M&CDIRECTORATE

RDSO-MC0WELD(GEN)/1/2025 Date:03.03.2025

Sub: Uploading of welding training programme schedule & course content in M&C Dte home page.

In reference to the above subject, ED/M&C has permitted to upload welding training programme schedule-2025 & course content in RDSO website (www.rdso.indianrailways.gov.in) in M&C Dte home page(under vertical/R&T)

Therefor it is requested to arrange for uploading welding training programme schedule-2025 & course content in M&C Dte home page(under vertical/R&T) of RDSO website (www.rdso.indianrailways.gov.in).

3.3.2025

(Rajesh Srivastava)
Director/M&C

Director/TMS

TRAINING PROGRAMME ON WELDING TRAINING FOR RAILWAY SUPERVISORS (CMA/CMS/JE/SSE) 2025

S.N	Code	Course	Month	Duration (3 days)
1.	W-I	Welding metallurgy and weldability of steel, stainless steel basic of welding.	April	23.04.25 to 25.04.25
2.	W-II	Fusion arc welding process & technique used in IR (welded bridge girder, coach fabrication etc)	June	04.06.25 to 06.06.25
3.	W-III	Welding defects (Cause/remedies) for its acceptance/rejection as per standards. Welding inspection operations (Welding quality assurance).	July	09.07.25 to 11.07.25
4.	W-IV	Dissimilar metals welding and repairing of cracked railway components.	August	20.08.25 to 22.08.25
5.	W-V	Basic principles of flash butt welding & alumino thermit welding and its methodology application in Railways.	October	29.10.25 to 31.10.25

Course co-ordinator : Rajesh Srivastava, Director/M&C-I

COURSE CONTENT:

Welding metallurgy, basic of welding and weldability of steel, stainless steel, (W-I):

Definition & terms of welding, weldability of steel, Heat affected zone, weld metal dilution, weld metal solidification microstructure & cracking, Types of welding symbol, joints and welding Positions, an overview on fusion arc welding Processes, Type of electrodes, Functions of electrode flux covering, polarity, shielding Gases, Modes of Metal Transfer, welding technique, single-pass welds vs multipass weld, Heat input, preheat of base metal, welding parameters, welding environment, welding safety. Practical demonstration & lab visit.

Fusion arc welding process & technique used in IR (welded bridge girder, coach fabrication etc) (W-II):

Arc power sources: Volt-Ampere characteristics, open-circuit voltage, alternating-current power sources, direct-current power sources, safe practices.

Fusion arc welding process: Shield metal arc welding, gas metal arc welding, gas tungsten arc welding, flux cored arc welding, submerged arc welding, laser beam welding, arc stud welding, arc cutting and gouging, etc. Practical demonstration & lab visit.

Welding defects (Cause/remedies) for its acceptance/rejection as per standards (ISO: 5817). Welding inspection operations (Welding quality assurance) (W-III):

Weld quality: Weld and weld related discontinuities with reference to (1) Procedure/Process (2) Metallurgical & (3) Base Metal

(1) *Procedure/Process*
(a)Geometric: Misalignment, distortion, final dimension, weld size, overlap, weld profile, convexity, concavity, weld reinforcement.
(b)Weld/Structural: Incomplete fusion, incomplete joint penetration, undercut, underfill, inclusions, slag, tungsten.
Cracks- hot/cold, weld/base metal, longitudinal/transverse, root, toe, crater, throat, underbead & delayed cracking.
porosity, scattered, cluster, aligned, piping, surface irregularities, weld ripples, spatter, arc strikes
(2)Basic Metallurgy: Mechanical- strength, ductility, hardness, corrosion resistance etc
(3) Base Metal: laminations, delamination, lamellar tears, seams and laps etc.

Non-destructive examination Methods(DPT,MPT,UT,RT etc)

Practical demonstration & lab visit.

Dissimilar metals welding and repairing of cracked railway components (W-IV):

Definition and scope, weld metal dilution and alloying, dissimilar metal characteristics- melting temperatures, thermal conductivity, thermal expansion, magnetic effects, joint design, mechanical and physical properties, microstructural stability, corrosion resistance.

Filler metal selection, welding process selection, stainless steel to carbon or low alloy steel, austenitic stainless steel filler metal, Schaeffler diagram vs Delong diagram vs WRC-92 diagram. Practical demonstration & lab visit.

Maintenance & repairing of steel components by welding:
Preventive maintenance and corrective repair welding, repair welding procedures etc.

Flash butt welding & alumino thermite welding and its methodology application in Railways (W-V).

Basic principles of flash butt welding & alumina-thermite welding. Rail welding by FBW & AT welding process. Microstructure of weld metal, parent metal & HAZ, effect of cooling rate. Various rail defects pertaining to FBW & ATW. Standardization of FBW parameter for different grade of rails.

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