

# Advanced Welding Training Institute

## Training Module-Course Contents

Mod. No.	Course Title	Target Audience	Topics Covered
<b>TM010</b>	Basic Course in welding for Beginners	New recruits / Technicians from other trades redeployed as welders	Introduction to different welding processes. Weld defects causes and remedies. Introduction to Oxy-acetylene gas cutting. Practical in MMAW. Test for IS: 817 standard. <b>(About 30 Hours Theory &amp; 100 Hours of Practical)</b>
<b>TM020</b>	Refresher Course For Welders	Welders who have completed Basic Welding course (TM010) / welders of all grades.	Principles and techniques of welding (MMAW, GMAW & SAW). FCAW with CO2 gas shielding. Weld defects causes and remedies. Distortion and its control. Different positions welding in GMAW. Introduction to ISO 9606 standards. <b>(About 25 Hours Theory &amp; 75 Hours of Practical)</b>
<b>TM030</b>	TIG Welding for artisans	Welders who have completed TM010 or TM020 or welding technicians with 2 yrs experience.	Introduction to TIG welding process. TIG welding accessories, consumables and techniques. TIG Welding defects causes and remedies. Practical training on TIG welding. Introduction to ISO: 9606 / IS: 7310 testing standards. <b>(About 8 Hours Theory &amp; 28 Hours of Practical)</b>
<b>TM080</b>	Stainless Steel Welding for Welders	Welders who have completed Basic Welding course / welders of all grades	Introduction to stainless steel welding techniques. Defects causes and remedies. Distortion control. Practical in MMAW, FCAW & MIG welding for stainless steel. Introduction to ISO 9606 / IS 7310 testing standards, Fabrication Challenges. <b>(About 8 Hours Theory &amp; 28 Hours of Practical)</b>
<b>TM110</b>	Short Refresher course for welders	Welders of all Grades with minimum 2 years of experience.	Principles of CS & SS Welding (MMAW, GMAW, FCAW & TIG). Weld Joint Preparation. Weld defects causes and Remedies. Distortion Control. Critical Weld Joints in ICF coaches. Introduction to ISO 9606 / IS 7310 testing standards. <b>(About 8 Hours Theory &amp; 28 Hours of Practical)</b>
<b>TM110A</b>	Pre-Promotional Refresher Training for Welders	Welders before the next grade promotion	Weld defects causes and Remedies. Distortion Control. Critical Weld Joints in ICF coaches. Introduction to ISO 9606 / IS 7310 testing standards
<b>TM160</b>	Certification for welders as per ISO 9606-1	IS: 7318 / IS: 7310 qualified welders with 2 yrs experience	Introduction to ISO 9606-1 and its need in the present scenario. Explaining welders about the evaluation procedure followed by test. <b>(2 hours briefing followed by practice and test)</b>
<b>TM240</b>	Troubleshooting of MIG / MAG welding plants	Welders of IR having minimum 2yrs of experience or who have completed TM020 module.	Setting up MIG welding plant & wire feeder. Understanding recommended parameters for welding. Good maintenance practices in welding plant and wire feeder. Usage of different shielding gases. Trouble shooting in MIG torch. <b>(About 6 Hours Theory &amp; 12 Hours of Practical)</b>
<b>TM300</b>	Self-inspection course for welders & Fitters	Welders & Fitters of all grades	Points to be checked before, during & after welding, Understanding WPS and welding symbols in drawing. Types of defects and their identification. Corrective and preventive actions to be followed.
<b>TM330</b>	Training on GMAW welding	Welders who have completed Basic Welding course / welders of all grades.	Introduction to MIG welding process. MIG power source, accessories, consumables and techniques. MIG Welding defects causes and remedies. Practical training on MIG welding. <b>(About 8 Hours Theory &amp; 28 Hours of Practical)</b>
<b>VM200</b>	Welder certification programs as per ISO:9606	Welders from vendors of ICF/ other Railways having sufficient experience.	Introduction to ISO 9606-1 and its need in the present scenario. Explaining welders about the evaluation procedure followed by test. <b>(2 hrs briefing followed by practice and test)</b>

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EM050	Training for Newly Recruited Supervisors in Welding and NDT	Apprentice JEs and SSEs (Direct recruits from RRB and promoted JEs).	Introduction to welding processes and metallurgy. Introduction to SS welding. Inspection and testing of welding. Welding defects causes and remedies. Introduction to Oxy- acetylene gas cutting and plasma cutting. Resistance welding, LASER welding, Introduction to ISO 3834 standards. Objective type Test.
EM090	Stainless Steel Welding Course for Supervisors	The supervisors engaged in fabrication / repair of coach and wagon using Stainless Steel welding-	Introduction to SS welding. Application of TIG, MIG, Pulse MIG. Dissimilar metal welding. Welding defects causes and remedies. Welding codes and practices. WPS & PQR preparation as per ASME Section IX. EN 287, EN 15085 & ISO 3834 standards. Distortion control. Post weld surface treatment for SS. Welding practice. Objective Test.
EM150	Cost reduction methods in fabrication	All SSE, JE, & CMT staff of Indian Railways including Design staff.	Productivity improvement, automation and robotics, Time study methods, Lean Manufacturing, 5S principles, 6 sigma & 7 QC tools as applicable to fabrication. Welding economics..
EM340	Welding course for design & planning engineers.	Design and planning engineers of Production Units, Workshops, Zonal Railways of IR.	Introduction to various welding processes. Design of weld joints. Design requirement as per EN 15085, welding symbols as per ISO- 2553. Weld defects, causes and remedies. WPS as per ISO 15609. Pre and Post weld heat treatments. Failure analysis. Cost saving ideas for design engineers. Checklist for prototype inspection including usage of gauges and other instruments.
EM360	Course on Visual inspection as per ISO 3834 & EN 15085 requirements	Inspection and Production Personnel of Indian Railways engaged for rolling stock fabrication & maintenance.	Introduction to ISO 3834 & EN 15085 standards. Visual inspection as per ISO 17637. Welding defects causes and remedies. Material grouping as per ISO/TR 15608. WPS preparation as per ISO 15609. Welder qualification as per ISO 9606. Practical usage of gauges for weld measurements. Acceptance criteria as per ISO 5817. Examination (both theory and practical) <b>(About 16 Hours Theory &amp; 8 Hours of Practical)</b>
EM380	Welding Power source and its selection	SSEs & JEs of ICF and other Railway workshops	Types of power sources, Thyristor, MOSFET & IGBT controlled, elementary level trouble shooting
EM410	Weld measurement & usage of gauges	SSEs & JEs of ICF & other Railway workshops	Weld dimensions like Leg Size, Throat Size, etc. Welding defects measurement procedures. Usage of measuring instruments like Cam gauge, Universal gauge, Vernier caliper, depth gauge etc. <b>(About 16 Hours Theory &amp; 8 Hours of Practical)</b>
EM420	Training on advanced welding processes (CMT, robotic & LASER)	Supervisors of IR working in welding related activities	Introduction to Advanced Welding Processes, Working principles and machine layout. Shop visit to demonstrate working of machines. <b>(About 8 hours Theory &amp; 8 Hours of machine working demo)</b>

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EM430	Training program on quality management	Supervisors of ICF & other Railway workshops	Inspection and testing procedures in shell & furnishing. Quality Assurance Plan (QAP). Quality Deficiency Cost (QDC). Work test certificates (WTC). Rejection & replacement procedures. Role of Inspection agencies. Customer complaint analysis
EM450	Metallurgy & Heat treatment for Non-Metallurgists	All SSE, JE, & CMT staff of Indian Railways including Design staff.	Basics of Metallurgy, Fe-C diagram, Heat Treatments, Different Metal working processes, Welding Metallurgy, selection of materials, selection of electrodes, Mechanical testing, Corrosion Engineering.
EM 460	Metallography of Ferrous Materials	CMT Staffs of Indian Railways	Fe-C diagram, Heat Treatments Structure-Property relationship, Micro structure Identification, Grain size measurement
EM900	Welding coordinators for railway applications	Supervisors with prior work experience in welding area	Various welding processes, materials, welding metallurgy, DT & NDT, ISO: 3834 requirements, Welder qualification, welding procedure specification, role of welding coordinator. (Objective type test, followed by viva voce)