I.0 GENERAL

1.1 These specifications have been framed for a robust and sturdy machines, which shall take out the old turnouts and replace them by new assembled turnouts expeditiously and with desirable degree of accuracy. It shall also perform other related functions as detailed in the following clauses:

1.2 The technical specifications have been drafted to reflect the performance and quality requirement of the equipment machine in a neutral manner without bias to any specific manufacturer. Bidders are requested to study the specifications carefully and assure that their equipment machine fully comply therewith. If a bidder feels that his equipment machine can substantially meet the performance and quality requirements of the equipment machine, but does not fully satisfy a particular specification, he should immediately seek clarifications from the purchaser prior to submission of bids as to whether such deviation is substantive or not mention the same in the statement of deviation from the specifications, giving the details how the functional requirements are going to be met with.

1.3 The bidder shall specify the model offered and furnish a detailed technical description of the machine. The machine may consist of more than one units and the complete set of units required for performing the functions desired in the specification shall be treated as one machine. Systems/sub-systems of the working mechanism of the machine, as per Para3 in particular and all items of the specifications in general, shall be described in detail with sketches to show the manner in which the requirements of the specifications are accomplished by the machineoffered.

1.4 Photographs of the type of machine offered in work mode shall be enclosed with the offer. This shall also show close-ups of various working assemblies/systems and the full machine. The tenderer shall also furnish a compact disc (computer enabled) or DVD or USB video compact disc showing the working of machine in real time under field conditions. Tenderer shall also submit the names of countries & Railways where the offered machines are working and where their working at site can be visited by Indian Railway officials.

2.0 DIMENSIONAL AND OPERATING REQUIREMENTS

2.1 The diesel powered equipment machine shall be robust, reliable and suitable for working on Indian Railways. The design and dimensions of the machine and its components shall be to metric standards. Quality assurance during manufacturing of the machine shall be according to ISO-9001. The welding standard followed for manufacturing of machine should be to ISO:3834, EN:15085 or any other equivalent standard for welding railway vehicle and components. The manufacturer should specify the standard followed and certify that it meets the welding standard mentioned above. The machine shall be robust, reliable and suitable for working on straight, transition and curved tracks (upto 10 degree) on broad gauge (1676 mm) of Indian Railways.
2.2  The profile of the machine (including its units) longitudinally and in cross-section during transfer as self-propelled vehicle on track or loaded on railway wagons shall be within the Indian Railways Standard Metric BG Schedule of Dimensions (Revised-2004) provision of Indian Railways Schedule of Dimensions – 1676 mm gauge (BG), revised, 2004. with latest corrigendum and up to date correction slips issued. The minimum and maximum moving dimensions are enclosed at ANNEXUREI/I. To determine the profile of machine as loaded on Indian Railway wagon, floor height of standard railway wagons may be taken as 1055 mm from Rail level (Annexure-I/V). In loaded condition floor height may reduce up to 1145 mm.

2.3  Adequate clearance shall be allowed so that no component of any unit of machine shall infringe the minimum clearance of 102 mm from rail level while travelling on track.

2.4  Axle load of machine units while moving on track with or without Turnout Wherever applicable, axle load shall be lesser than 20.32T with minimum axle spacing of 1.5 m. Load per meter shall not exceed 7.67 T.

2.5  It shall be desirable to have rail wheel diameter of 915 mm, however, lesser diameter can also be considered.

2.6  Machine units while moving on track it shall be capable of negotiating curves up to 10 curvature (176175 m radius) super elevation up to 165 mm, and gradients up to 3%.

2.7  It shall be capable of continuous operation during the varying atmospheric and climatic conditions occurring through the year in India. The range of climatic conditions is as follows:

Ambient Temperature: - 0 – 55°C
Altitude – Sea Level: - 7001750 m above mean sea level.
Humidity: - 40% - 100%
Max. rail temperature : - 70°C.

2.8  During transfer from one station to another, the machine units should be equipped with suitable arrangements to fasten & secure it properly on the Railway wagon, so as to permit the movement of loaded Railway wagon at a speed of 75100 kmph.

2.9  It shall be capable of working and travelling without requiring power block in electrical sections. On Indian Railways, 25KV AC A current power supply is used for traction through an overhead wire at 5.5 m above rail level. On bridges and tunnels, the height is restricted to 4.8 m.

3.0  WORKING MECHANISM

3.1  The equipment machine shall be required to handle 1 in 81/2 or 1 in 12 or 1 in 16 turnout’s with plane Straight or curved switches and built up/cast manganese steel / welded crossing on concrete / steel / wooden sleepers. The details regarding length and weights of 1 in 8 1/2, 1 in 12 and 1 in 16 turnout on concrete sleepers is at ANNEXURE I/II. As mentioned at Annexure 1/II, total weight of 60 kg 1 in 12 fan shaped concrete turnout is 57.5 tonnes and that of 1 in 16 is about 65 tonnes. Out of this, while lifting the assembled turnout more weight comes on the machine, lifting the crossing side. With introduction of thick web switches, total weight of assembly may increase even further.
Considering these factors, lifting capacity of the machine while lifting and transporting the assembled turnout should not be less than 72 metric tonnes. If two or more than two units machines are used for the job, individual capacity of each units machine (in Indian working conditions as available in Indian railway yards) should not be less than 36 metric tonnes. Be equal and total capacity of these units acting as machine shall not be less than 72 metric tonnes. The machine should also be capable of handling Diamond turnout on Concrete sleepers and Trap switches on concrete sleepers. Dimensional detail of Diamond and Trap switch is enclosed at Annexure I/II.

3.2 Total number of lifting points (Left rail and Right rail lifting together at one location is one point) in each machine (all units involved in lifting at a time put together) should not be less than 6 to avoid excess sag in 1 in 12 assembled turnout on concrete sleepers when lifted by machine. The load carrying capacity of each hook/chain/Jaw should not be less than 8 tonnes be sufficient according to no of lifting points to lift the complete assembled T/O.

3.3 It shall be possible to change the entire turnout as one piece. However, if required by the Purchaser, it shall also be possible to change the turnout in segments. The machine shall however be so designed that it could be modified and/or augmented to handle longer turnouts of 1 in 16 and 1 in 20 which shall be 55 m and 65 m long respectively.

3.4 The equipment machine shall be capable of completing the following operations in a single traffic block (refer sketch at ANNEXURE –1/III)

a) Machine approaching the old turnout (G) from the side position near (A) or Longitudinally from position near (BD) or from some parking position in the yard in case of rail mounted machines by Lateral shifting and by moving On track.

b) Picking up of the complete assembly of old turnout (G) and its transportation and deposition at Position near (A) or (B) depending on site conditions. It may be noted that position near (A) may not necessarily be right opposite the old turnout and therefore the old turnout may be required to be moved both longitudinally and laterally or else it may have to be steered to Position near (A') or (B) at an angle other than right angle to the track.

c) Transfer of machines to the new turnout assembled at on position near (A) or (B) (C) or (D) and its lifting and transportation to the site of laying.

d) Laying of new turnout in place of old turnout.

e) Clearing of the site by the machines to position near (CA) or (DB) or some other position in the yard after laying of Points and crossing.

3.5 To perform the above function, the machine (with its units) should have following capability (Refer sketch at Annexure-1/III)

a. The machine and its units can be unloaded from Railway wagon in suitable siding line in Railway Yard and can be self propelled to position C and D with trolley without requiring any assistance of another power/Locomotive. This movement of machine should preferably be on Rail wheel on track so as not to infringe train movement on adjacent track and negotiating from one track to another over turnout which may be required for reaching position C and D is also comfortable.
b. It should be capable of shifting itself with all necessary units from track (C) & (D) to the position on ground at say position (A) and (B) which may be required for clearing occupied track or to shift itself on the fabricated panel placed at position A and B. The shifting facility and procedure should be simple and each set of unit being shifted should be stable by itself not requiring additional assistance of any auxiliary unit.

c. It should be capable of laterally shifting fabricated assembly from position on ground at say A or B to the nearby location for either directly laying the prefabricated panel or to load it over trolley placed on track there for shifting on track to some other position of laying.

d. It should be able to carry prefabricated turnout assembly over trolleys.

e. It should have arrangement for carrying longitudinally on crawler the fabricated assembly on prepared bed for final laying and adjustment.

f. The machine with its units should have the capability to self load and unload itself from the Indian Railways flat wagon as per para 3.17.

The manufacturer should clearly state how the above capability has been provided.

3.53.6 The supplier shall quote as part of the machine the following as applicable to his system.

a) Prime mover to help in the longitudinal transfer of the old or new turnout by the machine, if required.

b) Wagons for loading of machines during transfer from one station to another, (if required).

c) Facilities for lifting, loading and unloading on and from trolley & transfer laying of old or new turnout assembly during the process of changing, if required.

d) Facilities of loading and unloading of machine and its unit on Indian Railway wagon for transit from one station to another (Ref. clause 3.17). The Flat wagons used on IR are detailed in Annexure I/V, and total requirements of such wagons should not be more than two.

e) Any other unit required for performing the operations mentioned in clause 3.4 and for having capability mentioned at Clause 3.5.

3.7 Various types of units comprising the system shall be quoted and described individually and the total number of each type of units in the system shall be clearly stated. Break-up of the cost of each unit shall be given in foreign exchange and rupees for imported and indigenous contents respectively. The machine shall permit unrestricted movement of trains on the adjoining up tracks while replacing a turnout, in situations mentioned at clause 3.4.

3.6.3.8 As mentioned in para 3.6.5(c) above, the facilities for loading & transfer of old or new turnout may be provided in the shape of trolleys. There should be minimum four
numbers of trolleys to avoid sag in assembled turnout. The powering arrangement for movement of trolleys should be clearly stated. The trolleys should be motorized so that they are capable of lifting the assembled turnout by at least 30 cms, and at same time they should also be capable of slewing the lifted turnout by at least 30 cms in either direction (left or right).

3.7 Various types of units comprising the system shall be quoted and described individually and the total number of each type of units in the system shall be clearly stated. Break-up of the cost of each unit shall be given in foreign exchange and rupees for imported and indigenous contents respectively. The machine shall permit unrestricted movement of trains on the adjoining up tracks while replacing a turnout, as shown in Annexure I / III.

3.8 The machine shall also have the capability to change turnout on a Platformed line.

3.9 The workers at site shall not be required to work under a lifted turnout at any stage of the turnout changing operation.

3.10 Portal type unit of machines shall have at least preferably 2-4 legs or with rail wheels on each side and a Crawler for ensuring stability and safety. In machine units provided with Crawlers for movement on ground, Crawler is to move on continuous steel chains. To avoid any damage to the rails, sleepers and other track fittings, crawler chains should be covered with rubberized shoe plates rubber soles. It is desirable that the rubber soles are made / fitted in such a manner that the replacement / recoupment is possible during the service life of machine. Further during the service life of machine, replacements of rubber soles should be treated as a spare part for which the supplier has to ensure availability of rubber sole and its fitment on the steel chains (read with para13, as well).

3.11 During longitudinal transfer of the turnout on track, it may require to pass an OHEmast, a signal post or a wagon standing on another line, etc. The cycle of bypassingsuch an obstacle by laterally shifting the turnout by 1 m, then moving50 m in forward direction and again reverting back to the original position by lateral shift shall not take more than 6 minutes.

3.12 While working on platform lines, if the platform is to be used for machine working, the maximum pressure applied on platform surface by machine and its units supporting the prefabricated panel shall not exceed 3 kg /cm2.

3.13 The operations of traveling, lifting / lowering or lateral shifting shall not be sudden or jerky to avoid distortion of the turnout. During transport of the linked turnout, rails, sleepers and other track components are subjected to handling stresses so It is desirable that the mechanism of picking up and handling is smooth.

3.14 Operations of gripping / releasing of turnouts and lifting /lowering, traveling &, braking shall preferably be done from one operating panel for the purpose of better synchronization and reduced stresses on the turnout. In any case, if more than two operators and corresponding number of units have to perform traveling/ braking/ lifting / lowering / shifting operations, simultaneously, the machine shall have in-built system of synchronization of the motion of all units. Provision should exist for either synchronized working or the independent working of the machines by operation of switch inside the working cabins where applicable.
3.15 There shall be adequate safety arrangement to ensure proper locking of the lifted turnout to avoid any chance of falling of the same. It is desirable to maintain the lifted turnout in one horizontal plane, for this suitable arrangement and control systems may be provided on the machines.

3.16 The machine units which are not self-propelled for transfer from one station to another and are required to be loaded on Railway wagons for transfer, the, same shall be self loading / unloading type or else a crane or suitable equipment or arrangement required for loading / unloading of the machine units shall form, part of the system machine and be quoted by the tenderer accordingly. The loading/unloading equipment or arrangement shall also be self-loading / unloading type on flat top Railway wagons, for transfer along with the machine. The wagon floor ht may be taken same as in Clause 2.2. Also the loaded profile should not infringe the minimum and maximum moving dimensions enclosed at ANNEXURE I/I.

3.17 Sag in the turnout in lifted position during transit or during laying shall not be more than 20-50cms at any point for 52 / 60 kg rails turnout on concrete sleepers for 1 in 12. Calculation in support may be submitted. The lifting location and no of transportation trolleys may be increased if required to achieve the sag within the specified limits.

3.18 There shall be provision for longitudinal and lateral adjustments of the lifted turnout assembly up to for at least 20 cms in the machine unit lifting the assembly for accurate positioning at the time of final laying for proper butting of Stock Rail Joint and Back Leg of Crossing.

3.19 In the case of machines provided with sliding beams and tubes, there should be provision of lubrication/rollers on the metallic surfaces in contact with each other. The beam should be made to slide inside the tube with wear plates surrounding the beam in such a manner that, the beam's surfaces do not rub directly on the tubes insides. This will ensure that in case of wear due to metallic friction, neither the tube nor the beam is damaged and wear is borne by the especially designed wear plates. The wear plates should be fixed on the beam in such a manner that they can be replaced with ease.

3.20 The complete break-up of the cycle time in laying of one prefabricated assembly of 1 in 12 Turn out and clearing the site by machine for train operation over newly laid T/O in the situations given in Annexure 1/VI of one maximum lateral shift of the equipment in loaded condition with 1 in 12 concrete sleeper turnout shall be given by the tenderer in his description of the working of the machine. This will include steps involved in shifting of machine to position of fabricated panel, positioning itself for clamping, lifting, laterally shifting, longitudinal shifting, transportation, lowering, butting of Stock Rail Joint and releasing of the turnout and clearing the relayed point. The maximum lateral and longitudinal stroke assumed for the purpose shall also be specified.

3.21 Speed of longitudinal transfer of the machine while carrying a 1 in 12 concrete sleeper turnout shall be furnished.

3.22 The supplier should get acquainted himself with normal Indian Railway yard layouts and the types of terrain available in the Indian Railway yards. The machine should be able to work successfully in all the yards and the timings mentioned in para 3.20 & 3.21 & 3.22 above should take into account the realistic yard conditions.
3.23-3.24 The offer shall also submit separately the include a complete scheme of operations with timings to cover all the operations like machine approaching the old turnout, removing the old turnout, shifting the same to the location specified, placing it on ground, machine approaching the new turnout, picking it up, bringing of the new turnout to the site of laying, laying of new turnout and clearing of the site by the machines.

3.24 3.25 The holding and lifting (which is normally by clamping on rail) of turnout assembly by machine during lateral shifting, longitudinal shifting, transportation & final laying should be rigid enough so as to not normally take reaction from sleeper at any time which may disturb the original position of sleeper on assembled turnout. All units involved in the process should also be synchronized.

4.0 DIESEL ENGINE

4.1 The machine and its unit shall be powered by diesel engine preferably indigenous, with proven record of service in tropical countries, robust construction and low maintenance cost are of particular importance. Adequate allowance shall be made for de-rating of diesel engine under the most adverse climatic conditions mentioned in this specification elsewhere.

4.2 The supplier shall furnish the details of diesel engine and its controls to assess its conformity with the engines already operating on track machines on Indian Railways. The engine should be one of such designs/brand which are being manufactured indigenously and/or such designs, whose after sales servicing facilities are available in India.

4.3 High-speed diesel oil to Indian Standard Specification shall be normally used. Minimum fuel capacities sufficient for continuous operation of each unit of machine for 8 hrs will be desirable.

4.4 Sight glass type fuel measuring gauge preferably of full height shall be provided on the fuel tank.

4.5 For starting the engine, storage batteries of well known make shall be provided. The engine shall normally be push/pull button start type or key type.

4.6 Since the engine is to work outdoor under extreme dusty conditions, the air intake system shall be designed suitably so as not to allow dust through air intake system.

4.7 There is a likelihood of dust deposition over the engine body and surrounding area over the lubricants spill over. These should be easy to access for daily cleaning and routine maintenance. In case, air cooled engines are proposed by the supplier, maintenance equipment for cleaning and maintenance of the air cooling fins shall be provided by the supplier along with the machine.

4.8 The engine parameter monitoring gauges like temperature, rpm, and lub. Oil pressure shall be direct reading type mounted on the engine backed up by electrical/mechanical gauges in the operator’s cabin wherever available showing the absolute readings along with safe limits suitably coloured. There shall be audio visual warning (safety mechanism) to the operators in case of any of the parameters exceeding the safe limit, and engine shut down circuit in case of operator’s failure to respond.
4.9 Suitable and rugged mechanism should be provided to start the prime mover at no load and gradual loading after the start of the prime mover.

4.10 The engine power take off shall be coupled to the main gear box through a flexible coupling. The engine shall be mounted on suitable Anti Vibration Mountings.

5.0 COOLING SYSTEM

5.1 The cooling system shall be efficient and designed for a maximum ambient temperature of 55°C. Supplier may note that the machine shall be working under extreme dusty conditions and the cooling mechanism should be maintainable under these conditions. Adequate heat transfer arrangement shall be provided so that under extreme heat conditions as mentioned in para2.7 above, the system oil temperature does not go beyond 85 degree centigrade specified range of the engine.

6.0 BRAKES

6.1 Hydraulic/pneumatic brakes shall be provided. The brakes provided for the different operations shall be protected from ingress of water, grease, oil or other substances which may have an adverse effect on the brake. The brake lining shall be suitable for high ambient temperature of 55 0C. The force required for operating the brakes shall not exceed 10 kg at the handle while applying by hand and 20 kg on the pedal when applied by foot. In addition, mechanical brakes shall also be provided for use in an eventually of failure ofmain brakes as well as for parking purposes.

7.0 HORN, HOOTER AND SAFETY SWITCHES

7.1 The equipment machine units capable of independent movement shall be provided with electric/pneumatic horns/hooters facing outwards at each end of the machine at suitable location. The horns shall be distinctly audible from a distance of at-least 400200 m from the machine unit. The horns/hooters shall be operated by means of push buttons provided in the cabs operating panel and also outside the machine body at appropriate locations on both sides. Where ever feasible adequate numbers of safety stop switches should be provided all around in the body of machine unit so that in case of any danger to worker during working, the working can be stopped immediately.

7.2 Machine shall be provided with emergency backup system to wind up the machine in the event of failure of prime mover or power transmission system of the machine.

7.3 One Pneumatically/electrically operated hooter capable of producing intensity of sound between 105-110 dB at a distance of 5 meter (when measured in still air in a closed room) and with variation in intensity of sound not be more than 5 dB shall be provided as a unit with the machine. The hooter shall fixed in one of the main unit facing outwards at suitable locations, operated by means of push buttons provided in the operating panel to warn the staff working on/around the machine about approaching train on adjoining track. Additionally switches for such hooter shall be provided outside on the main machine unit frame so that it can be operated by staff present at work site near the machine unit. The hooter shall also be operatable from remote point at a distance of at least 300 m from the hooter.
8.0 ELECTRIC EQUIPMENT AND LIGHTING

8.1 The electrical equipment to be provided shall conform to relevant standard specifications and shall be suitable for Indian climatic conditions. The machine units capable of independent movement shall be equipped with head light at each end and with two front and rear parking lights, which can be switched on to red or white according to the direction of the travel. Powerful swiveling floodlights shall also be provided in main working units to illuminate the working area sufficiently bright for efficient working during night.

9.0 STRUCTURAL FRAME

9.1 The body framework shall be of standard welded steel sections and of steel sheets, so as to permit transportation of the machine, properly secured on a wagon.

10.0 CABINS

10.1 Where ever operators panel are provided in cabins, the cabin of that machine unit The machine shall be equipped with fully enclosed cabins with safety glass windows wherever applicable. In view of the high ambient temperature prevailing in India, special attention should be paid to free circulation of air and ventilation in the driver’s cabin. It shall be possible to have a clear view of the track ahead while driving/working the machine in either direction.

10.2 The gauge, instruments and controls shall be suitably located in the operator’s panel cab so that they can be observed without undue fatigue to the operator. One screen wiper preferably operated by compressed air/Electrically shall be provided on the front window of cabin where ever applicable.

10.3 One fire extinguisher (dry chemical type) should be provided in the cabin where available.

10.4 The machine shall be provided with adequate space for keeping the tools and spares required for on-site repair of the machine to attend the breakdowns and other working requirements.

11.0 TOOLS & INSTRUCTION MANUALS

11.1 Each machine shall be supplied with a complete kit of tools required by the operator in emergency and for normal working of the machine. The list of tools to be provided shall include all tools necessary for maintenance and repair of the entire machine including specialized equipment, all special tools shall be listed and catalogued illustrating the method of application. The tenderer shall along with his offer submit the list of tools to be supplied along with each machine. The list can be modified to suit the purchaser’s requirement, while examining the offer.

11.2 Detailed operating manual, maintenance and service manual, service and repair instructions shall be specially prepared in English language and Five four hard copies & soft copies of each of the same shall be supplied with each machine.
11.3 List of equipment / required for purposes of training the Railway Maintenance, Operations and Executive Staff, shall be supplied.

11.4 The manufacturer shall also supply circuit diagrams of electrical, hydraulic, pneumatic and electronic circuits used on the machine and its unit. Trouble shooting diagram/table shall also be supplied. In addition, the tenderer shall provide dimension and drawings with material description of items like rubber seals, washers, springs, bushes, metallic pins, etc. These shall be specially prepared in English language and four copies of these shall be provided with each machine.

11.5 While offering the machine for first inspection, the supplier shall submit one copy of complete technical literature in English language including operation, service and maintenance manual/instructions and complete electrical, electronic hydraulic & pneumatic circuit diagrams, trouble shooting charts, component drawings/ description and other relevant technical details as reference document for the inspecting officer.

11.6 A draft copy of all documents to be supplied with the machine should be sent 3 months in advance of inspection of the first machine to RDSO for their review regarding adequacy and manner of detailing. Necessary modifications and further detailing as per RDSO’s comments should be carried out and compliance should be reported to RDSO as well as the Inspecting officer of the first machine.

11.7 One set of all the manuals and diagrams should also be sent to the Principal/IRTMTC, Allahabad, one set to ED/TMM, RDSO, Lucknow, one set to DTK (MC)/Railway Board and one set to Director/IRICEN/Pune along with supply of first machine of similar group. In case, there is any subsequent amendment in above documents based on field performance, the amendment/amended documents should also be sent to above mentioned authorities.

11.8 One portable diesel operated D.C. welding plant (with the provision of auxiliary output of minimum 2.5 KW, 230 V AC for lighting) of reputed make (preferably made in India) with a minimum 5 KVA capacity capable of welding upto 5 mm. electrode (dia) at 60% duty cycle shall be supplied. Sufficient cable or lead shall be provided with the welding plant for day to day repairing of machine and its wearing parts. The diesel tank capacity shall be not less than 10 liters.

12.0 SPARE PARTS

12.1 should be advised along with their condemning limits The tenderer should quote, apart from main equipment, separately for the mandatory spares as well as for recommended spares required for two years of operation along with description, part number, quantity, cost, whether imported or indigenous. The expected life of the components /spare parts. The machines shall be supplied with necessary spare parts for the operation and maintenance of the machine for a period of two years or 2000 hours of working whichever is earlier. The spare parts required shall be detailed in a separate list indicating description, part number, quantity and whether, imported or indigenous. The manufacturer shall be responsible for the subsequent availability of spare parts to ensure trouble free service for the life of the machine (15 years). For indigenous parts, and bought out components and assemblies the source (original equipment manufacturers reference and part number) and other technical details shall be supplied while offering the first machine for inspection.
13.0 **MAKER'S TEST CERTIFICATE**

13.1 Copies of Maker's certificate, guaranteeing the performance of the machines shall be supplied in duplicate along with the delivery of each machine.

14.0 **OPERATORS**

14.1 The number of operators and allied staff for working of the machines under normal condition shall be indicated, specifying their duties and minimum qualifications.

15.0 **Optional Equipment:**

Tenderer is expected to quote for optional equipment separately for each item giving the advantages/functions of such optional equipment. Tenderer shall also indicate whether such equipments are already in use on machines elsewhere indicating the user Railway system.

16.0 **Warranty:**

In addition to the special conditions of contract dealing with warranty, the following will apply.

The machine shall be warranted for 1200 effective working hours or 18 months from date of commissioning and proving test of equipment or 24 months from date of delivery at ultimate destination in India whichever shall be earlier. Effective working hours for this purpose will be traffic block time during which machine is deployed for work. Should any design modification be made in any part of the equipment offered, the warranty period of 18 months would commence from the commissioning and proving test of equipment for the purpose of that part and those parts which may get damaged due to defects in the new replaced part. The cost of such modification should be borne by the supplier.

17.0 **INSPECTION OF THE MACHINE**

17.1 While inspecting the machine before dispatch from the supplier's premises, the inspecting officer shall verify the conformity of the machine with respect to individual specification as above. The machine's conformity/non-conformity with respect to each item shall be jointly recorded before issue of the inspection certificate and approval for dispatch of the machine as per Annexure-IV enclosed.

17.2 Following arrangements shall be made by the supplier/Manufacturer at the inspection premises for carrying out inspection of the machine by inspecting officials:

- Machine units to be stabled on straight & level BG track. The length of the track should be at least 10 m more than buffer to buffer length of machine.
- In order to check Maximum Moving dimensions in cross section, a Sturdy frame of IR Max Moving Dimensions shall be provided by the manufacturer and passed over the machine units (loaded on wagon or raised to the floor ht of wagon) holding it perpendicular to track, centre aligned with track centre. Adequate arrangements shall be made to the satisfaction of inspecting official
17.3 The following documents shall be provided to the Inspecting Officer at least 4 weeks in advance of the date of inspection.

i) One copy of complete technical literature mentioned in clause 11, in English language, including operation, service and field maintenance manuals/instructions and complete electrical, hydraulic and pneumatic circuit diagrams, trouble shooting charts, component drawings/description and other relevant technical details as a reference documents for the inspecting officer.

ii) Cross section of the machine units (both on track and loaded on wagon) super imposed on IR maximum moving dimensions envelope shall be provided to IO in advance.

iii) Clause by clause comments of the manufacturer to be sent to Inspecting Officer (IO) in advance for his review. Comments should state manufacturer’s conformity of compliance of each of the requirement stated in each clause, elaborating where necessary the details/manner in which the requirement has been complied. The proforma for the clause-wise comments is given below:

<table>
<thead>
<tr>
<th>Clause</th>
<th>Clause no.</th>
<th>Comments of Supplier/manufacturer</th>
<th>Comments of Inspecting Officer</th>
</tr>
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iv) Manufacturer’s Internal Quality Inspection Report of the machine.

v) Manufacturer’s quality certificate and/or test reports for bought out assemblies/sub-assemblies to be provided to IO, containing serial number wherever applicable.

vi) Draft Inspection Report to be prepared by the manufacturer, containing all annexure mentioned at para 17.4

vii) Details of arrangements made for checking Maximum Moving Dimensions for his approval.

Supplier will incorporate amendments/further clarification in the above documents to the satisfaction of the Inspecting Officer keeping in view the Inspecting Officer’s comments, if any.

17.4 List of documents to be annexed in the draft Inspection Report should include:

i. Maker’s Test Certificate.
ii. Manufacturer’s Internal Quality Inspection Report
iii. Quality Certificates of Bought out assemblies/sub-assemblies
iv. Cross section of the machine units when on track and when loaded on wagon super imposed on the IR MMD
v. List of spare parts to be dispatched along with the machine
vi. List of tools to be dispatched along with the machine
vii. List of Manuals, Drawings, Spare Parts Catalogues, etc. to be dispatched along with the machine, duly indicating the number of sets of each.
These above documents shall be part of final inspection report

16.018.0 ACCEPTANCE TESTS

In addition to verification of the various items of specifications covered earlier, the following tests shall be carried out in India at the Purchaser’s premises by the Purchaser’s nominee at the time of commissioning of the machine.

16.118.1 Dimensional check of loading gauge i.e. maximum moving dimensions, clearance with machine units on track and on wagons wherever applicable etc.

16.218.2 Testing for negotiability of machine units capable of moving on track of 10 curve and on 1 in 8 1/2 turnout where ever applicable, on the first machine.

16.318.3 Stability test of machine loaded on carrier vehicle Indian Railway Flat wagon being pulled by power. Any arrangement to be made on first flat wagon for fixing the machine properly be done by the supplier.

16.418.4 Construction and engineering of the machine.

16.518.5 Actual output and performance quality test:

These tests shall consist of the use of machine under field conditions in India. The machine shall be operated by the trained personnel of the purchaser or the operators provided by the supplier. The following operations will be conducted. (refer sketch at Annexure 1/III)

a) The time taken in laying preassembled assembly from position (A) by lateral shifting to position (G) with proper alignment and butting of stock rail joint and back leg of crossing, taking initial position when machine units are in complete readiness with fabricated assembly should not be more than one and half hour. The laying to be done primarily be lateral shifting without using transportation trolley to prepared bed at G prepared beforehand. The above requires lateral shifting of minimum 6 m and longitudinal shifting minimum 2 m. The time of one and half hour to include clearing of laid assembly by machine units for permitting movement of train over the laid assembly.

b) The time taken in laying pre fabricated assembly (B) by shifting the assembly on trolley to Position (G) with proper alignment and butting of stock rail joint and back leg of crossing taking initial position when machine units are in complete readiness with fabricated assembly for loading on trolley placed in the siding line should not be more than one and half hour. The laying would primarily be by longitudinally shifting the assembly to the prepared bed at (G) prepared beforehand. The above requires longitudinal movement upto 700 mt. The time of one and half hour to include clearing laid assembly by machine units for permitting movement of train over the laid assembly.

a) Replacement of 1/12 Old turnout on steel / wooden sleepers in track by a 1/12 concrete sleeper turnout and covering all the operations described in para 3.4. The machine shall be able to complete the entire job of changing the turnout, covering all operation from the starting of the machine from position A/A’ to the clearing of the track by the machine, in gross traffic block of 1 1/2 hr. This shall also include the time required for any setting of machine for various functions.
b) during the entire operation of changing of the turnout. For this test, the machine shall be initially placed in position A or A’ and the old turnout shall be removed to position D. The new turnout shall be assembled at position C which may be up to 50 m out longitudinally from old turnout. Stoppages of work not attributable to machine or on account of obstacles shall be discounted.

c) Test of machine capability as per Item 3.11.5

d) Self loading/unloading of machine on wagons or loading by another equipment in accordance with para 3.167 including self loading of the equipment itself.

17.0 19.0 Should any modifications be found necessary as a result of the tests, these shall be carried out by the supplier at his own expenses.

20.0 TRAINING AND SERVICE ENGINEERS:

20.1 The supplier shall provide at his own expense the services of competent engineers during the warrantee period for warrantee related issues. The service engineers shall be available for the commissioning of the machine for regular service. E-Learning courses module should be arranged for imparting training to railway operators. In addition the service engineer shall provide hands on training to railway staff in calibration, operation, repairing and maintenance of the machine in field to make them fully conversant with the machine. The engineers shall also advise the Railways on appropriate maintenance, testing, operating, repair and staff training facilities that are necessary for the efficient performance of the machines.

21.0 MARKING & COLOUR OF MACHINE:

21.1 The machine body shall be painted in golden yellow colour of Indian Standard Colour code of 356 as per IS:5. The exterior painting shall be polyurethane binder based conforming to RDSO Specification No. M&C/PCN/100/2013 (Specification for Epoxy cum Polyurethane Painting System – Two packs for the Exterior Painting of Railway Coaches, Diesel and Electric Locomotives and other Industrial Applications) or ISO 12944.

21.2 Following should be written in black on the machine at appropriate location in English & Hindi as per direction of Indian Railway official

i) India Railways logo of suitable height in different machine units at prominent locations.

ii) “INDIAN RAILWAYS” to be written in Bold and in Black colour of appropriate size for clear visibility at prominent location on different units of machine.

iii) Manufacturers Name and Machine model and manufacturing Year should be written in black colour and in letter of size less than the size in which Indian Railways is written and at suitable locations.

****
NOTE:
ALL DIMENSIONS ARE IN MILLIMETRES EXCEPT WHERE OTHERWISE SHOWN.

RAIL

3735 MAX

1082

2653

MAXIMUM MOVING DIMENSIONS

4265 MAX

1676mm GAUGE

DIAGRAM No. 1D (EDOT-2202)

2440 MAX

3050 MAX

102 MIN

305 MIN

LEVEL

3850 MAX
Approximate weight of sub-assemblies of 1 in 12 turnout with 10125 ordinary curved switch and built up crossing BG 60 kg. UIC on concrete sleepers.

<table>
<thead>
<tr>
<th>Sub-Assembly</th>
<th>Approx. Panel length (M)</th>
<th>Approx. Weight (t)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch Portion</td>
<td>15</td>
<td>15.5</td>
<td>Sleeper Nos. 1 to 27</td>
</tr>
<tr>
<td>Intermediate Portion</td>
<td>2.0</td>
<td>23.0</td>
<td>Sleeper Nos. 28 to 63</td>
</tr>
<tr>
<td>Crossing Portion</td>
<td>11</td>
<td>19.0</td>
<td>Sleeper Nos. 64 to 83</td>
</tr>
<tr>
<td>Total length &amp; wt</td>
<td>46</td>
<td>57.5</td>
<td>Sleeper Nos. 1 to 83</td>
</tr>
</tbody>
</table>
ANNEXURE I / IV

INSPECTION CERTIFICATE OF INSPECTION OF TRACK MACHINE ( ) BY INSPECTING OFFICIAL AND APPROVAL FOR DESPATCH OF MACHINES (STRIKE OUT WHICHEVER NOT APPLICABLE)

This is to certify that I have inspected the machine type) _______________________________ bearing Sl.No. ________________ from (date) ____________ to _____________ at (Place) ________________ for its conformity/non-conformity with respect to the laid down Technical Specifications in contract Agreement No. ____________________________________ dated ______________________ between President of India through Director Track (Machines) and M/s. (Name of Supplier) ________________________________

The detailed Inspection Note regarding its conformity/non-conformity to the laid specifications is enclosed along with as Annexure’ A’. It is observed that (strike out whichever is not applicable):

- The Machine conforms to all the laid down specifications.
- The machine conforms to all the laid down specifications except those at Sl.No. _________________. The above deviations are minor/major affecting/not affecting the performance of the equipment in substantial way. The following T and P/manuals/drawings are to be supplied along with the machine:

__________________________
__________________________
__________________________

Based on the above, the Machine is certified/not certified to be conforming to the specifications:

The machine is approved/not approved for despatch to ________________________________ (Consignee) Indian Railway.

SIGNATURE AND DATE
INSPECTING OFFICIAL
(NAME AND DESIGNATION)
for and behalf of President of India

ANNEXURE I/V
1. ALL DIMENSIONS ARE IN MILLIMETRES
ANNEXURE-I/VI

TIME TAKEN IN LAYING 1 in 12 POINTS AND CROSSING

The complete break-up of the cycle time in laying of one prefabricated assembly of 1 in 12 Turn out and clearing the site by machine for train operation over newly laid T/O in the below two situation be given (reference Annexure 1/III):

Case –I: Machine (including all units) is at C and new prefabricated T/O assembly is at A. Existing laid assembly G is to be shifted to cess close to Band then new assembly at A is to be laid in its place. The prefabricated panel is at a distance of around 6m or more from the siding line on which machine is positioned initially. Also the new assembly at A is not in the complete lateral alignment of existing T/O G and is required to be shifted by not less than 2 m towards Stock Rail Joint for laying at required position.

The breakup of time to be given activity wise as given below which may further be broken into sub activities involved where felt necessary.

- Shifting of machine from C to the existing T/O assembly at G and removal of T/O assemble to cess.
- Further shifting of machine to new fabricated T/O at A.
- Shifting and Laying of the new T/O assembly at the position G by lateral shifting without use of trolley including longitudinal adjustment of minimum 2 m required.
- Clearing of site by machine back to position C by lateral shifting or by movement on track as comfortable taking minimum time.

Brief on how these activities will be performed should also be given

Case-II: Machine (including all units) is at Don siding line and prefabricated T/O assembly is at B close to the siding line. Laying to be done at G where existing points and crossing is dismantled and bed is prepared beforehand. The net longitudinal movement is 700 m.

The breakup of time to be given activity wise as given below which may further be broken into sub activities involved where felt necessary

- Shifting of Machine from C to over assembled T/O at B and Shifting the assembly on trolley on siding line.
- Time in transit of the assembled T/O on trolley to the site of laying.
- Time in activities involved in actual laying and correct placement of new T/o.
- Time in clearing the site by machine to position C by lateral shifting or by movement on track as comfortable taking minimum time.