



GOVERNMENT OF INDIA  
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP  
DIRECTORATE GENERAL OF TRAINING

**COMPETENCY BASED CURRICULUM**

**CERTIFICATE COURSE ON**

# **Railway Track Maintenance**



**NSQF LEVEL- 2.5**

**SECTOR – CAPITAL GOODS AND MANUFACTURING**

# Railway Track Maintenance

**Duration: 240 Hours**

**NSQF LEVEL- 2.5**

**(Version: 1.0)**

**Designed in 2026**

**Developed By**

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

**&**

**CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE**

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## 1. COURSE INFORMATION

### 1.1 GENERAL

This course has been developed for CTS/CITS trainees to take up as optional courses during course of study for technical and behavioural upgradation of trainees to meet industry related job roles. During the 240 hours duration of Railway Track Maintenance course, a candidate is trained on professional skills & knowledge related to job role. The Broad components covered during the course are given below:

During the course, trainee will learn about the railway track maintenance including storage & handling of welding equipment & materials, check operation & maintenance of Long and Short welded rails (LWR/SWR), making of thermit welding components & its parts, selection of rails for welding, defects in weld – its causes and elimination which are required to plan, organize and execute the job as per the specifications.

### 1.2 COURSE STRUCTURE

Table below depicts the distribution of training hours across various course elements during a period of 6 weeks: -

S No.	Course Element	Notional Training Hours
1.	Professional Skill (Trade Practical)	180
2.	Professional Knowledge (Trade Theory)	60
	<b>Total</b>	<b>240</b>

### 1.3 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of course through assessment at the end of the course through skill testing at Training Center & CBT through examination conducted by DGT.

The minimum pass percentage for skill test is 60% and for theory will be 33% as in main CTS examination.

## 2. JOB ROLE

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### **Brief description of Job roles:**

Welder is also known as Welding Technician, this role is similar for all types of joining techniques like Gas Discharge Arc Welding (MIG, MAG, TIG), Resistance Welding (Spot Welding, Projection Welding, Butt Welding) and Automatic or Robotic Welding Process. This role is responsible for joining various types of metallic frames, structures, jigs, plates, sheets etc. using heating and melting process created through electrical power and gaseous discharge, maintaining process parameters, conducting quality checks on output product and maintaining a safe and healthy working environment on the shop floor.

### **Reference NCO-2015:**

- i) 7212.0301 - Welder

### 3. GENERAL INFORMATION

<b>Name of the Trade</b>	<b>RAILWAY TRACK MAINTENANCE</b>
<b>Reference NCO – 2015</b>	7212.0301
<b>NSQF Level</b>	2.5
<b>Duration of Craftsmen Training</b>	240 Hours
<b>Entry Qualification</b>	8 <sup>th</sup> Class passed and pursuing/ passed out Welder under CTS OR Welder under CITS Candidates
<b>Unit Strength (No. of Student), Space &amp; Power Norms</b>	Same as Welder under CTS OR Welder under CITS.
<b>Instructors Qualification</b>	<p>B.Voc/Degree in Mechanical / Metallurgy / Production Engineering from AICTE/UGC recognized university/ college with one year of teaching or industry experience in the welding field.</p> <p style="text-align: center;">OR</p> <p>03 years Diploma in Mechanical/ Metallurgy/ Production Engineering from AICTE/ recognized board of technical education with two years of teaching or industry experience in the welding field.</p> <p style="text-align: center;">OR</p> <p>NTC/ NAC passed in “Welder” Trade with three years' of teaching or industry experience in welding field.</p> <p><b>Essential Qualification:</b> Regular/ RPL variants of National Craft Instructor Certificate (NCIC) in Welder trade under DGT.</p> <p><b>NOTE:</b> Out of two Instructors required for the unit of 2(1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications.</p>
<b>List of Tools and Equipment</b>	As per Annexure – I

## 4. LEARNING OUTCOME

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*Learning outcomes are a reflection of total competencies of a trainee and assessment will be carried out as per the assessment criteria.*

### 4.1 LEARNING OUTCOMES

1. Plan and organize the work to make job as per specification.
2. Perform Handling & storage of welding equipment & material.
3. Perform operation & maintenance of Long & Short Welded Rails.
4. Make Thermit Welding components and its parts.
5. Select the rails for welding.
6. Defect in weld causes and eliminations.

SYLLABUS – RAILWAY TRACK MAINTENANCE			
Duration: 240 Hours			
Duration	Reference Learning outcome	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
Professional skills 25 Hrs.  Professional Knowledge 05 Hrs.	Plan and organize the work to make job as per specification.	<ol style="list-style-type: none"> <li>1. Importance of trade training, List of tools &amp; Machinery used in the trade.</li> <li>2. Safety attitude development of the trainee by educating them to use Personal Protective Equipment (PPE).</li> <li>3. First Aid Method and basic training.</li> <li>4. Safe disposal of waste materials like cotton waste, metal chips/burrs etc.</li> <li>5. Hazard identification and avoidance.</li> <li>6. Safety signs for Danger, Warning, caution &amp; personal safety message.</li> <li>7. Preventive measures for electrical accidents &amp; steps to be taken in such accidents.</li> <li>8. Use of Fire extinguishers.</li> </ol>	<p>All necessary guidance to be provided to the new comers to become familiar with the working of Industrial Training Institute system including stores procedures.</p> <p>Soft Skills, its importance and Job area after completion of training.</p> <p>Importance of safety and general precautions observed in the in the industry/shop floor.</p> <p>Introduction of First aid.</p> <p>Operation of electrical mains and electrical safety.</p> <p>Introduction of PPEs.</p> <p>Response to emergencies e.g.; power failure, fire, and system failure.</p> <p><b>Importance of housekeeping &amp; good shop floor practices.</b></p> <p>Introduction to 5S concept &amp; its application.</p> <p><b>Occupational Safety &amp; Health:</b> Health, Safety and Environment guidelines, legislations &amp; regulations as applicable.</p>
Professional skills 25 Hrs.  Professional Knowledge	Perform Handling & storage of welding equipment & material.	<ol style="list-style-type: none"> <li>9. Brief instruction &amp; Biodata of Trainees</li> <li>10. Railway's Organizational Structure, Role of Thermit welder in Railways. Basic Track structure.</li> </ol>	<p>Types of Fish plates &amp; Fish bolts.</p> <p>Fish Plates</p> <p>Joggled fish Plates</p> <p>Combination Fish-Plates</p>

<p>05 Hrs.</p>		<p>11. Different Types of Rails.  52 Kg/m Rail  60 Kg/m Rail (UIC 60)  60 Kg/m rail (60 E1)  136 RE rail</p> <p>12. Marking of Rails</p> <p>13. Identification of Different Qualities of Rails in the Field Longer rails</p> <p>14. Recommended Rail Section</p> <p>15. Different UTS rails, Mechanical &amp; chemical properties, permissible wear limit of SH &amp; new rail. Selection of rails for welding. Precautions while using R260, R350HT &amp; HH Rails, and precautions while selecting old rails for welding.</p>	<p>Elastic Fastenings: Types of ERC - ERC mark III, ERC mark V, zero toe load fastenings, J-clips.</p> <p>Rubber pads: Different types.</p> <p>Liners: Different types, GFN liners, metal liners, combination liners</p> <p>Introduction to Glued joints, Block Joint, SEJs, Points &amp; Crossing.</p> <p>Model room showing different types of rails, sleepers, elastic fastenings, SEJ, Glued joint, block joint, points and crossing.</p> <p>Introduction to SKV, Wider gap Welding, compressed air preheating, 3 piece mould AT welding technique, New development in AT-weld.</p> <p>Introduction to Flash Butt welding, Testing of FBW welds, Mobile flash-butt welding Planning &amp; executing of TWR with MOBILE FBW PLANT</p> <p>Technical Film/Video clip/Photographs on AT welding, FBW Welding</p> <p>Field visit for showing items mentioned at 1.4 &amp; 1.5 above.</p>
		<p><b>Handling &amp; storage of welding equipment &amp; material</b></p> <p>16. Packing condition, storage &amp; handling of portions.</p> <p>17. Check to be carried out for apparatus and consumables by welder before welding and basic knowledge regarding consumables being used in Small Track Machines.</p> <p>18. Hands on training for operation of small Track</p>	<p>Introduction to various welding equipment, weld trimmer, weld profile grinder, pre-heating equipment, abrasive rail cutting m/c, Rail tensor etc.</p>

		<p>Machines including weld trimmer, grinder, rail cutting, hole drilling, chamfering, etc.</p> <p>19. Hands on: Repair &amp; maintenance of Small Track machines, troubleshooting of Small Track machines.</p> <p>20. Working of Lorry</p> <p>21. Introduction to various welding materials used for welding, welding portion, mould, single shot crucible, auto thimble, luting sand etc. Regarding ingredients of Portion &amp; their function in reaction along with technique of Preheating</p>	
<p>Professional skills 25 Hrs.</p> <p>Professional Knowledge 05 Hrs.</p>	<p>Perform operation &amp; maintenance of Long &amp; Short Welded Rails (LWR/SWR).</p>	<p>22. Check Rail temperature</p> <ul style="list-style-type: none"> <li>• Short Welded Rail (S.W.R.)</li> <li>• Long welded Rail (L.W.R.)</li> <li>• Continuous welded Rail (C.W.R.)</li> </ul> <p>23. Action to be taken in case of Rail fractures/Weld failures</p> <p>24. Rail temperature-types of Rail Thermometers, measurement of temperature and working range and Hands on measurement.</p> <p>25. Working of Rail tensor, supper puller &amp; its use in welding</p> <p>26. De-stressing Operation of LWR</p> <p>27. De-stressing without Rail Tensors</p>	<ul style="list-style-type: none"> <li>• Introduction to LWR/SWR track.</li> <li>• Do's and Don'ts for LWR and SWR track.</li> </ul>

		28. De-stressing with Rail Tensors	
Professional skills 25 Hrs.  Professional Knowledge 05 Hrs.	Make Thermit Welding components and its parts.	<p><b>Part IV Detailed Procedure of Thermit Welding.</b></p> <p>29. Preparation before welding</p> <p>30. Cutting of rail end, elimination of bolt hole &amp; heat affected zone, checking squareness of joints, vertical and lateral alignment, measurement of gap, tolerances of rail end and rail joints before welding, cleaning of rail ends, checks to be carried out of by welder before welding. In a checklist form it should be explained.</p>	<ul style="list-style-type: none"> <li>• Basic knowledge of squareness of joints, vertical and lateral alignment, measurement of gap, tolerances of rail end</li> </ul>
Professional skills 30 Hrs.  Professional Knowledge 15 Hrs.	Select the rails for welding.	<p><b>Hands On - Selection of rails for welding.</b></p> <p>31. Practical demo of AT welding complete procedure from preparation of rail to final grinding for normal gap.</p> <p>32. Practical demo of AT welding -complete procedure from preparation of rail to final grinding for wide gap.</p> <p>33. Hands-on - Execution of AT welding normal gap welding by trainees.</p> <p>34. Hands-on - Execution of AT welding wide gap welding by trainees.</p>	<ul style="list-style-type: none"> <li>• Introduction of AT welding complete procedure, AT welding normal gap welding,</li> </ul>
Professional skills 50 Hrs.	Defect in weld causes and eliminations.	<p><b>Defects in weld causes and eliminations.</b></p> <p>35. Various welding defects,</p>	<ul style="list-style-type: none"> <li>• Trouble shoot and defect of welding causes and its operation.</li> </ul>

Professional Knowledge 25 Hrs.	<p>causes of defects (due to portion manufacturing defect, during execution and internal defect), precautions to be taken during welding to avoid weld defects.</p> <p>36. Maintenance of welding record.</p> <p>37. Various Tests on weld USFD, Hardness &amp; Load Deflection and breaking of Welds etc.</p>	<ul style="list-style-type: none"> <li>• Dos &amp; Don'ts in AT welding and checklist for execution.</li> </ul>
	<p><b>Safety &amp; Protection of Track.</b></p> <p>38. Precaution during work on running lines and in track circuited areas, electrified areas.</p> <p>39. Precaution during welding activity, handling / transporting materials.</p>	<ul style="list-style-type: none"> <li>• Basic safety and protection from rail track.</li> </ul>
	<p>40. Precaution during working on sharp Curves/Curves with poor visibility, Ghat sections. Precaution during working at accident spots, congested locations like bridge, tunnel.</p> <p>41. Hands on - Demonstration of various safety drills including exchange of hand signals &amp; protection of track.</p> <p>42. Technical film/video/photograph on Track Protection &amp; safety.</p>	<ul style="list-style-type: none"> <li>• Track Protection &amp; Personal Safety, Dos and Don'ts use of safety equipment.</li> </ul>
	<p><b>Part VIII - Exam and feedback</b></p> <p>43. Hands On - Execution of AT Welding by trainees &amp; discussion.</p> <p>44. Hands On -Lab Testing on</p>	<ul style="list-style-type: none"> <li>• Interview and checking working performance of trainees.</li> </ul>

		executed weld & discussion. 45. Discussion on field Problems and their Solutions.	
<b>Feedback &amp; issue of Completion Certificate after successful completion.</b>			

## 6. ASSESSMENT CRITERIA

LEARNING OUTCOME	ASSESSMENT CRITERIA
1. Plan and organize the work to make job as per specification	Identification of tools & machineries used in the process.
	Observe safety procedure during above operation as per standard norms and company guidelines.
	Identification of common hazards for the process and preventive measures to be taken to avoid them.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
2. Perform Handling & storage of welding equipment & material.	Observe the basic track structures in railways and role of thermit welding in it.
	Identification of different types and qualities of rails in the field and their mechanical & physical properties.
	Check recommended rail sections for welding as per norms
	Observe packing condition, storage and handling of portions.
	Check to be carried out for apparatus and consumables before welding
3. Introduction to Long & Short Welded Rails and its operation.	Do's and Don'ts for LWR and SWR track
	Measuring of rail temperature and its working range.
	Working of Rail tensor, supper puller & its use in welding
	De-stressing operation of LWR with or without rail tensors.
4. Make Thermit Welding components and its parts.	Perform detailed process of themit welding
	Check squareness of joints, vertical and lateral alignment
	Check to be carried out of by welder before welding
5. Select of rails for welding.	Practical demo of AT welding complete procedure
	Demonstrate AT welding -complete procedure from preparation of rail to final grinding
	Hands-on - Execution of AT welding wide gap welding
6. Defect in weld causes and eliminations.	Execute various welding defects, causes of defects
	Maintenance of welding record
	Track Protection & Personal Safety, Dos and Don'ts

LIST OF TOOLS & EQUIPMENT			
S No.	Name of the Tools and Equipment	Specification	Quantity
<b>Same as Welder under CTS</b>			
<b>Additional Tools &amp; Equipment required</b>			
Pre-Heating Equipment [Compressed Air-Petrol Pre-heating technique]			
1.	Suitable compressor system with pressure gauges		1 No.
2.	Torch(Burner) complete		1 No.
3.	Torch (burner) keys		1 No.
4.	Torch (burner) stand		1 No.
Small track machines			
5.	Abrasive Rail Cutter		1 No.
6.	Rail Cutting Wheel Abrasive Disc As Required		1 No.
7.	Rail Drilling Machine with Rail profile guided grinding trolley (Grinding wheel).		1 No.
8.	Weld Trimmer Power Pack Version		1 No.
9.	Rail Profile Weld Grinder		1 No.
10.	Portable A.C generator (3 kVA rated petrol run)suitable for running of Rail Profile Grinder and lighting arrangements.		1 No.
11.	Box type Gauge cum Level (BG) along with Spirit Level		1 No.
12.	Chamfering Kit- Manual/ Chamfering Machine- Battery operated		1 No.
13.	Magnetic Base type Rail Thermometer		1 No.
14.	Gang / Worksite Remote Control Hooter		1 No.
Other Equipment			
15.	3 Piece mould, Single shot Crucible, Lutting sand, Portion with Igniter and complete		1 Set (For 60Kg rail)
16.	3 Piece mould, Single shot Crucible, Lutting sand, Portion with Igniter and complete		1 Set (For 52 Kg rail)
17.	Sodium silicate liquid		As required
18.	Crucible caps		1 No.
19.	Crucible forks		1 No.

20.	Crucible stands		1 No.
21.	Crucible rings		1 No.
22.	Mould pressure (clamp)		1set
23.	Cleaning rod round		1 No.
24.	Tapping rod		1 No.
25.	Straight edge 1m long		1 No.
26.	Straight edge 10 cm. long		1 No.
27.	Aluminium/steel rod for thermal plugging		2 Nos.
28.	Leather washers for pump		2 Nos.
29.	Gap gauges and height gauge		1 No.
30.	Filler gauge		1 No.
31.	Tools for punching the marking		1 Set
32.	Mould shoes		2 Pairs
33.	Stop watch		1 No.
34.	Pyrometer/Thermal chalk for measurement of rail temperature		1 No.
35.	Wooden wedges for rail alignment		12 Nos.
36.	Mirror 150 x 100mm with handle		1 No.
37.	Tool box containing –		
38.	Hot sets (chisels) (for Emergency use only)		2 Nos.
39.	Funnel tin (for pouring petrol )		1 No.
40.	Adjustable spanner		1 No.
41.	Hammer 1 kg		1 No.
42.	Sledge hammer double panel 5 kg.		2 Nos.
43.	Steel wire brush		1 No.
44.	Blue goggles		1 Pair.
45.	Paint brush 50mm		1 No.
46.	Slag container (bowl)		1 No.
47.	Asbestos gloves		2 Pairs.
48.	Hose clips		4 Nos.
49.	Pliers		1 No.
50.	Rail file 350x40x6mm (For Emergency use only)		2 Nos.
51.	To ensure quality, protective clothing, shoes gear & Leather gloves.		1 Set

**ANNEXURE-II**

The DGT sincerely acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts and all others who contributed in designing/ revising the curriculum. Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

<b>List of members attended the Trade Committee Meeting for designing of Railway Track Maintenance syllabus under Short Term Course held at IRICEN, Pune</b>			
<b>Sl. No.</b>	<b>Name and Designation (Shri/Smt./Kumari)</b>	<b>Organization with Address</b>	<b>Remarks</b>
1.	Rajeev Kumar Sinha, ADG/IRICEN	IRICEN, PUNE	
2.	T. RAGULAN, DIRECTOR	CSTARI, KOLKATA	Chairman
3.	SHRIRANG KAMBLE, SR.PROF. (BRIDGE)	IRICEN, PUNE	Member
4.	HARI RAM, SR.PROF.TRD	IRIEEN, NASHIK	Member
5.	AKHILESH PANDEY, ASSISTANT DIRECTOR	CSTARI, KOLKATA	Member
6.	J.M PATEKARI, ASST.PROFESSOR	IRICEN	Member
7.	JANARDAN PRACAD, ASSISTANT PROFESSOR	IRICEN	Member
8.	R.K. PANDEY, SR. INSTRUCTOR	IRIEEN, NASHIK	Member
9.	DHUMAL SACHIN MANIKRAO, DEPUTY DIRECTOR	DVET, REGIONAL OFFICE, PUNE	Member
10.	INDIRESH RANGRAO BHILEGAONKAR, PRINCIPAL	GOVT.I.T.I. AUNDH (WOMEN)PUNE	Member
11.	UBALE KISHOR SODAMRAG, INSPECTOR	REGIONAL OFFICE PUNE	Member
12.	CHAVAN SUNIL VASANT, CRAFT INSTRUCTOR ELECTRICIAN	ITI AUNDH PUNE	Member
13.	PAWAR SANTOSH TULSHIRAM, CRAFT INSTRUCTOR (WELDER)	GOVT.I.T.I. AUNDH, PUNE-67	Member
14.	PAWALE HANUMANT DATTATRAY, CRAFT INSTRUCTOR -CTOK-FITTER	GOVT.I.T.I. AUNDH, PUNE	Member
15.	PANKAJ NIMBA BHAMAKE, CRAFT INSTRUCTOR ELECTRICIAN	GOVT.I.T.I. NASHIK	Member
16.	CHABUKCWAR TUKARAM PRABHAKAR, CRAFT INSTRUCTOR ELECTRICIAN	GOVT.I.T.I. NASHIK	Member
17.	JITENDRA J. SAMBARE, CRFT INSTRUCTOR	GOVT. INDUSTRIAL TRAINING INSTITUTE SINNAR, NASHIK	Member

18.	NITESH ANANDA PATIL, TRAINING OFFICER	NSTI MUMBAI	Member
19.	DIPAK DAGADU PATIL, DEPUTY MANAGER (QUALITY	M/S- HIND RECTIFIERS LIMITED, NASHIK	Member
20.	TELANGI MOHAN KANKANNA, VICE PRINCIPLE	GOVT. ITI NASHIK	Member
21.	DILIP VISHNU ADHAV, PLANT HEAD	LUCY ELECTRIC INDIA PVT.LTD. AHMEDABAD NASHIK	Member
22.	RAVINDRA SIDRAMAPPA MUNDASE, DEPUTY DIRECTOR	GOVT. INDUSTRIAL TRAINING INSTITUTE, NASHIK	Member
23.	ANIL GOTIRAM GAVIT, JOINT DIRECTOR	REGIONAL OFFICER, NASHIK	Member
24.	BRINDABAN DAS, DEPUTY DIRECTOR	CSTARI KOLKATA	Member
25.	ABHAY ARUN MAHISHI, JOINT DIRECTOR	CSTARI KOLKATA	Member
26.	Jai Kumar Kanojiya, Sr. Instructor Track – II	IRICEN Pune	Member