

# **SURFACING SEALS**

## **SURFACING SEALS**

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### **MAIN FUNCTIONS**

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- Provide a waterproof cover to the underlying pavement.
- Provide a safe, all weather, dust free riding surface for traffic with adequate skid resistance.
- Protect the underlying layer from the abrasive and disruptive forces of traffic and the environment.

# **SURFACING SEALS**

## **FACTORS INFLUENCING PERFORMANCE**

- **PAVEMENT STRUCTURE AND CONDITION**  
(Base Type, Flexural Properties ....)
- **EXISTING SUBSTRATE**  
(Softness, Cracking ....)
- **TRAFFIC**  
(Volume, Loading, Tyre pressure, Speed ...)
- **ROAD GEOMETRY**  
(Grade, Curves, Intersections, Width ...)
- **DESIGN**  
(Appropriateness, Input Data ....)

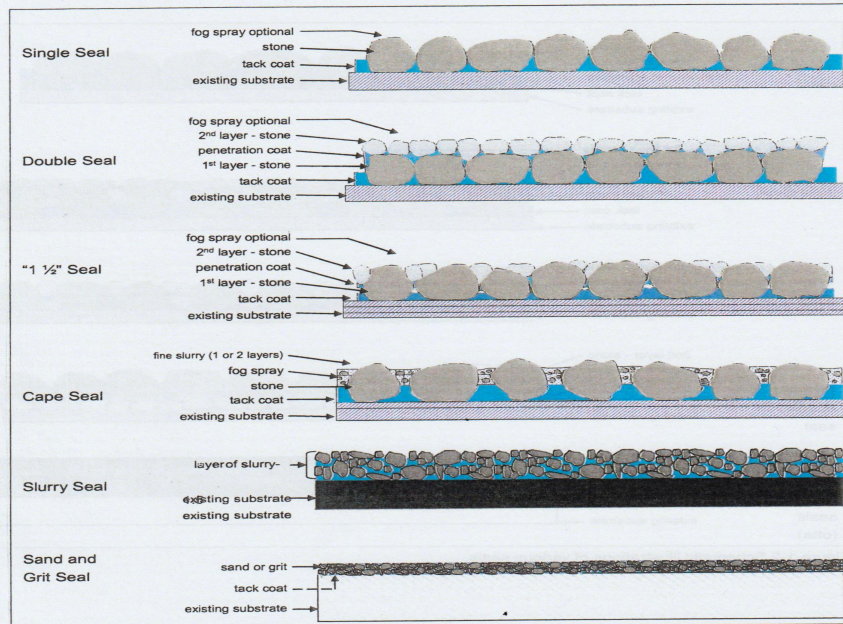
# **SURFACING SEALS**

## **FACTORS INFLUENCING PERFORMANCE**

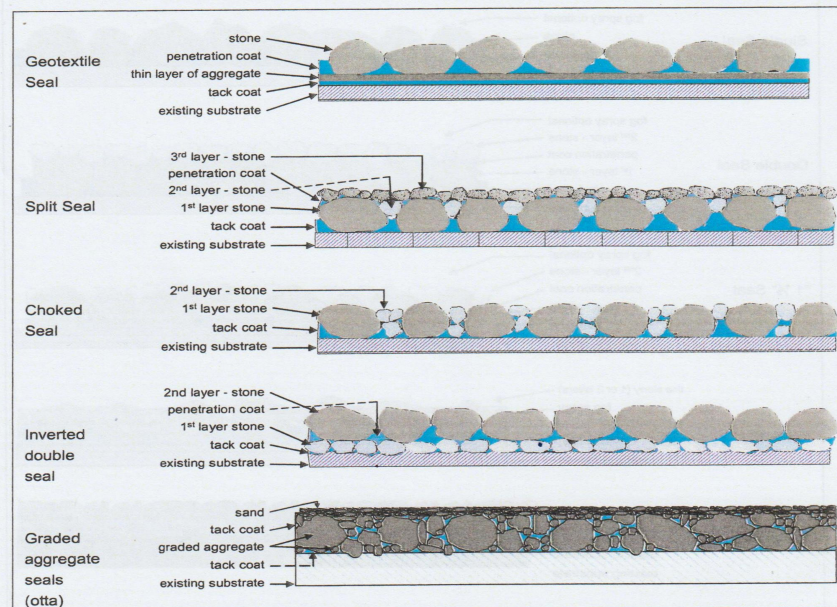
- **MATERIALS** (Aggregates, binders ....)
- **PREPARATION, PRE-TREATMENT & REPAIRS** before construction
- **CONSTRUCTION & SUPERVISION** (Conformance ...)
- **MAINTENANCE** (Capacity, timely ...)



## SEAL TYPES



## SEAL TYPES continued



## DISTRIBUTOR



## SPRAYING BINDER





## SPRAY NOZZLES



## SPREADING CHIPS



## GOOD CHIP SURFACE



## PRECOATED CHIPS





## **RAVELLING on JOINT**



## **GENERAL RAVELLING**



## BLEEDING



## SMOOTH TEXTURE





## **PLUCK-OUT**



## **ROLLED-IN 6,7mm CHIPS**



## **SEAL TYPES**

- **DUST PALLIATIVE**
  - ✓ **Gravel Roads - uses 'dirty binder'**
  - ✓ **Self priming often used with grit or sand**
  - ✓ **Light Traffic – needs further spray after 2 to 3 years**
  - ✓ **Possible to upgrade to seal**

## **SEAL TYPES**

- **GRAVSEAL - Similar to an Otta Seal**

**One-stop operation**

**Self-priming with graded stone chips  
- 13 mm + 2 mm**

**1,6 to 1,8 L/m<sup>2</sup> modified hot pen  
binder**

**Light traffic – 5 years**



## **SEAL TYPES**

- **REJUVENATOR**

**Old / Dry or Lean surfaces**

**Softens and penetrates surface**

**Ordinary fog-sprays sit on surface  
and get worn off by traffic**

## **SEAL TYPES**

### **SAND SEAL**

- ✓ **Lower traffic volumes**
- ✓ **Prime**
- ✓ **Hot pen bit – about 1 L/m<sup>2</sup> + sand**
- ✓ **2 Applications**
- ✓ **Need graded sand with coarse  
( >2 mm) fraction**

# SEAL TYPES

## GENERAL SEALS

**The heavier the traffic the bigger the stone (or more layers), the more binder can and should be applied**

**Must reduce the binder content for more heavy traffic, also for steep grades and high concentrations**

## SHORT BREAK

**10 Minutes**





# DESIGN of SINGLE and DOUBLE SEALS



## INTRODUCTION

- **SABITA Manual 40 / TRH 3 now calculates application rates for the various seal types instead of using charts**

### **MOSTLY USE :-**

- **SINGLE SEALS:** 7 mm, 10 mm, & 14 mm, and
- **DOUBLE SEALS:** 14 mm and 20 mm with a smaller second stone

### **SINGLE SEALS MAINLY for RESEALS**

**I would tend to use modified binders when possible**

### **CALCULATIONS:-**

**There are several calculations and these require very careful input of data**

# INPUT DATA

- **BALL PEN – Corrected Values (CBP) in mm**
- **TRAFFIC – ELV/lane/day**      1 Heavy = 40 Lights
- **ALD in mm to one decimal**
- **MACRO Texture required**
- **AGGREGATE hardness – 10 % FACT**

## OTHER DATA for Amendments:

Existing Texture depth (VTD), Binder Type, Heavy traffic speeds, Cold micro-climates, Aggregate “packing” and micro-texture

## Important design inputs

Quality of the chips:

Strength

Durability

Grading

Shape



Flakiness



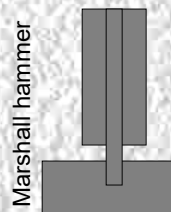
ALD

Sand patch test is used to assess the **existing** surface texture

**SANS BT11**

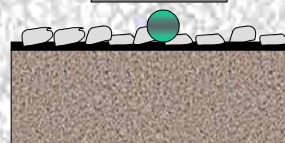


Pour sand onto surface, cone shape - level it in circle flush with chips and measure diameter



Penetration test is used to assess **hardness** of existing surface

**SANS BT10**



**19 dia**

Traffic volume and type is extremely important

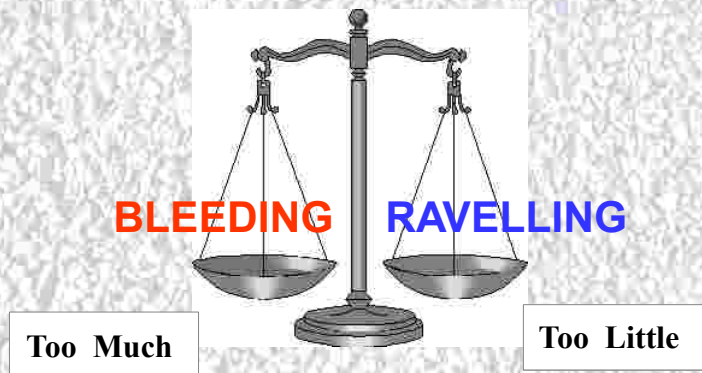
The grade also effects the design – reduce spray rates on steep inclines

**Watch out for patchy surface Conditions – wheeltracks etc**



# SEAL DESIGN OBJECTIVE

APPLY AS MUCH **BINDER** AS  
POSSIBLE - BUT .....



## **New** (2020) SEAL DESIGN

E.4.2 Single & Double Seals Page 197

- **BASIC APPLICATION RATES**
- **ADJUSTMENTS**
- **BINDER DISTRIBUTION**
- **CONVERSIONS**

## **BASIC APPLICATION RATES**

- **Traffic (ELVs/Lane/Day)**
- **Embedment (Corrected Ball Pens - CBP)**
- **Average Least Dimension (ALD)**

## **ADJUSTMENTS**

- **Existing Macro Texture**
- **Heavy Vehicle Speed**
- **Macro Climate**
- **Cold Micro-climate**
- **Aggregate Micro-texture**



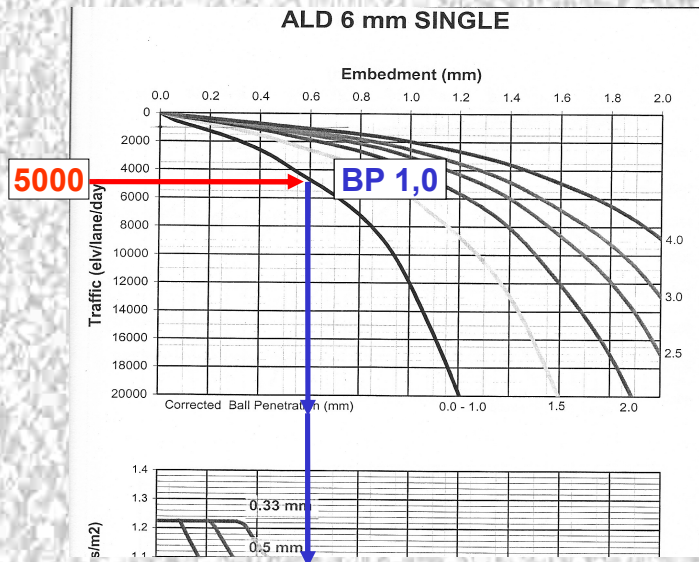
## **BINDER DISTRIBUTION**

- **Tack Coat**
- **Pentration Coat**
- **Cover Spray**

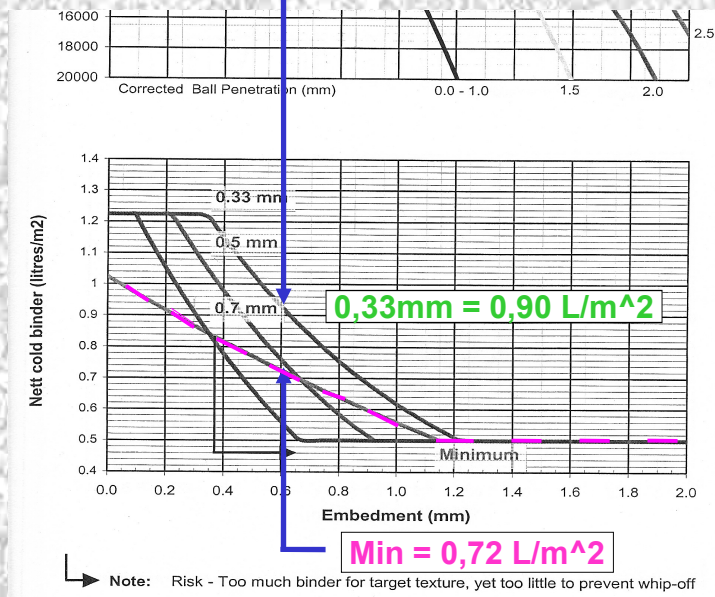
## **CONVERSIONS**

- **Conventional to Modified**
- **Cold to Hot**

# CHART SEAL DESIGN BASIC 1

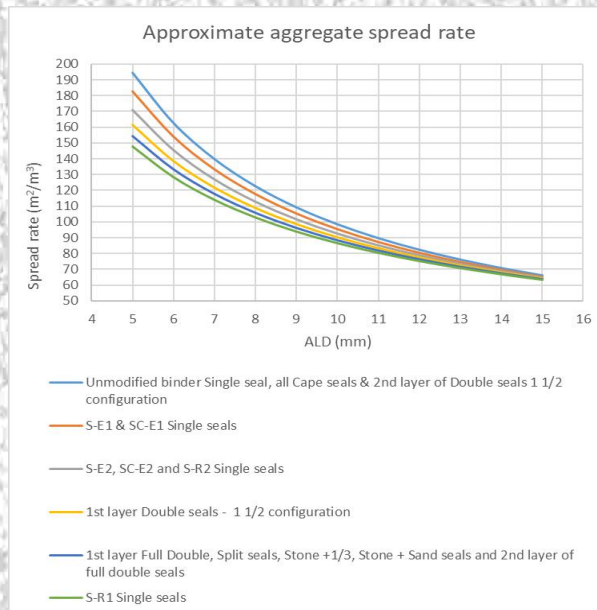


REFER  
TO  
NOTES





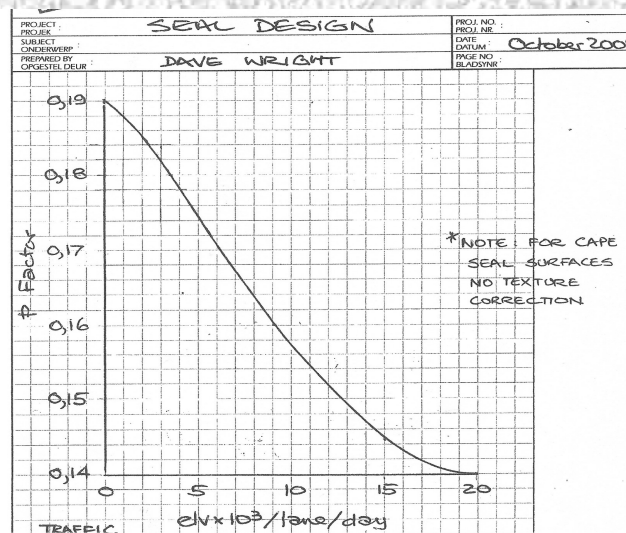
## CHIP APPLICATIONS



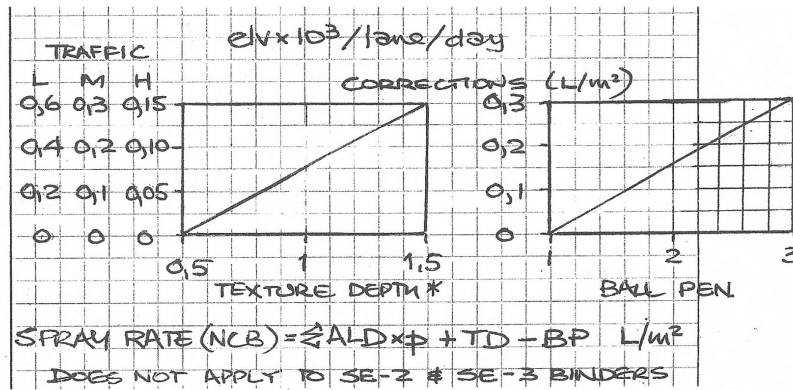
Manual 40/  
TRH3  
Section F  
Construction

Fig F 27 (page  
297)

## Dave Wright Quick Check



# Dave Wright Quick Check



## CHIP APPLICATIONS

- ☐ THE CHART SHOULD BE TAKEN AS A **GUIDE**
- ☐ **USE CHART RATE AS START**
- ☐ DECIDE ON TIGHT , MEDIUM or OPEN APPLICATION
- ☐ **ADJUST ON ROAD TO GET DESIRED SHOULDER TO SHOULDER APPEARANCE**
- TIP:** LOOK IN WHEELTRACKS OF CHIP SPREADER
- ☐ **AMEND TARGET RATE TO SUIT**



## **PRECOAT / FOG-SPRAY**

**SINGLE SEALS: CRAZY IF YOU DON'T USE ONE  
OR THE OTHER**

**PRECOAT (12 litres/m<sup>3</sup>) with HOT  
SPRAYS – No Correction to Spray Rate**

**FOG-SPRAY (0,3 litres/m<sup>2</sup> NCB) with  
Emulsion – 50% Correction  
to Spray Rate**

## **SURFACE TEXTURE**

- ❖ **SEALS GENERALLY > 0,6mm ST**
- ❖ **Cape Seals – Misleading Because of  
20 mm Chip Points**
- ❖ **What is Existing Surface?**
  - Coarse : Texture Treatment**
  - Med to Fine : Consider**
- ❖ **UNEVEN**
  - ✓ **LATERALLY – Differential Treatment**
  - ✓ **LONGITUDINALLY – Texture Treatment**

## ADJUSTMENTS

### ❖ CHIP APPLICATIONS

**MORE OPEN → MORE BINDER**

### ❖ CLIMATE

**ONLY REDUCE SPRAY RATES IN HOT**  
**(humid?) AREAS**

### ❖ BALL PENS - USE MODIFIED METHOD when no “Half-Moon effect” after first blow

- ✓ **REDUCES AVERAGE BP and**  
**INCREASES APPLICATION OF BINDER**

**NO TEMP MODIFICATION for BASE, ? for SEALS**  
**and Necessary for ASPHALT**

## GRADIENTS

### ROADS WITH HEAVY VEHICLES

- **SIGNIFICANT Numbers :- REDUCE by 10%**
- **SMALL Numbers :- REDUCE by 5%**

### FOLLOW HEAVIES AND NOTE SVs

- **UPHILL – WHERE THEY DROP TO LESS**  
**THAN 40 km/h**

**NOTE : Normally Extends OVER Crests**

- **DOWNHILL – WHERE THEY APPLY BRAKES**  
**Watch the break lights!**

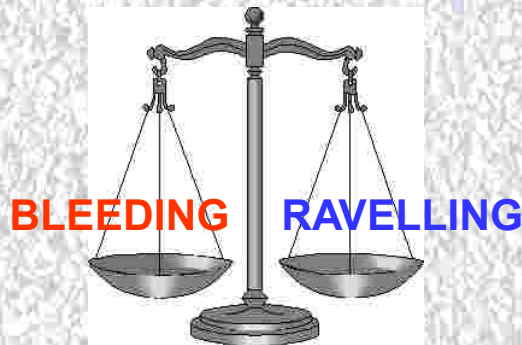


## MODIFIED BINDERS

- ❖ BE VERY CAUTIOUS ABOUT DOING WORK CLOSE TO WINTER
- ❖ DOUBLE SEALS COULD BE DONE IN COLDER WEATHER – ALLOW TIME BEFORE TRAFFICKING – CONSIDER FOG SPRAY
- ❖ NEW TRH 3 ALLOWS FOR BITUMEN-RUBBER

## IN CONCLUSION

- OBJECTIVE : APPLY AS MUCH BINDER AS POSSIBLE



# **SURFACING DESIGN**

- 1 IT'S  
COMPLICATED**
- 2 I CAN, WITH  
IMAGINATION,  
GIVE YOU ANY  
APPLICATION  
RATE!**
- 3 YOU NEED  
EXPERIENCE**