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File No.RW/NH-35072/05/2018-S&R (P&B) (E165688)
Government of India
Ministry of Road Transport & Highways
(S&R (P&B/New Technology) Zone)
Transport Bhawan, 1, Parliament Street, New Delhi-110001

Dated: 23rd August, 2023

CIRCULAR

To

1. The Chief Secretaries of all the State Governments/ UTs.
2. The Principal Secretaries/ Secretaries of all States/ UTs Public Works Department/ Road Construction Department/ Highways Department (dealing with National Highways and other centrally sponsored schemes).
3. The Chairman, National Highways Authority of India, G-5 & 6, Sector-10, Dwarka, New Delhi-110 075.
4. The Managing Director, NHIDCL, PTI Building, New Delhi-110001.
5. The Director General (Border Roads), Seema Sadak Bhawan, Ring Road, New Delhi-110 010.
6. All Engineers-in-Chief and Chief Engineers of Public Works Department of States/ UTs/ Road Construction Department/ Highways Departments (dealing with National Highways and other centrally sponsored schemes).
7. All CE-ROs, ROs and ELOs of the Ministry.

Subject:-Use of Bitumen: Demand-Supply, Type & Grade, Specifications, Source of Procurement and Quality in Construction of National Highways Projects- Reg.

Reference: Ministry's Circular No. RW/NH-35072/05/2018-S&R (P&B) dated 24.08.2018

Madam/Sir,

Bituminous binder is one of the most important ingredient which influences the performance of bituminous mixes. Selection of appropriate grade of bituminous binder for a particular section of National Highway based on prevailing loading, ambient temperature & rainfall and ensuring quality of bituminous binder during construction is indispensable to have durable flexible pavement.

2. Keeping in view the above requirements, following have been decided in supersession to provisions contained in Ministry's circular cited above:

2.1 **Selection of Appropriate Grade of Bituminous Binder:** Bituminous binder for conventional pavement courses shall be in accordance with IRC: 37 "Guidelines for the Design of Flexible Pavements". However, provisions contained in relevant IRC Guidelines/Standards shall be applicable for selection of binder grade for pavement courses such as Stone Matrix Asphalt (SMA), Gap-graded Rubberised Bituminous Mixes (GGRB), High Performance Mixes (HiPER) and Cement Grouted Bituminous Macadam (CGBM).

2.2 **Specification of Bituminous Binder:**

2.2.1 **Viscosity Grade Bitumen:** Viscosity Grade Bitumen shall comply the requirements of quality characteristics specified in IS: 73 "Paving Bitumen -Specification" except that

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1-Supersedes circular dated 23.08.2023

minimum Viscosity at 60°C for VG-40 grade bitumen shall be 3600 Poise as recommended in IRC: 37. In addition to these, bitumen shall also be tested for Wax Content as per IS: 10512 and Wax Content shall not be more than 4.5 per cent.

2.2.2 **Polymer Modified Bitumen (PMB)**: Polymer Modified Bitumen shall comply the requirements specified in IRC: SP: 53 "Guidelines on Use of Modified Bitumen in Road Construction". In addition, PMB shall comply the requirements specified in IS: 15462 "Polymer Modified Bitumen (PMB)-Specification" for Multiple Stress Creep Recovery (MSCR) Test.

2.2.3 **Rubber Modified Bitumen (RMB)**: Rubber Modified Bitumen shall comply the requirements specified in IRC: SP: 53 "Guidelines on Use of Modified Bitumen in Road Construction".

2.3 **Source of Procurement of Bituminous Binder:**

2.3.1 **Viscosity Grade Bitumen:** Considering the shortfall of domestic production vis-a-vis demand, use of imported bitumen may be accepted. Traceability of imported bitumen shall be ensured. Along with each tanker load, Manufacturer's Test Certificate (MTC) shall be provided. MTC will also have the details such as name of origin country, name of refinery, GPS co-ordinates of loading & unloading ports, adopted refining process, etc.

2.3.2 **Modified Bitumen:** To minimise separation issue, modified bitumen (PMB, CRMB & NRMB) shall be procured from domestic sources only. Further, as all refineries do not produce modified bitumen themselves, modified bitumen may be procured from domestic refineries or private producers.

2.4 **Quality Assurance & Quality Control of Bituminous Binder:**

2.4 **Laboratory for Testing of Bituminous Binder:** Refineries/Producer's/Manufacturer's/supplier's own laboratory as well as third party laboratory shall have ISO: 17025 "General requirements for the competence of testing and calibration laboratories" certification granted by NABL. Each equipment shall have valid calibration certificate.

2.4.2 **Quality Assurance & Quality Control of Bituminous Binder:** A Standard Operating Procedure (SoP) having details of internal quality control by refinery/supplier/producer, repeatability & reproducibility of test results, responsibilities of departmental officers (PD/EE), responsibilities of AE/IE, mandatory testing of sample taken from tankers before unloading, etc. is given in **Annexure-1, 2, 3 & 4** respectively for Domestically Procured Viscosity Grade Bitumen, Imported Viscosity Grade Bitumen, Polymer Modified Bitumen Domestically Procured and Rubber Modified Bitumen Domestically Procured. The SoP shall be scrupulously followed to ensure quality of bitumen/modified bitumen.

3. It is requested that the contents of the circular may be brought into the notice of all concerned for immediate needful compliance.

4. This issues with the approval of Competent Authority.

Yours sincerely,

Bidur Kant Jha
23/08/2023

(Bidur Kant Jha)
Director
(New Technology for Highway Development)
For Director General (Road Development) & Special Secretary

Copy to:

1. All CEs in the Ministry of Road Transport & Highways
2. All ROs of the Ministry of Road Transport & Highways
3. The Secretary General, Indian Roads Congress
4. Technical circular file of S&R (P&B) Section
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Annexure-1

SoP for QA/ & QC of Domestically Procured Viscosity Grade Bitumen

i. Refinery shall have ISO: 17025 certified well-equipped laboratory at refinery itself for internal quality control.

ii. Along with each tanker load, Manufacturer's Test Certificate shall be provided. MTC also have the details such as GPS co-ordinates of loading & unloading locations.

iii. Contractor shall have well-equipped laboratory at Project site. All the equipment in the laboratory shall have valid calibration certificate. Before unloading of Bitumen into the storage tank of Hot Mix Plant, it shall be tested for properties such as Viscosity at 60^{0}C, Penetration & Softening Point Test. After satisfactory test results, bitumen shall be allowed for unloading. Other properties test shall be carried out as per frequency specified in Section 900 of Ministry's Specifications for Road and Bridge Works. As establishment of site laboratory for carrying out all tests on bitumen may be difficult in projects costing less than Rs 25 Crore (Civil Works Cost), option to use a nearby established reputed laboratory can be given to the contractor in which case such laboratory details should be intimated to RO / EE NH PWD to plan their random checks.

iv. Every bitumen storage tank of Hot Mix Plant should be clearly labelled with the grade of bitumen it contains. When the grade of bitumen in a tank is changed, it is important to ensure that the tank is emptied and relabelled before the new grade is delivered.

v. Before approval of mix design, Project Director (PD)/Executive Engineer (EE) shall visit the site laboratory (other identified laboratory for projects costing less than Rs. 25 Crore) and ensure that the laboratory is well equipped as per IRC: SP: 112. Twice in a month, PD/EE shall witness tests on quality characteristics such as Viscosity at 60^{0}C, Penetration, Softening Point and Purity Test in her/his presence from random samples. In case of NH projects costing Rs. 100 Crore and more (Civil Works Cost) executed through State PWDs, RO (MoRTH) or his authorized officer should witness the tests on bitumen at least once and preferably twice during the

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construction. This is to be recorded before passing of the final bill. To facilitate such random checking EPC contractor shall intimate EE NH PWD & RO MORTH, the details of arrival of Bitumen tankers to site including the date & time of arrival / nos. of tankers arriving at the site etc., to enable RO / EE NH PWD to plan their random checks.

Annexure-2
SoP for QA & QC of Imported Viscosity Grade Bitumen

In addition to QA & QC SoP detailed in **Annexure-1**, following shall be followed:

i. The supplier importing bitumen shall preferably have its own vessel to ship bitumen. The supplier shall have adequate number of bitumen storage tanks at port of discharge. There shall be no intermingling of bitumen from different vessels in the storage tank.
ii. Supplier shall have ISO: 17025 certified well-equipped laboratory at location of storage for internal quality control.
iii. No mixing of bitumen imported and procured from domestic refineries shall be done in the storage tank of contractor at hot mix plant.
iv. The supplier of imported bitumen shall be held accountable if bitumen fails to meet acceptance tests either in contractor's site laboratory or any third party ISO: 17025 certified laboratory.

Annexure-3
SoP for QA/QC of Polymer Modified Bitumen Domestically Procured

In addition to QA&QC SoP given in **Annexure-1 & 2** for base bitumen used for production of PMB, following shall also be followed:

i. No project-site blending/production of PMB shall be allowed.
ii. Producers shall have ISO: 17025 certified well-equipped laboratory including apparatus for Multiple Stress Creep Recovery (MSCR) at production plant itself for internal quality control.
iii. Along with each tanker load, Manufacturer's Test Certificate shall be provided. MTC also have the details such as GPS co-ordinates of loading & unloading locations, source of base bitumen & its grade, rpm of High Shear Mill, blending temperature, duration of blending, generic name of modifier, source of modifier, % content of modifier etc.
iv. Contractor shall have well-equipped laboratory with valid calibration certificate for all equipment at project site. Contractor's laboratory must have DSR equipment and qualified personnel to conduct MSCR test on PMB drawn from tanker on arrival at site.
v. Before unloading of PMB into the storage tank at Hot Mix Plant, it shall be tested for properties such as MSCR, Elastic Recovery, Penetration, Softening Point and Separation Test. After satisfactory results, PMB shall be allowed for unloading. Other properties shall be carried out as per frequency specified in Section 900 of Ministry's Specifications for Road and Bridge Works or IRC: SP: 53.
vi. PMB storage tank at Hot Mix Plant shall have stirrer arrangement.
vii. Before approval of mix design, PD/EE shall visit the site laboratory and ensure that the laboratory is well equipped as per IRC: SP; 112. Twice in a month, PD/EE shall witness tests on quality characteristics such as MSCR, Elastic Recovery, Penetration, Softening Point and Separation Test in her/his presence. In case of NH projects costing Rs. 100 Crore and more (Civil Works Cost) executed through State

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PWDs, RO (MoRTH) or his authorized officer should witness the tests on bitumen at least once and preferably twice during the construction. This is to be recorded before passing of the final bill. To facilitate such random checking EPC contractor shall intimate EE NH PWD & RO MORTH, the details of arrival of Bitumen tankers to site including the date & time of arrival / nos. of tankers arriving at the site etc., to enable RO / EE NH PWD to plan their random checks.

Annexure-4

SoP for QA/QC of Rubber Modified Bitumen Domestically Procured

In addition to QA&QC SoP given in **Annexure-1 & 2** for base bitumen used for production of CRMB/NRMB, following shall also be followed:

i. No project-site blending/production of modified bitumen shall be allowed.
ii. Producers shall have ISO: 17025 certified well-equipped laboratory including apparatus for Rubber Content of Crumb Rubber Modified Bitumen (Soxhlet Method as per Austroads Test Method AGPT/T142) at processing plant itself for internal quality control.
iii. Along with each tanker load, Manufacturer's Test Certificate shall be provided. MTC also have the details such as GPS co-ordinates of loading & unloading locations, source of base bitumen & its grade, rpm of High Shear Mill, blending temperature, duration of blending, generic name of modifier, source of modifier including whether it is of truck tyre or car tyre, % content of modifier etc.
iv. Crumb Rubber shall be of truck tyre only and it shall be 100.0% passing through 600 micron sieve.
v. Contractor shall have well-equipped laboratory with valid calibration certificate for all equipment at project site. Contractor's laboratory must have Rubber Content of Crumb Rubber Modified Bitumen (Soxhlet Method as per Austroads Test Method AGPT/T142) and qualified personnel to conduct Rubber Content test on RMB drawn from tanker on arrival at site.
vi. Before unloading of CRMB/NRMB into the storage tank at Hot Mix Plant, it shall be tested for properties such as Elastic Recovery, Penetration, Softening Point and Separation Test. After satisfactory results, CRMB/NRMB shall be allowed for unloading. Other properties shall be carried out as per frequency specified in Section 900 of Ministry's Specifications for Road and Bridge Works or IRC: SP: 53. As establishment of site laboratory for carrying out all tests on bitumen may be difficult in projects costing less than Rs 25 Crore (Civil Works Cost), option to use a nearby established reputed laboratory can be given to the contractor in which case such laboratory details should be intimated to RO / EE NH PWD to plan their random checks.
vii. RMB Storage Tank at Hot Mix Plant shall have stirrer arrangement.
viii. Before approval of mix design, PD/EE shall visit the site laboratory and ensure that the laboratory is well equipped as per IRC: SP; 112. Twice in a month, PD/EE shall witness tests on quality characteristics such as Elastic Recovery, Penetration, Softening Point and Separation Test in her/his presence. In case of NH projects costing Rs. 100 Crore and more (Civil Works Cost) executed through State PWDs, RO (MoRTH) or his authorized officer should witness the tests on bitumen at least once and preferably twice during the construction. This is to be recorded before passing of the final bill. To facilitate such random checking EPC contractor shall intimate EE NH PWD & RO MORTH, the details of arrival of Bitumen tankers to site including the date & time of arrival / nos. of tankers arriving at the site etc., to enable RO / EE NH PWD to plan their random checks.

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