



# Bitumen Production and Asphalt Binder Quality Course: PG Grading and Polymer-Modified Bitumen



## **Bitumen Production and Asphalt Binder Quality Course: PG Grading and Polymer-Modified Bitumen**

### **Introduction:**

Bitumen production and asphalt binder quality, covering refinery bitumen units, PG grading and polymer-modified bitumen, is a 5-day course for refinery, terminal and binder laboratory staff that ends with a Bitumen Binder Supply and Quality Plan. Road programmes lose pavement life when binders leave the refinery off-grade, harden in overheated tanks or separate in transit. Nominees already run bitumen units, terminals or binder tests and work through case studies built on unit data, test reports and supply records. CoreConcept Training Center delivers this bitumen production and asphalt binder quality course.

### **Course Objectives:**

- Control vacuum residue cut points, air-blowing conditions and deasphalting severity so that refinery bitumen meets a target penetration, softening point and viscosity
- Classify paving binders by penetration, viscosity and Superpave performance grade and select a grade for a stated climate and traffic loading
- Interpret rolling thin film oven, pressure ageing vessel, dynamic shear rheometer, bending beam rheometer and MSCR results to accept or reject a binder batch
- Specify polymer-modified bitumen and cationic or anionic emulsions by polymer content, storage stability, setting class and residue properties
- Operate hot bitumen storage, blending and road tanker transport within temperature limits that prevent hardening, segregation and fume exposure
- Draft a binder supply specification with sampling, acceptance testing and non-conformance rules for a road programme

### **Target Audience:**

- Refinery teams responsible for vacuum residue routing, bitumen blowing units and finished grade quality
  - Bitumen terminal and blending teams responsible for tank heating, grade blending and road tanker loading
  - Polymer modification and emulsion plant teams responsible for mill operation, recipes and product stability
  - Road-authority materials teams responsible for binder specifications, supplier approval and delivery acceptance
  - Binder testing laboratory teams responsible for ageing, rheology and consistency tests on delivered batches
  - Supply and contracts teams responsible for bitumen tenders, delivery schedules and quality claims
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## **Course Outline:**

### **Day 1: Bitumen Origins, Refinery Routes and Product Landscape**

- Bitumen Chemistry With Asphaltenes, Resins, Aromatics and Saturates
- Vacuum Residue Cut Point Effect on Bitumen Hardness
- Solvent Deasphalting With Propane or Butane for Hard Grades
- Paving, Industrial and Oxidised Bitumen Product Families
- Current-State Review of a Refinery Bitumen Supply Chain

### **Day 2: Grading Systems, Binder Ageing and Rheology Tests**

- Penetration Grading and Ring and Ball Softening Point
- Viscosity Grading With Rotational Viscometer Measurements
- Superpave Performance Grade Notation for High and Low Temperatures
- Rolling Thin Film Oven and Pressure Ageing Vessel Conditioning
- Dynamic Shear Rheometer, Bending Beam Rheometer and MSCR Results

### **Day 3: Air-Blowing Units, Polymer Modification and Emulsion Production**

- Air-Blowing Unit Temperature, Air Rate and Residence Time
- Penetration Index Shift From Blowing and Fluxing Recipes
- SBS Polymer-Modified Bitumen Mill Dispersion and Curing
- Colloid Mill Emulsion Production With Cationic and Anionic Emulsifiers
- EN 13808 Emulsion Classes for Tack, Chip Seal and Slurry

### **Day 4: Storage, Heated Transport and Binder Quality Failures**

- Hot Storage Tank Heating Limits and Circulation Practice
- Polymer-Modified Bitumen Storage Stability and Separation Checks
- Road Tanker Loading Temperature, Insulation and Delivery Time
- Fume Exposure and Hydrogen Sulphide Controls at Bitumen Tanks
- Root Cause Analysis of Off-Grade and Hardened Binder Deliveries

### **Day 5: Case Study: Bitumen Binder Supply and Quality Plan**

- Case Refinery Grade Slate and Unit Capacity Review
  - Climate and Traffic Data Used to Select Binder Grades
  - Binder Supply Specification and Sampling Frequency Table Drafting
  - Acceptance Testing, Non-Conformance and Quality Claim Rules
  - Bitumen Binder Supply and Quality Plan Completion and Panel Review
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## **Skills You Will Gain:**

- Vacuum Residue Cut Selection
- Bitumen Blowing Control
- Performance Grade Selection
- Binder Rheology Interpretation
- Polymer Modification Recipe Control
- Emulsion Setting Class Specification
- Hot Bitumen Logistics Control
- Binder Acceptance Testing

## **Why Attend This Course:**

- Deliver a Bitumen Binder Supply and Quality Plan for a case refinery or terminal to the technical manager and the road-authority materials engineer for approval
- Decide which grade, polymer-modified binder or emulsion class suits a road section and whether a delivered batch is accepted or rejected
- Avoid rejected loads, rutting and early cracking caused by off-grade production, overheated tanks or binder separation in transit
- Coach unit operators, terminal staff and laboratory technicians using grade selection sheets, test acceptance tables and storage temperature charts

## **Conclusion:**

Back at work, the participant presents the Bitumen Binder Supply and Quality Plan to the refinery technical manager, the terminal manager and the road-authority materials engineer. They use it to agree the grade slate, the binder supply specification, sampling points and the acceptance and claim rules for the coming paving season. After the first season of deliveries under the plan, the organisation should review rejected loads, test result spread, storage temperatures and early pavement distress reports, then tighten the weaker clauses.

## **Frequently Asked Questions FAQ:**

### **What should participants know before a bitumen production and asphalt binder quality course?**

Participants should already work on a bitumen unit, at a bitumen terminal or emulsion plant, or in a binder testing laboratory, and read basic test reports. Bringing an anonymised grade specification, test certificate or tank temperature log helps during the case study day.

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## **How does bitumen production and asphalt binder quality differ from a pavement design course?**

It treats the binder as a manufactured product: how refineries make it, how laboratories grade and age it, how it is modified, stored and delivered, and how buyers accept it. Pavement design courses size layers and design asphalt mixes rather than producing and testing the binder.

## **Why does asphalt binder quality use performance grading as well as penetration grading?**

Penetration and softening point describe consistency at fixed test temperatures. Performance grading measures stiffness and elasticity after simulated ageing across the high and low temperatures a road will see, so the binder can be matched to climate and heavy traffic loading.

## **What do participants take back from the bitumen production and asphalt binder quality course?**

Participants take back a Bitumen Binder Supply and Quality Plan for a case refinery or terminal, with a grade selection sheet, a binder supply specification, a sampling table, storage and transport temperature limits, and acceptance and claim rules they can adapt.

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