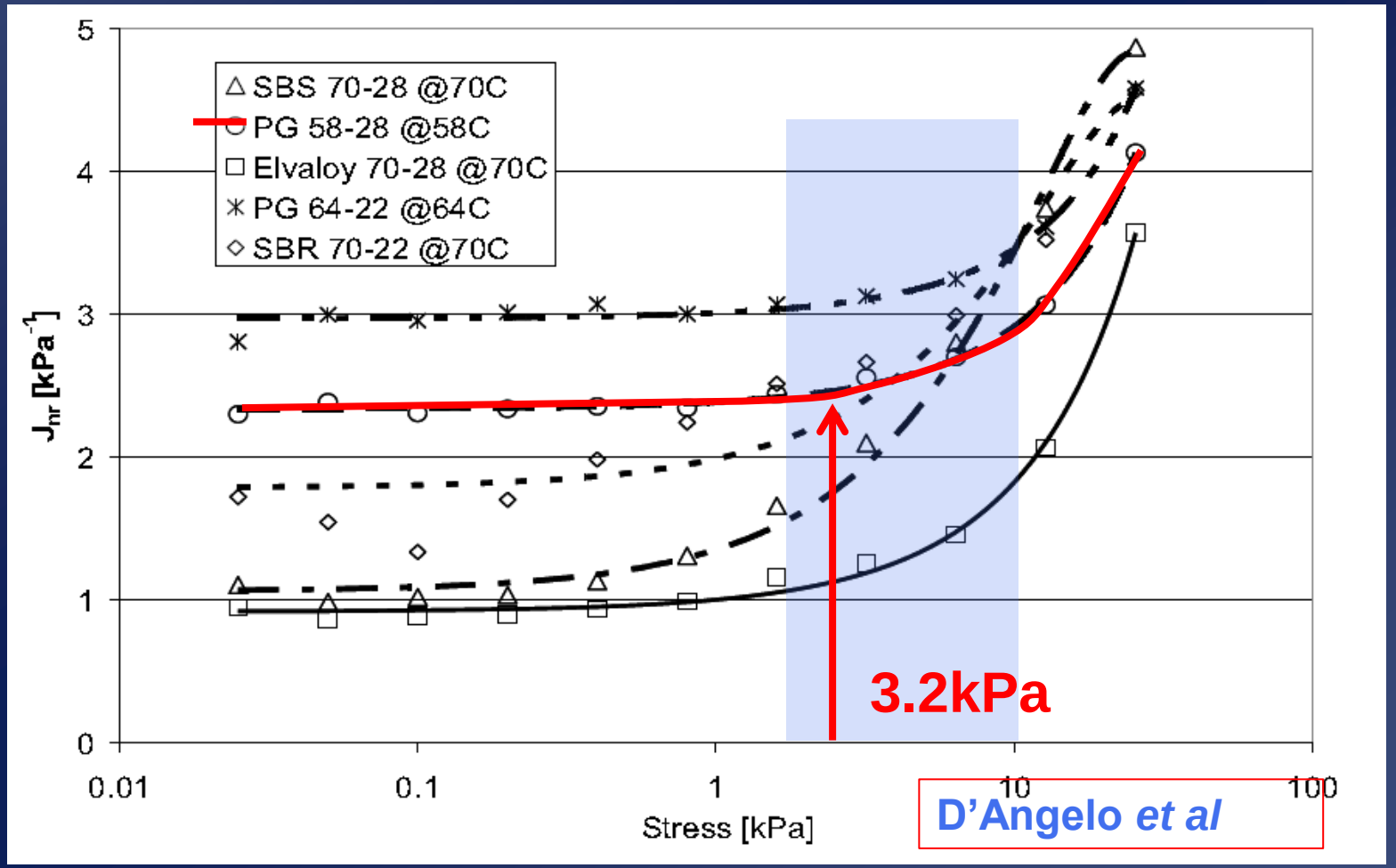


$$J_{nr} = \frac{\text{Ave permanent shear strain (non-recov) per cycle}}{\text{Applied shear stress}}$$

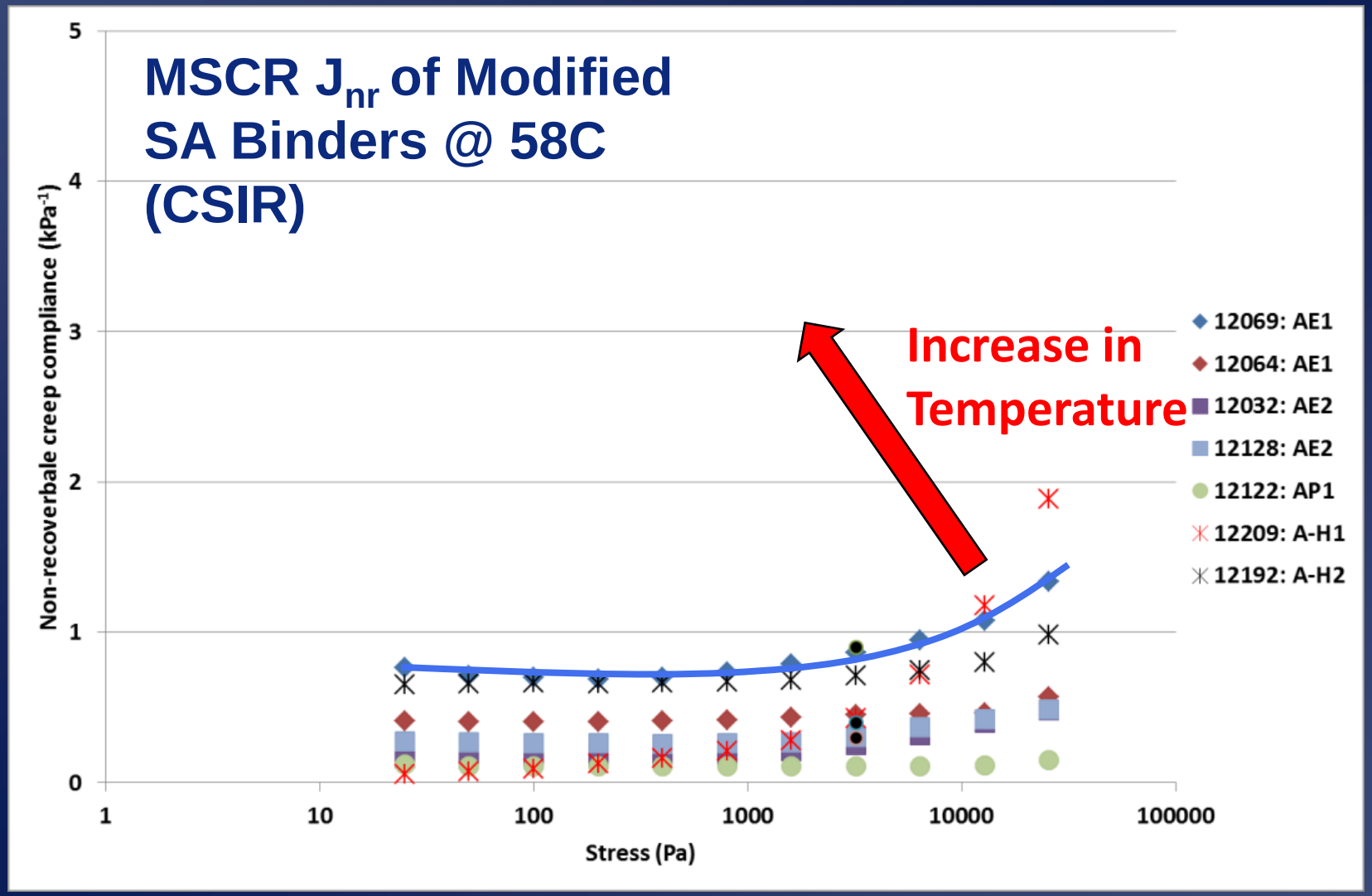
AASHTO TP70

Findings of PG Spec Research$_1$

- MSCR (Permanent deformation)
  - Stress levels



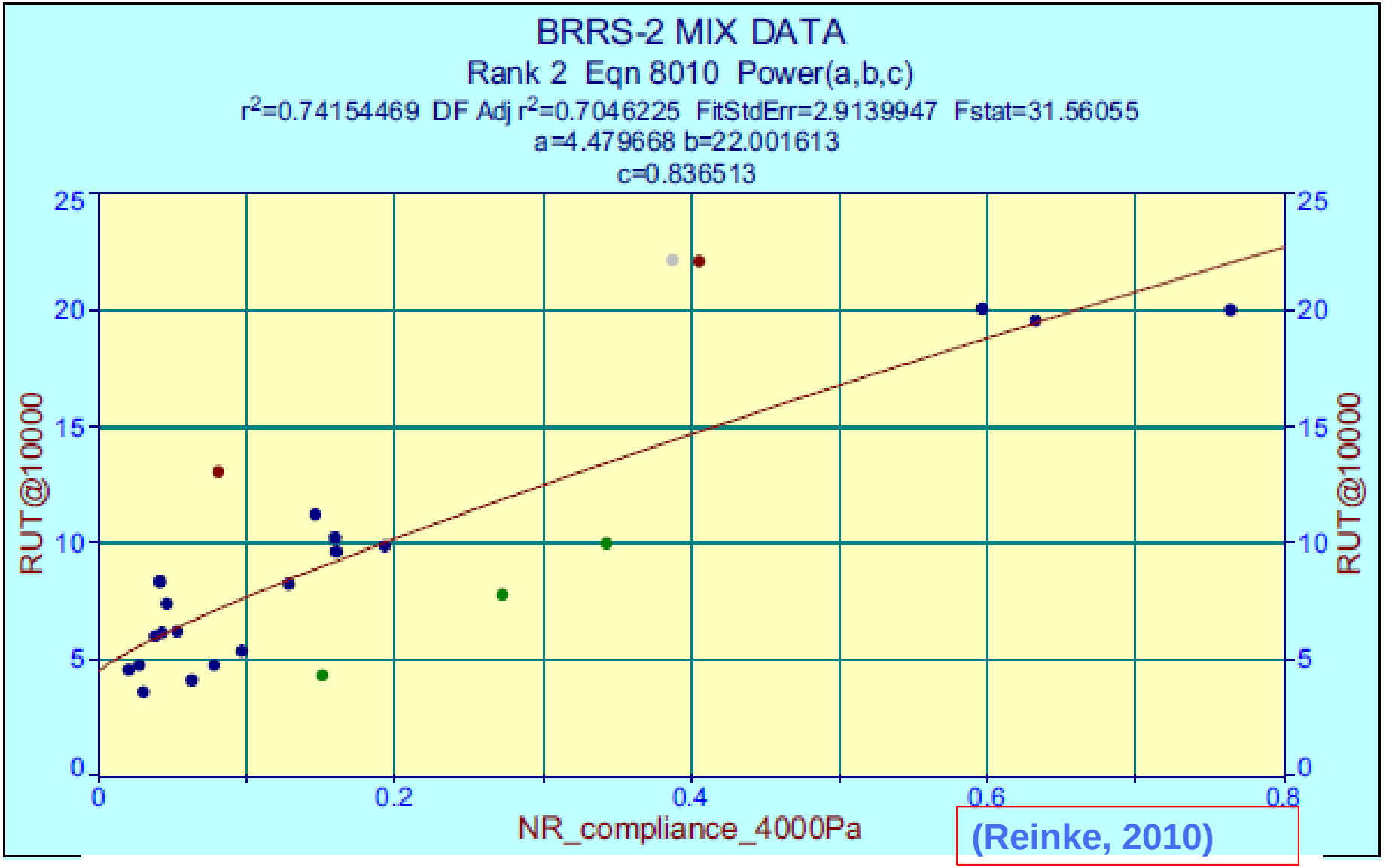
Stress dependency SA Binders



Findings of PG Spec Research$_1$

- MSCR (Permanent deformation)
  - USA started with 3.2 kPa (linear behaviour)
  - Reinke proposes up to 15 kPa (mobilise networks of PG binders etc, realistic τ values)
  - SA considering 3.2 kPa and 10 kPa (modified ASTM method)
  - Extend cycles 3 x 10s, up to 300 seconds
  - CSIR to prepare Tentative Method for evaluation

Hamburg Rut Tester Correlation

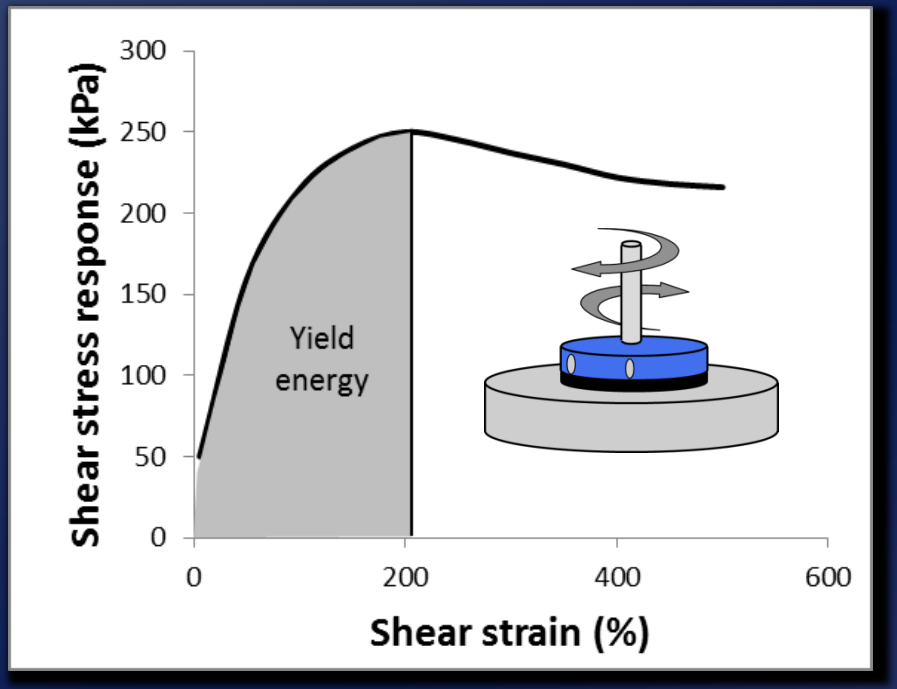


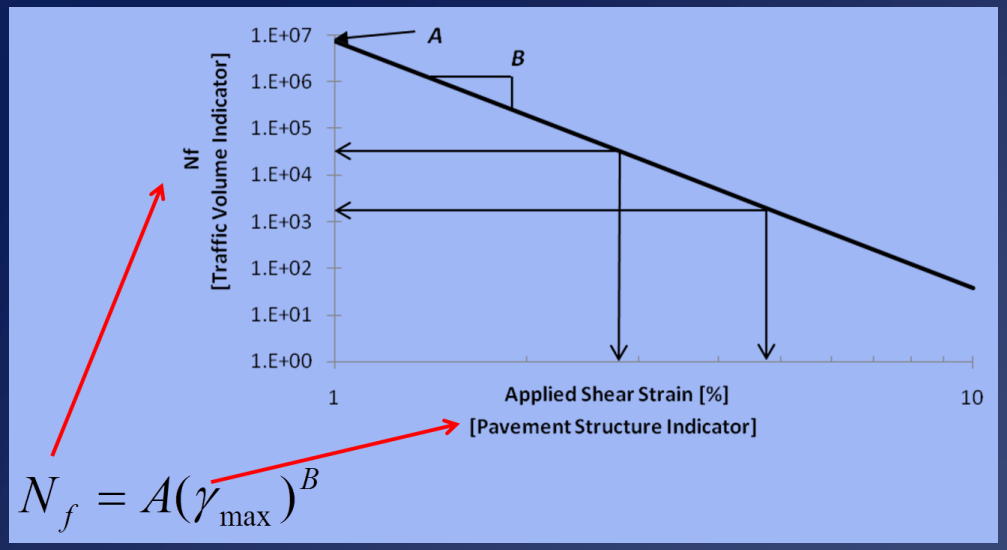
(Reinke, 2010)

Findings of PG Spec Research$_2$

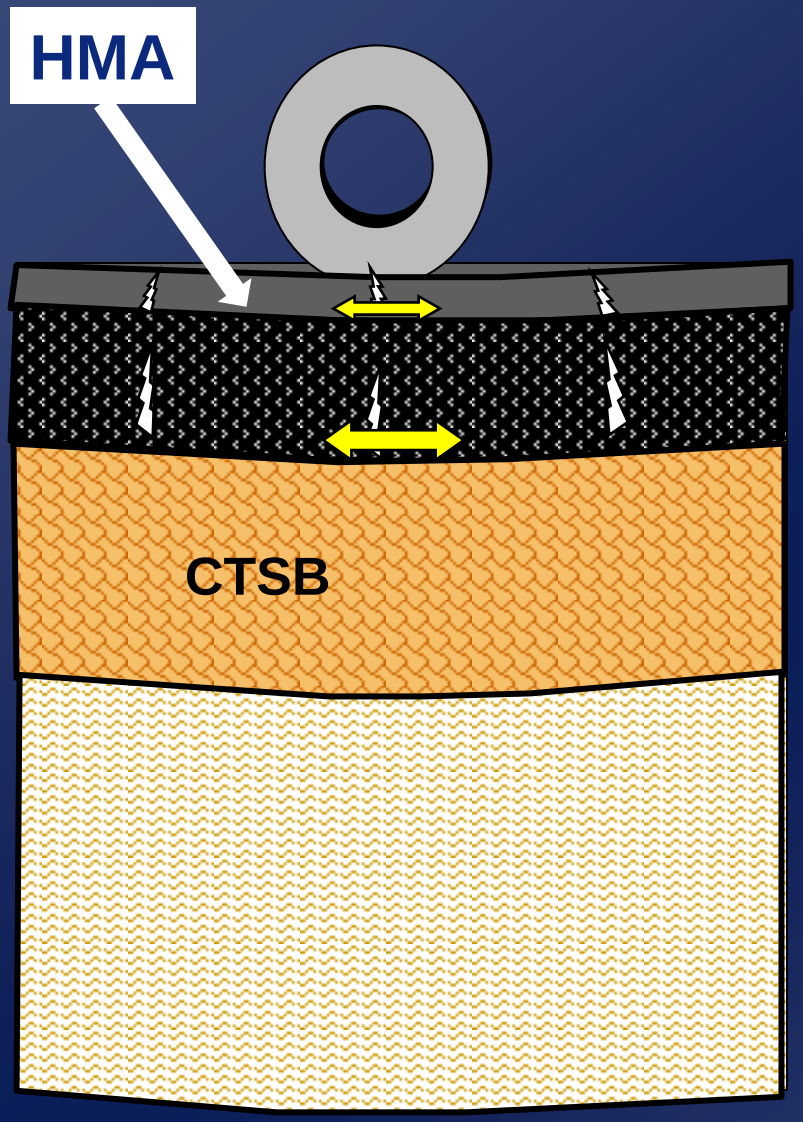
- Fatigue on DSR

BYET versus LAS$_{modified}$

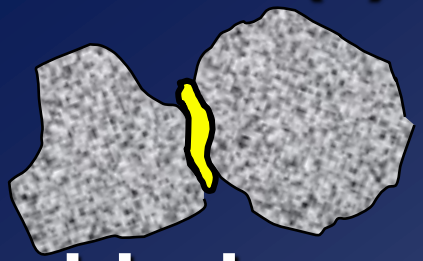




Strain Levels for BYET



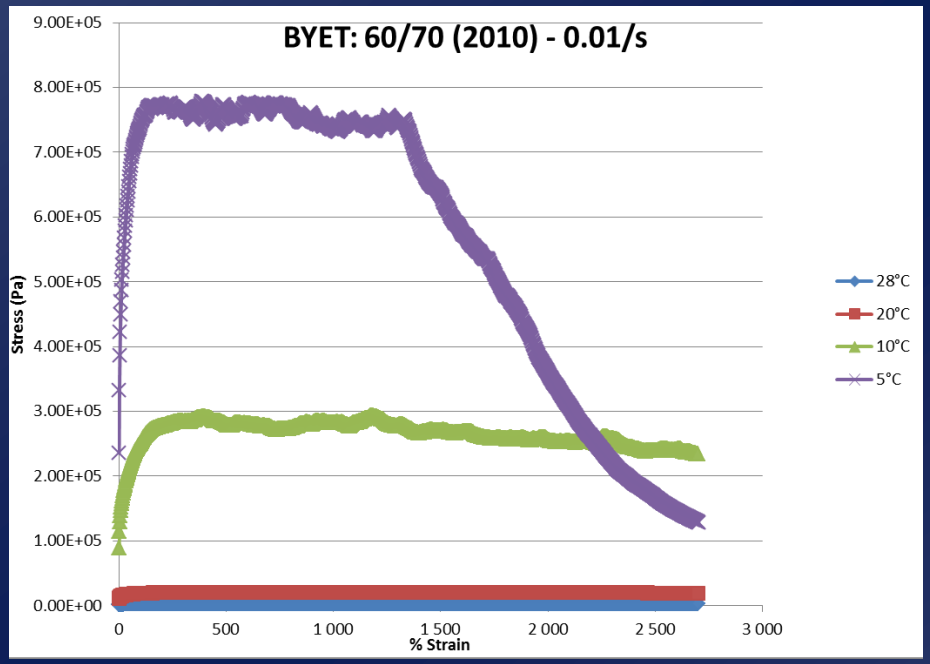
- Typically 100 με
- Bahia binder (ε) = 50 x mix (ε)

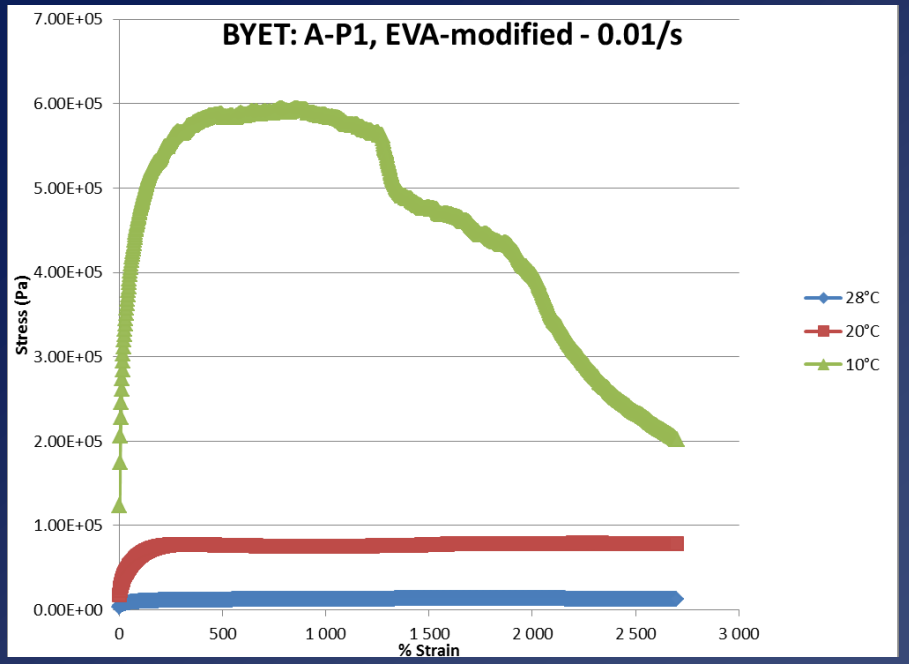


- So binder ε = 0.5%
- How does this relate to ε = 3600% from BYET?

Findings of PG Spec Research$_2$

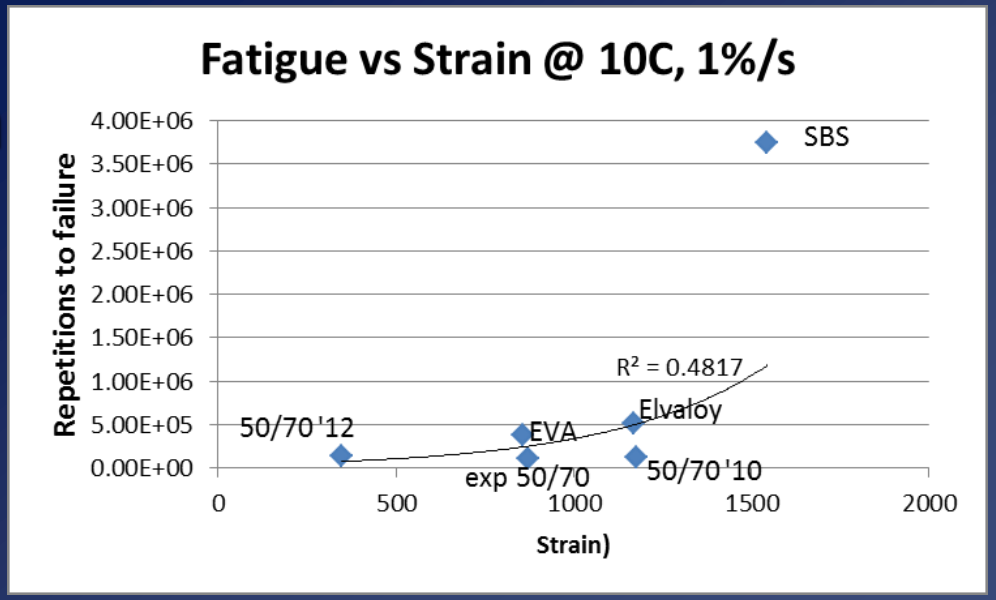
- Fatigue on DSR
  - BYET showing clear distinction between unmodified and modified binders





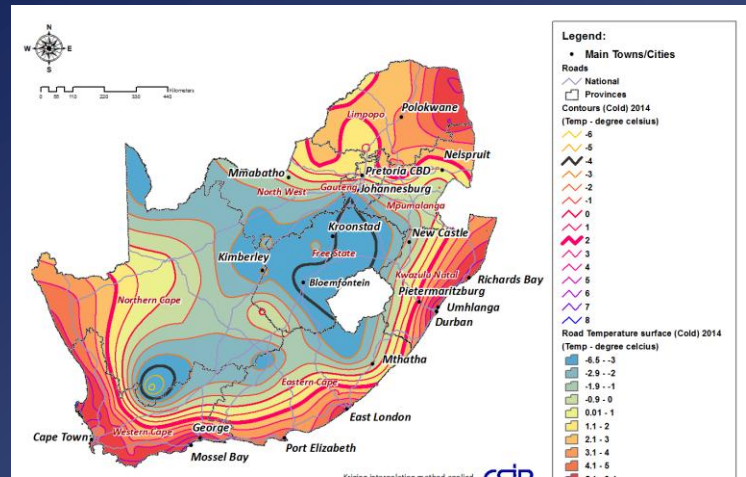
Findings of PG Spec Research$_2$

- Fatigue on DSR
  - BYET calculation to be extended to 4100μγ
  - Correlation with 4PB tests not good
    - Aggregate types not identical
    - Grading types
  - Recommendation expected soon from CSIR



Findings of PG Spec Research$_3$

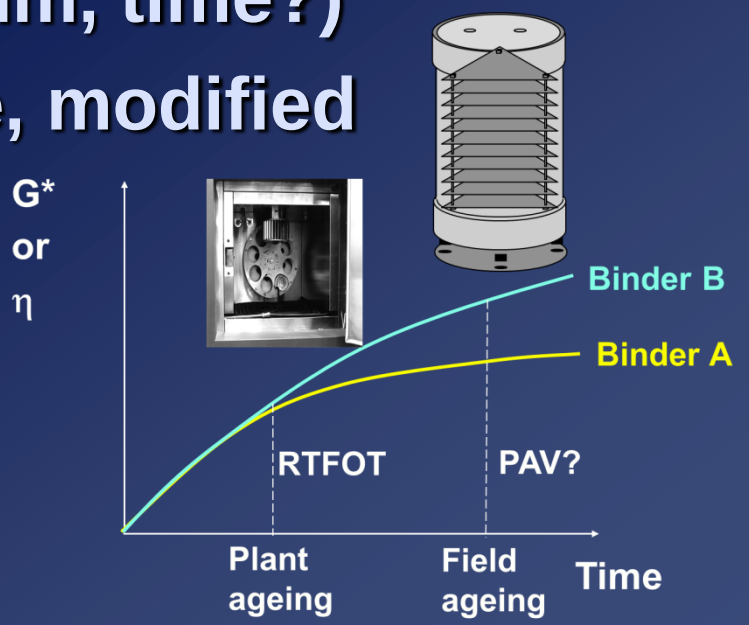
- **Low Temperature LT Cracking with DSR**
  - Tests in SA originally done at -16C to date
  - Blanket decision on LT at -10C for SA (although non-standard, it should be adopted)
  - Creep test @ 5ºC preferred (for s & m)
  - More research in SA, as UWM used cyclic load
  - CSIR method to investigate tanδ method of Soleimani and Hesp



(CSIR)

Findings of PG Spec Research$_4$

- **Long Term Ageing Simulation**
  - Standard PAV hopelessly underestimates field ageing e.g. 3 years equivalent not 10 yrs
  - Glover et al proposed a harsher method (thinner film 2mm to 0.8mm, time?)
  - CSIR to develop tentative, modified procedure for SA

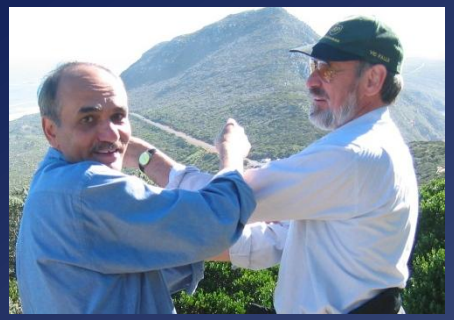


Findings of PG Spec Research$_5$

- Binder recovery
  - Abson method (CSIR) and Rotor Vapour Method (other labs)
  - Report by Georges Mturi
    - Centrifuge – how many repeats?
    - FTIR or another method to check if filler is out
  - To be standardised for SA (in progress)

Way Forward
Time Line 2014

Workshop with Hussain and Martin



15 April

15 May

30 May

12 June

Implement PG Lead Group ideas by CSIR

Review Draft Protocols by Lead Group

Refine Protocol

Implement

DSR workbook development

More research!!


Thank you!!