



CBTU

Companhia Brasileira de Trens Urbanos

Administração Central

REFERENCE TERM

(01-2024/GEENG/GAESP/DT)

PURCHASE OF TR-45 RAILS

GENERAL MANAGEMENT OF STUDIES AND PROJECTS - GAESP

TECHNICAL DIRECTORATE





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TERM OF REFERENCE

1. NEED IDENTIFICATION

- 1.1 The CBTU (Companhia Brasileira de Trens Urbanos) has executive projects for the recovery/renovation and expansion of its passenger train systems in Natal, João Pessoa, Recife, and Maceió. The projects aim to transform the existing systems into structuring mobility solutions for their respective urban regions, making them more efficient and reliable, thus enabling the utilization of their medium/high-capacity transportation potential.
- 1.2 In the system recovery, the replacement of the rails is essential to ensure passenger safety and ensure the durability of the rolling stock.

2. OBJECT DEFINITION

- 2.1. This Terms of Reference, referred to as TR, aims to acquire 3,034.08 tons of TR-45 Rails (with a nominal mass of 44.64 kg/m), new, manufactured, and tested in accordance with ABNT NBR 7590:2012. The chemical composition, strength limit, and elongation must comply with the quality of Type 3A steel, and the STANDARD established in the AREMA Standard may be accepted.
- 2.2. The object is intended for the Urban Train systems of Natal, João Pessoa, Recife, and Maceió of the Brazilian Urban Train Company – CBTU, and the acquisition must be made through the Price Registration System (SRP)."
- 2.3. As per item 10 of Preliminary Technical Study No. 001-2024/GAPRO/DT, and considering the nature of the intended contract, the object can be characterized as a COMMON GOOD, as per Article 113 of RILC-CBTU, combined with Article 3, Section II, of Decree No. 10,024/2019.
- 2.4. The Price Registration System (PRS) will be adopted as per Article 181 of the Internal Procurement and Contracting Regulation of the Brazilian Urban Trains Company (CBTU - RILC), since this contract falls under the following circumstances: I - when the characteristics of the goods or services require frequent contracting; II - when it is convenient to acquire goods with provisions for phased deliveries or to contract services paid per unit of measurement or on a task basis; and III - when it is convenient to acquire goods or contract services to serve more than one area or Administrative Unit of CBTU. The validity period of the Price Registration Record shall not exceed 12 months, including any extensions, in accordance with Article 189 of the RILC.



3. JUSTIFICATION FOR PROCUREMENT

- 3.1. Maintaining available rails for use in their respective Superintendencies, meaning having the purchased and delivered rails, is a crucial factor for contracting recovery and expansion works. This is because the process of acquiring rails requires a lengthy period of time. Acquiring rails after the works on the track have been contracted could lead to undesirable delays and stoppages.
- 3.2. Despite financial difficulties, actions continue to be executed to keep the system operational with a minimum level of safety. However, they do not fully meet the requirements for important and necessary actions for the complete recovery of the systems.
- 3.3. Rails experience wear and tear over time. Wear and tear result from the mechanical interaction between the wheel and the rail, which do not possess the same hardness.
- 3.4. The speed at which wear and tear occurs depends on the curvature radius of the tracks and the weight of the load carried by the vehicles. There is a variable called specific wear, which is the ratio between the consumed area of the rail head and the gross area of its cross-section. The established limit for wear and tear is 25% of the total area of the rail head's cross-section.
- 3.5. The key factors influencing the durability of the rails can be outlined as follows:
 - 3.5.1. Traffic intensity;
 - 3.5.2. Weight in tons per axle of the rolling stock;
 - 3.5.3. Permanent way geometry (curve radii, gradients, and other geometric elements);
 - 3.5.4. Maintenance conditions of the permanent way (track condition, unevenness, misalignment, and maintenance frequency).
- 3.6. Within the CBTU rail lines, there are systems with rails that were installed about 30 years ago and show excessive wear and indications for replacement. It is also evident that the inadequate condition of the permanent way results in reduced rail lifespan, increased wear and tear of the rolling stock, increased wear and tear of systems directly connected to the superstructure, reduced rolling stock speed, and decreased operational production.
- 3.7. According to PIM01-DNIT, the rail constitutes the main element of the permanent way structure and must fulfill the following purposes:
 - 3.7.1. Directly resist the stresses it receives from the train and transmit them to the other elements composing the track structure (rail fastenings, support plate, sleeper, ballast, and sub-ballast).
 - 3.7.2. Guide the wheels of railway vehicles in their movement.
 - 3.7.3. Serve as a conductor for electric current for signaling and traction on electrified lines.
- 3.8. Part of the procurement aims to acquire rails for use in permanent way maintenance, involving the replacement of existing worn-out rails. Another portion of the rails will be used in the duplication and



expansion of certain sections, aiming for operational efficiency and railway traffic safety. Additionally, it is important to maintain a technical reserve of rails to meet the needs of preventive and corrective maintenance of permanent ways.

- 3.9. The quantities and justifications submitted by the STUs (Superintendencies) and presented in the table below have been analyzed. The quantity requested by STU/MAC has been adjusted.

REQUESTING STU	JUSTIFICATIONS/APPLICATIONS
NATAL	O The urban train system in Natal has the following main characteristics: an authorized maximum speed of 60 km/h, standard gauge, and a maximum gradient of 3%. The characteristic trains have a maximum load of 200 kN per axle. Based on calculations derived from the specifications of NBR 7590, the TR-45 rail is the most suitable for those conditions. As a result, approximately 50% of the STU/NAT rail network already consists of TR-45 rails. Furthermore, we have a stock of specific monobloc concrete sleepers for this profile. Therefore, for the purpose of standardization within the system, it is advisable to continue using this type of rail. Furthermore, the maintenance facilities of the CBTU/STU-NAT system does not have appropriate machinery for handling TR-57 rails. Due to their high linear density, TR-57 rails require robust equipment for installation and maintenance activities, specifically tampers, levelers, and aligners (such as Plasser & Theurer machines).
JOÃO PESSOA	Out of the total 30 km of track in the STU/JOP system, 9 km consists of TR45 rail. We need to replace the remaining 21 km, especially because the sleepers and fastenings have already been acquired.
RECIFE	The need to acquire TR-45 rails presented in this form aims to replace old TR-37 rails on the Diesel line of CBTU Recife. This line has a mix of TR-37 and TR-45 rails; however, the segments with TR-37 rails exhibit excessive corrugation and high vibration when light rail vehicles (LRVs) are in operation. As all the sleepers on the line are designed for TR-45 rails and this rail profile is already applied to a significant portion of the line, it is deemed appropriate to standardize the use of TR-45 rails throughout the Diesel line. The use of TR-57 rails will be reserved only for the Central and South lines (electric).
MACEIÓ	Remodeling project of the track for the implementation of the Light Rail Transit (VLT) in Maceió.



- 3.10. To establish a Technical Reserve of up to 10%, the expertise of the permanent way maintenance department and the challenge of procuring rails quickly for potential emergency maintenance were taken into account, considering that these rails are imported products.

4. SPECIFICATIONS OF THE OBJECT AND APPLICABLE STANDARDS

- 4.1. The Specifications and Service Instructions to guide the mentioned supply are indicated below, standardizing the presented proposals, thus allowing for a more thorough analysis of them.
- 4.2. The Contractor must fully adhere to the Permanent Way Service Specifications - EMVP/16 of CBTU, Annex V of this Reference Terms or obtained through the link: <https://www.cbtu.gov.br/index.php/pt/manutencao-metroferroviaria/especificacaomaterial>
- 4.3. The ABNT standards shall be observed when referenced in the EMVP/16 of CBTU, with the STANDARD established in the AREMA Standard being accepted.
- 4.4. The Safety Regulatory Standards - NR - currently in force in Brazil and Environmental Legislation (Law 6.938/81) must be complied with.
- 4.5. The Law No. 13.303/2016 and the Internal Regulations for Bidding and Contracting - RILC-CBTU must be observed.
- 4.6. Rails shall be supplied in 12-meter-long bars, as established in the EMVP/16.
- 4.7. Rails must be free of defects or cracks of any kind, and they must also be straight and uniformly sectioned throughout their length.
- 4.8. Rails must be marked according to ABNT NBR 7590:2012.
- 4.9. Rails can be ordered with or without holes, as previously requested by CBTU.
- 4.10. Rails must be handled with care to prevent damage during loading and unloading.
- 4.11. Rails can only be shipped out of the country after receiving the CERTIFICATE OF APPROVAL and after its acceptance by CBTU.
- 4.12. All services and material supplies must be carried out in accordance with Brazilian Technical Standards (ABNT), requirements, specifications, and service instructions outlined in this Reference Term.

5. PRICE ESTIMATE

- 5.1. The total estimated cost for the acquisition, considering the price from the SICRO reference table - January/2024, in their respective regions, is presented in the table below:



DESCRIPTION			
New railway rail type TR-45, Quality 3A, in 12-meter bars, in accordance with the Reference Term and complying with EMVP 16 and the ABNT NBR 7590/2012 standard.			
STU	QUANTITY (tons)	UNIT PRICE (R\$)	TOTAL PRICE (R\$)
ITEM 1 – NATAL- RN	1150.31	R\$ 15,490.42	R\$ 17,818,785.03
ITEM 2 – JOÃO PESSOA - PB	939.53	R\$ 15,455.22	R\$ 14,520,642.85
ITEM 3 – RECIFE - PE	456.77	R\$ 15,433.20	R\$ 7,049,422.76
ITEM 4 – MACEIÓ - AL	487.47	R\$ 15,392.23	R\$ 7,503,250.36
		TOTAL	R\$ 46,892,101.00

6. RESPONSIBILITIES OF THE PARTIES

6.1. OBLIGATIONS OF THE CONTRACTED PARTY

- 6.1.1 No changes can be made by the CONTRACTOR to the terms and units adopted in this document, under the allegation of insufficient data or information about the supply and transport services, loading and unloading of materials, stacking, as well as the conditions existing at the delivery locations.
- 6.1.2 The CONTRACTOR must fulfill all obligations set out in the TR, its annexes, and its proposal, assuming as exclusively their own the risks and expenses arising from the proper and perfect delivery of the object.
- 6.1.3 Execute the delivery of the object in perfect condition, according to the specifications, schedule, and location specified in this RT and in the proposal accepted by CBTU, accompanied by the respective invoice, in which indications regarding: brand, manufacturer, model, origin, expiration date, as well as warranty, shall be stated.
- 6.1.4 Take responsibility for defects and damages resulting from the object, in accordance with articles 12, 13, and 17 to 27 of the Consumer Protection Code (Law No. 8.078, 1990) and Article 76 of Law No. 13.303, 2016.
- 6.1.5 Replace, repair, or correct, at their own expense, within the period specified in this TR or as otherwise agreed with the management and oversight of the Contract, any object with damages or defects.
- 6.1.6 Notify the CONTRACTING PARTY in writing, within a maximum of 24 (twenty-four) hours preceding the delivery date, of the reasons preventing compliance with the stipulated deadline, providing evidence of the impossibility.
- 6.1.7 Maintain, throughout the supply of the object and in compatibility with the assumed obligations, all the qualification, proposal, and qualification conditions.



- 6.1.8 Provide the object of this contract within the best quality standards following the specifications contained in this RT and the regulations applied to the manufacturing of the object under the Contract Instrument.
- 6.1.9 Address the observations and complaints of the CONTRACTING PARTY's inspection regarding the supply and execution of the object.
- 6.1.10 Be responsible for compliance with all Federal, State, and Municipal laws and regulations, as well as regulations, standards, instructions, and guidelines applicable and necessary for its operation as a company, in addition to obtaining all licenses, permits, and authorizations directly or indirectly related to the contracted supply and the exercise of its activities in the jurisdictions where they occur.
- 6.1.11 All Contract expenses, Insurance (including exchange rate variation), Social Laws, Social Security (INSS), and others that apply to the supply, equipment, and personnel will be the sole responsibility of the Contracted Company.
- 6.1.12 The Contracted Company shall be solely responsible for compensations for any work-related accidents resulting from the execution of the contracted services or any force majeure. They shall also be responsible for the potential destruction or damage by third parties to the services performed, until their final acceptance, as well as any compensation owed to third parties for facts arising from the contracted services, even if they occur in public spaces.
- 6.1.13 Hiring of a Certification Company:
 - 6.1.13.1 The Contracted Company must bear the expenses of hiring a Certification Company, previously approved by CBTU, which will oversee the entire process of service execution from start to finish, having free access to any documentation related to these services and manufacturer's facilities.
 - 6.1.13.2 Within 10 calendar days after the contract is signed, the CONTRACTOR must present the Certification Company, which must have international scope, to verify the rails.
 - 6.1.13.3 The Certification Company will be evaluated for approval by CBTU, and for this purpose, must provide certificates that prove that the institution has certified similar objects to the object of this contract, i.e., certification of tests for the supply of rails for metro and railway use.
 - 6.1.13.4 After CBTU issues the Purchase Order, proof of the chosen Certification Company's hiring must be presented within five business days.
 - 6.1.13.5 The Certification Company will present the results of tests conducted on the first batch of rails for analysis and approval by CBTU. If this batch fails, the Contractor must provide a schedule on execution of another batch, which must be agreed upon by CBTU, for a new evaluation.



- 6.1.13.6 The recurrence of the refusal of the second batch will result in termination of the contract by CBTU.
- 6.1.13.7 The Certification Company must oversee the testing of all production batches of rails. Reports must be presented in both English and Portuguese. If any batch is rejected, the Contractor must submit another batch for testing in replacement of the rejected batch. 6.1.14 Any errors/mistakes in the proposal dimensioning will be the sole responsibility of the CONTRACTOR.
- 6.1.14 Any errors/mistakes in the proposal dimensioning will be the sole responsibility of the CONTRACTED COMPANY.
- 6.1.15 CBTU will not be liable for any commitments made by the CONTRACTOR with third parties, even if related to the execution of the object of this RT, as well as for any damage caused to third parties as a result of an act of the CONTRACTED COMPANY, its employees, agents, or subordinates.
- 6.1.16 Throughout the entire execution of the Contract, the CONTRACTOR commits to fully observe the provisions set forth in the Code of Ethics, the Code of Conduct and Integrity, and the Related Party Transactions Policy, all developed by CBTU.
- 6.1.17 For the purpose of complying with the aforementioned rule, the documents referred to in the previous item are available at the following web addresses, and the CONTRACTOR is also entitled to formally request copies of the same from the Contract Manager:
- Code of Ethics:
<https://www.cbtu.gov.br/images/home/acbtu/codigodeeticacbtu190918.pdf>;
 - Code of Conduct and Integrity:
https://www.cbtu.gov.br/images/gagov/codigo_de_conduta_e_integridade.pdf;
 - Related Party Transactions Policy:
https://www.cbtu.gov.br/images/gagov/politica_de_transacoes_com_partes_relacionadas.pdf.
- 6.1.18 All fees, taxes, and duties that should be part of the final price of the object of this Bidding must be included in the proposed prices.
- 6.1.19 The CONTRACTOR must comply with the items regarding the contractor's obligations as stated in the Bid Document.

6.2. CONTRACTING PARTY'S OBLIGATIONS

- 6.2.1 Exercise comprehensive oversight during the supply process, with the same or any authorized representative having access to the facilities of the CONTRACTED PARTY at any time.
- 6.2.2 Supervise the contract execution as per specifications and notify the CONTRACTED PARTY of any irregularities found in the manufacturing, transportation, and delivery of the materials.



- 6.2.3 Through its representative (CBTU INSPECTOR and CBTU MANAGER), oversee and monitor the execution of this Contract, documenting identified deficiencies in a proper record and communicating to the CONTRACTED PARTY any occurrences and any matters that, in its judgment, require corrective measures from the CONTRACTED PARTY.
- 6.2.4 Promptly request the CONTRACTED PARTY and its representatives to take all necessary measures for the smooth progress of the services.
- 6.2.5 Communicate in writing to the CONTRACTED PARTY regarding imperfections, faults, or irregularities observed in the provided object and/or services rendered, for them to be replaced, repaired, and/or corrected.
- 6.2.6 Make payments to the CONTRACTED PARTY in the corresponding amount for the supply of the object in this agreement, within the deadlines and forms established in this RT and its annexes.
- 6.2.7 Provide pertinent information and clarifications as requested by the employees of the CONTRACTED PARTY or its representatives.
- 6.2.8 Always communicate in writing and in a timely manner to the CONTRACTED PARTY any instructions and/or procedures to be adopted regarding the contracted object.
 - The CONTRACTING PARTY must promptly inform the CONTRACTED PARTY of any changes related to the delivery address.
- 6.2.9 Apply appropriate contractual and legal penalties to the CONTRACTED PARTY through administrative procedures, ensuring the right to a fair hearing and due process. Administrative sanctions applied after regular administrative proceedings, as a result of acts carried out during the external phase of the bidding or in the execution of the contract, are provided for in the Bidding Notice and in the Contractual Instrument, also observing the legal and regulatory provisions.
- 6.2.10 The CONTRACTING PARTY must approve the Certifying Body presented by the CONTRACTED PARTY.
- 6.2.11 Archive, among other documents, projects, "as built" records, technical specifications, budgets, acceptance terms, contracts and amendments, technical inspection reports after receiving the object of this contract.
- 6.2.12 Issue the respective Closure Certificate after the conclusion of the Contract, provided there are no outstanding physical and/or financial matters in the Contract, arranging for the proper signature by the contracting parties, in accordance with CBTU's internal regulations.

7. PHYSICAL SUPPLY SCHEDULE

7.1. The physical supply schedule related to this contract is detailed in ANNEX III of this RT.

8. ACCEPTANCE CONDITIONS AND ACCEPTANCE OF THE OBJECT

- 8.1. The release for rail shipment will take place after the execution of all verifications, tests, and counter-tests under the supervision of the Certifying Body, and upon acceptance and approval of the shipment release by CBTU's inspection.
- 8.2. The rails must be loaded and transported securely with metal plates for identification, ensuring they arrive at the delivery location in perfect condition. The Contractor may suggest, optionally, an alternative type of packaging, provided that the type of securing or packaging to be used is explicitly detailed in their proposal, so it can be analyzed and, if necessary, approved by CBTU.
- 8.3. The responsibility for loading, unloading, and stacking the material rests solely with the Contracted Party. The CBTU warehouse manager is responsible for verifying quantities and checking for possible damage incurred during loading, transportation, and/or unloading.
- 8.4. In the event of material damage, it may be refused by the receiving authority. A Material Non-Receipt Certificate will be issued on the spot, specifying the quantity and the reason for non-acceptance.
- 8.5. Final acceptance will only be granted after all necessary repairs and corrections required by the inspection have been completed, and upon issuance of CBTU's Definitive Acceptance Certificates. There will be no provisional or partial acceptance.
- 8.6. Quantities previously approved, supplied, and delivered at locations specified by the Inspection in each of the cities described in this Agreement will be measured and paid for, following certification of the quality and condition of the delivered rails, and issuance of the respective Definitive Acceptance Certificate for the consignment.
- 8.7. **Delivery Location:** The rails must be delivered to the locations designated by the Purchase Order issued by CBTU. The delivery addresses are listed in the table below.

UNIT	ADDRESS
STU Natal	Praça Augusto Severo, 302, Ribeira – Natal/RN. CEP: 59.012-380
STU João Pessoa	Pátio de Cabedelo – Rua Cleto Campelo, s/n, Centro, Cabedelo -PB. CEP: 58.100-130.
	Estação Jacaré - Rua Jair Cunha, s/n, Jacaré, Cabedelo /PB. CEP: 58.105-700.
	Estação Bayeux - Rua Gustavo Maciel Monteiro, 847-853, Centro, Bayeux /PB. CEP: 58.307-240.
STU Recife	Rua Curumirim s/n, Pontezinha, Cabo de Santo Agostinho - PE. CEP: 54.589-015
STU Maceió	Rua Barão de Anadia, 121, Centro – Maceió/AL. CEP: 57.020-630



8.8. Object Delivery Hours: Delivery can be made from 8:30 AM to 11:30 AM and from 1:30 PM to 4:00 PM, Monday to Friday, excluding holidays. For all locations, the CONTRACTOR must make prior contact with the contract management, with a minimum of 48 hours' notice, to schedule the delivery.

9. PROPOSAL EVALUATION CRITERIA

9.1. The criterion for selecting the winning proposal will be the HIGHEST DISCOUNT, provided that the proposal and its presentation meet all the requirements set forth in this RT and the Bid Document.

9.2. The total value of the proposal should include all direct and indirect expenses necessary for the complete execution of the contracted supplies, as well as administrative support costs, office expenses, social and labor law charges, insurances, fees, licenses, and taxes of any nature that apply or may apply to the Contract or its object. These are essential for the perfect execution and full development of the supplies, as well as the CONTRACTED PARTY's profit.

9.3. The proposal should be submitted on the company's letterhead and must compulsorily contain the following information:

- a) Company name (Legal Entity);
- b) Address;
- c) CNPJ (Brazilian Tax ID);
- d) Phone and/or email;
- e) Validity of the proposal for a minimum of 60 (sixty) days;
- f) Payment terms within 30 (thirty) days after invoice delivery;
- g) Shipping method (CIF);
- h) Execution period as per the schedule;
- i) Warranty period;
- j) Inclusive of taxes;
- k) Signature of the responsible person who prepared the proposal with CPF (Tax ID) and RG (Identification);
- l) Inclusion of Bank Details for payment.

9.4. The shipping method for the rails should be CIF (Cost, Insurance, and Freight), meaning the BIDDER is responsible for all costs and risks from pickup at the Superintendence to the return after service execution.

9.5. The proposal prices must be expressed in the national currency (Brazilian real) and adjustable according to item 14, including the values of IPI, ICMS, and other taxes that may be applicable to the final price.

9.6. BIDDERS located outside the states of Rio Grande do Norte, Paraíba, Pernambuco, and Alagoas should observe the prepayment of the Anticipated ICMS Differential Rate that applies to goods coming from other states (when applicable).



10. TECHNICAL QUALIFICATION

- 10.1. The bidder must present one or more certificate(s) and/or declaration(s) of operational technical capacity on official letterhead, signed by an individual at a level equivalent to Superintendent or Director or a position with administrative authority (manager, department head, division), issued in the name of the proposing company, by a public or private company, demonstrating aptitude for supplying relevant and compatible items in terms of characteristics, quantities, and deadlines with the object of this contract.
- 10.2. The certificate(s) must demonstrate, individually or collectively, the supply of TR-45 or TR-57 rails of 3A quality, with equivalent quality to the STANDART standard established in the AREMA Standard for use in metro rail systems being acceptable, in a quantity equal to or greater than 10% of the total quantity of the desired item specified in this Terms of Reference.

11. EXECUTION REGIME

- 11.1. The contract regime will be Unit Price Contract.

12. CONSORTIA AND SUBCONTRACTING

- 12.1. Subcontracting of the bidding object will not be allowed as it involves the supply of goods. However, subcontracting for ancillary services such as loading, unloading, maneuvering, stacking, etc., will be permitted.
- 12.2. The formation of a consortium will be allowed.
- 12.3. Legal entities organized in a consortium must observe:
 - I - Proof of the public or private commitment to establish the consortium, signed by the consortium members;"
 - II - Designation of the legal entity responsible for the consortium, which must meet the leadership conditions set out in the invitation to bid; and
 - III - Submission of the documents required in the invitation to bid for each consortium member, allowing, for the purpose of technical qualification, the sum of the quantities from each consortium member.
 - IV - Proof of economic and financial qualification through:
 - a) Submission of the sum of the values of each consortium member, in proportion to their respective participation, with an addition of 30% (thirty percent) of the values required for individual bidders; and
 - b) Demonstration, by each consortium member, of meeting the accounting requirements defined in the invitation to bid."



The documents listed in items I and II below must mandatorily include a clause of joint and several liability among all consortium members:

I - In the commitment to form a consortium to be signed by the bidders; and

II - In the contract to be entered into by the winning consortium.

The winning consortium is required to record the commitment to form a consortium at the Registry of Titles and Documents, as per the law, prior to the execution of the contract, in accordance with the provisions of item I above.

Any replacement of a consortium member during the bidding process or after the contract is signed must be expressly authorized in writing by the CBTU.

13. PERFORMANCE AND MATERIAL EXECUTION GUARANTEE

13.1. The CONTRACTED PARTY shall provide a guarantee corresponding to 5% (five percent) of the total contract value, and may, in accordance with the provisions of paragraph one of article 70 of Law No. 13,303/2016, choose from the modalities listed below:

13.1.1. Cash deposit: it must be deposited at Caixa Econômica Federal - CEF, in a specific account with monetary correction, in favor of CBTU, as instructed by the contract management.

13.1.2. Security bond: the insurance policy must be issued by an institution authorized by the Superintendência de Seguros Privados - SUSEP, to operate in the insurance market;

13.1.3. Bank guarantee: the Letter of Guarantee must be issued by a financial institution authorized by the Banco Central do Brasil - BACEN, operating in Brazil.

13.2. The CONTRACTED PARTY must present proof of the guarantee to CBTU within a maximum period of 15 (fifteen) calendar days, starting from the contract signing date.

13.3. The CONTRACTED PARTY may, in writing and with proper justifications, request an extension of the period for providing the guarantee, before the above-mentioned deadline expires, for an equal period, once only. The approval of such extension will be at the discretion of CBTU, subject to agreement from the contract management.

13.4. Regardless of the chosen modality, the provided guarantee shall cover the payment of:

13.4.1. Damages arising from the breach of the contract's object and/or non-fulfillment of other obligations stipulated within it;

13.4.2. Damages caused to the administration resulting from negligence or willful misconduct during the contract execution;

13.4.3. Sanction fines applied by CBTU to the CONTRACTED PARTY;

13.4.4. Labor and social security obligations of any nature not fulfilled by the CONTRACTOR.



- 13.5. Guarantees in the form of security bonds will not be accepted if they do not expressly cover the events mentioned in the previous item.
- 13.6. In case the guarantee is provided through a security bond or bank guarantee, these must be valid for a minimum of 90 (ninety) days beyond the contractual deadline. The instrument will then be returned to the CONTRACTED PARTY after verifying the fulfillment of all contractual obligations and issuance of the Contract Closure Certificate.
- 13.7. When the guarantee is provided through a security bond, the CONTRACTED PARTY must prove the full payment of the premium.
- 13.8. The insurance policy must expressly state the insurer's responsibility for any and all sanction fines imposed on the CONTRACTED PARTY.
- 13.9. Failure to comply with the deadline for providing the guarantee will result in a fine of 0.07% (seven hundredths of a percent) of the contract value per day of delay, up to a maximum of 2% (two percent).
- 13.10. A delay exceeding 30 (thirty) days authorizes CBTU to terminate the contract due to non-compliance or irregular compliance with the clauses of this contract, as well as Articles 239 and 240 of RILC/CBTU.
- 13.11. In the event of a change in the contract value, an extension of the validity period, full or partial utilization of the guarantee by CBTU, or in other situations resulting in loss or insufficiency of the guarantee, the CONTRACTED PARTY must arrange for the supplementation or replacement of the provided guarantee within the deadline set by CBTU, subject to the original conditions for guarantee acceptance stipulated in this Clause.
- 13.12. The guarantor must expressly declare that they are fully aware of the terms of the bid and contractual clauses.
- 13.13. The guarantee will be considered extinguished:
- 13.13.1. Upon the return of the insurance policy, guarantee letter, or authorization for the withdrawal of the cash amount deposited as a guarantee, accompanied by a declaration from CBTU;
 - 13.13.2. Within 90 (ninety) days after the expiration of the validity period, if CBTU does not report any incidents.
 - 13.13.3. In both cases outlined in the previous subsections, CBTU must issue a Closure Certificate, confirming that the CONTRACTED PARTY has fulfilled all contract clauses.
- 13.14. CBTU will not execute the guarantee in the occurrence of one or more of the following situations:
- 13.14.1. Fortuitous event or force majeure;



- 13.14.2. Alteration without prior notice to the insurer or guarantor;
- 13.14.3. Non-compliance with obligations by the CONTRACTED PARTY due to acts or events caused by CBTU;
- 13.14.4. Willful misconduct by CBTU employees.
- 13.15. CBTU itself will assess the exemption of liability provided in subsections 13.3.3 and 13.3.4, and the guarantee entity will not be a party to the process initiated by CBTU.
- 13.16. Guarantees that include other exemptions of liability not specified in this Terms of Reference will not be accepted.
- 13.17. Material warranty:
 - 13.17.1. The material covered by this Technical Requirement, TR-45 Rails, must be guaranteed until December 31 of year N + 5, where N is the year of manufacture, as per item 6.19 of EMVP 16.

14. ADJUSTMENT CRITERIA

- 14.1. The amount stated in the contract will be annually adjusted, with a minimum interval of one year, counted from the date of submission of the final adjudicated proposal.
- 14.2. The contract amount will be adjusted provided that the annual periodicity is observed, applying the variation of the Broad Producer Price Index - Basic Metallurgical Manufacturing Industry, following the formula below:
 $R = P_0 [(I - I_0) / I_0]$ where:
R= Desired adjustment value;
P₀ = Measurement value to be adjusted;
I = Producer Price Index – Basic Metallurgical Transformation Industry – 1006823, published in the Economic Conjuncture magazine of FGV, corresponding to the month of the annual contract adjustment;;
I₀ = Producer Price Index – Basic Metallurgical Transformation Industry – 1006823, published in the Economic Conjuncture magazine of FGV, corresponding to the base date month.
Base Date: Deadline for proposal submission or the last adjustment.
- 14.3. In the case of a contract concluded in foreign currency, the adoption of the national adjustment index provided for in item 14.2 will not apply, as payment will be based on the value of the foreign currency prevailing on the working day immediately preceding the date of actual payment, in accordance with Article 23-A, § 4, of the RILC-CBTU. In this scenario, the maintenance of the effective conditions of the proposal submitted in the tender will be guaranteed.
- 14.4. The adoption of the rule provided in the previous item does not preclude the possibility of contract revision, aiming to restore the initial economic and financial balance of the contract, in accordance



with Article 81, item VI, of Law No. 13,303/2016; provided that the interested party in the revision effectively demonstrates the legal requirements.

- 14.5. The risk matrix defined in Annex IVI is an integral part of this Reference Term and establishes the risks and responsibilities between the parties, characterizing the initial economic and financial balance of the contract

15. CONTRACT EXECUTION PERIOD AND VALIDITY PERIOD

- 15.1. **Execution Period:** The material must be supplied within 180 calendar days from the receipt of the Work Order.
- 15.2. **The contract will be valid:** 8 months from the contract signing date.

16. MANAGEMENT AND SUPERVISION PROCEDURE

- 16.1. The management and supervision of the object of this Bid will be carried out by the Manager and Supervisor appointed by the CONTRACTING PARTY, who are responsible for monitoring, supervising, verifying, and evaluating the execution, as well as resolving any doubts and issues, and directing the rectification of shortcomings through the CONTRACTED PARTY's representative, with full authority to formally represent it concerning the contract's object.
- 16.2. The CONTRACTED PARTY must inform CBTU in advance about the manufacturing process adopted and the steel characteristics in accordance with Items 1, 2, and 4 of this Terms of Reference.
- 16.3. Prior to the start of the continuous services, the CONTRACTED PARTY must provide the production schedule.
- 16.4. CBTU's supervision reserves the right to request the immediate removal of any member of the CONTRACTED PARTY's team who, in their opinion, is hindering the smooth progress of the services.

17. POSSIBILITY OF COOPERATIVE SOCIETY PARTICIPATION

- 17.1. Due to the nature of the acquisition, participation of a cooperative society will not be allowed.

18. INTENTION OF PRICE REGISTRATION

- 18.1. Considering that there is no demand from the public administration that justifies the possibility of accepting the participation of other entities in the issuance of the Intention of Price Registration (IRP), as well as the possibility of subsequent adherence to the Price Registration System (SRP) and



the corresponding Minutes resulting from this Process, the Procurement Process will not allow the acquisition through the Price Registration System (SRP).

19. RISK MATRIX

- 19.1. The risk matrix is the instrument that defines the responsibilities of the Contracting Party and the CONTRACTED PARTY in the execution of the contract.
- 19.2. The CONTRACTED PARTY is fully and exclusively responsible for all risks related to the scope of the agreement, including, but not limited to, as established in the Risk Matrix - Annex IV.
- 19.3. The CONTRACTED PARTY is not responsible for risks related to the scope of the agreement for which the responsibility lies with the Contracting Party, as established in the Risk Matrix.
- 19.4. Acts of God or force majeure that may be subject to insurance coverage offered in Brazil at the time of their occurrence or as specified in the Risk Matrix are the responsibility of the CONTRACTED PARTY;
- 19.5. The execution of addendums resulting from events allocated in the risk matrix as the responsibility of the CONTRACTED PARTY is prohibited.

20. SUSTAINABILITY CRITERIA AND PRACTICES

- 20.1. Throughout the execution of the entire process covered by this tender, all applicable legislation related to the environment and sustainability as follows:
 - CONAMA Resolution No. 307/2002 - Establishes guidelines, criteria, and procedures for the management of construction waste, including actions for reduction, reuse, recycling, and appropriate final disposal of this waste.
 - CONAMA Resolution No. 448/2012 - Provides criteria and guidelines for the environmental licensing of road, rail, waterway, port, and airport enterprises, including infrastructure and construction works associated with these enterprises.
 - ISO 14001:2015 - Environmental management systems - Requirements with guidance for use - Although it is not a standard specifically for concrete, ISO 14001 establishes requirements for implementing an environmental management system, helping organizations identify and control their environmental impacts, including those associated with concrete production.
 - Federal Law No. 6.938/81 - Deals with the National Environmental Policy. This law establishes principles and guidelines for the rational use of natural resources, the preservation and recovery of environmental quality, among other aspects.



- Federal Law No. 9.605/98 - Environmental Crimes Law. This law defines environmental crimes and their penalties, including damage to permanent preservation areas, illegal deforestation, water pollution, among others.
- 20.2. The CONTRACTED party must present the Federal Technical Registry of Potentially Polluting Activities - CTF/APP, in full validity, issued by the Brazilian Institute of Environment and Renewable Natural Resources - IBAMA, under the terms of IBAMA Normative Instruction No. 13, dated August 23, 2021, as amended by IBAMA Normative Instruction No. 6, dated January 27, 2022.
- 20.3. During delivery to CBTU's warehouse, the CONTRACTED party must follow the recommendations of the Sustainability Committee of the unit designated for receiving the material.

21. BUDGET FORECAST

- 21.1. Considering Article 183 of the Internal Regulations for Bidding, Direct Contracting, Contracts, and Agreements of CBTU - RILC CBTU, as follows:
"Article 183. In the bidding for Price Registration, it is not necessary to indicate the budget allocation, which will only be required for the formalization of the contract or other valid instrument."

22. GENERAL PROVISIONS

- 22.1. The CONTRACTED PARTY is obliged to maintain, throughout the entire execution of the Contract, all the qualification and eligibility conditions required in the contracting process.
- 22.2. CBTU is responsible for the accuracy and legitimacy of the information provided and the documents presented.
- 22.3. The intended contract will be governed, especially, by Law No. 13,303 of June 30, 2016 - Legal Statute of State Companies, by Decree No. 10,024 of September 20, 2019 - ELECTRONIC BIDDING, Decree No. 11,462 of March 31, 2023 - PRICE REGISTRATION SYSTEM, and other applicable legal provisions.
- 22.4. In case of divergence or contradiction between the provisions in this Terms of Reference and the relevant legislation, the prevailing legal provisions shall apply; this may also lead to the execution of addendums.
- 22.5. The CONTRACTED PARTY commits, along with its employees and representatives, to maintain the strictest confidentiality regarding the content of CBTU's procedures and regulations, or any information received or become aware of due to this contract.



- 22.6. Any matters not covered by this contract that may arise during the execution of the contracted services will be decided by CBTU, in accordance with the provisions of Law No. 13,303/2016 and RILC-CBTU, as well as private law principles.
- 22.7. When counting the deadlines established in this Reference Term, the day of commencement will be excluded, and the day of expiration will be included. Deadlines only start and end on working days at CBTU.
- 22.8. Other formalities related to the supply of the object of this contract should be in accordance with the Contractual Instrument.

23. ATTACHMENTS

ANNEX I. MODEL OF PRICE PROPOSAL;
ANNEX II. SICRO REFERENCE VALUE JANUARY/24;
ANNEX III. PHYSICAL SUPPLY SCHEDULE;
ANNEX IV. RISK MATRIX; and
ANNEX V. SPECIFICATION OF PERMANENT WAY MATERIAL - EMVP/16 - RAILS.

Brasília, May 8, 2024.

Silvia Maria Leite Barbosa de Moraes
Technical Management of Civil Engineering – GEENG
CBTU/AC

Amarildo Wagner de Carvalho Fonseca Doria
Technical Management of Civil Engineering – GEENG
CBTU/AC



ANNEX I - PRICE PROPOSAL TEMPLATE

OBJECT: Price Registration for the eventual hiring of a specialized company for the supply of TR-45 railway rails, according to the specifications contained in the Reference Term and its annexes. Including manufacturing, loading, international and national transportation, customs clearance process and internalization in Brazil if necessary, and unloading at delivery addresses.

IDENTIFICATION OF THE BIDDING COMPANY:

Business Name:	
CNPJ:	
Address:	
District:	City:
State:	ZIP Code:
Phone:	Email:

PROPOSAL:

DESCRIPTION			
New TR-45 railway rail, Quality 3A, in bars with a length of 12 (twelve) meters, according to the Terms of Reference and complying with EMVP 16 and ABNT NBR 7590/2012 standard. .			
STU	QUANTITY (tons)	UNIT PRICE (R\$)	TOTAL PRICE (R\$)
ITEM 1 – NATAL- RN	1,150.31		
ITEM 2 – JOÃO PESSOA - PB	939.53		
ITEM 3 – RECIFE - PE	456.77		
ITEM 4 – MACEIÓ - AL	487,47		

- 1) This proposal is valid for (_____) days from the date of its submission.
Note: Proposals with a term shorter than 90 (ninety) days will be disqualified.
- 2) The above-mentioned values already include all necessary costs related to the supply of the object, as well as all taxes, labor, social security, fiscal, commercial charges, fees, freight, insurance, personnel movements, and any other that directly or indirectly affects the object of this bidding.
- 3) We declare that we fully agree with all the conditions, obligations, and deadlines set forth in the Notice and its Annexes.

(Company Headquarters Location) - State, ____/____/____

Signature/stamp of the legal representative of the company



ANNEX II - SICRO REFERENCE VALUE JANUARY/24

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SISTEMA DE CUSTOS REFERENCIAIS DE OBRAS - SICRO

DNIT

Rio Grande do Norte - Janeiro/2024

Código	Descrição	Unidade	Preço Unitário (R\$)
M2148	Porta-dente de corte para fresadora e recicladora a frio	un	494,0606
M2150	Selante elástico à base de poliuretano e asfalto	kg	53,7486
M2152	Aditivo de cura para concreto	kg	11,4492
M2153	Coroa de diamante linha HWG	un	1.869,7737
M2156	Coroa de diamante linha NWG	un	1.634,5428
M2158	Argamassa asfáltica	kg	26,2722
M2160	Tubo PEAD corrugado perfurado para drenagem - D = 100 mm	m	20,8225
M2162	Coroa de widia linha AWG	un	465,3233
M2163	Tubo de concreto armado PA1 - D = 0,40 m	m	106,2006
M2164	Tubo de concreto armado PA2 - D = 0,40 m	m	121,1526
M2165	Tubo de concreto armado PA3 - D = 0,40 m	m	125,2050
M2166	Tubo de concreto armado PA4 - D = 0,40 m	m	162,1686
M2167	Tubo de concreto armado PA1 - D = 0,60 m	m	182,2666
M2168	Tubo de concreto armado PA2 - D = 0,60 m	m	209,0537
M2169	Tubo de concreto armado PA3 - D = 0,60 m	m	219,0601
M2170	Tubo de concreto armado PA4 - D = 0,60 m	m	275,3319
M2171	Tubo de concreto armado PA1 - D = 0,80 m	m	276,2068
M2172	Tubo de concreto armado PA2 - D = 0,80 m	m	317,1621
M2173	Tubo de concreto armado PA3 - D = 0,80 m	m	361,0883
M2174	Tubo de concreto armado PA4 - D = 0,80 m	m	388,4526
M2175	Tubo de concreto armado PA1 - D = 1,00 m	m	414,5775
M2176	Tubo de concreto armado PA2 - D = 1,00 m	m	438,0534
M2177	Tubo de concreto armado PA3 - D = 1,00 m	m	487,5935
M2178	Tubo de concreto armado PA4 - D = 1,00 m	m	521,4525
M2179	Tubo de concreto armado PA1 - D = 1,20 m	m	538,8469
M2180	Tubo de concreto armado PA2 - D = 1,20 m	m	607,8469
M2181	Tubo de concreto armado PA3 - D = 1,20 m	m	713,0279
M2182	Tubo de concreto armado PA4 - D = 1,20 m	m	798,2285
M2183	Tubo de concreto armado PA1 - D = 1,50 m	m	981,0742
M2184	Tubo de concreto armado PA2 - D = 1,50 m	m	1.025,1584
M2185	Tubo de concreto armado PA3 - D = 1,50 m	m	1.115,6052
M2186	Tubo de concreto armado PA4 - D = 1,50 m	m	1.185,5956
M2187	Tubo de concreto armado PA1 - D = 0,50 m	m	141,9978
M2188	Tubo de concreto armado PA2 - D = 0,50 m	m	159,2645
M2189	Tubo de concreto armado PA3 - D = 0,50 m	m	164,3376
M2190	Tubo de concreto armado PA4 - D = 0,50 m	m	240,7620
M2192	Coroa de widia linha HWG	un	833,7355
M2193	Coroa de widia linha NWG	un	769,5800
M2197	Haste de paredes paralelas com niple linha NW	m	739,5735
M2198	Trilho UIC60 em aço-carbono - C = 12 m	t	16.529,6837
M2200	Trilho TR45 em aço-carbono - C = 12 m	t	15.490,4243
M2202	Trilho TR57 em aço-carbono - C = 12 m	t	15.490,4243
M2204	Trilho TR68 em aço-carbono - C = 12 m	t	15.490,4243
M2206	Lubrificador de trilhos e de flanges de rodas	un	92.541,6670
M2207	Tirefão - D = 24 mm e C = 188 mm	un	19,4393
M2208	Tirefão - D = 22 mm e C = 155 mm	un	10,6636
M2209	Retensor para via férrea de TR45	un	48,5726
M2210	Retensor para via férrea de TR57	un	50,3487
M2211	Retensor para via férrea de TR68	un	52,5528
M2213	Placa de apoio em aço laminado para UIC60 com fixação rígida	un	165,9696
M2214	Grampo elástico Pandrol para fixação elástica	un	14,2928
M2215	Placa de apoio em aço laminado para TR45 com fixação elástica	un	82,9024
M2216	Placa de apoio em aço laminado para TR57 com fixação elástica	un	122,9238
M2217	Placa de apoio em aço laminado para TR68 com fixação elástica	un	133,8538
M2218	Placa de apoio em aço laminado para TR45 com fixação rígida	un	72,8964
M2219	Placa de apoio em aço laminado para TR57 com fixação rígida	un	151,8025
M2220	Placa de apoio em aço laminado para TR68 com fixação rígida	un	163,8960
M2221	Retensor para via férrea de UIC60	un	54,6099
M2222	Placa de apoio em aço laminado para UIC60 com fixação elástica	un	134,3503
M2225	Tala de junção TJ 45 não isolada com 6 furos	par	687,8962
M2227	Tala de junção TJ 57 não isolada com 6 furos	par	838,6316
M2229	Tala de junção TJ 68 não isolada com 6 furos	par	996,7035



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SISTEMA DE CUSTOS REFERENCIAIS DE OBRAS - SICRO

DNIT

Paraíba - Janeiro/2024

Código	Descrição	Unidade	Preço Unitário (R\$)
M2148	Porta-dente de corte para fresadora e recicladora a frio	un	493,5765
M2150	Selante elástico à base de poliuretano e asfalto	kg	53,7486
M2152	Aditivo de cura para concreto	kg	12,1579
M2153	Coroa de diamante linha HWG	un	1.869,7229
M2156	Coroa de diamante linha NWG	un	1.633,9648
M2158	Argamassa asfáltica	kg	26,2722
M2160	Tubo PEAD corrugado perfurado para drenagem - D = 100 mm	m	20,7034
M2162	Coroa de vidia linha AWG	un	465,3048
M2163	Tubo de concreto armado PA1 - D = 0,40 m	m	106,2006
M2164	Tubo de concreto armado PA2 - D = 0,40 m	m	121,1526
M2165	Tubo de concreto armado PA3 - D = 0,40 m	m	125,2050
M2166	Tubo de concreto armado PA4 - D = 0,40 m	m	162,1686
M2167	Tubo de concreto armado PA1 - D = 0,60 m	m	182,2666
M2168	Tubo de concreto armado PA2 - D = 0,60 m	m	209,0537
M2169	Tubo de concreto armado PA3 - D = 0,60 m	m	219,0601
M2170	Tubo de concreto armado PA4 - D = 0,60 m	m	275,3319
M2171	Tubo de concreto armado PA1 - D = 0,80 m	m	276,2068
M2172	Tubo de concreto armado PA2 - D = 0,80 m	m	317,1621
M2173	Tubo de concreto armado PA3 - D = 0,80 m	m	361,0883
M2174	Tubo de concreto armado PA4 - D = 0,80 m	m	388,4526
M2175	Tubo de concreto armado PA1 - D = 1,00 m	m	414,5775
M2176	Tubo de concreto armado PA2 - D = 1,00 m	m	438,0534
M2177	Tubo de concreto armado PA3 - D = 1,00 m	m	487,5935
M2178	Tubo de concreto armado PA4 - D = 1,00 m	m	521,4525
M2179	Tubo de concreto armado PA1 - D = 1,20 m	m	538,8469
M2180	Tubo de concreto armado PA2 - D = 1,20 m	m	607,8469
M2181	Tubo de concreto armado PA3 - D = 1,20 m	m	713,0279
M2182	Tubo de concreto armado PA4 - D = 1,20 m	m	798,2285
M2183	Tubo de concreto armado PA1 - D = 1,50 m	m	981,0742
M2184	Tubo de concreto armado PA2 - D = 1,50 m	m	1.025,1584
M2185	Tubo de concreto armado PA3 - D = 1,50 m	m	1.115,6052
M2186	Tubo de concreto armado PA4 - D = 1,50 m	m	1.185,5956
M2187	Tubo de concreto armado PA1 - D = 0,50 m	m	141,9978
M2188	Tubo de concreto armado PA2 - D = 0,50 m	m	159,2645
M2189	Tubo de concreto armado PA3 - D = 0,50 m	m	164,3376
M2190	Tubo de concreto armado PA4 - D = 0,50 m	m	240,7620
M2192	Coroa de vidia linha HWG	un	833,6847
M2193	Coroa de vidia linha NWG	un	769,5430
M2197	Haste de paredes paralelas com niple linha NW	m	738,6763
M2198	Trilho UIC60 em aço-carbono - C = 12 m	t	16.494,8723
M2200	Trilho TR45 em aço-carbono - C = 12 m	t	15.455,2212
M2202	Trilho TR57 em aço-carbono - C = 12 m	t	15.455,2212
M2204	Trilho TR68 em aço-carbono - C = 12 m	t	15.455,2212
M2206	Lubrificador de trilhos e de flanges de rodas	un	92.454,9727
M2207	Tirefão - D = 24 mm e C = 188 mm	un	19,4042
M2208	Tirefão - D = 22 mm e C = 155 mm	un	10,6415
M2209	Retensor para via férrea de TR45	un	48,4978
M2210	Retensor para via férrea de TR57	un	50,2695
M2211	Retensor para via férrea de TR68	un	52,4691
M2213	Placa de apoio em aço laminado para UIC60 com fixação rígida	un	165,3684
M2214	Grampo elástico Pandrol para fixação elástica	un	14,2563
M2215	Placa de apoio em aço laminado para TR45 com fixação elástica	un	82,6869
M2216	Placa de apoio em aço laminado para TR57 com fixação elástica	un	122,4600
M2217	Placa de apoio em aço laminado para TR68 com fixação elástica	un	133,1512
M2218	Placa de apoio em aço laminado para TR45 com fixação rígida	un	72,7207
M2219	Placa de apoio em aço laminado para TR57 com fixação rígida	un	151,3910
M2220	Placa de apoio em aço laminado para TR68 com fixação rígida	un	163,2532
M2221	Retensor para via férrea de UIC60	un	54,4951
M2222	Placa de apoio em aço laminado para UIC60 com fixação elástica	un	133,7492
M2225	Tala de junção TJ 45 não isolada com 6 furos	par	686,9203
M2227	Tala de junção TJ 57 não isolada com 6 furos	par	837,6556
M2229	Tala de junção TJ 68 não isolada com 6 furos	par	995,5476



CGCIT

SISTEMA DE CUSTOS REFERENCIAIS DE OBRAS - SICRO

DNIT

Pernambuco - Janeiro/2024

Código	Descrição	Unidade	Preço Unitário (R\$)
M2148	Porta-dente de corte para fresadora e recicladora a frio	un	493,2454
M2150	Selante elástico à base de poliuretano e asfalto	kg	53,7486
M2152	Aditivo de cura para concreto	kg	10,4935
M2153	Coroa de diamante linha HWG	un	1.869,6931
M2156	Coroa de diamante linha NWG	un	1.633,6265
M2158	Argamassa asfáltica	kg	26,2722
M2160	Tubo PEAD corrugado perfurado para drenagem - D = 100 mm	m	20,6183
M2162	Coroa de vidia linha AWG	un	465,2940
M2163	Tubo de concreto armado PA1 - D = 0,40 m	m	95,4296
M2164	Tubo de concreto armado PA2 - D = 0,40 m	m	115,5052
M2165	Tubo de concreto armado PA3 - D = 0,40 m	m	125,2050
M2166	Tubo de concreto armado PA4 - D = 0,40 m	m	162,1686
M2167	Tubo de concreto armado PA1 - D = 0,60 m	m	182,2666
M2168	Tubo de concreto armado PA2 - D = 0,60 m	m	212,4824
M2169	Tubo de concreto armado PA3 - D = 0,60 m	m	221,3988
M2170	Tubo de concreto armado PA4 - D = 0,60 m	m	275,3319
M2171	Tubo de concreto armado PA1 - D = 0,80 m	m	331,0333
M2172	Tubo de concreto armado PA2 - D = 0,80 m	m	354,5185
M2173	Tubo de concreto armado PA3 - D = 0,80 m	m	468,9166
M2174	Tubo de concreto armado PA4 - D = 0,80 m	m	608,1108
M2175	Tubo de concreto armado PA1 - D = 1,00 m	m	429,8000
M2176	Tubo de concreto armado PA2 - D = 1,00 m	m	471,9203
M2177	Tubo de concreto armado PA3 - D = 1,00 m	m	487,5935
M2178	Tubo de concreto armado PA4 - D = 1,00 m	m	521,4525
M2179	Tubo de concreto armado PA1 - D = 1,20 m	m	605,3502
M2180	Tubo de concreto armado PA2 - D = 1,20 m	m	607,8469
M2181	Tubo de concreto armado PA3 - D = 1,20 m	m	713,0279
M2182	Tubo de concreto armado PA4 - D = 1,20 m	m	798,2285
M2183	Tubo de concreto armado PA1 - D = 1,50 m	m	963,1115
M2184	Tubo de concreto armado PA2 - D = 1,50 m	m	1.025,1584
M2185	Tubo de concreto armado PA3 - D = 1,50 m	m	1.115,6052
M2186	Tubo de concreto armado PA4 - D = 1,50 m	m	1.185,5956
M2187	Tubo de concreto armado PA1 - D = 0,50 m	m	105,2962
M2188	Tubo de concreto armado PA2 - D = 0,50 m	m	159,2645
M2189	Tubo de concreto armado PA3 - D = 0,50 m	m	164,3376
M2190	Tubo de concreto armado PA4 - D = 0,50 m	m	240,7620
M2192	Coroa de vidia linha HWG	un	833,6549
M2193	Coroa de vidia linha NWG	un	769,5214
M2197	Haste de paredes paralelas com niple linha NW	m	738,1510
M2198	Trilho UIC60 em aço-carbono - C = 12 m	t	16.473,8336
M2200	Trilho TR45 em aço-carbono - C = 12 m	t	15.433,1964
M2202	Trilho TR57 em aço-carbono - C = 12 m	t	15.433,1964
M2204	Trilho TR68 em aço-carbono - C = 12 m	t	15.433,1964
M2206	Lubrificador de trilhos e de flanges de rodas	un	92.404,2221
M2207	Trefão - D = 24 mm e C = 188 mm	un	19,3830
M2208	Trefão - D = 22 mm e C = 155 mm	un	10,6281
M2209	Retensor para via férrea de TR45	un	48,4524
M2210	Retensor para via férrea de TR57	un	50,2214
M2211	Retensor para via férrea de TR68	un	52,4184
M2213	Placa de apoio em aço laminado para UIC60 com fixação rígida	un	165,0165
M2214	Grampo elástico Pandrol para fixação elástica	un	14,2341
M2215	Placa de apoio em aço laminado para TR45 com fixação elástica	un	82,5563
M2216	Placa de apoio em aço laminado para TR57 com fixação elástica	un	122,1788
M2217	Placa de apoio em aço laminado para TR68 com fixação elástica	un	132,7251
M2218	Placa de apoio em aço laminado para TR45 com fixação rígida	un	72,6178
M2219	Placa de apoio em aço laminado para TR57 com fixação rígida	un	151,1501
M2220	Placa de apoio em aço laminado para TR68 com fixação rígida	un	162,8769
M2221	Retensor para via férrea de UIC60	un	54,4255
M2222	Placa de apoio em aço laminado para UIC60 com fixação elástica	un	133,3972
M2225	Tala de junção TJ 45 não isolada com 6 furos	par	686,3490
M2227	Tala de junção TJ 57 não isolada com 6 furos	par	837,0843
M2229	Tala de junção TJ 68 não isolada com 6 furos	par	994,8709



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SISTEMA DE CUSTOS REFERENCIAIS DE OBRAS - SICRO

DNIT

Alagoas - Janeiro/2024

Código	Descrição	Unidade	Preço Unitário (R\$)
M2148	Porta-dente de corte para fresadora e recicladora a frio	un	492,5187
M2150	Selante elástico à base de poliuretano e asfalto	kg	53,2462
M2152	Aditivo de cura para concreto	kg	12,1555
M2153	Coroa de diamante linha HWG	un	1.869,6352
M2156	Coroa de diamante linha NWG	un	1.632,9691
M2158	Argamassa asfáltica	kg	26,0267
M2160	Tubo PEAD corrugado perfurado para drenagem - D = 100 mm	m	20,4369
M2162	Coroa de vidia linha AWG	un	465,2729
M2163	Tubo de concreto armado PA1 - D = 0,40 m	m	91,6097
M2164	Tubo de concreto armado PA2 - D = 0,40 m	m	104,5074
M2165	Tubo de concreto armado PA3 - D = 0,40 m	m	108,0030
M2166	Tubo de concreto armado PA4 - D = 0,40 m	m	139,8883
M2167	Tubo de concreto armado PA1 - D = 0,60 m	m	157,2250
M2168	Tubo de concreto armado PA2 - D = 0,60 m	m	165,3000
M2169	Tubo de concreto armado PA3 - D = 0,60 m	m	188,9634
M2170	Tubo de concreto armado PA4 - D = 0,60 m	m	237,5040
M2171	Tubo de concreto armado PA1 - D = 0,80 m	m	251,2043
M2172	Tubo de concreto armado PA2 - D = 0,80 m	m	303,0500
M2173	Tubo de concreto armado PA3 - D = 0,80 m	m	311,4784
M2174	Tubo de concreto armado PA4 - D = 0,80 m	m	346,1814
M2175	Tubo de concreto armado PA1 - D = 1,00 m	m	357,6187
M2176	Tubo de concreto armado PA2 - D = 1,00 m	m	377,8693
M2177	Tubo de concreto armado PA3 - D = 1,00 m	m	420,6030
M2178	Tubo de concreto armado PA4 - D = 1,00 m	m	449,8102
M2179	Tubo de concreto armado PA1 - D = 1,20 m	m	464,8147
M2180	Tubo de concreto armado PA2 - D = 1,20 m	m	524,3348
M2181	Tubo de concreto armado PA3 - D = 1,20 m	m	637,4268
M2182	Tubo de concreto armado PA4 - D = 1,20 m	m	712,7690
M2183	Tubo de concreto armado PA1 - D = 1,50 m	m	846,2845
M2184	Tubo de concreto armado PA2 - D = 1,50 m	m	884,3120
M2185	Tubo de concreto armado PA3 - D = 1,50 m	m	962,3322
M2186	Tubo de concreto armado PA4 - D = 1,50 m	m	1.022,7066
M2187	Tubo de concreto armado PA1 - D = 0,50 m	m	130,1993
M2188	Tubo de concreto armado PA2 - D = 0,50 m	m	137,3832
M2189	Tubo de concreto armado PA3 - D = 0,50 m	m	141,7593
M2190	Tubo de concreto armado PA4 - D = 0,50 m	m	207,6837
M2192	Coroa de vidia linha HWG	un	833,5970
M2193	Coroa de vidia linha NWG	un	769,4793
M2197	Haste de paredes paralelas com niple linha NW	m	737,1305
M2198	Trilho UIC60 em aço-carbono - C = 12 m	t	16.432,9574
M2200	Trilho TR45 em aço-carbono - C = 12 m	t	15.392,2316
M2202	Trilho TR57 em aço-carbono - C = 12 m	t	15.392,2316
M2204	Trilho TR68 em aço-carbono - C = 12 m	t	15.392,2316
M2206	Lubrificador de trilhos e de flanges de rodas	un	92.305,6183
M2207	Trefão - D = 24 mm e C = 188 mm	un	19,3434
M2208	Trefão - D = 22 mm e C = 155 mm	un	10,6031
M2209	Retensor para via férrea de TR45	un	48,3679
M2210	Retensor para via férrea de TR57	un	50,1320
M2211	Retensor para via férrea de TR68	un	52,3241
M2213	Placa de apoio em aço laminado para UIC60 com fixação rígida	un	164,3327
M2214	Grampo elástico Pandrol para fixação elástica	un	14,1929
M2215	Placa de apoio em aço laminado para TR45 com fixação elástica	un	82,3132
M2216	Placa de apoio em aço laminado para TR57 com fixação elástica	un	121,6557
M2217	Placa de apoio em aço laminado para TR68 com fixação elástica	un	131,9327
M2218	Placa de apoio em aço laminado para TR45 com fixação rígida	un	72,4180
M2219	Placa de apoio em aço laminado para TR57 com fixação rígida	un	150,6820
M2220	Placa de apoio em aço laminado para TR68 com fixação rígida	un	162,1458
M2221	Retensor para via férrea de UIC60	un	54,2960
M2222	Placa de apoio em aço laminado para UIC60 com fixação elástica	un	132,7135
M2225	Tala de junção TJ 45 não isolada com 6 furos	par	685,2390
M2227	Tala de junção TJ 57 não isolada com 6 furos	par	835,9744
M2229	Tala de junção TJ 68 não isolada com 6 furos	par	993,5562



ANNEX III - PHYSICAL SUPPLY SCHEDULE

Stage	Item	Duration (days)	Start	Completion	Prerequisite
1.1	Manufacturing of rails with concurrent performance of required tests by the Certifying Authority, issuance of reports and certifications.	95	01/01/20XX	04/06/20XX	
1.2	Delivery of the technical documentation issued by the Certifying Authority certifying the conformity of the rails and release of the shipment.	5	04/06/20XX	04/11/20XX	
1.3	Review by CBTU Inspectors of all technical documentation related to the tests, reports, and certifications referred to in subsections 1.1 and 1.2 of this schedule.	5	04/11/20XX	04/16/20XX	1.2
1.4	Presentation by the Contractor of the right to respond and provide a comprehensive defense, if necessary for the rectification of the documentation mentioned in subsection 1.3.	5	04/16/20XX	04/21/20XX	1.3
1.5	Issuance of the Technical Opinion regarding the presentation of the opposing arguments and comprehensive defense as outlined in subsection 1.4.	5	04/21/20XX	04/26/20XX	1.4
1.6	Issuance of the Technical Opinion regarding the presentation of the opposing arguments and comprehensive defense as outlined in subsection 1.3.	5	04/26/20XX	05/01/20XX	1.5
1.7	Shipment, transportation, and delivery to the addresses indicated in the Purchase Order, following the approval of subsection 1.3.	60	05/01/20XX	06/30/20XX	1.1
2.1	Checking of the delivered quantities, inspection for potential damages incurred during loading, transportation, and unloading of the material, as well as reviewing the delivery documentation. Issuance of the Provisional Acceptance Certificate.	5	06/30/20XX	07/05/20XX	1.7
2.2	Presentation by the Contractor of a contradictory and comprehensive defense, if necessary, regarding sub-item 2.1.	5	07/05/20XX	07/10/20XX	2.1; 2.2
2.3	Issuance of the Technical Report on the presentation of the contradictory and comprehensive defense pertaining to sub-item 2.2.	5	07/10/20XX	07/15/20XX	2.2
2.4	Completion of the quantity of rails or replacement of damaged rails, and the documentation of delivery, related to sub-item 2.1 and in accordance with the conclusions of sub-items 2.2 and 2.3.	30	07/15/20XX	08/14/20XX	2.3
2.5	Issuance of the Final Acceptance Certificate.	25	08/14/20XX	09/08/20XX	2.1
3.1	Payment.	30	09/08/20XX	10/08/20XX	2.5

Within 180 (one hundred and eighty) days - Counted from the issuance date of the Purchase Order for each acquired installment.

Within 5 (five) days - Counted from the delivery of the object and the final technical documentation, reports, and conformity certifications.

Within 5 (five) days - Counted from the issuance of the Provisional Receipt.

Within 5 (five) days - Counted from the analysis of sub-item 2.1.

Within 5 (five) days - Counted from the analysis of sub-item 2.3.

Within 30 (thirty) days - Counted from the analysis of sub-item 2.3.

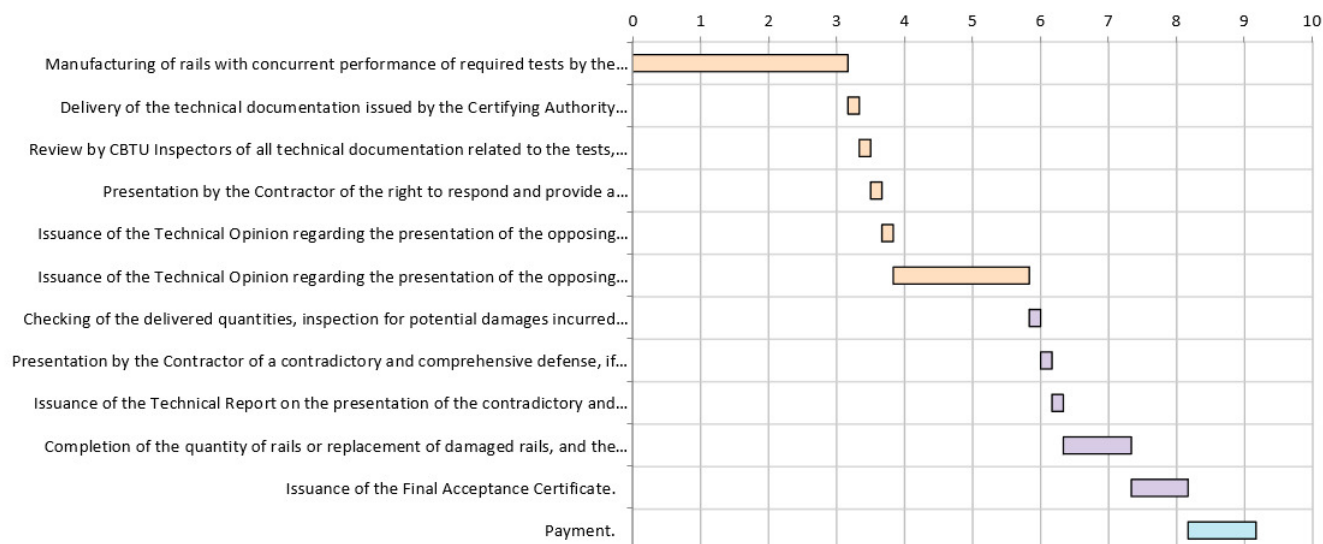
Within 5 (five) days - Counted from the analysis of sub-item 2.4.

Within 5 (five) days - Counted from the analysis of sub-item 2.4.



Within 30 (thirty) days after receiving the billing documents (Invoice/Invoice), at the general protocol of CBTU.

GANTT CHART





ANNEX IV - RISK MATRIX FOR ACQUISITION OF TR-45 RAILS

RISKS SUPPORTED BY THE CONTRACTOR				
Cause	Risk	Consequence/Effect (Impact)	Probability	Preventive Measure
Absence of product quality control; failure to meet standards.	The product does not meet the specifications.	Non-acceptance of the product; delay in subsequent stages.	Medium.	Requirement of contractor's experience; hiring of a supervising company; request for laboratory tests and trials.
Inadequate transportation and/or storage.	The product was damaged.	Non-acceptance of the product; delay in subsequent stages.	Low.	Requirement of contractor's experience; hiring of a supervising company.
Logistical inadequacy of the manufacturer.	Delay in manufacturing.	Halt or delay in subsequent stages.	Low.	Requirement of contractor's experience; hiring of a supervising company; requirement of a production schedule.
Extraordinary and unforeseeable events (strikes, pandemics, weather events).	Delay in international transportation.	Halt or delay in subsequent stages.	Very low.	None.
Route deviations (due to excessive loads and high service demand).	Delay in international transportation.	Delay in subsequent stages, unforeseen expenses (payment of fees for priority shipments and hiring of transport for goods delivered to different airports or ports).	Low.	Comprehensive planning of the import process (good logistic choices, compliance with Incoterms).
Local holidays.	Delays in customs	Delay in subsequent stages.	Low.	Schedule drafted considering local calendar.
Strikes.	Delays in customs	Delay in subsequent stages.	Low.	Schedule drafted with a margin of buffer.
Discrepancies in documentation or requirement of non-mandatory documents (proof of payment, catalog, technical report).	Delays in customs clearance process.	Delay in subsequent stages; additional costs.	Low.	Comprehensive planning of the import process (good logistic choices, compliance with Incoterms, and quality of document issuance).
Extraordinary and Unforeseeable Events (strikes, pandemic, climatic events).	Delays in internalization in Brazil.	Delay in subsequent stages.	Low.	None.



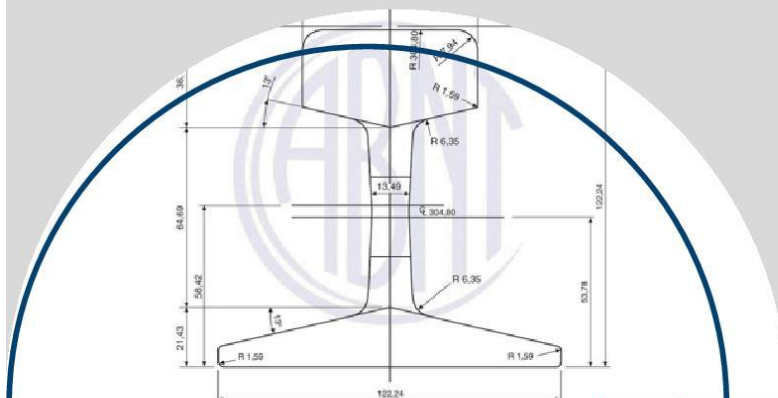
Extraordinary and Unforeseeable Events (strikes, pandemic, climatic events).	Delays in transportation within Brazil.	Delay in subsequent stages.	Low.	None.
Cash flow problems, country's economic situation, exchange rate changes.	Financial liquidity issues of the contracted.	Contract suspension; abandonment of service; delay in product delivery.	Low.	Requirement of economic and financial qualification of the contracted.
Non-compliance with laws, regulations, guidelines, instructions, licenses, permits, authorizations, and others relevant to the exercise of their activities.	Functioning and licensing problems as a Company.	Contract suspension; abandonment of service; delay in product delivery.	Medium.	Requirements of relevant documentation.

RISKS SUPPORTED BY CBTU				
Cause	Risk	Consequence/Effect (Impact)	Probability	Preventive Measure
Force majeure or fortuitous event.	Uninsurable events characterized as force majeure or acts of God.	Unforeseen losses and costs.	Very low.	None.
Change in requirements; update of normative criteria.	Unforeseen specification changes.	Delivery delays; unforeseen costs.	Low.	Review of specifications and standards before contracting.
Lack of resources foreseen in the contract disbursement.	Availability of financial resources incompatible with the disbursement forecast.	Contract suspension.	Low.	Use of approved resources.
Changes in tax legislation.	Tax changes.	Price change.	Low.	None.
Changes in the needs of the requester.	Changes in contracted quantities.	Price and delivery time change.	Low.	Well-defined calculation memo.
Changes in the needs of the requester.	Changes in delivery locations.	Price and delivery time change.	Low.	Well-defined logistics.
Inconsistencies in documents (technical specification, detailing, quantity, cost) and in the product delivery schedule.	Contractor's identification of inconsistencies in the provided documents.	Price and delivery time change.	Low.	Review of specifications and standards before contracting.



ANNEX V - SPECIFICATION OF PERMANENT WAY MATERIAL - EMVP/16 – RAILS

EMVP 16/CBTU TRILHOS



**ESPECIFICAÇÃO DE
MATERIAL DE VIA
PERMANENTE
ESVP 16/CBTU - REV. 7**





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DIRETORIA TÉCNICA	TRILHOS	FL.	 CBTU Companhia Brasileira de Trens Urbanos
GEENG – GERÊNCIA DE ENGENHARIA CIVIL		1/16	

1. OBJETIVO

- 1.1. Esta Especificação fixa as características dos Trilhos Vignole a serem utilizados na Superestrutura da Via Permanente da CBTU.

2. REFERÊNCIAS NORMATIVAS

- 2.1. Esta ESVP deve ser observada juntamente com a ABNT NBR-7590:2012 - (ou versão mais atualizada à época de sua utilização).
- 2.2. Em caso de divergência entre a EMVP-16/CBTU e a ABNT NBR-7590:2012, deve prevalecer a que for mais restritiva a favor da segurança e da qualidade.
- 2.3. A edição válida das normas serão sempre as mais recentes, anterior à data de início dos documentos de concorrência.

3. CARACTERÍSTICAS GERAIS

- 3.1. Somente serão aceitos para aplicação nas linhas da CBTU, Trilhos isentos de defeitos prejudiciais ou fendas de qualquer espécie, devendo ainda ser retilíneos e de seção uniforme em todo seu comprimento, obedecendo aos requisitos recomendados na NBR-7590:2012 com relação à:
- Fabricação: Requisitos Gerais, Laminação e Estocagem (item 3.1 da NBR-7590:2012)
 - Dimensões: Massa, Forma e Dimensões e Comprimento (item 3.2 da NBR-7590:2012)
 - Tolerância: (item 3.3 da NBR-7590:2012)

3.2. Dimensões dos trilhos

- 3.2.1. Os trilhos serão fornecidos de acordo com a NBR-7590:2012 da ABNT, com 12 metros de comprimento, quando medidos à temperatura normal de 20°C. A tolerância de comprimento está na TABELA 2. Poderá ser fornecido também, mediante prévia autorização da CBTU, barras de 18, 24 e 36 metros de comprimento.
- 3.2.2. O perfil laminado dos trilhos fabricados será o definido pela NBR-7590:2012 da ABNT.
- 3.2.3. A massa nominal dos trilhos, para efeito de cálculo de quantitativo de peso, será calculada conforme a TABELA 1, abaixo:

REV	DATA	MOTIVO/REFERÊNCIA	APROV. CBTU	REV	DATA	MOTIVO/REFERÊNCIA	APROV. CBTU
0	21/11/1985	ELABORAÇÃO		4	16/11/2005	REVISÃO	
1	18/10/1996	REVISÃO		5	18/11/2011	REVISÃO	
2	12/11/1998	REVISÃO		6	30/06/2020	REVISÃO	
3	16/05/2002	REVISÃO		7	16/05/2023	REVISÃO	



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TABELA 1 - Massa Nominal	
Tipo de Trilho	Massa Nominal por metro de trilho (kg/m)
TR37	37,1
TR45	44,64
TR57	56,90
NOTA: O trilho é designado por TR.	

3.3. Tolerância

3.3.1. As tolerâncias gerais para os trilhos devem estar de acordo com a TABELA 2:

TABELA 2 - Tolerâncias para todos os tipos de trilho	
Dimensão	Tolerância (mm)
Altura	+ 0,8 e - 0,4
Largura do patim	+/- 1,0
Largura do boleto	+/- 0,6
Assimetria	+/- 1,2
Esquadria da extremidade (em qualquer direção)	0,6
Espessura da alma	+ 1,0 e - 0,5
Inclinação do boleto e do patim	+/- 3,6
Diâmetro do furo	+/- 0,8
Posição do centro do furo, com referência à extremidade do trilho e à base do patim	+/- 0,8
Comprimento	+/- 10,0

3.4. Propriedades mecânicas

3.4.1. As propriedades mecânicas dos trilhos devem estar de acordo com a TABELA 3:

TABELA 3 - Propriedades Mecânicas Limite de Resistência e Alongamento				
Tipo de Aço	Resistência à Tração - Mínima (Mpa)	Alongamento mínimo (%)	Escoamento mínimo (Mpa)	Dureza Brinell (HB)
Aço Carbono 3 (resistência mínima)	880	10	420	260 a 310
Aço-Liga 7 (média resistência)	1000	8	580	310 a 340

REV	DATA	MOTIVO/REFERÊNCIA	APROV. CBTU	REV	DATA	MOTIVO/REFERÊNCIA	APROV. CBTU
0	21/11/1985	ELABORAÇÃO		4	16/11/2005	REVISÃO	
1	18/10/1996	REVISÃO		5	18/11/2011	REVISÃO	
2	12/11/1998	REVISÃO		6	30/06/2020	REVISÃO	
3	16/05/2002	REVISÃO		7	16/05/2023	REVISÃO	



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3.5. Seção transversal dos trilhos e suas dimensões

3.5.1. Trilho TR-37:

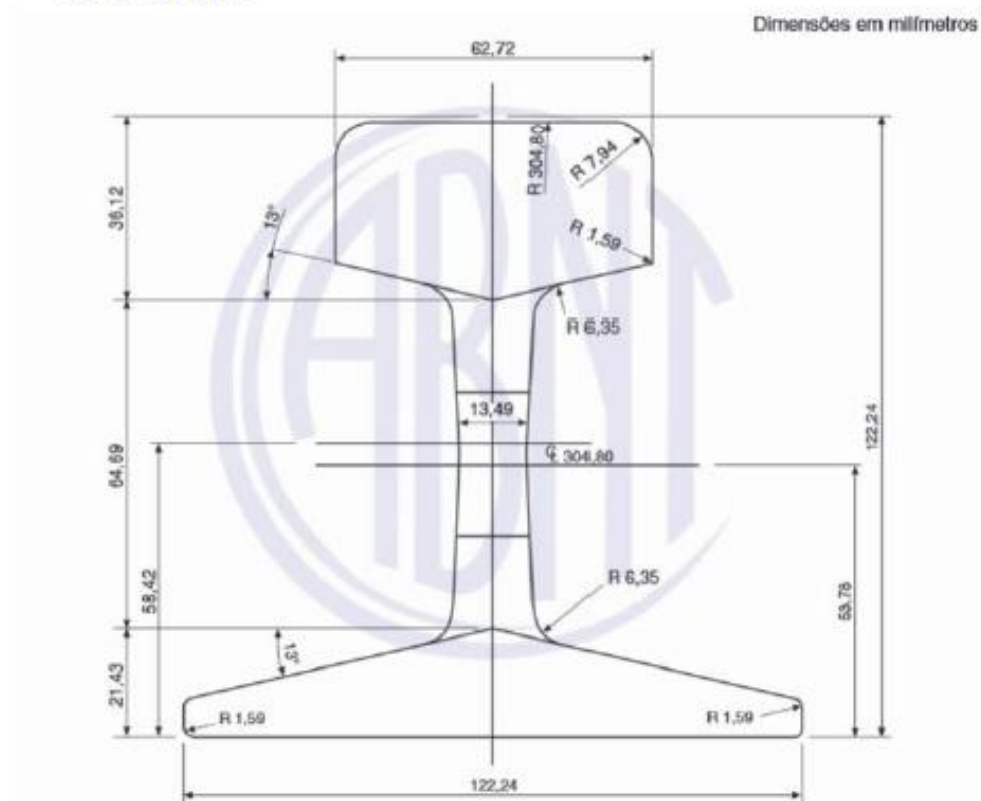


Figura A.1 – Forma e dimensões do trilho TR37

Tabela A.1 – Requisitos do trilho TR37

Área da seção transversal cm ²	Momento de inércia cm ⁴	Módulo de resistência do boleto cm ³	Módulo de resistência do patim cm ³	Peso por metro kg/m
47,39	951,40	149,10	162,90	37,20

REV	DATA	MOTIVO/REFERÊNCIA	APROV. CBTU	REV	DATA	MOTIVO/REFERÊNCIA	APROV. CBTU
0	21/11/1985	ELABORAÇÃO		4	16/11/2005	REVISÃO	
1	18/10/1996	REVISÃO		5	18/11/2011	REVISÃO	
2	12/11/1998	REVISÃO		6	30/06/2020	REVISÃO	
3	16/05/2002	REVISÃO		7	16/05/2023	REVISÃO	



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3.5.2. Trilho TR-45:

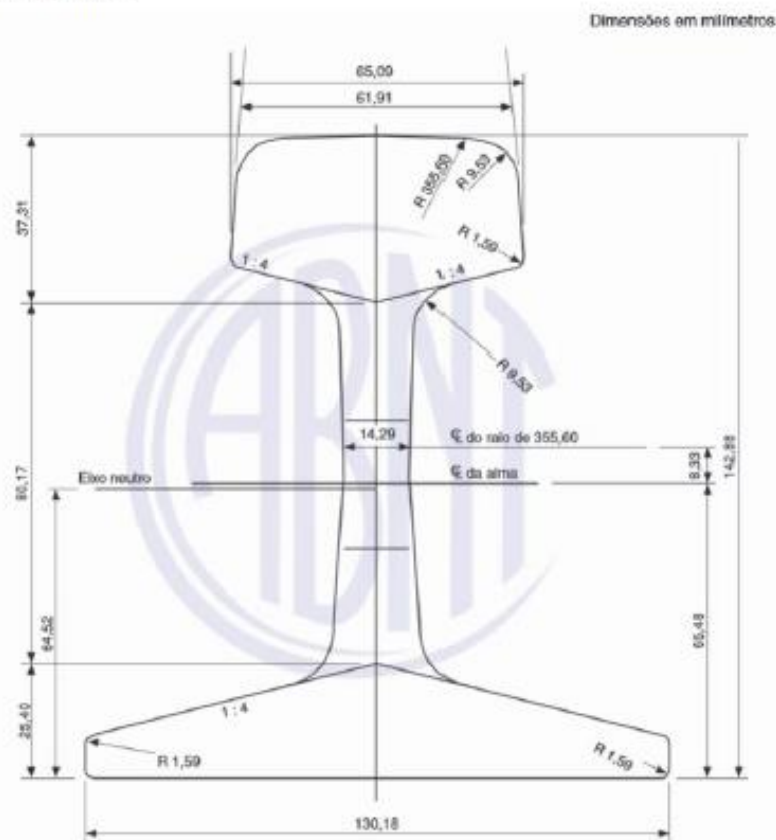


Figura A.2 – Forma e dimensões do trilho TR45

Tabela A.2 – Requisitos do trilho TR45

Área da seção transversal cm ²	Momento de inércia cm ⁴	Módulo de resistência do boleto cm ³	Módulo de resistência do patim cm ³	Peso por metro kg/m
56,90	1 610,81	205,82	249,58	44,65

REV	DATA	MOTIVO/REFERÊNCIA	APROV. CBTU	REV	DATA	MOTIVO/REFERÊNCIA	APROV. CBTU
0	21/11/1985	ELABORAÇÃO		4	16/11/2005	REVISÃO	
1	18/10/1996	REVISÃO		5	18/11/2011	REVISÃO	
2	12/11/1998	REVISÃO		6	30/06/2020	REVISÃO	
3	16/05/2002	REVISÃO		7	16/05/2023	REVISÃO	



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3.5.3. Trilho TR-57:

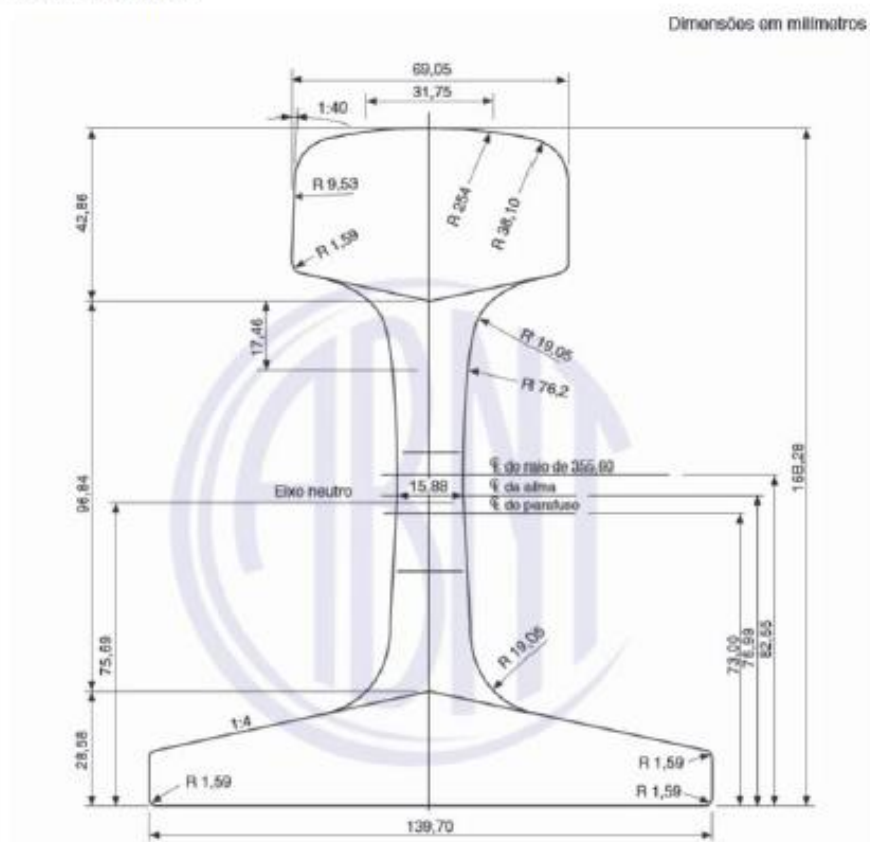


Figura A.4 – Forma e dimensões do trilho TR57

Tabela A.4 – Requisitos do trilho TR57

Área da seção transversal cm ²	Momento de inércia cm ⁴	Módulo de resistência do boleto cm ³	Módulo de resistência do patim cm ³	Peso por metro kg/m
72,56	2 730,48	297,00	360,52	56,90

REV	DATA	MOTIVO/REFERÊNCIA	APROV. CBTU	REV	DATA	MOTIVO/REFERÊNCIA	APROV. CBTU
0	21/11/1985	ELABORAÇÃO		4	16/11/2005	REVISÃO	
1	18/10/1996	REVISÃO		5	18/11/2011	REVISÃO	
2	12/11/1998	REVISÃO		6	30/06/2020	REVISÃO	
3	16/05/2002	REVISÃO		7	16/05/2023	REVISÃO	



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3.6. Composição química

3.6.1. O aço para a fabricação dos trilhos deverá ter a composição química de acordo com a ABNT NBR 7590:2012, TABELAS 4, 5 e 6 a seguir:

TABELA 4 - COMPOSIÇÃO QUÍMICA			
COMPOSIÇÃO QUÍMICA (%)		Aço Carbono 3	Aço- Liga 7
CARBONO C	Máxima	0,80	0,80
	Mínima	0,60	0,70
MANGANÊS Mn	Máxima	1,30	1,40
	Mínima	0,80	1,00
SILÍCIO Si	Máxima	0,50	1,00
	Mínima	0,10	0,60
FÓSFORO P	Máxima	0,02	0,02
ENXOFRE S	Máxima	0,02	0,02
NÍQUEL Ni	Máxima	-	-
CROMO Cr	Máxima	0,15	0,40
	Mínima	-	0,15
MOLIBDÊNIO Mo	Máxima	-	-
VANÁDIO V	Máxima	-	-
NIÓBIO Nb	Máxima	-	0,05
	Mínima	-	0,02

TABELA 5 - Variação da composição química		
Elemento	Abaixo da Mínima %	Acima da máxima %
Carbono	0,04	0,04
Manganês	0,06	0,06
Fósforo	-	0,008
Enxofre	-	0,008
Silício	0,02	0,05
NOTA: A variação da Tabela 5 só é considerada para análise química de amostra retirada do boleto de peça acabada.		

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TABELA 6 (TABELA 7 da NB 7590)			
Trilhos não tratados - Teores máximos de elementos residuais			
Valores em percentual em massa			
Níquel	Cromo	Molibdênio	Vanádio
0,25	0,40	0,10	0,03
<u>NOTA: Os teores máximos de elementos residuais desta tabela são aplicados somente para os trilhos de Aço-Liga.</u>			

3.6.2. Fragilidade ao Hidrogênio

3.6.2.1. Para evitar a fragilidade do trilho ao hidrogênio, o aço deve ter teor de hidrogênio, medido em corpo de prova retirado em vazamento ou no boleto do trilho, máximo de 0,000002 (2 partes por milhão) ou 0,0002%.

3.6.3. Teor de Oxigênio

3.6.3.1. O teor máximo de oxigênio, medido em corpo de prova retirado em vazamento ou no boleto do trilho, deve ser de 0,000020 (20 partes por milhão) ou 0,002%.

4. MARCAS E ESTAMPAS

4.1. Marcação

4.1.1. As marcas estampadas na alma de cada trilho devem ser perfeitamente legíveis, de modo, a se manterem durante toda vida útil do trilho.

4.1.2. A marcação deve ser em alto-relevo, com altura de 25mm, saliência com variação maior ou igual a 1mm e menor e igual a 1,5mm.

4.1.3. As marcas estampadas em alto-relevo, em um dos lados da alma do trilho, devem obedecer a seguinte ordem:

I - Marca do Fabricante;

II - País de origem;

III - Método de redução do teor de hidrogênio (processo de resfriamento);

IV - Processo de fabricação conforme tipo de forno de aço: T = Thomas; B = Bressemer; M = Martin; E = Elétrico; SM = Siemens Martin;

V - Tipo de trilho;

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VI - Ano de fabricação (os dois últimos algarismos);

VII - Mês de fabricação (indicado pelo número de traços verticais).

Exemplo: CSN BRASIL RC LD TR 57 84 ||||

Trilho fabricado pela CSN, no Brasil, com resfriamento controlado pelo processo LD, processo e fabricação SM, trilho TR-57, em 1984, em maio.

4.1.4. Marcas estampadas a quente: no lado oposto da alma citada no item 3.1.1, obedecendo a seguinte ordem:

I - Número da corrida;

II - Posição do trilho na corrida contínua ou no lingote;

III - Posição do lingote na ordem do lingotamento;

IV - Sentido de laminação

Exemplo: 950238 B 12

Trilho da corrida 950238, posição no lingote B, lingote nº 12

OBS1: A marcação do processo de fabricação é dispensada sempre que a numeração da corrida permita identificá-lo.

Exemplo: 7A00784 F 20

Trilho da corrida 7A0784 (a letra A indica que a corrida é LD do forno A), posição no lingote F, lingote nº 20.

OBS2: A marcação em cada lado da alma deve ser repetida, no mínimo, a cada 3000mm.

4.1.5. Marcação adicional:

- Os trilhos nº 1, em comprimentos menores que o padrão encomendado (trilhos curtos), caso aceitos pela CBTU, terão ambas as extremidades pintadas de verde.
- Os trilhos nº 1, nos padrões encomendados, não levarão qualquer identificação por cor.

5. ACABAMENTO

5.1. Resfriamento

5.1.1. Depois de laminados a quente (para evitar a fissura no patim e outros defeitos), todos os trilhos de massa nominal igual ou superior a 45 Kg/m serão submetidos ao

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resfriamento controlado conforme as especificações ASTM-A1:00(2018) e NBR-7590:2012 (item 6.4) da ABNT.

5.1.2. O trilho que não for resfriado de acordo com a ASTM-A1:00(2018), deverá ter sua marca de resfriamento controlado (RC) retirada.

5.2. Desempeno

5.2.1. O desempenho do trilho é efetuado a frio, por ações graduais e sem choque.

5.3. Superfície dos trilhos

5.3.1. Todos os trilhos deverão ser apresentados com os boletos lisos, bem retificados, sem apresentarem torções, ondulações, dobras ou qualquer outro defeito prejudicial ao seu bom desempenho.

5.3.2. Serão considerados retificados, os trilhos que, quando colocados com o boleto para cima numa superfície plana, não apresentarem entre suas extremidades uma flecha superior a 20mm, em um comprimento de 12m, ou proporcionalmente a isso, conforme o comprimento do trilho.

5.4. Corte dos trilhos

5.4.1. Para estabelecer o comprimento final e para dar ao trilho o devido esquadro e acabamento, suas extremidades serão cortadas a frio perpendicularmente ao seu eixo por fresa ou serra, tolerando-se uma variação para fora do esquadro de 0,5 mm). A superfície frontal do trilho deverá ser plana, lisa e sem defeito. Rebarbas deixadas pelo corte deverão ser retiradas

5.5. Furação dos trilhos

5.5.1. Os trilhos poderão ser encomendados com furação ou sem furação, conforme solicitação prévia da CBTU.

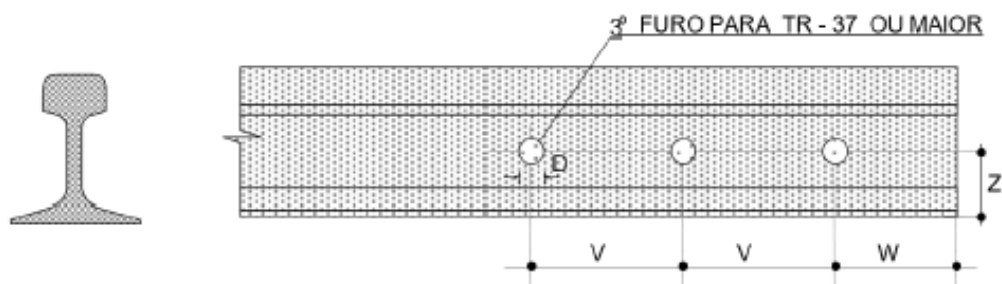
5.5.2. O trilho deve ser furado a frio, com broca e de forma a produzir furo cilíndrico, de parede lisa e sem rebarba.

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TABELA 7 (TABELA 8 da NB 7590)			
Tipo de trilho	Dimensões (mm)		
	Z	W	V
TR37	53,70	68,30	139,70
TR45	65,50	68,30	139,70
TR57	73,00	88,90	150,40



6. ENSAIOS

6.1. Serão executados, obrigatoriamente, os ensaios e análises necessários à verificação dos seguintes dados:

- Composição química;
- Dureza Brinell;
- Resistência ao choque;
- Condições internas;
- Limites de alongamento e resistência à tração;

6.2. O Fabricante, ao submeter os trilhos a ensaios, deverá apresentar, ao inspetor da CBTU, uma relação dos trilhos de todas as corridas e lingotes. Os trilhos apresentados para ensaios devem ser colocados em uma estante horizontal, sobre suportes. O acesso aos trilhos deverá ser livre para facilitar a inspeção.

6.3. A CBTU poderá aceitar como válidos os certificados dos ensaios e análises fornecidos pelo Fabricante.

6.4. A CBTU poderá realizar, sempre que julgar conveniente, as análises e ensaios confirmatórios através de laboratório especializado. As despesas correrão por conta da CBTU.

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7. INSPEÇÃO

- 7.1. A execução das inspeções deverá ser programada e, para tanto, o Fabricante deverá fornecer ao comprador o cronograma de fabricação, em prazo previamente combinado, não inferior a 72 horas (dias úteis).
- 7.2. Os inspetores da CBTU terão livre acesso, a qualquer hora de trabalho, a todos os setores de fabricação e testes, que concernem ao fabrico do material pedido.
- 7.3. Deverá ser cedida à CBTU uma área, no local da inspeção, a ser utilizada para a guarda de materiais, elaboração e controle de dados, relatórios etc.
- 7.4. Caberá ao Fabricante, sem ônus para a CBTU, fornecer o local e os meios necessários à execução da inspeção, a fim de assegurar que o produto fabricado preencha todos os requisitos especificados.
- 7.5. Após o desempenho e acabamento dos trilhos aprovados pelo Controle de Qualidade do Fabricante, todos os trilhos serão submetidos a exame visual e controle dimensional pelos inspetores da CBTU.
- 7.6. A inspeção será feita com base no total de trilhos laminados e acabados. Deverá ser realizado um controle de qualidade de trilhos aceitos e rejeitados, inclusive relacionando os trilhos por tipo de defeitos que proporcionaram a rejeição. Também deverão ser relacionados os trilhos curtos com seus respectivos comprimentos.
- 7.7. Exame visual:
- 7.7.1. Será feito a olho nu ou através de lentes, em local que ofereça boas condições de iluminação, com a finalidade de separar trilhos com defeitos superficiais que não foram detectados pelo Controle de Qualidade do Fabricante.
- 7.7.2. Quando a iluminação não for adequada, o Fabricante deverá fornecer uma iluminação suficiente para a realização de uma boa inspeção.
- 7.8. Exame dimensional:
- 7.8.1. O exame deverá ser realizado em mesa nivelada e apropriada, devendo haver espaçamento suficiente entre os trilhos, para observação de suas partes externas e geometria. O Fabricante deverá fornecer, sem ônus à CBTU, serventes para auxílio na inspeção.

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7.8.2. Deverá ser realizado através de gabaritos, régua e trena, visando a aferição das tolerâncias nas dimensões de seção, retilidade e comprimento do trilho.

7.8.3. Os gabaritos e calibres necessários aos controles de formas, dimensões e furação, deverão ser fornecidos pelo Fabricante, em dois conjuntos, sem ônus à CBTU, conforme Norma NBR-7590:2012 da ABNT, e só utilizados quando aprovados pela Fiscalização da CBTU.

7.8.4. Em cada trilho serão verificados os seguintes tópicos, conforme Norma NBR7590:2012 da ABNT:

- Altura do trilho - gabarito GAB-I;
- Largura do trilho - gabarito GAB-II;
- Forma e dimensão do boleto - gabarito GAB -III;
- Assimetria do trilho - gabarito GAB-IV;
- Forma da superfície de ajuste da tala de junção - gabarito GAB-V;
- Furação - gabarito GAB-VI;
- Distância entre o furo e a base do patim - gabarito GAB-VII;
- Comprimento do trilho - trena com precisão milimétrica;
- Retilidade do trilho - régua de aço plana e retificada com 1m de comprimento

Serão admissíveis as seguintes tolerâncias:

DIMENSÃO	TIPO DE TRILHO	TOLERÂNCIA
Altura	Até TR-57	± 0,6
	TR-68	± 0,6
Largura do patim	todos	± 1,0
Largura do boleto	Até TR-57	± 0,5
	TR-68	± 0,5
Assimetria	todos	± 1,6
Esquadria das extremidades (em qualquer direção)	todos	0,8
Espessura da alma	todos	+ 1 e -0,5
Inclinação do boleto e do patim		± 3,6%
Diâmetro do furo	todos	± 0,8
Posição do centro do furo, com referência à extremidade do trilho e a base do patim	todos	± 0,8
Comprimento	todos	± 10,0
Retilidade		Conforme desenho a seguir*

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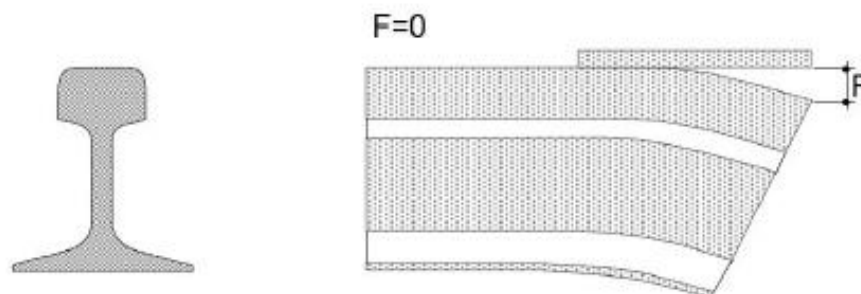


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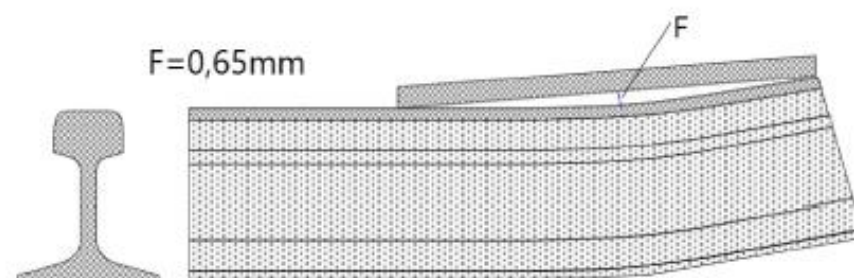
* A retilidade nas extremidades dos trilhos será verificada da seguinte maneira:

* A retilidade nas extremidades dos trilhos será verificada da seguinte maneira:

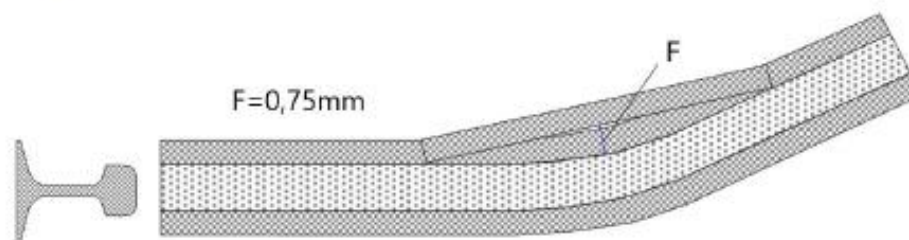
a) Vertical convexo:



b) Vertical convêxo



c) Horizontal côncavo



OBS: F = Flecha máxima permitida, utilizando uma régua de 1m.

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8. EMBARQUE E TRANSPORTE

- 8.1. Os trilhos serão embarcados e transportados em transporte marítimo, veículos apropriados e vagões ferroviários, devendo ser manuseados com atenção para evitar danos e/ou empeno.
- 8.2. Os trilhos devem ser transportados, amarrados e cintados em cinco ou três trilhos por amarração. A disposição dos nos amarrados de cinco trilhos deve ser de três trilhos com boleto para cima e dois trilhos com boleto para baixo. Nos amarrados de três trilhos deve ser de dois trilhos com boleto para cima e um trilho com boleto para baixo.
- 8.3. Em transporte de veículo terrestre, os amarrados de trilhos devem ser cintados por mais de três cintas, abrangendo todos os trilhos.
- 8.4. O controle e acompanhamento do embarque, fase final da inspeção, deverão ser feitos pelo representante da CBTU, para verificar se os trilhos embarcados foram os liberados, e se não houve danos. O embarque só deverá ser efetuado mediante autorização da Fiscalização.
- 8.5. Os trilhos deverão ser embarcados e transportados em amarrados com placas metálicas de identificação, separadamente por tipo, classe e comprimento (nominal e curto), a menos que a quantidade fornecida seja insuficiente para permitir embarque separado.
- 8.6. O controle de peso de transporte será feito pela pesagem do vagão ou carreta antes e após o carregamento, devendo considerar em ambos os casos, os pontaletes de madeira para separação dos trilhos.
- 8.7. No caso de transporte marítimo, os trilhos deverão ter proteção anticorrosiva, a qual deverá constar na proposta de fornecimento dos trilhos o produto a ser utilizado.

9. RELATÓRIOS

9.1. Planilha de Liberação de Trilhos para Embarque

- A Fiscalização da CBTU deverá apresentar ao Fabricante, uma planilha contendo a identificação dos trilhos aprovados na inspeção, e liberados para embarque (Anexo).

9.2. Certificado

9.2.1. Ao Fabricante obriga-se emitir um certificado com uma declaração de que os exames foram executados de acordo com esta Especificação.

9.2.2. Os resultados obtidos dos ensaios de propriedades mecânicas, dureza e composição

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química deverão ser incluídos no certificado.

9.2.3. Os certificados deverão ser emitidos para cada lote embarcado.

9.2.4. Deverá ser seguida a amostragem de acordo com tabela 17 da NBR 7590:2012 conforme a Figura X abaixo:

4 Amostragem

A amostragem deve ser feita de acordo com a Tabela 17.

Tabela 17 – Amostragem

Ensaio	Amostragem
Exames visuais	Em todos os trilhos acabados por corrida
Exames dimensionais	Em todos os trilhos acabados por corrida
Composição química	Uma para cada corrida de trilho laminado ou a cada 150 t
Resistência ao choque	Um ensaio para cada corrida de trilho laminado
Condições internas	Em todos os trilhos
Alongamento e resistência à tração	Uma para cada corrida de trilho laminado
Dureza Brinell	Dois ensaios para cada corrida de trilho laminado
Tensões residuais de fabricação	Uma para cada corrida de trilho laminado
Descarbonetação	Uma em cada corrida
Inclusão não metálica	Uma para cada corrida de trilho laminado, na região indicada na Figura A.19, respeitando-se o especificado em 5.4.2

10. GARANTIA

10.1. Os trilhos serão garantidos até 31 de dezembro do ano N + 5, sendo N o ano de fabricação marcado no trilho contra todo defeito de fabricação e não detectado no recebimento.

10.2. Durante a garantia, o trilho que romper, ou apresentar defeito, será retirado da linha e colocado à disposição do fornecedor, mediante comunicação por escrito, para fins de verificação. Estes trilhos devem ser substituídos dentro de 90 dias, a contar da comunicação, sem ônus para a CBTU.

10.3. O trilho substituído será considerado de propriedade da CBTU, caso não seja retirado dentro do prazo de 30 dias, a contar da substituição.

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