

***SOUTH CENTRAL RAILWAY***  
***SPECIAL CONDITIONS - TECHNICAL***

**Name of work:** SCR Construction Organization: Hyderabad Division: Proposed laying and linking of BG track, Assembling, insertion of Points & crossings, Supplying, transportation, Leading and dumping of stone ballast, transportation of P.Way materials and execution of other miscellaneous works from Ch:238000.0m to Ch:255500.0m between Alampur (excluding yard) to Dupadu (including yard) stations in connection with Mahbubnagar-Dhone Doubling Project.

**PARTICULARS OF WORK**

- 1.0 SITE: The works included in this tender are to be carried out in connection with Proposed new Doubling line of track between Alampur (excluding yard) to Dupadu (including yard) stations. The work areas are situated in Jogulamba Gadwal District of Telangana state & Kurnool District of Andhra Pradesh state.
- 2.0 **GENERAL FEATURES:**
- 2.1 The following works are proposed to be executed under this contract:-
- a. Supply of ballast, transportation of ballast, leading and dumping of stone ballast
  - b. Transportation of P.Way materials to work spot from nominated places of S.C. Railway.
  - c. Laying and Linking of BG track, assembling and insertion of points and crossings and execution of other miscellaneous P.Way works between Alampur (excluding yard) to Dupadu (including yard) stations in connection with Mahbubnagar-Dhone Doubling Project.
  - d. The contractor has to execute the above works under this tender while adhering to these features / conditions and may quote the rates accordingly.
  - e. Any other incidental ancillary works and miscellaneous works connected with main works as ordered by the Engineer-in-charge.
- 2.2 The quoted rates for works shall include clearing of site from dumped debris/earth, vegetation, bushes & thorny trees etc., leveling of ground, removing and stacking of free rails, sleepers of any type without any hindrance to the work site as directed by the engineer-in-charge. The tenderer has to provide temporary lighting, illumination, ventilation, communication etc. that may be required during the course of work at contractor's own cost. The contractor shall note that the work is to be carried out at take off point from the existing running line where Rail traffic is very heavy and in close proximity to the work spot and as such he has to take adequate precautions and safety measures by posting day night watchmen for safety of Rail/Road traffic and workmen.
- 2.3 He should also take adequate precautions for the safety of workmen as they have to work in close proximity to running Railway lines and as such ensure all the safety measures to be taken for the safety of Rail traffic and workmen. All expenditure for ensuring the above shall be borne by the contractor and his rates shall be inclusive of all these elements.
- 3.0 Any other particulars / specifications required in connection with the above work may be obtained / perused in the office of Chief Administrative Officer (Construction), S.C.Railway, Secunderabad or Deputy Chief Engineer (Construction-I Secunderabad@SC), S.C.Railway, Secunderabad.
- 4.0 **SPECIFICATIONS:**
- 4.1 The execution of all works under this Tender/Contract shall conform to the specifications and codes of practice mentioned below and as mentioned in other part of this document as amended from time to time.
- i) Indian Railways Unified Standard Specification (Formation Works, Bridge Works and P.Way Works) – 2021.

- ii) Central Public Works Department, Specifications, Vol. 1 & 2 – 2019.
- iii) For Earth work in embankment: RDSO's guide lines RDSO/2020/GE: IRS-0004, for Earthwork in cutting, RDSO's guide lines GE: G-2 and Manufactured Blanketing material as per RDSO's guide lines RDSO/2020/GE: IRS-0004.
- iii) Indian Railways Standard Concrete Bridge Code (Revised) 1997 read in conjunction with Indian Standard Specifications mentioned therein.
- iv) Notes in South Central Railway Unified Standard Schedule of Rates, 2021
- v) IS Code No. IS/2062-1999 Code for supply of steel for fabrication purposes.
- vi) I.S.456/2000 Code of practice for plain and reinforced concrete.
- vii) Indian Railway Permanent-Way, Bridges and Works Manual.
- viii) Indian Railway Standard Schedule of dimensions.
- ix) The works shall be carried out to the relevant I.S. Codes of practice and other specifications mentioned in plans.

**Note:**

- 1) Latest edition including correction slips up to date of submission of price bid /revised bids, shall govern.
- 2) The list given above is by no means exhaustive. All I.S. and I.R.S. codes pertaining to Work shall be applicable.
- 3) Copies of plans and additional information required may be had by tenderers from office of the Chief Administrative officer, construction, S.C.Railway, Secunderabad or office of Dy. Chief Engineer / Construction - I / S.C.Railway / Secunderabad on any working day during office hours.

- 4.2 The Railway reserves the right to reject or alter any part of the work executed by the contractor which in the judgment of Railway does not comply with the requirements of the above specifications. The decision of the Railway shall be final and conclusive for all purpose.

**5.0 TIME OF COMPLETION:**

Time is the essence of the contract. All works included in the contract shall be completed within the period of **18 (Eighteen) Months** from the date of issue of acceptance letter, including intervening monsoon period. The tenderer/ Contractor would be expected to adhere to the progress of work as per accepted mile stone chart below. In case he/they fail in achieving the first 2 miles stones, the contract would be liable for termination under Clause-62 of IRGCC.

**6.0 Mile stone programme:**

The Tenderer should adhere the following time frame:

Sl.No.	Name of event (Mile Stone)	Schedule
I	Preliminary works, like erection of site offices, collection of material, mobilization of machinery, deployment of man power etc.,	D1 + 30 days
II	Supply of Ballast & Transportation of all necessary P.Way Material	D1 + 120 days
III	Completion of linking between Alampur (excluding yard) to Dupadu (including yard) stations.	D1+ 270 days
IV	Completion of finishing works and Commissioning of the Yard.	D1+ 365 days
V	Maintenance of Commissioned Yard till handing over the same to division.	D1+ 547 days

- NOTE: 1) D1 stands for the date on which Railway has given the site/drawings as relevant to the contractor.
- 2) The above schedule should be for completion of each item in totality. Hence the tenderer should plan for execution simultaneously for some of the items given above so as to give proportionate progress to complete the entire work within the schedule. As such the tenderer is required to give milestone chart within **15 days** from the date of issue of acceptance letter.
- 6.1 Extension of time of completion will be governed by Clause-17 of IRS GCC. However, while granting the extension of time under Clause-17 (B) of IRS GCC, a token penalty as deemed fit based on the

circumstances of the case can be imposed on the Contractor without prejudice to other rights of Railway Administration as provided under IRS GCC.

**7.0 MAINTENANCE:**

- 7.1 Earth work in formation of embankment and cutting shall be maintained as per IRU SSR 2021 para no: 1.1.4 read with clause no: 48 of IRS GCC.
- 7.2 For track linking works, the contractor is not required to do any maintenance after completion of the work in all respects but any defects noticed/reported at the time of execution should be made good and rectified. All other works except wood work covered under this contract shall be maintained by the contractor for a period of 6 (six) months from the certified date of completion of the whole work as covered by the contract. In the case of wood work, the maintenance period will be 12 months. If any warping, cracks or any other defects develop during this period, the timber will have to be satisfaction of the Engineer. 10% of the cost of the items of wood work involved will be retained as security deposit during maintenance period.
- 7.3 During the maintenance period, the Contractor shall bear the responsibility and be liable for maintenance as envisaged in the clause No.47 of IRS GCC.

**8.0 EARTH WORK :**

- a) **EXECUTION OF EARTH WORK FOR FOUNDATIONS:** shall be as per IRU standard specifications for formation works, Bridge works and P.Way works USSR 2021 & CPWD specifications 2019 for DSR 2023.
- b) **EXECUTION OF EARTH WORK** in embankment shall be as per IRU standard specifications for formation works, Bridge works and P.Way works USSR 2021 & CPWD specifications 2019 for DSR 2023
- c) **EXECUTION OF EARTH WORK** in cutting shall be as per IRU standard specifications for formation works, Bridge works and P.Way works USSR 2021 & CPWD specifications 2019 for DSR 2023.

**8.1 JUNGLE CLEARANCE:** Before the work is started, the contractor shall clear the areas on ground between the toes plus additional extra width of 1.00 m on both sides of the new bank/cutting, all the jungle, grass shrubs, trees including roots etc. In case the new bank is to be made in contact with the slope of the existing bank, slopes of the existing bank/cutting coming in contact with the new earthwork shall be cleared of all jungles, bushes, trees etc., and properly Benched. No extra payment will be made for clearance of the jungle, shrubs, bushes, trees, etc. The jungle and trees so cleared shall be given to the contractor free of cost except trees having girth of more than 30 cm which will be the property of Railways. The rates quoted for earth work are deemed to include the charges for clearance of jungle, shrubs trees etc. and for providing benching on the existing banks slopes as per specifications including all labour, T & P etc.

**8.2 DRILLING OF HOLES AND PROVIDING ANCHOR RODS:** If the foundations are to be laid on the rock bed met in the river bed anchoring the rock surface by providing anchor rods of 25mm diameter MS/HYSD bars of suitable lengths at intervals as per the drawings. 40mm diameter of holes are required to be drilled for this purpose at the bottom of foundation level to suitable depths at required spacing as per drawing and the anchor rods of 25mm diameter should be fixed with contractor's cement capsules. The other end of the rod should be made bent suitably and buried in the foundation concrete for the bonding.

**9.0 OPEN EXCAVATION: The work shall be carried out as per Indian Railways Unified Standard Specifications (Formation Works, Bridge Works & P.Way Works) -2021.**

- 9.1** Open excavation done for foundations may be executed with sloping sides with or without timbering or may be excavated with vertical sides properly timbered and shored from ground level up to the bottom of the excavation and the work should be efficiently carried out in such away so as to ensure its own stability as well as the safety of adjoining lands, structures, moving rail/road traffic and labour working there on and also in such away as will prevent them from being in any way detrimentally affected. However temporary shoring with timbering is to be provided if necessary to protect the track and road embankment from slipping for which the contractor will have to use his timbers. No extra rate will be paid for and the rates quoted for excavation will include the same.

- 9.2** The excavation must also be kept free from water at all times during the progress of the work by means of bailing or pumping out, making channels, leading water away from the excavation as well as diversion of water to prevent its ingress into foundations, or otherwise till the work below water is completed in all respects. The rates quoted for excavation shall exclude the charges for all such work.
- 9.3** Any unforeseen, under lying cables, pipe lines etc., if met with during execution should be taken care to either safeguard or divert the same with the approval of departments concerned. All necessary administrative help will be given in this matter. However, escalation over the original agreement rates will not be entertained because of delays in such clearances.

**9.4 PAYMENT FOR OPEN EXCAVATION: Payment for excavation in foundation shall be measured as Specified in Indian Railways Unified Standard Specifications (Formation Works, Bridge Works & P.Way Works) - 2021.**

- 9.4.1** The quantity for excavation will be determined by multiplying the plan area of the open foundations with the depth from the average foundation bottom level up to which the excavation is carried out to the average ground level from where excavation is started. If any excavation is done for side slopes of foundations will not be paid for. Any extra area of excavation made for provision of working space shuttering and other supports also will not be paid for. The rates quoted for excavation of foundation shall include the cost of all such works.
- 9.4.2** The excavated soil should not be left out in heaps causing obstruction after the work is completed in all respects. All excavated soil should be lead out to the places indicated by the Engineer.
- 9.4.3** While quoting the rates for Bridge work, the contractor should note that the Proposed bridge is to be constructed under the conditions both rail and road traffic nearby and should have to be done with restricted space of working and should consider these aspects.

## **SPECIAL CONDITIONS FOR LAYING AND LINKING OF RAILWAY TRACK**

### **1.0 SETTING OUT OF WORK:**

- 1.1 The marking for the proposed track including curves will be initially set out by the Engineer or his representative. The Contractor thereafter shall set out the parts and carryout the works thereof fully. The contractor shall be responsible for the accuracy of the lines, levels and dimensions of the work in accordance with the standards conforming to specification and manuals specified at clause No.3 of Special Conditions. The contractor shall also alter or amend any error in the dimensions, levels or lines of work set out or laid by him to the satisfaction of the Engineer.
- 1.2 The quoted rates should be deemed to include charges for any and all site facilities that are considered necessary for the execution of the works mentioned in the Schedule.

### **2.0 EXECUTION OF WORKS:**

- 2.1 The contractors are requested to inspect the site and availability of road for transportation of P.Way materials before quoting their rates. The quoted rate for linking items is inclusive of transportation of P.way fittings like fish plates, fish bolts & nuts, rubber pads, liners and elastic rail clips etc., from existing stacks at DSK/C Depot to site of work including leading, loading and unloading. No extra payment will be made for transportation of P.Way fittings like fish plates, fish bolts & nuts, grooved rubber pads, metal liners, elastic rail clips etc.,
- 2.2 The contractor should make his own arrangements for the required trucks/tractor/trailers for the expeditious transport of rails, sleepers and other P.Way materials at his own cost with his fuels, consumables and sufficient men etc., complete.
- 2.3 The contractor has to handle the P.way materials carefully while trucking out. Any loss or damage / shortage involved while handling will have to be borne by the contractor at the rate fixed by the Railways and the materials damaged / made out of use the Railways property.
- 2.4 Before dismantling, the inventory of the existing P.Way materials should be taken jointly by the contractor and SSE-P.Way-in-charge. The contractor should sign on the inventory as a token of his acceptance. While dismantling existing BG track including points and crossings the contractor has to take care of P.way materials without causing any damage to the materials and also to the running electrified track nearby. The contractor is responsible for safe custody of released materials with him until they are handed over to the Railway as per inventory.
- 2.5 Leveling the existing ballast including the ballast dumped in advance is to be spread suitably to standard profile of BG track. After spreading of ballast, it should be rolled with 8 / 10 tons power roller.
- 2.6 The PSC sleepers are available along the alignment i.e on cess / bank / formation / in yard limits, the contractor has to move the sleepers onto levelled ballast surface and lay them to the correct centre line of the track given and to correct spacing and specified sleeper density as directed by the Engineer-in-charge.
- 2.7 The contractor has to lead the 52 kg / 60 kg free rails / welded rail panels available along the alignment onto already laid PSC sleepers. The rails shall be connected by Fishplates, bolts and nuts duly lubricating the same with contractor's grease, graphite and oil with his labour and tools. The linking shall be done to correct gaps as directed by the Engineer-in-charge.
- 2.8 Paint marks shall be made on the rails with contractor's paint as directed by the Engineer-in-charge to indicate the spacing of sleepers to be adopted.

- 2.9 The elastic rail clips should be fixed in the holes of M.C.I inserts after providing the grooved rubber pads under the rails seats and liners in position for fastening the rails with sleepers as directed by the Engineer-in-charge.
- 2.10 The newly linked track has to be brought to the standards / tolerances as specified in Para 3.0 below for BG by attending to the track as required.
- 2.11 After linking the BG track, the track is to be lifted upto 150mm with Railway's ballast including doing kutchra packing and one round of through packing will be given and the track shall be lifted further upto 150mm in stages including two rounds of through packing after completion of final stage of lift, complete as detailed under para 224 of I.R.P.W. Manual and after packing the sleepers shall be checked with can be double for looseness and the loosely packed sleepers if any should be repacked.
- 2.12 Laying and linking of BG track on loop lines will be with 52 Kg./90 R rails on any sleeper density. The contractor has to transport the fittings like fish plates, bolts and nuts and any type of sleepers' fittings from DSK/C Depot to site of work. The quoted rate is inclusive of all these operations.
- 2.13 After linking the BG track in loop lines the track is to be lifted upto an extent of 250mm in convenient stages with Railway's ballast. After completion of final stage of lift, the track is to be packed with two rounds of through packing including spacing, squaring, gauging, aligning, leveling etc. and brought to the correct standards.
- 2.14 While dumping the ballast onto the newly linked BG track the existing ballast stacks are to be fully cleared, without leaving any amount of ballast. If any ballast is leftover in the stacks, such stacks will not be paid.
- 2.15 The pre-assembled turnouts / trap switches are to be inserted on to the new BG track by making necessary temporary arrangements, lifting and packing the same after insertion to the required level including three rounds of through packing. Wherever space is not available for assembling points and crossings, the same to be assembled at nearby place in all respects complete and the same to be kept near the location where the insertion of points and crossings to be done in-situ.
- 2.16 If the contractor fails to employ adequate labour during the course of execution of the work at any stage the Railway will take action to employ such labour as necessary or get the work done by fixing up an agency even on single tender basis or executing the work through existing agency at other stations at the risk and cost of the contractor. The decision of the Engineer / his representative is final and binding.
- 2.17 The released BG P.way materials are to be transported by the contractor by any means by any convenient shortest route including loading the materials onto his vehicles, transportation and unloading and handed over to the depots as directed under clear acknowledgement. The materials are to be handed over duly stacked material-wise and classification-wise as directed by PW/DSK by removing all the fittings from the sleepers. A wastage/loss upto 2 % will be permitted on released P.way fittings such as round spikes, dog spikes, cotters, keys and fish bolts etc.
- 3.0 **SPECIFICATIONS FOR FINISHED WORK:**
- 3.1 The track should be brought to the standards as per para 316 of IRPW Manual after completion of work in all respects. Extract of certain vital parameters are appended as below:

Gauge	Sleeper to sleeper variation	2mm
Expansion Gap	Over average gap worked out by recording 20 successive gaps	$\pm 2\text{mm}$
Joints	Low joints not permitted	---
	High joints not more than	$\pm 2\text{mm}$
	Squaring of joints on straight	$\pm 10\text{mm}$
Spacing of sleepers	With respect of theoretical spacing	$\pm 20\text{mm}$
Cross level	To be recorded on every 4th sleeper.	$\pm 3\text{mm}$
Alignment	On straight on 10M.Chord	$\pm 2\text{mm}$
	On curves of Radius more than 600 M. on 20M Chord.	
	Variation over theoretical versines shall not exceed	5 mm
	On curves of Radius less than 600M. On 20M Chord.	
	Variation over theoretical versines shall not exceed	10mm
Longitudinal level	Variation in longitudinal level with reference to approved longitudinal section not to exceed	50mm
Loose sleepers	After packing	Not more than 20%
Greasing of ERCs	Entire leg of ERC should be applied with grease confirming to IS 408-1981 as amended from time to time.	

3.2 **ALIGNMENT:** Alignment should be straight as verified by sighting. On curved alignment correct versines shall be provided as directed by the SSE/P.way-in-charge. However not more than a variation of 20% will be permitted at any of the location over the prescribed versines. The alignment shall not deviate by more than the permissible limits detailed above. Resetting of curves shall be done as many numbers of times as required to get the desired profile for smooth running.

3.3 **GAUGE:** Gauge shall be checked with standard gauge and should be 1676mm. on straight and curves upto 4 degrees and 6mm slack on curves sharper than 4 degrees. Permissible variation from sleeper to sleeper shall not exceed 2mm.

3.4 **LEVELS:** Levels shall be checked by level board and spirit level. Track should be free from sags and low joints, permissible variation of crossover being  $\pm 3\text{mm}$  at every 4th sleeper but not exceeding 1mm between any two consecutive sleepers.

#### 4.0 **P.WAY TOOLS, etc.:**

4.1 The contractor shall make his own arrangements for P.Way tools and instruments etc. and the Railway will not supply any tools or instruments or any other appliances required for this work.

4.2 All consumable stores like graphite, grease, oil, paint coal tar, cotton waste etc. required for the work shall be arranged by the contractor at his own cost.

#### 5.0 **OTHER CONDITIONS:**

5.1 The work of laying of BG track with PSC sleepers is to be carried out partially by the side of existing BG track, certain points and crossings have to be inserted in the existing BG track after dismantling the track under traffic conditions during block period.

5.2 The fittings such as fish plates, bolts, rubber pads, liners and elastic rail clips, rail screws and SEJ fittings etc., required for plain track will be issued to the contractor at Railway's

nominated depot which are to be transported by his vehicles to the site of work. The rate includes the cost of loading the materials into contractor vehicles, transportation and unloading of above track fittings from Railway's nominated depot to the site of work. The contractor has to quote the percentage rate for the schedule duly considering the above aspect of transportation cost involved.

- 5.3 No loss of fittings will be permitted in case of 60Kg/ 52kg fish plates, bolts, elastic rail clips, rubber pads and liners. The cost of the material not accounted for will be recovered from the contractor.
- 5.4 The contractor must ensure safety of labour engaged by him while working on the track during the course of execution of this work. The Railway will not be responsible for any injury or damages sustained by the Contractor's labour. The work has to be carried out observing all safety precautions.
- 5.5 The work should be carried out without any interference to the normal working of the track and structures. The contractor will be responsible for any loss or damage to Railway and public property if it occurred during the course of execution and the Railway reserves right to have the damages made good by the contractor.
- 5.6 If the contractor's vehicles or persons are involved in any accident, it would be the responsibility of the contractor and Railway will not be responsible for any damage or compensation thereof.
- 5.7 The contractor shall permit carriage of Railway representative free of charges in his lorry while transporting Railway materials from loading point to unloading point.
- 5.8 The work should be executed in workman like manner to the satisfaction of the Engineer-in-charge.
- 5.9 The contractor should provide necessary barricades while executing the works at level crossings for safety of road users and the works at level crossings should be completed expeditiously to avoid inconvenience to the road users.
- 5.10 The weight of the class II/released materials used for the work will be arrived based on theoretical weight less 5% for wear and tear.
- 5.11 One track running meter for the purpose of payment is measured on the centre line of the track which includes rails on either side with sleepers and fittings.
- 5.12 A register will be opened at the site in which all the material handing over to the contractor should be recorded with date of handing over the Railway material / released material. In the same register there will be corresponding entry of the handing over the released material / Railway materials back to the Railway by the Contractor.

#### **6.0 ACCURACY OF DRILLING HOLES ON RAILS:**

- 6.1 The contractor should note the accuracy of the dimension of the holes to be drilled for each rail which should conform to the dimensions mentioned in the Railways manuals and to be checked by actually fixing 52 Kg/90 R fish plates on bothsides of the rails with fish bolts and nuts. The holes should be perpendicular to the axis of the rails. Reaming and chamfering



should be done and drilling to be done without any burrs. The rate quoted includes the above verifications also. If any hole is drilled wrongly the contractor will have to cut out the ends of the rails as directed by the Engineer-in-charge at his own cost and penalty of Rs. 50/- (Fifty only) per each hole drilled wrongly will be recovered and no payment shall be made for drilling fresh holes. The cut pieces of the rails shall be the property of the Railway and should be handed over to Railways and the cost of the same will be recovered from the Contractor at twice the normal rate. The normal rate would be Railway's procurement rate prevailing at the time of last receipt of the rails plus 5% towards freight charges. The decision of the Railways regarding this shall be final and binding.

**7.0 ACCURACY OF SQUARING OF JOINTS:**

- 7.1 Rails supplied by Railway are likely to have slight variation in length. The contractor has to ensure the correctness of pairing before starting the leading and linking of rails for track work to ensure correct squaring of joints within permissible limits of 10mm. No extra payment shall be made on this account.

**8.0 ACCURACY IN CUTTING OF RAILS:**

- 8.1 Cutting of rails by contractors is to be done with their tools, plant and labour etc., and the cutting must be square in section. The cut pieces left over are the property of the railways and they should be handed over to DSK/C depot as directed by the Engineer-in-charge.
- 8.2 The contractor should arrange for required number of hacksaw blades or Rail cutting machine and labour for cutting / operating the machines at his own cost. Petrol and other consumables required for the above should also be arranged by him at his own cost.

**9.0 SUPPLY OF MATERIALS BY RAILWAY:**

- 9.1 The Railway materials will be issued on specific requisition by the contractor and as per requirements by the consistent with the progress of the works. The materials will have to be lead by the contractor to the site of work at his own cost. No claim will be entertained on account of crossing of track if any and the rate quoted should be inclusive if all lead, handling and also cover all precautions to life and properly as are considered necessary during the course of execution.
- 9.2 The materials issued by the Railway shall be used solely and economically for the purpose of the work covered by this contract only. The materials shall be used in such quantities and proportions as specified in the items of work and as are indicated in the schedule or in the relevant specifications or drawings or as approved by the Engineer-in-charge, whose decision thereto shall be final. Wastage or damage to such materials in any matter shall be totally avoided.
- 9.3 Any leftover P.way materials / fittings as surplus out of the materials supplied by the Railway free of cost, should be returned to the DSK/C depots as directed by the Engineer-in-charge. Surplus materials should be returned in good and whole condition.
- 9.4 The Contractor will be liable to render full account for all the materials issued by Railway free of cost. If any quantity of Railway materials issued free of cost is consumed in excess or wasted or damaged or lost or not satisfactorily accounted for, recovery shall be made from the contractor at twice the issue rate.
- 9.5 The issue rate will be Railway's procurement rate at the time of last issue of material concerned plus 5% freight charges.
- 9.6 Though most of the materials will be arranged by the Railway before commencement of mega block, some minor item / quantities may have to be arranged during mega block.

**10.0 PROCUREMENT OF PLANT AND MACHINERY BY CONTRACTOR:**

- 10.1 It should be clearly understood that it is entirely contractor's responsibility and liability to find and procure all the machinery, tools and plant and their spare parts, fuel, consumable stores and labour that are required for the efficient and methodical execution of the work. The quoted rates shall be deemed to be inclusive of all charges for such items including man power required to operate such plants and machinery. Delay in procurement of such items due to their non-availability or import difficulties or any other causes, whatsoever, shall not be taken as an excuse for slow progress or non-performance of the work.
- 10.2 The contractor should have the following workmen, tools and machinery during execution of work for linking of track as required by agency to complete the work in time.

**i) WORKMEN:**

The contractor shall mobilize adequate labour in the order of 75 to 100 for ballast dumping and in orders of 50 to 75 for linking etc., this is only an indication & requirement may vary on day to day basis, depending up on the site condition. Contractor should always equipped with adequate man power for complete the work in time.

**ii) TOOLS:**

The contractor shall provide adequate tools for the work men.

- a) Hook and chain arrangements for handling sleepers / Rails - 2 Nos.
- b) Tractor for dragging sleepers / Rails - 1 Nos.
- c) Rail dollies -1 Set.
- d) Rail drilling machine -1 Nos (With template and operator)
- e) Rail cutting parties - 1 sets (With hacksaw blades or rail cutting machine)
- f) Crow bar / beaters - 10 Nos.
- g) Shovels - 10 Nos.
- h) Wire claws- 10 Nos.
- i) Fish bolts spanners - 2 Nos.
- j) Simplex / track lifting jacks - 2 Nos.
- k) Chamfering kit - 1 No.

**iii) MACHINERY:**

The contractor shall provide adequate machinery for the work.

- a) Road roller 8 / 10 MT capacity - 1 No.

**SPECIAL CONDITIONS FOR MAINTENANCE OF RAILWAY TRACK**

**1.0 EXECUTION OF WORKS:**

- 1.1 The track of 60 Kg./ 52 Kg. / 90R rails laid on PSC/Wooden sleepers to 1660 / M+7 / M+4 sleeper density shall be maintained as per the standard parameters as detailed in para 224 of IRPW Manual.
- 1.2 The rails and sleeper fastenings to be fixed/ driven during the maintenance of track shall be ensured the following.
  - a) The elastic rail clips (ERC) shall be driven to fasten the rails to sleepers securely duly providing the grooved rubber pads at rail seat and liners in position as directed by the Engineer-in-charge.
  - b) Plate screws, rail screws should be driven in to the wooden sleepers by auguring correct size holes for fastening the rails with sleepers and bearing plates as directed by the Engineer-in-charge.
- 1.3 The P.Way fittings required for BG track i.e. fish plates, bolts, rubber pads, liners and elastic rail clips, tie bars or any sleeper fittings for fixing during maintenance will be issued by the Railway free of cost at DSK stores depot. The contractor should make his own arrangements for the required trucks/tractor/trailers for the expeditious transport of P.way materials at his own cost with his fuels and consumables and sufficient men to site of work.
- 1.4 The contractor has to handle the materials carefully while trucking out. Any damage or breakage involved while handling the loss will have to be borne by the contractor at the rate, fixed by the Railway and the materials damaged / made out of use will be the Railway's property.

**2.0 LIFTING AND PACKING THE TRACK:**

- 2.1 The newly linked BG track shall be lifted to the proposed BG rail level and packed with the ballast as per para 224 of IRPW manual including removing the excess ballast in the track, leading and dumping the same at the locations where deficiencies are existing and completing leveling etc. within a maximum lead of 100m.
- 2.2 After attending the through packing the sleepers shall be checked for looseness and slacks if any shall be attended.
- 2.3 During the through packing the track shall be brought to the correct standards and variations of track parameters such as gauge, alignment, cross levels, twist, etc. shall be kept within the standards specified.
- 2.4 Alignment should be straight as verified by sighting. On curves the alignment should be to correct versine as directed by the Engineer-in-charge who will pass the work. However, variation will not be permitted at any of the locations, over the prescribed variation in alignment should not exceed +/- 3mm over 11/12m rail depending on the rail length.

3.0 **SPECIFICATIONS FOR FINISHED WORK:**

3.1 The track should be brought to under mentioned standards after completing work in all respects, as directed.

3.2 **ALIGNMENT:** Alignment should be straight as verified by sighting. On curve alignment correct versines shall be provided as directed by the inspector-in-charge.

- i) On straight 10M Chord  $\pm 2$ mm.
- ii) On curves more than 600m of radius on 20m chord the variation over theoretical versines shall not exceed 5mm.
- iii) On curves of radius less than 600m on 20m chord the variation over theoretical versines shall not exceed 10mm.
- iv) Expansion gaps – Over average gap worked out by recording two successive gaps  $\pm 2$ mm.
- v) Joints – Low joints not permitted and high joints not more than  $\pm 2$ mm.
- vi) Unevenness – measured on 3.60m chord  $\pm 5$ mm.
- vii) Sleeper spacing – with respect to theoretical spacing  $\pm 20$ mm.
- viii) Squareness of joints on straight  $\pm 10$  mm and on curves  $\pm 15$ mm.
- ix) Variation in longitudinal level with reference to approved longitudinal sections not more 50 mm.
- x) Loose sleepers should not be more than 20% after completion of packing.
- xi) The centre leg of the ERC should be applied with grease IS 408 - 1981 (Specification for grease No.“0” graphite). The eye of the MCI insert should be smeared with the same grease before treated ERCs are driven back.

3.3 **GAUGE:** Gauge shall be checked with standard gauge and should be 1676mm on straight and curves upto 4 degree and 6mm slack for curves sharper than 4 degree. Permissible variation from sleeper to sleeper shall not exceed 2mm.

3.4 **LEVELS:** Levels shall be checked by level board and spirit level. Track should be free from sags and low joints. Permissible variation of cross-level being 3mm at every 4<sup>th</sup> sleeper but not exceeding 1mm between any two consecutive sleepers.

4.0 **SPECIAL ATTENTION TO CONTRACTORS:**

4.1 The maintenance of the newly laid BG track is to be carried out on the running track.

4.2 The contractor should procure sufficient P.Way tools for maintenance of track and also engage sufficient number of experienced labour to carryout and complete the work within the time limit specified. No tools shall be supplied by the Railway.

4.3 The contractor must ensure safety of labour engaged by him while working on the track during the course of execution of this work. The Railway will not be responsible for any injury or damages sustained by the contractor's labour. The work has to be carried out observing all safety precautions.

4.4 The work should be carried out without any interference to the normal working of the track and structures. The contractor will be responsible for any loss or damage to Railway and Public property if it occurred during the course of execution. Railway reserves right the cost of lost materials will be recovered from the contractor and to have the damages made good by the contractor.

- 4.5 If the contractor's vehicles or persons are involved in any accident it would be the responsibility of the contractor and railway will not be responsible for any damage or compensation thereof.

In the event of any accident at the work spot the departmental inquiry will be held by the Railway, if it is established that it occurred wholly or partly due to any act that amount to negligence on the part of the contractor, he / they renders himself / themselves liable for any damages and also for legal consequences in the event of loss of human life, injury etc.

- 4.6 The contractor shall permit carriage of Railway representative free of charge in his lorry while transporting Railway materials from loading point to unloading point.
- 4.7 The work should be executed in workman like manner to the satisfaction of the Engineer-in-charge.
- 4.8 The contractor should provide necessary barricades while executing the works at level crossings for safety of road users and the works at level crossings should be completed expeditiously to avoid inconvenience to the road users.
- 4.9 The contractors are requested to inspect the site and availability of road for transportation of P.way materials before quoting their rates.
- 4.10 One track running meter for the purpose of payment is measured on the center line of the track which includes rails on either side with sleepers and fittings.
- 4.11 The contractor(s) are required to employ qualified and experienced staff to carry out all the items of works included in the schedule.
- 4.12 The contractor may require to start and maintain the track from either end of the section (jurisdiction) specified in the schedule and wherever required to attend as per the directions of Engineer-in-Charge.
- 4.13 The contractor shall engage at least One Keyman, 16 Labour having expertise in attending track work and one mate/supervisor for maintenance of for every 6 Km. of track. One Keyman should be available on all the days of maintenance of entire length of track during maintenance period.
- 4.14 **PENALTY:**
- i) If the contractor fails to engage sufficient labour as prescribed in para 4.13 above ; Railway is free to engage labour falling short of the requirement on any particular day for maintenance, the work will be carried out by Railway either departmentally or any other means and double the cost incurred will be recovered from the contractor's running bills. No claim will be entertained on this account.
  - ii) If the labour engaged by the contractor is less than that prescribed in para 4.13 above; recovery at a rate of Rs.500/- per labour per day short of the required / specified in para 4.13 will be made from the contractor's bills.

## **ANNEXURE**

### **LEADING AND DUMPING OF STONE BALLAST**

- 1.0 The contractor should start the work of leading and dumping of the ballast in the track only after obtaining written permission from the Engineer-in-charge or as and when directed by the Engineer-in-charge to do so.
- 2.0 The contractor should arrange at his own cost all the tools, appliances and labour etc. for removing the Railway's ballast from the stacks into BT as well as leading the ballast on to the track using wire claws of design approved by the Engineer-in-charge and not by shovels or powrahs.
- 3.0 In places of deep cuttings, very high banks, yards, points and crossings and at lengthy bridges etc., the contractor under the instructions of Engineer-in-charge may arrange to collect the ballast at the nominated locations nearest to the track for the purpose of easy leading on to the track. After measurement of the ballast the contractor has to lead the ballast at the required locations with all leads and lifts which may vary up to lead of 150 m on either side of the stacks at the quoted rates only and no extra payment shall be made for these leads.
- 4.0 Entire ballast in a stack should be removed & dumped onto track. The site of stack should be made free of ballast. Whenever required and ordered by the Engineer-in-charge the bottom layers of stacks have to be screened so that no quarry dust in the ballast is carried on to the track. No separate payment will be made for the same. If bottom layers of stack are not removed a stage payment of 90% of stack quantity will be paid. This amount will be released after removing the bottom layers.
- 5.0 The ballast after measurement by the AXEN should not be inserted into the track before the bill is passed in the Dy.CE / XEN office and should be cleared only after obtaining the clearance from the Dy.CE / XEN.
- 6.0 Mixing of hand broken and machine broken ballast in the same stack will not be allowed.
- 7.0 The ballast stacked in one or more stacks between telegraph posts has to be normally lifted from each stack and dumped on the track situated between these two TPs. If required the ballast is also to be lead beyond these two TPs upto and next adjoining TPs on either side of these first mentioned two TPs and dumped on the track, opposite to the adjacent TP length without any extra payment.
- 8.0 No stack measurements will be taken. Quantity will be assessed based on the measurements already taken (vide ballast supply agreements as per ballast ledger).
- 9.0 The Railway administration will not be responsible for safety of the labour engaged by the contractor for the works of this contract and should indemnify the Railway for any compensation to be paid for the loss of human life or injury sustained by his labour.
- 10.0 The operation of collection and training out of ballast should not be carried out simultaneously at the same depot. Similarly the operation of collection of ballast alongside the Railway line and dumping of the ballast into the track should not be carried out in the same block section. Any deviation of these stipulations shall not be allowed except by specific written approval of the Dy. Chief Engineer.

- 11.0 Leading of ballast on to the track shall be done uniformly. If due to any reason, excess ballast is unloaded/dumped at some location, where it is not required (or) excess over to the requirement, the same shall be adjusted/transported to the deficient ballast locations/ Chainage. No extra payment shall be made towards this. The payment for leading of ballast at these locations shall be made only after such rectification of above locations as pointed out by Engineer-in-charge is made good.
- 12.0 **Training out ballast:** The agency has to train out ballast either at depot or from mid section to the required chainages in the required quantities as per direction of the Engineer-in-charge. Ballast has to be loaded with contractors own machinery, labour on to Railway wagons within the time allotted.No detention to Railway wagons/ Rake shall be permitted. Ballast to be loaded preferably in night time/ evening time, so that unloading can be done during day time.
- 13.0 Ballast has to be unloaded from wagon with contractor's own labour, tools in the desired quantities at desired locations without causing any obstruction to the movement of rake/ trains.The unloaded ballast should be properly adjusted in cribs, sides and shall be brought to the profile of BG LWR track as per para 263 & annexure 2/11 of IRPWM 2004. If ballast is coming in the way of wagon /train movement, the same shall be removed to ensure safe passage of train/ rake.
- 14.0 The agency has to arrange adequate labour (at least minimum 5 persons per wagon) for unloading the ballast and a minimum of 25 persons to clear the rail head ballast.

**TRANSPORTATION OF P.WAY MATERIALS**

- 1.0 The contractor should inspect the site for carrying out the work with the facilities available at different locations for loading, transportation and unloading of rails, BG PSC Mono-block / Turnout sleepers and other P-way fittings before quoting the rates.
- 2.0 The PSC Mono-block / Turnout sleepers, rails and other P-way materials shall be unloaded at site of work without infringing the earth work in formation for proposed track. If any sleepers / rails are found infringing the earthwork in formation, the same should be shifted by the Contractor at his cost. After transportation and unloading, the Contractor has to arrange sufficient labour for keeping the turnout sleepers as set-wise and care should be taken not to mix up the sleeper from one set with another set or other ordinary sleepers.
- 3.0 Normally, wooden packing pieces are provided in between layers of PSC turnout sleepers for packing purpose by factory authorities. If, in case of the wooden packing pieces provided by the factory authorities at the time of loading PSC turnout sleepers onto vehicles, after unloading, the Contractor should return the same to SSE/P-way-in-charge of the work at DSK/C Depot.
- 4.0 The contractor should accommodate in his lorry free of charge one or two Railway employees as escort in Driver's cabin if the Railway choose to send escort with the Railway's P.way materials.
- 5.0 Loading of PSC Mono-block / turnout sleepers into the Contractor's vehicles at the factory premises will be done by the Factory authorities. The Contractor has to transport the sleepers from factory to proposed site of work with his vehicles, unloading and keeping as set-wise with his labour and tools etc., Before unloading of sleepers / rails the existing ground should be leveled for which no extra payment will be made.
- 6.0 Loading / Unloading of P-way materials is to be done by deploying road crane or any other methods approved by the Engineer-in-charge taking adequate precautions to prevent any damage. The Contractor has to unload the PSC Mono-block / Turnout sleepers by approved method without causing any damage to the sleepers by putting lorry tyres etc., and as directed by the Engineer-in-charge.
- 7.0 The contractor will be held responsible for any loss or damage that may occur to the pre-stressed concrete sleepers while loading, unloading and transportation or when they are in custody of contractor and the cost of such damages or loss will be recovered from him as per rules in force. Contractor cannot have any objection on penalty levied by Railway and the decision of the Railway is final and binding on contractor. Concerned AXEN / XEN will certify the damage /loss of PSC sleepers with every CC bill.
- 8.0 During the operation of the loading, unloading and leading of PSC concrete sleepers, if the sleeper is damaged to such as extent that it becomes unfit for use in track, recovery will be effected towards cost of sleepers including cost of freight and incidental charges at 7% and supervision charges at 12½% from contractor's on account bills. If any small damage (like breaking of corners, edges etc.) occurs appropriate penalty will be levied on contractor for damages as deemed by Railway. Contractor cannot have any objection on penalty levied by Railway and the decision of the Railway is final and binding on contractor. Concerned AXEN /



XEN will certify the damage /loss of PSC sleepers with every CC bill.

- 9.0 While transporting, if Rails, other P.way materials i.e fittings are damaged during the course of transportation, the cost will be recovered from the contractor's bills / deposits for any loss / damage / shortage for the materials at the rate fixed by Railways.
- 10.0 Each Broad Gauge (BG) pre-stressed concrete sleeper weighs about 300 Kgs. approximately. Each BG 1 in 16 PSC Turnout set consists of approximately 114 Nos. of sleepers weighing about 56 MT, BG 1 in 12 PSC Turnout set consists of approximately 96 Nos. of sleepers weighing about 43.60 MT and BG 1 in 8 ½ PSC Turnout set consists of 67 Nos. of sleepers weighing about 30.70 MT approximately. The above weights may vary up to 10% which is to be taken into consideration while quoting the rates.
- 11.0 Break down to transport vehicles if any will be on contractor's account.
- 12.0 Accidents if any to his vehicles or to persons while working would be the responsibility of the contractor and the Railway will not be responsible for any damages or compensation thereof.
- 13.0 While working close to or alongside the existing Railway track, the contractor shall be responsible for ensuring that no obstruction to safe running of trains or interference with the signaling or electric wires etc. are caused at any time. He shall also make adequate arrangements to keep short lookout for trains approaching from either directions and warn the workmen vehicles etc., well in advance.
- 14.0 While loading the rails onto contractor's vehicles or unloading from contractor's vehicles, the labour are required to cross the tracks / embankments, no extra payment will be made.
- 15.0 The contractor should mobilize adequate number of vehicles and labour capable for doing this work at short notice. The contractor shall make his own arrangements for the required trucks / tractors / trailers / Cranes for loading, unloading and transportation of rails, sleepers and other P.way materials for the works with his crew, fuels, consumables, sufficient labour etc.
- 16.0 The weight of P.way materials viz., rails, fittings etc., will be arrived based on theoretical weight for Class-I materials and for Class-II materials with a reduction of 5% for wear and tear. In case of PSC Mono-block / Turnout sleepers and certain other P-way materials and fittings, where it is not possible to assess the weight theoretically, payment for loading, transportation and unloading as admissible under different items of schedule will be made based on the lorry weightment basis. For this purpose, before loading the PSC Mono-block / Turnout Sleepers and certain other P-way materials and fittings, the weight of empty lorry is to be weighed and after loading the loaded lorry also has to be weighed in the presence of Railway official, duly indicating the weight / Nos. on the gate pass issued to the Contractor. Payment for transportation will be made for the quantity as per the gate pass / weightment certificate certified by the Engineer-in-charge. The Contractor has to pay the weighing machine charges at loading point.
- 17.0 The lead for transportation of P.way materials will be arrived based on the shortest practicable route and the Assistant Engineer has to certify that the lead adopted for arriving MTKM under transportation items is as per the shortest practicable route. No claim for longer lead than the shortest practicable route is allowed. The contractor has to quote his rates duly considering the above points.

- 18.0 The work should be carried out without any interference to the normal working of the track and structures. The contractor will be responsible for any loss or damage to Railway and public property if it occurred during the course of execution and the Railway reserves right to have the damages made good by the Contractor.
- 19.0 While inserting the BG PSC turnout for main / loop lines under line block and for cut & connection work the contractor has to arrange sufficient labour to complete the work well within the block period. The Railway will arrange the line block. As soon as the block is permitted the contractor has to complete the work well in advance without fail within the block period. Idling of labour if any on account of getting the line block will not be considered and the contractor will have no claim whatsoever in this regard.
- 20.0 The layouts for additional loop lines are to be assembled and laid at the places where it is nominated for linking directly. The work is to be carried out within the yard limits. The Contractor should take all safety measures without infringing the running lines or endangering to passengers.
- 21.0 Idling of the contractor's labour / lorries / trucks, if any on account of delay in placement of vehicles will not be considered and the contractor will have no claim whatsoever in this regard.
- 22.0 **PROCUREMENT OF PLANT AND MACHINERY BY CONTRACTOR:**
- 22.1 It should be clearly understood that it is entirely contractor's responsibility and liability to find and procure all the machinery, tools and plant and their spare parts, fuel, consumable stores and labour that are required for the efficient and methodical execution of the work. The quoted rates shall be deemed to be inclusive of all charges for such items including man power required to operate such plants and machinery. Delay in procurement of such items due to their non-availability or import difficulties or any other causes, whatsoever, shall not be taken as an excuse for slow progress or non-performance of the work.

**SPECIAL CONDITIONS FOR PAINTING OF RAILS ON CESS****(A) PAINTING OF NEW RAILS ON CESS****1.0 Surface preparation:**

- (a) The surface preparation of rails is one of the most important pre-requisites for the painting to serve the purpose. Sufficient care should therefore be taken in preparing the surface. The surface shall be made free from oil, grease and dust. The surface shall be rubbed with wire brush and sand paper/emery paper. The tools used may be hand or power operated such as scrappers, wire brushes, emery/sand paper; pumice stones, brick bats etc. Wire brushing should invariably be done at the end so as to obtain a uniform rubbed surface. The surface prepared may be checked by visual observation for uniformity of surface
- (b) Surface preparation shall not be done unless the approved paints of sufficient quantities are available in stock at site. Special care should be taken in preparing the surface at the weld collars, liner contact areas and uniformity of preparation at these locations shall be attained to that of rest of the surface. Generally, weld collars and liner contact areas are considered most corrosive prone areas, from which fatigue failures develop.
- (c) Surface preparation/painting shall not be done in the following conditions.
  - (i) When the ambient temperature is below 10° centigrade or above 50° centigrade.
  - (ii) In rainy season.
  - (iii) During night.
  - (iv) In winter before 8.00 a.m.
  - (v) In summer between 11.00 AM. and 3.00 PM on areas that are likely to be exposed to direct sun light.
  - (vi) Extremely wind/misty/dust blowing conditions.
- (d) Chemicals should not be used for surface preparation.

**2. Painting Scheme:**

- (i) 1<sup>st</sup> Coat: Anti corrosive bituminous black paint confirming to IS 9862-1981 to a thickness of 100 microns.
- (ii) 2<sup>nd</sup> Coat: Anti corrosive bituminous black paint confirming to IS 9862-1981 to a thickness of 100 microns.

NOTE: 1. Surface preparation by way of cleaning, wiping, brushing may be required between successive coats to remove dust, mud, night-soil etc.

**2. The thickness of the film mentioned above is to be ensured at :**

- (i) Junction of web flange
- (ii) Liner contact area
- (iii) Flange curve near foot

### 3.0 Supply of paints:

Paints shall either be procured through Stores Department or supplied by the contractor against painting contracts. Paints manufactured by the following Firms of repute alone shall either be procured or be permitted to be used by contractors through composite contract involving supply and painting of rails.

- 4.1 Paints should be used within the prescribed shelf life from the date of manufacture. The quantity of paint procured should be such that it is fully used before the prescribed period for its use.
- 4.2 The Contractor/Supplier shall furnish to the Railway the date of manufacture of the paint as certified by the manufacturer. The labels on the containers should furnish information regarding the date of manufacture, batch no. etc.

### 5.0 Application of paint:

- (i) First coat of painting shall be done only after the surface preparation is approved by the SSE (P.Way)/AXEN. Paint shall be applied on dry surface free from any type of moisture and shall not be done under the conditions mentioned earlier in 1 (c) of Para (A).
- (ii) Paint shall be mixed well in the container before it is applied. Over mixing shall not be done. Visible air bubbles or foam formation shall totally be avoided.
- (iii) Brush shall not be less than 2" (5 cm.) in width and should have good flexible bristles. If a new brush is used, the same should be soaked in Raw Linseed Oil for at least 24 hours before using the painting. The brushes shall be cleaned at the end of each day's work.
- (iv) Dust settled after scraping shall be cleaned before applying paint.
- (v) When the paint is applied by brush, the brush shall be held at 45° to the surface and paint applied with several light vertical/lateral strokes turning the brush frequently and transferring the paint and covering the whole surface. After this, the brush shall be used cross-wise for a complete coverage and finally finish with vertical/lateral strokes to achieve uniform and even surface.
- (vi) Rags, waste cotton, cloth or similar articles should not be used for applying paint.
- (vii) The coat of paint applied shall be such that the prescribed dry film thickness is achieved by actual trial for the particular brand of paint. The applied coat of paint shall be uniform, and free from brush marks, sags, blemishes, scattering, crawling, uneven thickness, holes, lap marks, lifting, peeling, staining, cracking, checking scaling, holidays and alligatoring.
- (viii) Each coat of paint shall be left to dry till it sufficiently hardens before the subsequent coat is applied. Each coat of paint shall be inspected by SSE (P.Way)/AXEN and certified as satisfactory before applying the subsequent coat.
- (ix) The thickness of the dry film shall not be less than the specified thickness. If the thickness is found less than specified thickness, additional coat of paint has to be applied to bring it to the required thickness. The thickness shall be measured at various locations to ensure that the minimum prescribed thickness is attained all over the areas painted. Engineer-in-charge should satisfy himself that the thickness obtained is not less than that specified.
- (x) Painted surface shall be smooth and uniform in colour. The thickness of each coat

of paint shall be measured by ELCO Meter.

(xi) The time lag between successive operations indicated below shall under no circumstances be exceeded.

(a) Between completion of surface Preparation standard and the application of primer coat. - 4 hours.

(b) Bet. The 1st finishing coat and the 2nd finishing coat - 7 days.

#### 6.0 Testing of the Paint :

(i) The paints/painting shall be tested by the following instruments in the field by SSE (P.Way)/AXEN in addition to the tests conducted by CMT/LGD or any national Test house.

(a) Weight per liter cup 100 ml. capacity stainless steel

(b) Ford Cup No.4

(c) Scratch Hardness Tester Hand Operated preferably with lighting arrangement.

(d) Flexibility and adhesion Tester with ¼" (6.25 mm)dia. rod.

Representative samples from each Batch of paint shall be got tested by either the Chemist & Metallurgist/Lallaguda (Secunderabad) or at any other National Testing Laboratories, whichever, is convenient at the cost of the Contractor. If the samples of paint tested, do not conform to the ISI specifications the whole lot of paint pertaining to that Batch shall be rejected.

#### **(B) Painting of In-service Rails:**

1. Surface preparation: The surface preparation may be carried out as described at Para(A)(1.0) as in case of new rails, except removal of loose paint/flaked paint also to be removed.

2. Painting Scheme :

(i) 1<sup>st</sup> Coat: Anti corrosive bituminous black paint confirming to IS 9862-1981 to a thickness of 100 microns.

(ii) 2<sup>nd</sup> Coat: Anti corrosive bituminous black paint confirming to IS 9862-1981 to a thickness of 100 microns.

#### **(C) Maintenance of Field-cum-site Order Books:-**

**(1)**

(i) Field-cum-site order books shall invariably be maintained for the painting work. Two separate Field Books shall be maintained so that one Book can be with the Inspector concerned, while the other book accompanies the Bill and M.Book for checking and passing of the Bill. All the field books shall accompany the Final bill and they shall be finally filed in Dy.CE's Office.

(ii) Inspector-in-charge shall record certificates in both Field Books and M.Books on completion of each stage of work i.e. surface preparation, primer coats, 1st finishing coat and 2nd finishing coat in token of the completion of each stage of

work confirming that each operation is done satisfactorily and completely. The minimum thickness of paint for each coat has to be recorded by SSE (P.Way) and AXEN shall test check the same.

- (iii) The certificate to be forwarded by SSE(P.Way)/AXEN and shall read as under: 1st finishing

coat of Km to km \_\_\_\_\_  
2nd finishing coat of Km \_\_\_\_\_ to km \_\_\_\_\_

is satisfactorily completed in full (except for----- )

The total quantity of paint consumed is \_\_\_\_\_ liters. And  
the minimum thickness of the paint is \_\_\_\_\_ Microns”

A similar certificate shall be furnished for the surface preparation either

- (iv) Field-cum-site order Book shall contain the following information
- (a) Section, km. TP, LH/RH, Rail, Gauge / non-gauge face side.
  - (b) Contractor's Name and Address: Details of Agreement.
  - (c) Name of manufacturer of the Paint, Specifications. Batch No. Manufacturing Date, expiry date, Reference to Certificate by the Chemist and Metallurgist, Lallaguda or certificate issued by National Test House.
  - (d) Date of commencement and completion of each of the following operations :
    - Surface preparation
    - Painting 1st Finishing coat
    - Painting 2nd finishing coat
  - (v) (a) The paints supplied shall be taken into account by the SSE/P.Way and issue back to the agency for painting as per requirement.
  - (b) The Agency on completion of the work shall return back the empty drums to the SSE/P.Way, who shall ensure that the empty drums are kept safe for a minimum period of 3 months after completion of work and thereafter return the same to Stores/Shop them duly obtaining concurrence from AXEN.
  - (2) Results of tests conducted by SSE/P.Way on Paint shall also be recorded in the field/ Site Order Books. A minimum of two tests per batch of paint shall be conducted at random.

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## **SPECIAL CONDITIONS TECHNICAL FOR SUPPLY AND STACKING OF STONE BALLAST**

- 1.0 These special conditions shall be applicable for stone ballast to be used for all types of sleepers on normal track, turnouts, tunnels, over deck slabs, etc. on all routes.
- 1.1 The Contractors shall arrange at his own cost all tools, explosives and conveyance required for excavation, quarrying, breaking, loading, leading, unloading and stacking of ballast.
- 1.2 When blasting is necessary, it shall be carried out in accordance with the statutory rules in force.
- 1.3 The rate payable to the Contractor is inclusive of all seigniorage charges, royalty, compensation to land owners, for right of passage, Goods and Service Tax, Income Tax, Octroi and any other incidental charges which are existing or may be imposed from time to time in future.
- 1.4 Stacking of ballast shall be done in Railway land as directed by the Engineer-in-charge or his authorized representative to facilitate convenience of loading into ballast train or leading onto the track.  
**Note:** Wire claws should be used while loading of ballast from stacks into BT as well as leading the ballast onto the track i.e., the baskets should be filled up with ballast by wire claws only.
- 1.5 Initially the ground has to be demarcated by the Contractor and then level the ground if uneven or sloping. The contractor should stack the ballast only on level ground approved by the SSE/P.Way on receipt of a certificate to that effect from the SSE/P.Way. If at the time of measurements of ballast stacks by the AEN, they are found stacked on uneven or sloppy ground and the Contractor will have to re-stack such ballast stacks after leveling the ground at his cost.
- 1.6 In places of deep cuttings, very high banks, yards, points and crossings and at lengthy bridges etc., the contractor under the instructions of Engineer-in-charge may arrange to collect the ballast at the nominated locations nearest to the track for the purpose of easy leading on to the track.
- 1.7 The schedule of quantity of ballast to be supplied along the alignment between chainages (each KM/TP) will be advised by the Engineer-in-charge before commencement of work. The Contractor should supply the ballast in accordance with the above schedule along the alignment/track. Minimum two stacks of specified quantities are to be collected in between chainages (TPs) at equal distance.
- 1.8 The ballast after measurements by the AEN should not be inserted into the track before the bill is passed in the Dy.CE/XEN Office and clear only after obtaining the clearance from Dy.CE/XEN.
- 1.9 The ballast stacks should be made uniform with their toes and ridges straight and their slopes duly checked with template with no bulging of toe line and top surfaces should be levelled with no cavity. Variations in the dimensions of stacks or in the minimum cubical content in a stack may be personally authorised by the Divisional Officers in cases where site conditions warrant the above. For collection of ballast alongside track the stacks should be built up as close to the track as possible consistent with ground conditions and availability of land.
- 1.10 At any time required by the Engineer or his authorized representative while stacking is in progress or at the time the measurements are being taken, the Contractor shall supply at his own cost labour, tools and other facilities to open out all or any of stacks for the purpose of inspection or measurements. Numbering of ballast stacks and white washing the stacks in strips shall be done by the Contractor at his own cost as directed by the Engineer-in-charge.
- 1.11 Ballast not confirming to the specifications and rejected by the Engineer-in-charge shall be removed from Railway premises by the Contractor within the time specified by the Engineer-in-charge. Failing such removal after the expiry of the period specified in the notice, the Railway shall be at liberty to dispose of the ballast at the cost of the Contractor

and charge ground rent as per Railway rules for the period such stacks are allowed to remain in Railway premises.

- 1.12 Payment for supply of ballast shall be made on the actual measurements without any deduction for voids. The payment for leading and dumping of ballast will be made based on the pre-recorded stack measurements without any deduction for voids. When training out/dumping of ballast is done under an Agreement different from the one for collection, the AEN/DEN should satisfy himself by test check that the stacks measured earlier are intact and records a certificate to this effect in the measurement book. There should not be any deductions of volume for settlement.
- 1.13 Bills for collection or training out of ballast should be based on stack gross measurements either in stacks or in wagons without any deduction for shrinkage/ voids. However, ballast supply is made in wagons shrinkage up to 8% shall be permitted while verifying the quantities at destination. It is the responsibility of the Contractor to ensure that ballast is not used or removed before it is recorded in the measurement book and taken over by the Engineer-in-charge and the quantities are finally agreed upon between the Railway and the Contractor.
- 1.14 Results of the sieve analysis of the ballast stacks should be recorded in register meant for the purpose. The percentage of oversized ballast and dust should be indicated from this register in the measurement book against each ballast stacks measured.
- 1.15 **Alongside Collections (Cess Collections):** In the case of alongside collections the SSE/P.Way-in-charge should maintain separate register showing the measurement of stacks as well as its disposition (between Chainage/Km. to Chainage/Km.). The stacks should be serially numbered between the successive posts. Any entry should be made in the register whenever the stacks are removed and ballast put into the track. Record should show the place where the removed ballast has been used with the date of removal.
- 1.16 The notes contained in South Central Railway Engineering Standing Order No.57/ 2007 have to be followed for supply of ballast as applicable for construction projects.
- 1.17 The operation of collection and training out of ballast should not be carried out simultaneously at the same Depot/place. Similarly, the operation of collection of ballast alongside the Railway line and dumping of the ballast into the track should not be carried out in the same block section. Any deviation of those stipulations shall be allowed except by specific written approval of the competent authority.
- 1.18 If ballast is to be collected for any reasons at a depot or alongside the track where there are some stacks previously measured, the existing ballast stacks will be re-measured first before fresh collections are allowed. After the fresh collections are completed, overall measurements shall be recorded. The difference between the quantity measured later and the quantity measured at the depot/kilometre on the previous occasion in each case will be the quantity collected.
- 1.19 If ballast is partially trained out from a depot and the ballast train is withdrawn, ballast remaining in the depot should be neatly stacked by the contractor at his cost to enable the measurements being taken. The difference between the original quantity and the quantity arrived at after restacking in each case shall be the quantity trained out.
- 1.20 The ballast collected shall confirm to the specification for track ballast.
- 1.21 **Test Certificate:** The tenderers will have to submit the test report of impact value, abrasion value, water absorption value from the approved laboratories as given in the Annexure-A enclosed without which tenders shall be summarily rejected.
- 2.0 SUPPLY SCHEDULE:**
- 2.1** Ballast should be supplied from the date of issue of letter of acceptance as per the programme given in "Additional Technical conditions":
- 2.2** The contractor shall stick to the schedule of supply. In the event of any shortage in supply during the quarter / month, the contractor shall make good the short fall in the following month. In case of failure, penalty Clause will be applicable which is as follows.



### 3.0 PENALTY CLAUSE:

- 3.1 The quarterly (3 Months period) supply schedule of ballast shall be drawn and specified in "Additional Technical conditions". When the supply of ballast for any quarterly period is less than the quantity mentioned in Para 2 above, a penalty of **Rs.60/- (Rupees Sixty only) per each quarter per 10 Cum (Ten cubic meters)** for the quantities supplied short will be levied unless the short fall is on Railway's account.
- 3.2 The levy of penalty otherwise will be decided on each occasion when an "On account" or "Final bill" is prepared taking into account, the factors leading to the short supply of ballast by the contractor, interruption due to ballast train not working or limited stacking space offered by the Railways etc. The levy/waival of penalty by the competent authority will be final and binding. In case the penalty is waived, the contractor shall arrange to make good the short supply in the subsequent quarter periods as per the quarterly / monthly supply schedule redrawn. The contractor shall be liable to supply ballast according to the revised schedule.
- 3.3 Penalty shall take into account the shortage of the actual quantity supplied from the date of the last measurement as compared to the quantity that should have been supplied during the intervening period at the stipulated monthly / quarterly rate. In case the penalty is levied and the contractor does not make up the short supply during subsequent months / quarter, the penalty shall continue till such time the total short supply is made good.
- 3.4 In the event of any failure on the part of the contractor for maintaining the prorate monthly / quarterly monthly quantum of supply specified under Clause No.2.0 at any stage of the contract, the Railway reserves the right to make good the balance total quantity by fixing any other agency on single tender basis or through departmental means as decided by the Engineer-in-charge and terminate the contract as envisaged in IRS GCC.
- 3.5 Levy of penalty as aforesaid does not amount to waiver of the right of Administration to take action under different clauses of IRS GCC.

### ENGINEERING STANDING ORDER No.57/2007

Sub: Consolidated instructions on Ballast Management.

Ballast is an important component of track structure. Sufficient cushion of clean and angular ballast is necessary for providing resilience to track and drainage of water. While crib ballast provides resistance against longitudinal movement of sleepers, the shoulder ballast of required profile commensurate with the sleepers in use is necessary for providing lateral stability to track against buckling. The role of shoulder ballast becomes even more important in LWR territory. Given the constraint of funds as well as limited capacity for movement of ballast, it is necessary that available quantity of ballast be used most efficiently with minimum wastage, giving priority to the locations where it will provide the maximum benefit in maintaining safety of tracks and minimize the maintenance efforts.

To achieve above noted objectives special attention is required to be paid to the following:

#### 1.0 Availability of cess:

- 1.1 While planning for ballasting of the track, it should be ensured that the cess conforms to provision of para 263 of IRPWM. While low cess will result in additional quantity of ballast getting consumed in shoulders, in sufficient width of cess will result in ballast rolling down the slope and thus lost.

#### 2.0 Assessment of Ballast requirement:

- 2.1 The requirement of ballast should be assessed every year (in January/ February) as per the provisions of para 264 of IRPWM. Based on the assessment, ballast deficiency diagram containing depth of clean and caked cushion as well as the quantity of ballast required to make good the deficiency should be prepared and updated. Copies of these diagrams shall be available with SEs, AXENs as well as in the division.

Further planning for calling of tenders and programme of DMT movement shall be made keeping this into account to ensure that sections vulnerable from the view of buckling of

ballasted well before the onset of summer season, i.e., mid-march itself. No case of caution / other measures should arise for deficiency of ballast. As far as possible only Depot ballast need to be taken. In new lines (inclusive of additional lines) also, after providing minimum ballast by cess supply, rest of ballasting should be done through DMT.

2.2 The quantity of accessed shall also be reflected in the Track Health Monitoring Charts along with deep screening and shallow screening last done in continuation of ballast deficiency data being reflected.

3.0 Track ballast shall be procured conforming to Specification of Track Ballast IRS-GE-I (Jan, 2004) issued by RDSO under RDSO's letter No.RS/F/7/4 dt.25/27.06.2004 as amended further, if any, subject to all modifications directed to be made by competent authority up to the date of calling of tenders(s).

#### **4.0 Management of Ballast depot Supply and training out:**

4.1 For ballast collected in depot, instructions contained in Para 266 of IRPWM regarding register of ballast collection and training out, loading from the depots and quantity trained out should be adhered to.

4.2 Stacking area shall be level, firm and with good drainage. As envisaged vide Para 266 of IRPWM, Depot is divided into suitable number of zones for the purpose of segregation of stacking and loading areas. The Zones shall be further divided into plots. In each plot, ballast shall be collected in stacks such that there is only one stack in a plot. The stack / plot would be the basic entity for measurement of the ballast supplied. The stacking capacity of the zone is up to 5000 cum. normally one contract shall be operated for each depot. Any deviation shall require specific approval of THOD.

##### **4.2.1 Supply Schedule:**

4.2.2 Quarterly schedule duly taking into account the initial mobilization period and monsoon period should be furnished in the tender documents. The normal monsoon period specifying the date of commencement to the date of ending as decided by the Engineer-in-charge should be indicated in the schedule. The details of supplies to be made during monsoon season should also be clearly specified in both cess supply and Depot supply, if required.

4.2.3 Based on the supply schedule mentioned in the tender documents as decided by tender committee duly accepted by accepting authority, the schedule of supplies has to be furnished in the letter of acceptance duly considering the date of acceptance letter and the date of commencement of the monsoon season.

4.2.4 Schedule for supply of ballast during the contract should be clearly indicated on the contract documents, prior to the start of work.

4.2.5 **Penalty for short supply:** The concern AXEN will work out the recovery of penalty for short supply vis-à-vis scheduled supply and a statement of the penalties to be recovered will be sent along with the each CC Bill to the divisional office. Divisional office after checking the penalty statement will ensure that penalty is recovered correctly as per provisions of the contract unless & until the recovery of such penalty is waived off by the competent authority considering the reasons & circumstances.

4.3 For each depot, a depot sketch with proper drawing no. and approval of Dy.CE/XEN in-charge of the depot shall be drawn clearly showing the zones and plots with specific identification No. for each of the plots. Original of the sketch shall be retained in divisional drawing office for record. At the time of tendering, a copy of the depot sketch shall form part of the tender papers clearly indicating the zones and plots for which the tender was being invited. A copy of the depot sketch shall be available with AXEN and SE/JE in charge of the depot.

4.4 The zones shall be distinctly divided and separated either by a track or physical barrier. The operation of simultaneous collection and training out of ballast should not be carried out in the same zone. Any deviation to this stipulation shall not be allowed.

4.5 The entire ballast in zone shall be measured in one go.

- 4.6 After passing the bill in the Divisional office, the permission for loading shall be granted by Dy.CE/XEN. There should be an interval of 3 days between the date of passing of bill by Dy.CE and date of commencement of loading and training out of operations, so as to enable Dy.CE/XEN or any other officer to exercise physical check if considered necessary.
- 4.7 Before granting permission for further collection, ground clearance certificate shall be furnished by the sectional engineer-in-charge of the depot when the ballast collected in any particular zone has been loaded completely in the wagon and the measurement is to be recorded for loading in the M.B. Based on this, AXEN will give permission for further supply after personal verification and recording the certificate in the M.B a minimum of 3 days time gap has to be maintained between the issue of ground clearance certificate by AXEN and starting of fresh supplies in the same zone. Intimation should also be sent to Division immediately by Depot in-charge through Engg. Control who will keep a record of all such messages in a separate register.
- 4.8 The details of measured stacks shall be entered in a stack measurement Register /Ballast passing register, which should have columns for measurements be an authentic initial record in the form of measurement book with machine numbered pages and instruction for preservation custody etc. Manuscript ruled registers should be used by proper machine numbering the pages.
- The ballast passing register should bear the following information:
- Reference to agreement No.
  - Date of measurement
  - Stack No.
  - Measurement as recorded indicating the different dimensions and volume,
  - Results of the quantity check and quantitative check as per sieve analysis over size, quantity, dust etc.,
- There should be no overwriting in the register, if any correction is required, the old entry should be struck off by drawing a line and a fresh entry made and initialled. No blank line should be left while recording. The recordings done at a time should be properly boxed by drawing a line at the start and close of the measurements. All entries passed in ballast passing register should be entered in Measurement book, which shall form the basis for the contractor's bill.
- 4.9 No measurement should be done for part stack(s). After measurement of a stack is done, it should not be disturbed except for training out.
- 4.10 The contractor or his authorized representative shall sign the ballast passing register as well as measurement book in token of acceptance of measurements taken by AXEN. After the stack is passed and measured, the stack number should be clearly marked on the stack either by lime or by placing a board. In addition lime should be sprinkled along all the edges of the stack to indicate that the stack has been accepted.
- 4.11 In another register, the Ground Balance Register, the quantity of ballast measured in each plot should be entered. After subsequent training out of ballast from a plot, the successive reducing balances in that plot should be reflected date-wise. For the quantities loaded, the reference of challan No. should be shown. After the entire quantity in plot has been trained out, the ground balance should be reduced to zero and the plot as shown as vacant. Further stacking at the plot can start only after permission by AXEN as per Para 4.7 above.
- 4.12 The bills for payments to the contractors should be prepared on the basis of the measurements recorded in the stack measurements Register/ Ballast passing register. These details shall be copied in the MBs giving the dates and other details of measurements and checks and the bills prepared.
- 4.13 Accountal of ballast collected in the dept.**
- 4.13.1 In terms of Para 266 of P.Way Manual and also Para E-1332 of Engg. Code the challan shall be prepared after loading of ballast into the wagons and sent to the consignee

where unloading is planned. The certified challan after unloading of ballast shall be sent back to depot in-charge.

- 4.13.2 Paint marks are to be made on the ballast hoppers both inside and outside to indicate the level upto which the ballast is required to be loaded in the ballast hoppers.
- 4.13.3 For this purpose, 6 copies of the challan for each consignment shall be prepared by the depot-in-charge. JE/P.Way after unloading the ballast shall acknowledge the same duly indicating the locations of unloading and return one copy immediately to ballast depot in charge through ballast trains supervisor. Out of other 4 copies SSE/P.way (in charge) shall return two copies to ballast depot in charge after furnishing DMTR/ledger particulars. One copy will be sent to Divisional office and duly retaining last 4<sup>th</sup> copy for his office record. The ballast depot in charge will retain one certified copy for his record and send another copy to the divisional office.
- 4.13.4 Ballast train supervisor / checker should invariably be deployed along with the movement of the ballast trains.
- 4.14 Movement of empty wagons in a rake should be avoided to the extent possible. In case empty hoppers (being defective or inadequacy of ballast in depot for loading) the details of empty wagons must be clearly indicated in challan.
- 4.15 Every possible care should be taken to load the ballast in the hoppers its design capacity duly avoiding loading / overloading / underutilization. Details of loading to be recorded in the ballast ledger after dispatch of each rake along with challan particulars. As loading of the ballast is done mechanically, the number of hoppers actually loaded with this measured ballast quantity may not exactly tally with the number of hoppers to be loaded theoretically. Variations of the quantity thus calculated shall be in the ballast ledger. If such variation is more than 5% of the matter should be investigated and reported to the Divisional Engineer in terms of IRPWM manual clause 266.
- 4.16 In case of faulty gradation of supply ballast, the stacks shall be rejected, if it exceeds permissible limits.

#### 5.0 **Management of Cess supply and training out of Ballast;**

- 5.1 For Ballast collection along cess & its running out, instruction as given in Para 267 of IRPWM shall be adhered to.
- 5.2 Stacking area should be level, firm and with good drainage, written permission for stacking shall be certified by AXEN (test checked at times by XEN/Dy CE) on the ballast passing register. Each stack shall be so formed that ratio of longer to smaller side does not exceed 2.5 except for areas where there is no constraint of land width in which case the ratio upto 3.5 may be permitted. The height of stack shall not be less than 1.0m except in hilly areas where it may be 0.50m. The height of stack shall not be more than 2.0m. The side slopes of stack should not be flatter than 1.5:1 (horizontal: Vertical) and the cubical content of each stack shall not be less than 30 cum in plain areas and 15 cum in hilly areas.
- 5.3 The plots for ballast stacks should be selected by SSE/JE in charge and approved by AXEN and should be on level ground and at such locations from where lifting and leading of the ballast into the track requires minimum effort. The supply contractor should level the area at his own cost before stacking the ballast.
- 5.4 The quantity of ballast required in a TP length should be properly assessed in advance and advised to the contractor to avoid surplus collection in one TP length & less than required in another which may result in unnecessary lead.
- 5.5 Measurement of ballast should be done following generally the provision in Para 4.8, 4.9, 4.10 & 4.12 above. The collection and stacking of ballast should be complete in all respect in a TP length before measurements are taken i.e measurement for ballast supplied in a particular TP length shall be taken only once during the currency of a contract.

- 5.6 In case of cess supply, cess supply sketch / diagram similar to depot sketch shall be drawn by SSE/JE in-charge of the section. The diagram shall reflect all the stacks available on the section clearly indicating the following by different colour / hatching.
- i) Stacks measured on that date and yet to be paid for,
  - ii) Stacks measured earlier but not yet disturbed,
  - iii) Stacks measured earlier and already disturbed, and
  - iv) Stacks where the supply is in progress.
- These diagrams shall also be signed by contractor's representative and AXEN duly certifying that position of stacks on the date of measurement is correctly incorporated in the diagram. Availability of cess supply diagram shall be pre-requisite for processing for the bill payment in the Divisional office.
- 5.7 For supplies along the cess, ballast shall not be dumped till passed by Dy.CE and the ballast accounted for in the ballast ledger of the SSE until written personal permission is given by Dy.CE. In all cases the date will be specified in the permission which will be minimum of 15 days after measurement, or 10 days after passing the bill whichever is later. In case of urgency, decision can be taken by Dy.CE/Con. in each case by a positive act of direction, in writing and if he is the bill passing officer for payment, then deviation is being approved by THOD.
- 5.8 Simultaneous collection and dumping in one block section is not permitted.
- 5.9 Sr.Section Engineer/ P.Way will record the measurements for the dumping / leading of ballast into the track in the MB after completion of dumping by contractor duly indicating stack no. & quantity and issue ground clearance certificate.
- 5.9.1 In respect of measurements recorded for dumping / leading of ballast and for ground clearance, AXEN will carry test check to a minimum 20% in each CC bill for the recorded measurements. There after he can accord permission in writing for further collection in the same block section subject to a minimum time of 7 days between date of issue of the test check by AXEN and starting of a fresh collection of ballast in the same block section, so as to enable Dy.CE/XEN or any other officer to exercise physical check, if considered necessary.
- 5.9.2 An intimation of ground clearance will also be sent to the Division immediately by SSE/P.way through Engineering control who will keep a record of all such messages in a separate register.
- 6.0 Delegation of powers for management of ballast:**
- 6.1 The sectional XEN/Dy.CE in whose jurisdiction the location falls shall deal with management of ballast procurement including tendering and the contract management both for depots as well as for cess supply. Where exceptions are to be made in control due to special working conditions / work load of the depot specific approval of the Pr.CE shall be required.
- 6.2 Dy.CE/C shall be responsible for the overall planning of ballast requirement and distribution of quantities to various depots and for cess supply. He shall also control the availability of funds for ballast, both under Revenue and Track Renewals and shall coordinate the overall movement of ballast trains from depots.
- 6.3 All initial measurements of ballast stacks can be recorded by SSE/JE holding independent charge subject to 100% check of these measurements to be exercised by the checks. Dy.CE/XEN, who is the bill passing officer, shall exercise 10% check, both in respect of stack measurement and quality before passing the bills. At least 30-33% of the bills should be covered by the test check to be carried out at the XEN/Dy.CE's level. Bills should preferably be checked keeping an element of surprise but at no stage, more than three bills should be missed in continuation.

\* \* \*

**SPECIFICATIONS FOR TRACK BALLAST IS/RDSO-GE/0001:2023, FEBRUARY 2023.**

1. **SCOPE:** These specifications will be applicable for stone ballast to be used for all types of sleepers on normal track, turnouts, tunnels and deck slabs etc on all routes.

2. **DETAILED SPECIFICATIONS:**

2.1 **GENERAL**

2.1.1 **Basic Quality:** Ballast should be hard durable and as far as possible angular along edges/corners, free from weathered portions of parent rock, organic impurities and inorganic residues.

2.1.2 **Particle shape:** Ballast should be cubical in shape as far as possible. Individual pieces should not be flaky and should have generally flat faces with not more than two rounded/ sub rounded faces.

2.1.3 **Mode of manufacture:** Ballast for all BG main lines and running lines, except on „E” routes but including „E” special routes, shall be machine crushed. For other BG lines and MG/NG routes planned/sanctioned for conversion, the ballast shall preferably be machine crushed. Hand broken ballast can be used in exceptional cases with prior approval of Chief Track Engineer/CAO/C. Such approval shall be obtained prior to invitation of tenders.

On other MG and NG routes not planned/sanctioned for conversion hand broken ballast can be used for which no approval shall be required.

2.2 **PHYSICAL PROPERTIES**

2.2.1 Ballast sample should satisfy the following physical properties in accordance with IS: 2386 Pt.IV-1963 (Reaffirmed in 2021) when tested as per the procedure given in Annexure- I & II.

	<b>BG, MG &amp; NG (planned/sanctioned for conversion)</b>	<b>NG &amp; MG (other than those planned for conversion)</b>
<b>Aggregate Abrasion Value</b>	30% Max.*	35% Max.
<b>Aggregate Impact Value</b>	20% Max.*	30% Max.

- \* In exceptional cases, on technical and/or economic grounds relaxable upto 35% and 25% respectively by CTE in open line and CAO/C for construction projects. The relaxation in Abrasion and Impact values shall be given prior to invitation of tender and should be incorporated in the Tender document.

2.2.2 To carry out Impact Test on ballast, a test sample of ballast pieces (about 5 kg in weight) of size 10 mm to 12.5 mm will be required. Appropriate care should be taken by the railways that ballast selected for breaking down to 10 mm to 12.5 mm size for Impact Test should be random from the ballast supply to avoid any subjectivity in selection of test sample. Alternatively, the test sample in the recommended range of size be got manufactured along with the ballast in sufficient quantity required for this test.

2.2.3 The „**Water Absorption**’ tested as per IS 2386 Pt.III-1963 (Reaffirmed in 2021) following the procedure given in Annexure III should not be more than 1%. This test, however, *is to be prescribed at the discretion of CE/CTE in open line and CAO/Con. for construction projects.*

2.2.3.1 The power of relaxing for water absorption limit should be delegated to CTE in open line/CAO on construction for specified areas. However, maximum water absorption in any case should not be allowed more than 2.5%.

## 2.3 SIZE AND GRADATION

2.3.1 Ballast should satisfy the following size and gradation:

- a) Retained on 65mm Sq. mesh sieve 5% Maximum
- b) Retained on 40mm Sq. mesh sieve\* 40%-60%
- c) Retained on 20mm Sq. mesh sieve\*\*\*

\*\*\* Not less than 98% for machine crushed ballast Not less than 95% for hand broken ballast

\* For machine crushed ballast only.

2.3.1.1 In exceptional cases, where it is considered necessary on technical considerations, to reduce the maximum size of ballast for NG lines, CTE may modify the size & gradation of the ballast as defined above. In case of such modifications, provision given in Para 2.3.2 to 2.3.4 below shall also be suitably modified. This will be finalized before invitation of tenders and should be incorporated in the tender documents.

### 2.3.2 Oversize Ballast

i) Retention on 65mm square mesh sieve.

A maximum of 5% ballast retained on 65mm sieve shall be allowed without deduction in payment.

In case ballast retained on 65mm sieve exceeds 5% but does not exceed 10%, payment at 5% reduction in contracted rate shall be made for the full stack. Stacks having more than 10% retention of ballast on 65mm sieve shall be rejected.

ii) In case ballast retained on 40mm square mesh sieve ( for machine crushed ballast only) exceeds 60% limit prescribed in 2.3.1 (b) above, payment at the following reduced rates shall be made for the full stack in addition to the reduction worked out at i) above.

- 5% reduction in contracted rates if retention on 40mm square mesh sieve is between 60% (excluding) and 65% (including).
- 10% reduction in contracted rates if retention on 40mm square mesh sieve is between 65% (excluding) and 70% (including).

iii) In case retention on 40mm square mesh sieve exceeds 70%, the stack shall be rejected.

iv) In case of hand broken ballast supply, 40mm sieve analysis may not be carried out. The executive may however ensure that the ballast is well graded between 65mm and 20mm size.

### 2.3.3 Under Size Ballast

The Ballast shall be treated as undersize and shall be rejected if-

i) Retention on 40mm Sq. Mesh sieve is less than 40%.

ii) Retention on 20mm square mesh sieve is less than 98% (for machine crushed) or 95% (for hand broken).



### **2.3.4 Sieve Analysis of Ballast**

- 2.3.4.1 The test sieves used for sieve analysis shall conform to the specifications given in Annexure-IV.
- 2.3.4.2 While carrying out sieve analysis, the screen shall not be kept inclined, but held horizontally and shaken vigorously. The pieces of ballast retained on the screen can be turned with hand to see if they pass through but should not be pushed through the sieve.
- 2.3.4.3 The percentage passing through or retained on the sieve shall be determined by weight. The weighing equipment used shall NOT have least count more than 100 grams.

## **3. CONDITIONS FOR SUBMISSION OF TENDER**

- 3.1 Each tenderer at the time of tendering shall submit the test report of Impact Value, Abrasion Value, Water Absorption Value from approved laboratories and the list of these laboratories shall be mentioned in the tender documents.
- 3.2 The tenderer shall also furnish an undertaking as incorporated in the tender document that the ballast supply at all times will conform to Specifications for Track Ballast as specified by Railway.

## **4. METHOD OF MEASUREMENT**

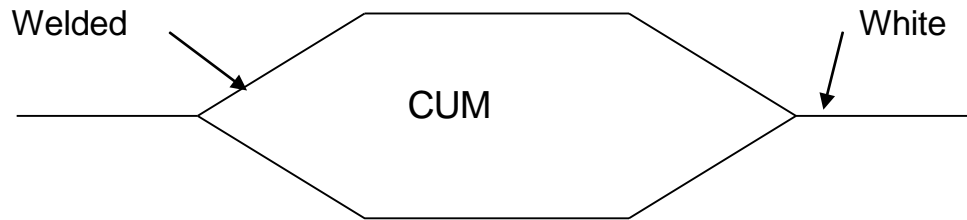
### **4.1 Stack Measurement**

Stacking shall be done on a neat, plain and firm ground with good drainage. The height of stack shall not be less than 1m except in hilly areas where it may be 0.5m. The height shall not be more than 2.0m. Top width of stack shall not be less than 1.0m. Top of stack shall be kept parallel to the ground plane. The side slopes of stack should not be flatter than 1.5:1 (Horizontal : Vertical). Cubical content of each stack shall normally be not less than 30 cum in plain areas and 15 cum in hilly areas.

### **4.2 Wagon Measurement**

- 4.2.1 In case of ballast supply taken by direct loading into wagons, a continuous white line should be painted inside the wagon to indicate the level to which the ballast should be loaded. The cubical content in cubic meter corresponding to white line should also be painted on both sides outside the wagon.

- 4.2.2 In addition to painted line, mentioned in para 4.2.1, short pieces of flats (cut pieces of tie bars or otherwise) with cubical contents punched shall be welded at the centre of all the four sides as permanent reference. In case the supply is taken in general service wagon, actual measurements will be taken.



### 4.3 Shrinkage Allowance

Payment shall be made for the gross measurements either in stacks or in wagons without any deduction for shrinkage/voids. However, when ballast supply is made in wagons, shrinkage upto 8% shall be permitted at destination while verifying the booked quantities by the consignee.

## 5. SAMPLING AND TESTING

### 5.1 General

- 5.1.1 The samples shall be drawn with due diligence and adequate precaution so that they represent the true nature and condition of the ballast.
- 5.1.2 Being a heterogeneous material, the gradation of ballast loaded in wagons and/or dumped/inserted in the track may not remain same as that initially checked in stacks, due to lifting, loading, transportation, unloading etc. Similarly in case of direct loading into wagons, the gradation of ballast at destination may not remain same as that at source, due to loading, transportation etc. Therefore, the samples from wagons and track are not representative samples as far as gradation is concerned. Even in the same stack, results of two checks may not be same.
- 5.1.3 The samples from a stack taken after lapse of a long period of stacking are not representative samples of the ballast initially supplied in the stack, due to settling down of smaller size particles in voids underneath, dirt/dust getting accumulated in the stack, rains etc.

### 5.2 Sampling Frequency

In order to ensure supply of uniform quality of ballast, the following norms shall be followed in respect of sampling, testing and acceptance:

- 5.2.1 On supply of the first 100 cum, the tests for Size & Gradation, Abrasion Value, Impact Value and Water Absorption (if prescribed) shall be carried out by Railway. Further supply shall be accepted only after this ballast satisfies the specifications for these tests. Railway reserves the right to terminate the

contract as per GCC at this stage itself in case the ballast supply fails to conform to any of these specifications.

**5.2.2 Subsequent test shall be carried out as follows:**

<b>Type of Tests</b>	<b>Supply in Stacks</b>	<b>Supply in Wagons</b>
(a) Size and Gradation Tests	One for each 100 cum or part thereof in any stack	One for each 100 cum or part thereof for quantity to be loaded in wagons
(b) Abrasion Value, Impact Value and Water Absorption Value (*)	One Test for every 2000 cum	

- (\*) These tests shall be done for the purpose of monitoring quality during supply. In case of the test results not being as per the prescribed specifications at any stage, further supplies shall be suspended till suitable corrective action is taken and supplies ensured as per specifications.

The above tests may be carried out more frequently, at the discretion of Railway.

**5.2.3 All tests for Abrasion Value, Impact Value and Water Absorption should be got done through approved laboratories or Railway's own laboratories (list of these laboratories shall be mentioned in the tender document). These tests, subsequent to award of contract, shall be done at Railway's cost.**

**5.3 Supply of ballast in Stacks**

**5.3.1 Sampling Procedure**

- (i) At the time of formation of stacks, sufficient care should be taken to ensure that there is sufficient space around the stack to facilitate movement of JCB/Power Equipments. The length and width of each stack shall be kept in such a way that every part of the stack is accessible to the JCB or Power Equipment, to be deployed for drawing "Samples".
- (ii) In case of ballast supply in stacks, three "Samples" each of 0.3-0.5 cum volume, one sample each from two sides and one sample from top after removing outer layer (150-200 mm) should be collected from stack for every 100 cum or part thereof, by JCB or other suitable Power Equipment.
- (iii) The location (in plan) and depths of sampling points shall be varied for different "Samples" and different stacks in a lot.
- (iv) "Gross Sample" should be prepared by thoroughly mixing the three "Samples" collected as in (ii) above, using JCB bucket or any other suitable Power

Equipment, on a clean, flat and hard surface.

**Note:** In exceptional cases of site specific constraints, approval of Competent Authority (Engineer-in-charge) shall be taken prior to invitation of tender, for using manual means for collection and mixing of “Samples”, and this should be incorporated in the Tender Document.

- (v) A “Test Sample” of volume 0.027 cum shall be drawn from each of the “Gross Sample”, by the method described in Para 5.3.1 (vi), for carrying out Size & Gradation tests.
- (vi) Method for drawing “Test Sample”: The ballast in “Gross Sample” shall be scooped into a cone shaped pile by taking care to drop each scoopful exactly over the same spot. After the cone is formed, it shall be flattened by pressing the top of cone with a smooth surface. Then it is cut into quarters by two lines which intersect at right angles at the centre of the cone. The bulk of the sample is reduced by rejecting any two diagonally opposite quarters. The remaining ballast shall be mixed and “test sample” shall be drawn for testing. After drawing “test sample”, the left over ballast of “Gross Sample” shall be dumped back in the stack. In case clean, flat and hard surface is not available then a tarpaulin or any other suitable sheet may be used on a flat surface for mixing, drawing and sieve analysis of samples.

5.3.2 In case of stacks of volume more than 100 cum, more than one “Test Samples” will be tested for Size & Gradation. In such cases, the sieve analysis results of all the “Test Samples” shall individually conform to following gradation, for acceptance/rejection of the whole stack:

- (i) Retention on 20mm Sq. Mesh Sieve shall not be less than 98% for machine crushed ballast (not less than 95% for hand broken ballast).
- (ii) Retention on 40mm Sq. Mesh Sieve shall be between 40 to 70%.
- (iii) Retention on 65mm Sq. Mesh Sieve shall not be more than 10%.

The full payment/reduced payment for the whole stack, as given in Para 2.3, shall be decided based on the average of the sieve analysis results of all the “Test Samples” for a stack.

#### **5.4 Supply of ballast in Heaps for loading directly in Wagons**

##### **5.4.1 Sampling Procedure**

Samples of ballast shall be collected from heaps of ballast proposed to be loaded into the wagons. For this, the contractor shall inform ADEN in-charge in writing sufficiently in advance before placement of rake, about the locations of ballast heaps from where it is to be loaded into wagons. ADEN in-charge shall decide the location of heaps from which sampling is to be done, judiciously covering the entire quantity of ballast to be loaded in the rake.

5.4.2 Based on the approx. quantity of ballast to be loaded in the rake, methodology for sampling of ballast to be followed shall be the same as in Para-5.3.1 and 5.3.2 above.

**Aggregate Abrasion Value**  
**(Based on IS: 2386 Part IV-1963, Reaffirmed in 2021)**

**1. Apparatus**

- 1.1 The abrasion test for track ballast shall be carried out using **Los- Angles Machine** as per fig.1.
- 1.2 The **abrasive charge** shall consist of 12 nos. cast iron or steel spheres approx. 48mm dia and each weighing between 390 and 445 gm ensuring total weight of charge as  $5,000 \pm 25$ gm.
- 1.3 **IS sieves** of sizes 50mm, 40mm, 25mm and 1.70mm.
- 1.4 **Drying Oven**

**2. Test Sample**

- 2.1 The test sample of 10,000gm shall consist of clean ballast conforming to the following grading:
- Passing 50mm and retained on 40mm square mesh sieve 5,000 gm@
  - Passing 40mm and retained on 25mm square mesh sieve 5,000 gm@ @ tolerance of  $\pm 2\%$  permitted.
- 2.2 The sample shall be dried in oven at  $100 - 110^{\circ}\text{C}$  to a constant weight and weighed (Weight „A“).

**3. Test Procedure**

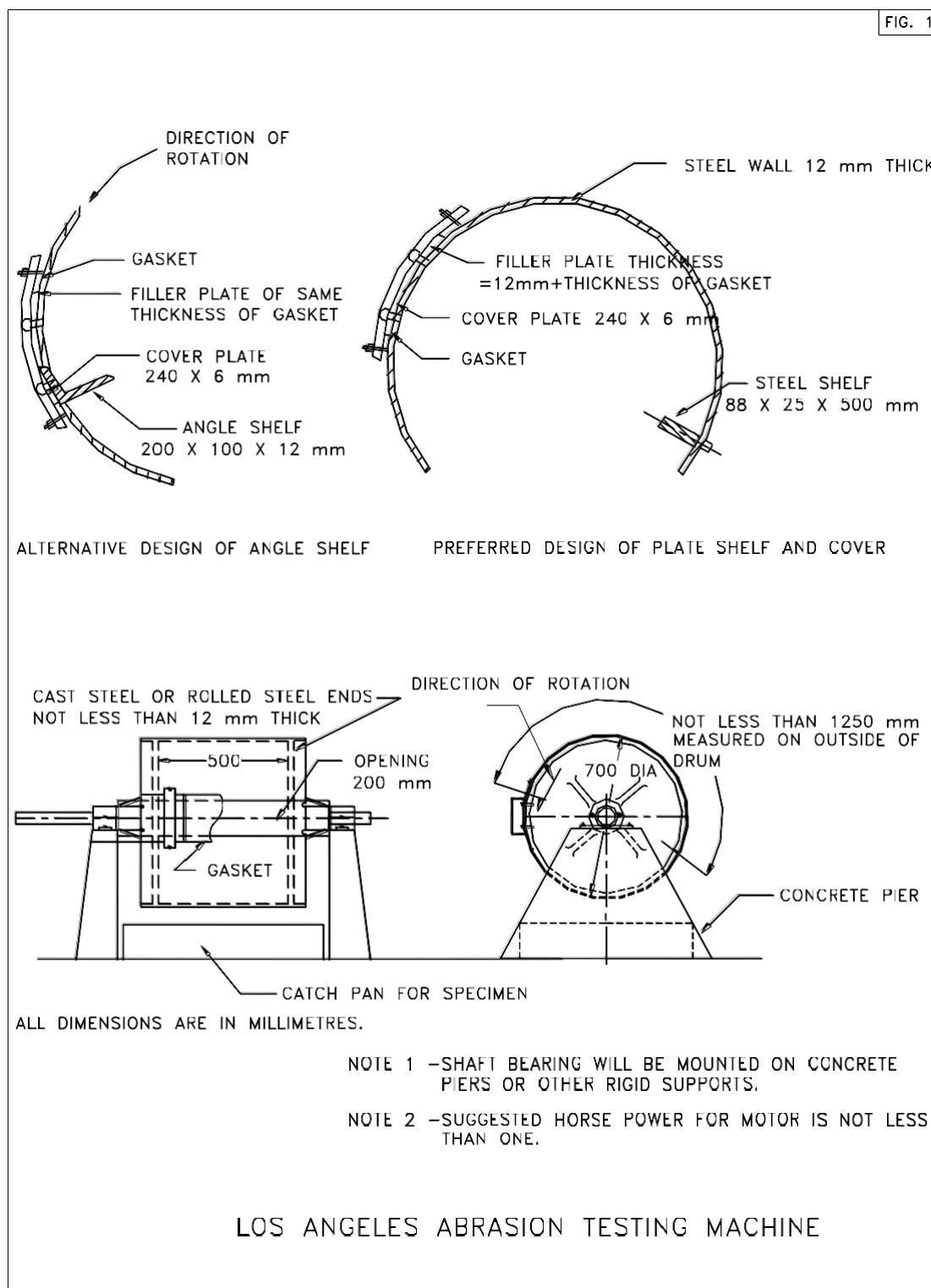
The test sample and the abrasive charge shall be placed in the Los-Angeles abrasion testing machine and the machine rotated at a speed of 20-33 revolutions/minute for 1000 revolutions. At the completion of test, the material shall be discharged and sieved through 1.70mm IS sieve.

**4. Analysis and reporting of the Result**

- 4.1 The material coarser than 1.70mm IS sieve shall be washed, dried in oven at  $100 - 110^{\circ}\text{C}$  to a constant weight and weighed (weight B).

- 4.2 The proportion of loss between Weight "A" and Weight "B" of the test sample shall be expressed as a percentage of the original weight of the test sample. This value shall be reported as:

$$\text{Aggregate Abrasion Value} = \frac{(A-B)}{A} \times 100$$



**Aggregate Impact Value**  
**(Based on IS: 2386 Part IV-1963, Reaffirmed in 2021)**

**1. Apparatus**

The apparatus shall consist of the following

- a) **Impact testing machine** conforming to IS: 2386 part IV-1963, (Reaffirmed in 2021) as per fig.2.
- b) **IS Sieve** of sizes 12.5mm, 10mm and 2.36mm.
- c) **A cylindrical metal measure** of 75mm dia & 50mm depth.
- d) **A tamping rod** 10mm circular cross section and 230mm length, rounded at one end.
- e) **Drying Oven**

**2. Test Sample**

2.1 The test sample shall be prepared out of track ballast so as to conform to following grading:

- |   |                         |      |
|---|-------------------------|------|
| - | Passing 12.5mm IS sieve | 100% |
| - | Retention 10mm IS sieve | 100% |

2.2 The sample shall be oven dried for 4 hours at a temperature of 100- 110°C and cooled.

2.3 The measure shall be filled about one-third full with the prepared aggregate and tamped with 25 strokes of the tamping rod. A further similar quantity of aggregate shall be added and a further tamping of 25 strokes given. The measure shall finally be filled to overflowing, tamped 25 times and the surplus aggregate struck off, using and tamping rod as a straight edge. The net weight of the aggregate in the measure shall be determined to the nearest gm (weight "A").

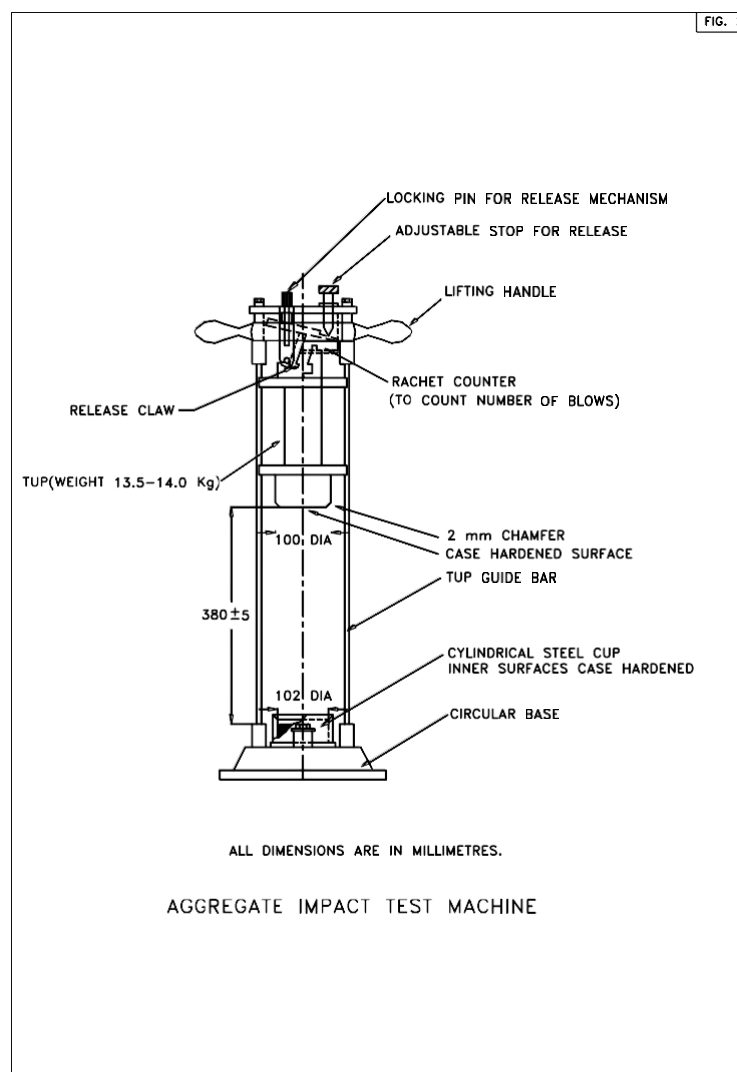
**3. Test Procedure**

3.1 The cup of impact testing machine shall be fixed firmly in the position on the base of the machine and the whole of the test sample placed in it and compacted by 25 strokes of the tamping rod.

3.2 The hammer shall be raised 380mm above the upper surface of the aggregate in the cup and allowed to fall freely on to the aggregate. The test sample shall be subjected to a total of 15 such blows, each being delivered at an interval of not less than one second.

#### 4. Analysis and Reporting of the result

- 4.1 The sample shall be removed and sieved through 2.36mm IS sieve. The fraction passing through shall be weighed (Weight „B“). The fraction retained on the sieve shall also be weighed (Weight „C“) and if the total weight (B+C ) is less than the initial weight ( Weight „A“ ) by more than one gm, the result shall be discarded and a fresh test made.
- 4.2 The ratio of the weight of the fines formed to the total sample weight shall be expressed as a percentage.  
Aggregate Impact Value =  $(B/A) \times 100$
- 4.3 Two such tests shall be carried out and the mean of the results shall be reported to the nearest whole number as the Aggregate Impact Value of the tested material.





**Water Absorption**

**(Based on IS: 2386 Part III-1963, Reaffirmed in 2021)**

**1. Apparatus**

The apparatus shall consist of the following:

- a) **Wire Basket-** Perforated, electroplated or plastic coated, with wire hangers for suspending it from the balance.
- b) **Water tight** container for suspending the basket.
- c) **Dry soft Absorbent cloth** 75x45 cm size 2 nos.
- d) **Shallow Tray** of minimum 650 square cm area.
- e) **Air tight container** of capacity similar to basket.
- f) **Drying Oven.**

**2. Test Sample**

A sample of not less than 2000gm shall be used.

**3. Test Procedure**

- 3.1 The sample shall be thoroughly washed to remove finer particle and dust, drained and then placed in the wire basket and immersed in distilled water at a temperature between 22-32°C.
- 3.2 After immersion the entrapped air shall be removed by lifting the basket and allowing it to drop 25 times in 25 seconds. The basket and sample shall remain immersed for a period of  $24 \pm \frac{1}{2}$  hours afterwards.
- 3.3 The basket and aggregate shall then be removed from the water, allowed to drain for few minutes, after which the aggregate shall be gently emptied from the basket on to one of dry clothes and gently surface dried with the cloth transferring it to second dry cloth when the first will remove no further moisture. The stone aggregate shall be spread on the second cloth and exposed to atmosphere (away from direct sunlight) until it appears to be completely surface dry. The aggregate then shall be weighed (Weight „A“).
- 3.4 The aggregate shall then be placed in an oven at a temperature 100 - 110°C for 24 hours. It shall then be removed from oven, cooled and weighed (weight „B“).

**4. Analysis and Reporting of the Result**

Water Absorption =  $\{(A-B)/ B\} \times 100$

- 4.1 Two such tests shall be made and individual and mean results shall be reported.

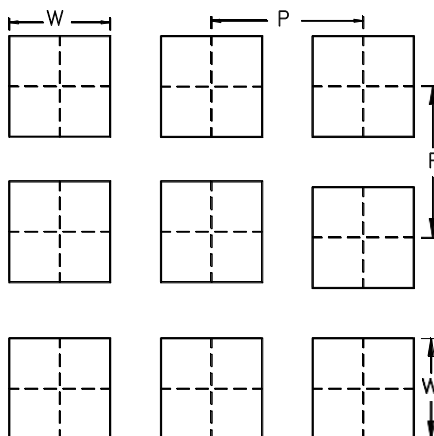
**Specification of Test Sieves used for Sieve Analysis of Ballast**

1. The test sieves shall be perforated plate sieve type with square holes/apertures, mounted on a frame. The test sieves are designated by the nominal size of holes/apertures.
2. **Material of Perforated Plate:** The perforated plate for test sieves shall be manufactured from Brass Sheet or Steel Sheet or Stainless Steel Sheet or Galvanized Steel Sheet or Electroplated Steel Sheet.
3. **Plate Thickness:** The thickness of plate used for making test sieve and the tolerance permitted for this shall be as following:

For 65mm Square Mesh Sieve - 3mm (Plus 1.0mm Minus 0.5mm) For 40mm Square Mesh Sieve - 2mm (Plus Minus 0.5mm)

For 20mm Square Mesh Sieve - 2mm (Plus Minus 0.5mm)

4. **Arrangement of Holes/Apertures:** The square holes/apertures of size “W” in the perforated plate shall be arranged at Pitch “P” as per the sketch given below:



5. **Sieve Opening Size, Pitch of Openings and tolerances:** The nominal size of individual hole/aperture at mid-section (W), the Pitch of holes/apertures (P) and permissible tolerance for them shall be as under:

Test Sieve of Square Mesh Size	W		P	
	Nomina I Size	Tolerance	Distance	Tolerance
65 mm	65 mm	(±) 1.5 mm	80 mm	(+) 12.0 mm (-) 8.0 mm
40 mm	40 mm	(±) 1.5 mm	50 mm	(+) 7.5 mm (-) 5.0 mm
20 mm	20 mm	(±) 1.0 mm	25 mm	(+) 4.0 mm (-) 2.5 mm

6. **Sieve Frame:** The frame of test sieves shall be manufactured from Hardwood or Steel sheet or Brass sheet. The internal size of the frame (i.e. clear size of perforated plate mounted on frame) shall not be less than 100cm in length, 70cm in breadth and 10cm in height on sides.
7. **Marking on test sieves:** A label shall be fixed to the frame of each sieve, legibly marked with following information:
- (i) Nominal Aperture Size,
  - (ii) Material of perforated plate,
  - (iii) Material of sieve frame,
  - (iv) Maker's Name or Trademark, and
  - (v) An Identification Number for the sieve.

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**ANNEXURE “A” LIST OF APPROVED****LABORATORIES**

Sl. No.	Laboratory
1	Osmania University, Tarnaka, Hyderabad.
2	JNT University, Kukatpally, Hyderabad.
3	National Institute of Construction Management and Research, Gachibowli, Hyderabad.
4	National Academy of Construction, Kondapur, Hyderabad.
5	Vasavi College of Engineering, Gandipet, Hyderabad.
6	Chaitanya Bharathi Institute of Technology, Gandipet, Hyderabad.
7	Deccan College of Engineering, Nampalli, Hyderabad.
8	Gurunanak Dev College of Engineering, Bidar.
9	National Institute of Technology, Warangal.
10	Kakatiya Institute of Technology and Sciences, Warangal.
11	Andhra Pradesh Research Laboratories, Rajendranagar, Hyderabad.
12	Sri Venkateswara College of Engineering, S.V.University, Tirupati.
13	Koneru Lakshmaiah University, Vaddeswaram, Guntur Dist.
14	Bapatla Engineering College, Bapatla.
15	JNT University, Kakinada.
16	JNT University, Anantapur.
17	S.K.University College of Engineering, Anantapur.
18	Rao Bahadur Y.Mahabaleswarappa Engineering College, Ballary.
19	Govt. Engineering College, Raichur.
20	G.Pullareddy College of Engineering, Kurnool.
21	Srisailem Right Branch Canal's Central Laboratory, Nandyal.
22	Rajiv Gandhi Memorial College of Engineering & Technology, Nandyal.
23	R.V.R & J.C College of Engineering, Chowdavaram, Guntur Dist.
24	Sri Guru Gobind Singhji College of Engineering & Technology, Nanded.
25	Govt. College of Engineering Osmanpura, Aurangabad.
26	Geo-technical Laboratory, Rail Nilayam, Secunderabad.
27	All the Railway laboratories of other Railways.
28	V.R.Siddhartha Engineering College, Kanuru, Vijayawada.