CHAPTER - VIII

1. Special specification for cement and steel

SUPPLY OF CEMENT AND STEEL REINFORCEMENT

1.0 The cement used shall be any of the following and the type selected should be appropriate for the intended use.

(a) 33 grade ordinary Portland cement conforming to IS:269

(b) 43 grade ordinary Portland cement conforming to IS:8112

(c) 53 grade ordinary Portland cement conforming to IS:12269

(d) Rapid hardening Portland cement conforming IS:8041

(e) Portland Slag cement conforming to IS:455

(f) Portland pozzolona cement (flyash based) conforing to IS: 1489 (part 1) Portland

(g) Pozzolana cement (calcined clay based) conforming to IS:1489 (part 2) Hydrophobic cement conforming to IS: 8043.

(h) Low heat Portland cement conforming to IS: 12600.

(i) Sulphate resisting Portland cement conforming to IS: 12330.

Portland Pozzolana Cement cannot be used for PSC works and can be used for RCC works with certain precautions.

Different types of cement shall not be mixed together. In case more than one type of cement is used in any work, a record shall be kept showing the location and the types of cement used.

Engineer-in-charge shall approve type of cement to be used before starting of work.

1.1 The cement should be procured from reputed manufacturer with the approval of Engineer – in – Charge. Type and brand of cement proposed to be used in the work shall have prior approval of Engineer in Charge.

1.2 Cement bags preferably in polythene packing should bear the following information in legible marking:

i) Manufacturer's Name.

ii) Registered Trade Mark of Manufacturer

iii) Type Of Cement

iv) Weight of each bag in Kg.

v) Date of Manufacture, generally marked as week of the year / year of

1.3 Manufacturer has to send the copy of test certificate to the purchaser. Contractor has to submit the manufacturer's test certificate to Rly. for their record. In addition to this, testing of cement procured by the Contractor batch wise in an approved laboratory is also required for physical properties.

2. Reinforced steel shall be as per Specification & Guidelines for procurement of steel items for Works Contracts w.r.t. supply & use of quality TMT Bars & structural steel as under:

(i) All Reinforcement steel (TMT Bars) as per IS:1786 with latest amendments should be procured from the following steel producers i.e. SAIL, VIZAG (RINL), TISCO, JSW (JSW Steel Ltd.) & JSPL (Jindal Steel & Power Limited) or Any other steel producer having Integrated Steel Plant (ISP), Using Iron Ore as basic raw material and having in – House Iron rolling facilities for production of steel through the process of DRI-EAF, BF-BOF and Corex-BOF only, duly following RDSO guidelines issued vide letter No.WKS/67/VD/TMT dated 21.02.2022 and Schedule of Technical Requirements (STR) Doc. no. WK-G-8.1-1 Ver.1.3.

(ii) Deformed bars or wires produced by re-rolling of finished products such as plates, rods, rails (Virgin or used scrap) or by rolling material for which the metallurgical history is not fully documented or not known are not acceptable under IS:1786(up to date), or other IS specifications shall not be supplied, and the same shall be summarily rejected.

(iii) The contractor shall furnish certificates issued by plant manufacturer/ plant consultant stating that firm is producing raw steel from iron ore or processed iron ore and entire infrastructure for producing sponge iron, billet and TMT Reinforcement Bars using iron ore as the basic material at single / multiple locations by the same company or its subsidiary companies (with plant address details) with details of installed annual production capacity in terms of sponge iron, billets and TMT Reinforcement Bars. In case of group concern units, firm needs to submit details of shares holdings / common shareholders certified by Chartered accountant.

(iv) The contractor shall furnish certificate issued by Plant manufacturer / Plant consultant (with documentary proof of process) establishing process being used at plant is either DRI-EAF, BF-BOF and Corex-BOF route only for manufacturing TMT reinforcement bar using iron ore as basic raw material.

(v) The contractor shall obtain the manufacturer's test certificate stating the process of manufacture, chemical composition, and test sheet giving the result of each mechanical test applicable to the material purchased, and submit it to the Engineer-in- Charge. Each test shall indicate the number of the cast to which it applies, corresponding to the number or identification mark to be found on the material. The contractor shall also get the steel tested for both chemical composition and physical properties (including bend test and re-bend test) as specified in IS:1786 from NABL accredited laboratory or any government laboratory as mentioned in para (viii).

(vi)The contractor will have to submit the invoices of materials and challans along with the lot/batch of the steel purchased as proof of purchase of steel from reputed producers/stockists. The details, such as agency, name of the project, and site location, shall be mentioned on the invoices. Steel shall be approved by the Engineer-in-Charge only after the production of necessary certificates before use in works.

(vii) Cost of testing by the contractor as mentioned in para (v) &(viii) shall be borne by the contractor. Rates quoted by the contractor are inclusive of the above charges.

(viii) In addition to the manufacturer's test certificate provided by the Contractor, the contractor shall get steel tested for both chemical composition and physical & mechanical properties (including bend test and re-bend test) as specified in IS:1786 from NABL accredited laboratory or any government laboratory and submit the test report to the Engineer-in - charge as per the frequencies given below:

(a) Reinforcement steel (TMT Bars) as per IS:1786 with latest amendments procured from steel producers, i.e., SAIL, VIZAG (RINL), TISCO/TATA, JSW (JSW Steel Ltd.) & JSPL (Jindal Steel & Power Limited) shall be tested for physical and mechanical properties of steel for every 100 MT (or part thereof) supply and for every change in lot/batch, whichever is earlier, for each diameter of steel. The chemical test shall be carried out for every 200 MT (or part thereof) supply and for every change in lot/batch, whichever is earlier, for each diameter of steel.

However, the Engineer-in - charge or his representative may get the steel tested as and when required at the cost of the Railway. Steel thus tested but failing to meet the specification of the Railway shall be rejected and the rejected lot should be removed from the site within 24 hrs by the contractor.

(b) For any other steel producer having an Integrated Steel Plant (ISP), Using Iron Ore as basic raw material and having in – House Iron rolling facilities for production of steel, through the process of DRI-EAF, BF-BOF and Corex-BOF only, duly following RDSO guidelines issued vide letter No.WKS/67/VD/TMT dated 21.02.2022 and Schedule of Technical Requirements (STR) Doc. no. WK-G-8.1-1 Ver. 1.3. The steel shall be tested for physical and mechanical properties of steel for every 50 MT (or part thereof) supply and for every change in lot/batch, whichever is earlier, for each diameter of steel. The chemical test shall be carried out for every 100 MT (or part thereof) supply and for every change in lot/batch whichever is earlier, for each diameter of steel.

However, the Engineer-in - charge or his representative may get the steel tested as and when required at the cost of the Railway. Steel thus tested but failing to meet the specification of the Railway shall be rejected and the rejected lot should be removed from the site within 24 hrs by the contractor.

3.0 Testing of reinforcement steel for physical & chemical properties is required in addition to submission of manufacturers' certificate by the tenderer/contractor for the discretion of the Engineer- in-charge.

3.1 If a lot of reinforcement steel supplied at site is having size less than 100 MT, then minimum 2 nos of tests on physical and mechanical properties shall be conducted. In case of lot size is more than 100 MT minimum number of such tests shall be 3.

4.0 Testing of this material shall be done by the contractor at approved laboratories as directed by the Engineer-in-charge.

5.0 Cost of testing has to be borne by the contractor at his own cost. Rates quoted by the contractor are inclusive of above testing charges.

6.0 Cost of steel and Cement to be paid to the contractor under relevant Schedule is inclusive of transportation from source to site of work, loading, unloading, stacking, storing, all taxes, tools, plant, labour, re-handling from site go down to mixer, royalty, freight, incidental charges, Sheds for storage and Chowkidars etc.

7.0 The contractor should disclose the source from where supplies of cement and steel are received by him and shall maintain a detailed record of receipt of cement and steel from different sources and shall keep the challan, invoice, lorry No. etc., and shall enter the receipts, issues and store balance in a Register as directed by the Engineer-in-charge and produce the same to the Engineer as and when demanded. Railway reserves the rights to inspect the contractor's godowns and documents pertaining to this work. The contractor shall use these materials in the work as per Rly's specifications/approved drawings and shall not use the quantities than what is stipulated in the relevant specifications/approved drawings. The copy of invoice of steel and cement should be submitted to the Rly. for their record.

8.0 No wastage on any of the materials supplied and used in the work by the contractor including cement and steel is payable by the Railway, Contractor will make his own arrangements for storing cement, steel and other materials.

9.0 Empty Cement bags would be the property of the Contractor and shall be disposed off by the contractor himself. However, in case of Railway is in need of empty cement bags, good and useable bags are to be supplied by the contractor at the rate of Rs. 1.50 (Rupees one and paise fifty only) per each empty polythene bag.

10.0 Payment of steel and cement to the Contractor under relevant Schedule.

10.1 No advance money will be paid to the contractor under any circumstances for procurement of cement for this work.

10.2 Payment for Cement will be released through on account contract bills along with Mass Cement Concrete / Reinforced Cement Concrete quantities after casting only.

10.3 For accountal of steel reinforcement, reinforcement register will be maintained by the Railway for entering the details, such as description of the reinforcement, Nos., cut length, total lengths, dia of the bar, weight per RMT, total weight etc. The above details are to be entered by the concerned Jr. Engineer (works) / Section Engineer (Works) and the contractor should sign the register as a token of acceptance of the details entered by Jr. Engineer/ Section Engineer of Railways.

10.4 Casting of the RCC works will commence only after final checking of the reinforcement by the Asst. Field Officer of Railways/Engineer-in-charge of the work.

10.5 Unit weights per Meter Run of different dia of reinforcement should be as per Table-1 of IS-1786-1985 for the purpose of arriving payment of steel.

10.6 The quantity of steel reinforcement will be calculated as per reinforcement actually utilized in the work. No extra will be paid for wastage / scraps or for cut rods, if any, which would be the property of the contractor.

10.7.1 Payment for Cement to the Contractor should be for the element for which concreting is completed.

10.7.2 Rate of consumption per cum. of Design mix shall be as per concrete mix design approved by the Engineer – In – Charge for M-25,M-35, etc.

10.7.3 If actual consumption is more than the theoretical consumption as per approved design mix, payment shall be restricted to theoretical consumption only. If the actual consumption of Cement is less than the theoretical consumption as per approved design mix, payment shall be restricted to actual consumption of Cement only.

10.8 Contractor should take proper precautionary measures to store the cement in good condition against rains, cyclones. Railway is not responsible for any loss of cement due to clodding on account of defective storage.

10.09 Contractor shall maintain one source of supply and shall submit copy of periodical test analysis of cement produced by the manufacturer / changes in source will have to be intimated with submission of fresh test certificate from manufacturer.

10.10 Engineer-in-charge shall have full discretion to take sample during the course of work and send sample of cement for testing at the cost of contractor and shall be free to reject the supplied cement if tested cement is not found in conformity to IS specification. The sampling to be done as per IS specification.

10.11 (A) Tests on cement to be as per IS : 4031, some of the tests which may be carried out are

i) Compressive strength
   (a) after 72 hours.
   (b) after 168 hours.

ii) Initial setting time and final setting time.

iii) Consistency.

iv) Soundness.

v) Expansion.

(B) Field test for finding out adulteration of cement with stone or coal dust–

Purpose of the test: The adulteration tests are required to be done to ascertain that cement is free from and adulator therein.

(a) Sample of cement shall be heated on a steel plate for 20 minutes on a stove. The adulterated cement changes its colour.

(b) Normal solution of HCL shall be added to an equal volume of water and the resultant solution shall be slowly added to small quantity of cement of about 10 grams taken in a test tube. If any large insoluble residue is noticed, it indicates presence of siliceous materials. Efflorescence and frothing indicates presence of admixture of lime stone dust.

(c) A small quantity of cement is taken in a test tube or a measuring cylinder and water added till container is half full. The mixture is shaken and allowed to settle for a few minutes. The cement particles settled down and the coal ash particles are found to be floating or in suspension as their lighter.

(C) Three small pots 3" x 3" x 1" in size are made from the sample of cement to be tested with 28% water/weight. The pots are covered with moist cloth for 24 hours. The pots should resist an impression of thump nail after 24 hours. After 48 hours, it should be difficult to break with fingers. If the cement is not good, the pot can be broken much easily. However, the first trial does not necessarily indicate that the cement is bad. Cement may be slow setting. Therefore, one more pot may be tested after 48 hours of curing. If this shown no improvement, the cement is definitely of a doubtful type and needs further testing in laboratory.

10.12 The procurement of cement should be regulated as not to allow cement becoming old by more than 3 months. In exceptional circumstances this may be relaxed by the Dy. Chief Engineer after getting it re-tested at the contractor's cost on his specific request. No Cement beyond 3 months from the date of manufacture shall be used in the work.