



Sample Test Project

Regional Skill Competitions – Level 3

Skill 10 – Welding

Category: Manufacturing and Engineering Technology

Table of Contents

A. Preface	3
B. Test Project.....	4
C. Marking Scheme	5
D. Infrastructure List.....	10
E. Instructions for candidates	11
F. Health, Safety, and Environment	12

Section - A

A. Preface

Skill Explained:

Welding is a fabrication or sculptural process that joins materials, usually metals or thermoplastics, by causing fusion, which is distinct from lower temperature metal-joining techniques such as brazing and soldering, which do not melt the base metal. In addition to melting the base metal, a filler material is typically added to the joint to form a pool of molten material (the weld pool) that cools to form a joint that is usually stronger than the base material. Pressure may also be used in conjunction with heat, or by itself, to produce a weld. Welding also requires a form of shield to protect the filler metals or melted metals from being contaminated or oxidized.

Although less common, there are also solid state welding processes such as friction welding in which metal does not melt.

Eligibility Criteria (for IndiaSkills 2018 and WorldSkills 2019):

Competitors born on or after 01 Jan 1997 are only eligible to attend the Competition.

Total Duration: 15.3 Hrs

1. DAY 1: Pressure vessel (10 hours)
2. DAY 2: Weld coupons (3 hours)
3. DAY 3: Aluminum (2hrs 30 min)

Section - B

B. Test Project

The Standards Specification is a guide to the required training and preparation for the skill competition.

In the skill competition the assessment of knowledge and understanding will take place through the assessment of performance.

The individual needs to know and understand:

- The different steps that lead to the setup of the machine
- The different modes of machine operation
- Programming, setting and operating of CNC lathe
- Mathematics, especially calculations in trigonometry
- Mounting tools, setting tool parameters
- How to modify clamping device, such as jaws, etc.
- How to clamp the part, correctly, and safely
- How to set the work shift and offset system
- How to run the program safely
- Stopping and restarting a cycle
- Emergency stopping
- Safety equipment (how to use, when to use, etc.)
- Use of appropriate measuring- or gauging instruments
- Quickly react if anything goes wrong.

Test module attached as annexure

1. **Pressure vessel (PDF attached)**
2. **Weld coupons (PDF attached)**
3. **Aluminum (PDF attached)**

Section – C

C. Marking Scheme

Marking Scheme: The Assessment is done by awarding points by adopting two methods, Measurement and Judgments

- Measurement - One which is measurable
- Judgments - Based on Industry expectations

WORLD SKILL INDIA MARKING FORM					
Sub Criterion		Pressure Vessel- Pressure Test			
Competitor Name					
Aspect ID	Max Mark	Aspect of Sub Criterion- Description	Requirement/ Normal Size	Result or Actual Value	Mark Awarded
M1	1	Vessel presented for assessment test	YES/NO		
M 2	2	Vessel holds pressure at 10 Bar	YES/NO		
		No leaks at 10 Bar			
M 3	2	Vessel holds pressure at 20 Bar	YES/NO		
		No leaks at 20 Bar			
M4	2	Vessel holds pressure at 30 Bar	YES/NO		
		No leaks at 30 Bar			
M 5	2	Vessel holds pressure at 40 Bar	YES/NO		
		No leaks at 40 Bar			
M 6	2	Vessel holds pressure at 50 Bar	YES/NO		
		No leaks at 50 Bar			
M 7	2	Vessel holds pressure at 55 Bar	YES/NO		
		No leaks at 55 Bar			
M 8	2	Vessel holds pressure at 60 Bar	YES/NO		
		No leaks at 60 Bar			
	15				

WORLD SKILL INDIA MARKING FORM					
Sub Criterion		Visual Assessment of ALUMINUM			
Competitor Name					
Aspect ID	Max Mark	Aspect of Sub Criterion-Description	Requirement/Normal Size	Result or Actual Value	Mark Awarded
M 01	0.6	Project is free from stray arc strike	Defects		
		One defect = 0.4 marks, 2 defects = 0.2 marks, 3 or more defects = 0 marks			
M 02	0.6	Butt weld bead widths uniform and regular?	Defects		
		Allow 1.5 mm variation in width. Each weld outside the variation = 1 defect			
		One defect = 0.4 marks, 2 defects = 0.2 marks, 3 or more defects = 0 mark			
M 03	0.6	All stop/restarts are smooth on the capping layer	YES/NO		
		Allow 1 mm variation between stop/start			
M 04	0.6	Weld metal is completely free from surface porosity or inclusions?	Defects		
		- 1 visible pore = 1 defect			
		One defect = 0.4 marks, 2 defects = 0.2 marks, 3 or more defects = 0mark			
M 05	0.5	Welded joints are free from undercut?	YES/NO		
		Disregard depth of 0.5mm or less			
M 06	0.6	Butt weld joints free from excessive face reinforcement?	Defects		
		Greater than 1.5 mm. Less than or equal to 10mmL = 1 defect accumulative			
M 07	0.8	Fillet weld leg lengths are in accordance with the specifications?	Defects		
		(-0 /+2.0 mm). Less than or equal to 10mmL = 1 defect accumulative			
		One defect = 0.6 marks, 2 defects = 0.4 marks, 3 or more defects = 0 marks			
M 08	0.6	Corner welds exhibit a full radius	Defects		

		contour?			
		(-1.0mm/+1.0mm). Less than or equal to 10mmL = 1 defect accumulative			
		One defect = 0.4 marks, 2 defects = 0.2 marks, 3 or more defects = 0 marks			
M 09	0.5	All fillet welds free from burn through?	Defects		
		- less than or equal to 10mmL = 1 defect (accumulative)			
		One defect = 0.4 marks, 2 defects = 0.2 marks, 3 or more defects = 0 marks			
M 10	2	All butt and corner joints display penetration/root fusion?	% Penetration		
		100% = 2.0 marks, >or=90% = 1.5 marks, >or=75% = 1.0 marks			
		>or=50% = 0.4 marks, <50% = 0 marks			
M 11	0.8	Welded joints are free from excessive penetration?	Defects		
		Greater than 3 mm. Zero mark if the total amount of penetration is less than 75 %			
		- less than or equal to 10mmL = 1 defect (accumulative)			
		One defect = 0.6 marks, 2 defects = 0.3 marks, 3 or more defects = 0 marks			
M 12	0.8	Weld penetration completely free from excessive root concavity or "Suck Back"?	Defects		
		Allow depth of 0.5 mm or less. Zero mark if the total amount of penetration is less than 75 %			
		One defect = 0.6 marks, 2 defects = 0.3 marks, 3 or more defects = 0 marks			
M 13	0.5	Joints are free from linear misalignment	YES/NO		
		Allow 1mm variation			
M 14	0.5	Weld joints are completely welded?	YES/NO		
		Fully formed bead may not terminate greater than or equal to 3mm from end of plate			
	10				

WORLD SKILL INDIA MARKING FORM					
Sub Criterion		Non-Destructive (X-Ray) Test Pipe			
Competitor Name					
Aspect ID	Max Mark	Aspect of Sub Criterion- Description	Requirement/ Normal Size	Result or Actual Value	Mark Awarded
M1	1	ISO 5817-Quality level of imperfections- Class D	YES/NO		
		CLASS D =1 MARK			
M 2	2	ISO 5817-Quality level of imperfections- Class C	YES/NO		
		CLASS C = 2 MARKS			
M 3	2	ISO 5817-Quality level of imperfections- Class B	YES/NO		
		CLASS B =2 MARKS			
M4	2	ISO 5817-Quality level of imperfections- Class A	YES/NO		
		CLASS A=2 MARKS			

WORLD SKILL INDIA MARKING FORM					
Sub Criterion		Non-Destructive (X-Ray) 10mm Test Plate			
Competitor Name					
Aspect ID	Max Mark	Aspect of Sub Criterion- Description	Requirement/ Normal Size	Result or Actual Value	Mark Awarded
M1	1	ISO 5817-Quality level of imperfections- Class D	YES/NO		
		CLASS D =1 MARK			
M 2	2	ISO 5817-Quality level of imperfections- Class C	YES/NO		
		CLASS C = 2 MARKS			
M 3	2	ISO 5817-Quality level of imperfections- Class B	YES/NO		
		CLASS B =2 MARKS			
M4	2	ISO 5817-Quality level of imperfections- Class A	YES/NO		
		CLASS A=2 MARKS			

WORLD SKILL INDIA MARKING FORM					
Sub Criterion		Non-Destructive (X-Ray) 16mm Test Plate			
Competitor Name					
Aspect ID	Max Mark	Aspect of SubCriterion- Description	Requiment/N ormal Size	Result or Actual Value	Mark Awarded
M1	1	ISO 5817-Quality level of imperfections- Class D	YES/NO		
		CLASS D =1 MARK			
M 2	2	ISO 5817-Quality level of imperfections- Class C	YES/NO		
		CLASS C = 2 MARKS			
M 3	2	ISO 5817-Quality level of imperfections- Class B	YES/NO		
		CLASS B =2 MARKS			
M4	2	ISO 5817-Quality level of imperfections- Class A	YES/NO		
		CLASS A=2 MARKS			

Section - D

D. Infrastructure List

Equipment, Tools & PPE List & Consumables

1. **Welding Machine (with Accessories)** : 1 No for every 2 candidates
(GTAW- 40%, GMAW-40% & MMAW-20%)
2. **Welding Consumable:** Electrodes : E7018 & ER308L (2.5/3.15 & 4 mm)
MIG Wire : ER-70S6 / ER308L (0.8/1.2 mm)
3. **Material:**
 - a. C.S Plate/ Sheet as per drawing
 - b. S.S Plate/ Sheet as per drawing
4. **Electrode Oven** -1 No (350°C)
5. **Angle & Straight Grinder**- 3 Nos. each with cutting & grinding wheels.
6. **Pedestal Grinder**- 1 No.
7. **Oxy Fuel Gas Cutting Set**- 2 Nos. with different Nozzles
8. **Plasma Cutting Set**- 1 No.
9. **Bench Vice**- 6 Nos/ or as per participants
10. **Gas Cylinders**- O₂, Acetylene, CO₂, Argon 99.9%, Argo-shield (Ar 80% - Co₂ 20%) in sufficient nos with regulators & Hose
11. **PPEs:** As per participants
 - a) Welding Helmet-10 with different DIN black glass
 - b) Cutting grinding Goggles - 10 nos.
 - c) Anvil - 1 no.
 - d) Ear Plug - 1 Pkt.
 - e) Mask - 10nos.
 - f) Welding Gloves - 12 Pairs
12. **DP Testing**- 2 sets.
13. **Tools:**
 - a) Wire Brush - 12 Pcs
 - b) Tongs & Chipping Hammer - 12 nos each
 - c) S.S. Wire Brush - 6 Pcs
 - d) Chisel - 6 Pcs
 - e) Hammers 500 grms - 4 Pcs
 - f) Hackshaw 1 inch Blade - 4 Pcs
 - g) All Flat/Half Round Files
 - h) Letter/ No. Punch- 1 set each small & big.
 - i) Silicon Spray Bottles - 3 nos.
 - j) Different diameter Tungsten Electrodes of Cerium
 - k) Welding Gauges
 - l) Steel Scale - 10 nos
 - m) Set Squares - 12 nos.
 - n) 1 Kg. Hammer - 1 no.
 - o) Digital Stop Watch - 3 nos.
 - p) Flash Light - 2 nos.
 - q) Wooden Pallet - 4 nos.
 - r) Contact tip spare - 6 nos. (GMAW)

Section – E

E. Instructions for candidates

INSTRUCTIONS TO THE COMPETITOR

- Competitor must use the given raw material during the competition.
- Any Additional material use will lead to deduction of the marks.
- Follow all the safety requirements such as use of PPE, good housekeeping etc. where ever applicable.

Section – F

F. Health, Safety, and Environment

1. All accredited participants and supporting volunteers will abide by rules and regulations with regards to Health, Safety, and Environment of the Competition venue.
2. All participants, technicians and supporting staff will wear the required protective Personnel clothing.
3. All participants will assume liability for all risks of injury and damage to property, loss of property, which might be associated with or result from participation in the event. The organizers will not be liable for any damage, however in case of Injury the competitor will immediately inform the immediate organizer for medical attention.