Asphalt Production & Quality Control
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Surfacing and Site Testing

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Asphalt Plant Types

HA Sector Scheme 14 / BS EN 13108:21
- Quality Procedures
- Plant Calibration and Maintenance
- Control of incoming constituent materials
- Finished Product Testing requirements
- OCL

BS594987:2010 / SHW clause 903 - Transport, Laying & Compaction

Bond coat

Best Practice

Site testing Requirements (Surface Texture / Compaction / Alignment)
Asphalt Plant Types

- Asphalt Plant
- Batch Heater
- Continuous Drum Mix Plant
Asphalt Plant

- 2 – 4 tonnes capacity mixer
- 80 – 160 Tonnes per hour
- Screen Deck - consistency in grading of finished product
- Hot aggregate storage
- Hot bin storage of asphalt and direct loading
- Mixing can be slowed with finer mixes / higher moisture contents
- Hot bin draining when switching from limestone to hardstone
- Alarm facility for mechanical issues…
- Can cope with demand for larger tonnage (storage)
Batch Heater Plant
Batch Heater

- ½ – 3 Tonnes capacity mixer
- No screens / reliant on accurate calibration
- Limitations on production by mix type
- Suitable for ‘recipe type mixtures’
- Greater need for tighter control of aggregate gradings
- Ideal for small loading (Collect trade)
- Less fuel efficient than other plant types
- Prone to contamination when switching from base / binder to smaller aggregate size mixes
- Good batch to batch temperature control
Continuous/drum-mix Plant
Continuous Drum Mix Plant

- No screens (but can be modified)
- Aggregate drying; binder and filler addition in same drum
- Very high volumes +200 Tonnes per hour
- Suitable for base and binder - larger tonnage
- Critical control required on moisture and aggregate gradings – recipe reliant on accuracy
- Start and end of the run can be segregated or suffer insufficient coating of binder
- Small loads and switching can cause inefficiency in cost and rate of production
National Highways
Sector Scheme 14

BS EN 13108:21
In summary:

- Purpose of SSD 14 and EN13108:21
- Fundamental requirements of the standards
- Plant calibration and maintenance
- Control of incoming raw and constituent materials
- In house testing and conformity/ OCL (*Operating Compliance Level*)
- Control of Non conforming products
Before introduction of European Standards for asphalt there was National Highway SSD 14 (QMS for production of asphalt) 1998

January 2008 EN standards for asphalt which saw a major revision to SSD14 and alignment with the BS EN 13108 series of standards

The Factory Production Control element of SSD14 became incorporated in BS EN 13108:21

FPC is a regulatory requirement of Attestation of Conformity under CPD for the purpose of CE marking. While SSD14 refers to this, it does not affect the CE Marking process.

SSD 14 = The Quality Plan / BS EN 13108:21 = Procedures and detailed requirements.
Main elements of changes to SSD14 in 2008 include

- Factory Production Control
- Reference to ISO9001
- Retention of UKAS Audit check for laboratory performance
- Plant binder blending Protocols
- Record retention protocol
- Mandatory Notification of non conforming products to customers
- OCL replaced previous Q Value conformity
EN13108:21 Overview

- Part of a system for the evaluation of conformity of bituminous mixtures conforming to BS EN 13108:1 to 7 in accordance with Type testing protocols.

- Minimum frequencies of monitoring and evaluation in all aspects of the process.

- Plant specific requirements for calibration, monitoring and maintenance. Calibration and maintenance requirements must meet those set out in the Quality plan and Table 2.

- Traceability and control of incoming raw materials. Sourcing in line with ITT approved materials.

- Testing of finished product to verify compliance with ITT and other related aspects.

- Measurement of conformity levels / appropriate control of non conformity.

- The producer shall establish and maintain procedures for training personnel involved in all aspects of Quality.
Calibration / Visual Inspections

- Safety / planned preventative maintenance programme
- Weigh Gear
- Admixture dispensers
- Flow meters (binder / admixtures)
- Batching system (Batch plants)
- Proportioning System (Continuous)
- In plant Temperature monitoring (Pyrometers)
- Lock off systems
- Records of all inspections, calibrations and checks kept for a minimum of 10 years
The control procedures shall verify that suppliers of incoming materials are capable of providing the required quality of materials and to confirm conformity with the initial type testing.

Switching raw material suppliers is not advisable.

- **Aggregates** – Source approval at ITT stage / grading/ Moisture / shape / Mechanical and chemical analysis.
- **Filler** – Source approval / Intrinsic properties / controlling reclaimed?
- **Binders** – source approval / Tank labelling / penetration / storage / temperature / manufacturers QC data
- **Additives / RAP** (Fibre pellets; pigment; polymers etc)
Incoming Raw Materials

Pointers…

- AGGREGATE – Ticket; Separate bays; clear labelling; size; geological source and PSV.
  - Contamination from source? Organoleptic Inspections; moisture; grading and minimising sources of cross contamination
  - Loading shovel cleanliness; Stock rotation on delivery; plant drain out; site conditions…

- BITUMEN - Delivery Ticket; Daily checks; correct labelling and lock off facility. Max storage and aged binder testing.

- Admixtures - Organoleptic check; ticket check; labelling; lock off; proof of intrinsic properties / appropriate storage and stock rotation
In House Testing Requirements

- Competency assessed and appropriate training for staff
- Calibrated laboratory equipment - ovens; balances; sampling procedure and access platform; appropriate PPE; compositional analysis testing procedure
- Prior to loading - Suitability of delivery vehicle
- First thing - Ticket Check and Organoleptic inspection – correct loading
- Temperature
- Workability!
- Sampling / Compliance of finished product with type testing specification (grading and binder content)
- Correct frequency of carrying out compositional analysis in accordance with Plant Operating Compliance Level (OCL)
- Only samples tested from source will be used in calculating OCL/ site samples found to be non compliant do not contribute to Plant OCL
The determination of OCL is a measure of the effectiveness of production processes.

Based on a rolling mean of the compliance of 32 results from across all product types.

Allowances for precision of sampling and testing via tolerance from target on spec parameters. (Table A1)

Test frequency based on non conformity rates on single results
- OCL A (X = 600T) (Y = 1000T) 0/2 NC
- OCL B (X = 300T) (Y = 500T) 3/6 NC
- OCL C (X = 150T) (Y = 250T) >6 NC
> 8 non compliances = immediate and comprehensive review of plant and procedures.

Test frequency can be increased for more effective monitoring.

NON CONFORMITY must be reported to the customer.
TRANSPORT LAYING and COMPACTION

BS594987:2010 and Additional Clauses
BS 594987:2010 Overview

- **Historical publications**
  - BS594 / 4987 part 2
  - Local authority Specifications / Best practices
  - SHW pre IAN 101/07

- BS 594987 first published in 2007 in line with EN13108

- SHW series 700 Road pavements general (Nov 09)

- SHW series 900 Road pavements - Bituminous mixtures (August 08)

- BS594987:2010 latest version – **Minimum requirement** for all surfacing

- SHW 700/900 In accordance with contract document appendices is complimentary and additional
Section 3 - Bond coat Specification
- SHW clause 920 Appendices 7/1 & 7/4

Section 4 - Transport & delivery

Section 5 - Preparation and general surfacing
- Level tolerances (SHW Clause 701 table 7/1)
- Regulating
- Overlaying
- Application of bond coat and spread rate

Section 6 Laying (machine / handlay) and equipment required
- Guidelines for Weather conditions (HA works refer to SHW Cl 945 also)
- Nominal thickness of layers
- Surface regularity / profiling (SHW clause 702 Table 7/2)
- Sampling material from the paver
- Joint formation
- Iron works
Section 7 - Chipping HRA
- Spec of HRA required (Materials SHW cl910 / cl911)
- Spread rate
- Method of applying chippings and equipment

Section 8 - Texture depth
- Procedure / Method of measurement
- SHW Clause 921 Table 9/3
- Contract document Appendix 1/5

Section 9 - Compaction
- Equipment type and specification
- Number of rollers depending upon tonnage
- Rolling temperature
- Testing to appendix 7/1 Clause 929 NDM/Coring
Introduced in IAN 101/07 following industry collaboration

- Reinforcement of some elements of BS594987
- Best practice
- Joint formation
- Over band sealing
- Reduction of ingress of water
- LONG TERM DURABILITY
- Initial rise in costs
- Reduction in maintenance
- Reduced whole life cost
Transport / Delivery / Discharge

- Vehicle safety features
- Cleanliness
- Insulation
- Only permitted release agents
- Correct loading
- Consideration of travel time and discharge temps
- Rate of supply
SITE PREPARATION
&
INSTALLATION
Substrate Suitability
• Surface free from loose material
• Thickness should be uniform
• Correct profile
• Thin slivers of material cause delamination
The Gang

Banksman

2x Screwmen

(+$ Roller Drivers & Joint man)

Paver Driver

Foreman
Screed Unit functions:

1. Accurately lays construction material to a specified level and shape
2. Provides a degree of compaction to the material
3. Irons and smoothes the material to a good finish
Paver Operation

**Tractor Operator**: Operates ‘primary controls’ to control paving speed, head of material in front of screed, steering, truck engagement, hopper clearance

**Screwman**: Operates ‘Secondary Controls’, including screed levels, crowning and screed compaction
Control Paver speed
Interlayer bond
Interlayer bond
The rules for good Interlayer bond

- Clean mechanically swept substrate
- No standing water, ice, frost or snow
- 0°C on a rising thermometer
- Polymer modified Bond coat
- Mechanically Hot applied
- 0.35Kg/m² residual binder - calibrated spray bars
- Allow to break
- Beware pickup in wheeltrack zones from paver wheels and delivery vehicles

= Improved Durability
Joint formation
Echelon paving where practical
• Segregation
• Rapid Cooling
• Diesel
Consequence of Bad Practice
Site Testing

- Air Voids (Clause 929)
- Surface regularity
  - Transverse (3m Beam)
  - Longitudinal (Rolling straight edge)
- Surface Macro texture (SHW clause 921 / 942)
- Rate of spread – Chippings (BS598:108:2005)
- Rate of spread – Emulsion
- Mixture composition - sampling from auger
Rolling Straight edge
Surface macro texture
Thank you for your attention!