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| **Calcareous materials** | **Test Method** | **Description** | |
| Properties of coarse-grained | | | |
| 2.6 | ASTM C127 | Specific Weight(g/cm^2) | |
| 0.6 | ASTM C127 | Water absorption percentage | |
| 20 | ASTM C131 | Los Angeles Abrasion Percent | |
| 100 | ASTM D5821 | Fracture percentage on one side | |
| 100 | ASTM D5821 | Fracture percentage on two sides | |
| 10 | BS812 | Elongation and shear coefficient | |
| Properties of fine-grained materials | | | |
| 2.7 | ASTM C128 | Special Weight | |
| 1.2 | ASTM C128 | Water absorption percentage | |
| Properties of calcareous filler | | | |
| 2.7 | ASTM C128 | Special Weight | |
| 2.6 | ASTM C128 | Water absorption percentage | |
| Properties of Wollastonite filler | | | |
| 2.9 | ASTM C128 | Special Weight | |
| 2.16 | ASTM C128 | Water absorption percentage | |

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| **Experiment** | **Experiment results** | **Instruction value 234** | **Quality** |
| The special weight in 25° C | 1.018 | - | OK |
| Penetration degree in 25° C (0.1 mm) | 60 | 60-70 | OK |
| Soft point (° C) | 51 | 49-56 | OK |
| Flammabitiy degree(° C) | 306 | Minimum 232 | OK |
| Tensile ability in 25° C | 100 | Minimum 100 | OK |
| Solubility in tri-chloroethylene(%) | 99.8 | Minimum 99 | OK |
| Rational laziness (Pa.S) in 135° C | 0.375 | Maximum 3 | OK |
| Change in initial mass in the Un process of thin layer of pitch in 5 hours at 163° C (%) | 0.2 | Maximum 0.8 | OK |
| The degree of penetration of residue from Un proves in thin pitch layer in 25° C (0.1 mm) | 45 | - | OK |
| The ratio of pitch residue penetration to penetration degree of initial pich (%) | 75 | Minimum 54 | OK |
| The tensil ability of Un process residue from thin pitch layer in 25° C (cm) | 50< | Minimum 50 | OK |
| G\*/sinη in shear dynamic rheometer (Pa) at 70° C the unaged pich with the frequency of 10 rad/s | 1060 | Minimum 100 | OK |
| G\*/sinη in shear dynamic rheometer (Pa) on the aged pitch RTFO with the frequency of 10 rad/s | 2380 | Minimum 2200 | OK |
| Creep stiffness in bending beam rheometer (MPa) in -6° C | 80 | Minimum 300 | OK |
| The amount of m in bending beam rheometer in -6° C | 0.342 | Minimum 0.3 | OK |

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| **Pass percentage of the proposed low grain size limit** | **Sieve (mm)** |
| 100 | 25 |
| 90 | 19 |
| 56 | 9.5 |
| 10 | 4.75 |
| 5 | 2.36 |
| 2 | 0.075 |

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| **Pass percentage of the proposed low grain size limit** | **Sieve (mm)** |
| 100 | 25 |
| 100 | 19 |
| 80 | 9.5 |
| 25 | 4.75 |
| 10 | 2.36 |
| 4 | 0.075 |

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| **Grading A** | **Grading B** | **Grading C** | **Grading D** | **E Grading** | **Sieve Size)mm)** |
| Pass percentage | | | | |
| 100 | 100 | 100 | 100 | 100 | 25 |
| 90 | 100 | 95 | 92.5 | 97.5 | 19 |
| 56 | 80 | 68 | 62 | 74 | 9.5 |
| 10 | 25 | 17.5 | 13.75 | 21.25 | 4.75 |
| 5 | 10 | 7.5 | 6.25 | 8.75 | 2.36 |
| 2 | 4 | 3 | 2.5 | 3.5 | 0.075 |

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| **3** | **3.5** | **4** | **Percentage of** **bitumen**  **Grading** |
| 100 | 77.6 | 68.3 | A |
| 79.8 | 55.9 | 30.1 | D |
| 73.4 | 48.2 | 22.7 | C |
| 61.2 | 36.8 | 20.4 | E |
| 54.3 | 30.6 | 18.16 | B |

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| **Run** | **Factor 1** | **Factor 2** | **Response 1** | **Response 2** | **Response 3** |
| A:d10 | B:B | Evaporation | Permeation | Cantabro |
|  | Percentage of bitumen | gr/day | m/s | % |
| 1 | 4.75 | 3 | 24.5 | 0.003265 | 100 |
| 2 | 3.6 | 3 | 19.5 | 0.00232 | 79.8 |
| 3 | 3 | 3 | 14.5 | 0.001806 | 73.4 |
| 4 | 2.6 | 3 | 10.125 | 0.001621 | 61.2 |
| 5 | 2.36 | 3 | 4.75 | 0.001429 | 54.3 |
| 6 | 4.75 | 3.5 | 24 | 0.003184 | 77.6 |
| 7 | 3.6 | 3.5 | 19 | 0.002282 | 55.9 |
| 8 | 3 | 3.5 | 14.05 | 0.001799 | 48.2 |
| 9 | 2.6 | 3.5 | 9.5 | 0.001602 | 36.8 |
| 10 | 2.36 | 3.5 | 4.375 | 0.0014247 | 30.6 |
| 11 | 4.75 | 4 | 23.7 | 0.003069 | 68.3 |
| 12 | 3.6 | 4 | 18.5 | 0.002258 | 30.1 |
| 13 | 3 | 4 | 13.55 | 0.001784 | 22.7 |
| 14 | 2.6 | 4 | 9 | 0.001572 | 20.4 |
| 15 | 2.36 | 4 | 4 | 0.0014196 | 18.16 |

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| **Name** | **Goal** | **Limit** | **Limit** |
| A:d10 | is in range | 2.36 | 4.75 |
| B:B | is in range | 3 | 4.1 |
| Evaporation | is in range | 4 | 24.5 |
| Permeation | is in range | 0.00141961 | 0.00326496 |
| Cantabro | is in range | 0 | 25 |

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| Source | Std. |  | Adjusted | Predicted |  |  |
| Dev. | R-Squared | R-Squared | R-Squared | PRESS |  |
| Linear | 5.238E-005 | 0.9945 | 0.9935 | 0.9903 | 5.746E-008 |  |
| 2FI | 4.600E-005 | 0.9961 | 0.9950 | 0.9928 | 4.261E-008 |  |
| Quadratic | 3.383E-005 | 0.9983 | 0.9973 | 0.9956 | 2.622E-008 | Suggested |
| Cubic | 3.339E-005 | 0.9989 | 0.9974 | 0.9940 | 3.557E-008 | Aliased |

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| Source | **Std.** |  | **Adjusted** | **Predicted** |  |  |
| Dev. | R-Squared | R-Squared | R-Squared | PRESS |  |
| Linear | 2.20 | 0.9195 | 0.9060 | 0.8709 | 92.75 |  |
| 2FI | 2.29 | 0.9195 | 0.8975 | 0.8040 | 140.77 |  |
| Quadratic | 0.74 | 0.9931 | 0.9893 | 0.9824 | 12.62 | Suggested |
| Cubic | 0.47 | 0.9982 | 0.9958 | 0.9933 | 4.80 | Aliased |

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| **Standard Value [29]** | | **Value** | **Test name** |
| **Minimum** | **Maximum** |
| 18 | 24 | 18.22% | Empty space percent |
| 80 | - | 93% | Modified Latman (TSR) |
| - | - | 750.5 | (Kgf) Compressive strength |
| - | - | 3.05 | Psychological |
| - | 30 | 29.74 | Aged Cantabro |