

## Instruction Sheet for the Candidate

<b>Qualification</b>	<b>National Vocational Certificate in Metal Forming &amp; Processing Level 5</b>
<b>Competency Standard</b>	Perform GMAW (MIG/MAG) and FCAW Welding
<b>Purpose of Assessment</b>	<b>Formative Assessment</b>
<b>Candidate Details</b>	Name _____ Registration/Roll Number _____
<b>Guidance for Candidate</b>	<p><b>To meet this standard, you are required to complete the following within 04 Hrs. time frame (for practical demonstration &amp; assessment):</b></p> <ul style="list-style-type: none"> <li>• CU1. Prepare Welding Machine for GMAW (MIG/MAG)</li> <li>• CU2. Make Welds on Carbon Steel Plate with GMAW Flat (1F) and Flat (1G)</li> <li>• CU3. Make Welds on Carbon Steel Plate with GMAW Horizontal (2F) and Horizontal (2G)</li> <li>• CU4. Prepare Welding Machine for FCAW</li> <li>• CU5. Make Welds on Carbon Steel Plate with FCAW Vertical (3F) and Vertical (3G)</li> <li>• CU6. Perform Post Welding Operations</li> </ul>
<b>Time: 04 Hrs.</b>	During a practical assessment, under observation by an assessor, you are required to
<b>Minimum Evidence Required</b>	<p><b>CU1. Prepare Welding Machine for GMAW (MIG/MAG)</b></p> <p><b>P1.</b> Identify welding requirements from the job, welding procedure specifications and/or technical drawings</p> <p><b>P2.</b> Carry out the pre cleaning of base metal as per requirement.</p> <p><b>P3.</b> Prepare GMAW welding machine in accordance with welding procedure specifications/ manufacturer instructions</p> <p><b>P4.</b> Install CO<sub>2</sub>/Argon/Helium gas cylinder to the GMAW/MAG machine as per job requirement</p> <p><b>P5.</b> Install gas heater for CO<sub>2</sub> cylinder as per requirement</p> <p><b>P6.</b> Connect welding machine to an independent power supply</p> <p><b>P7.</b> Install the consumable filler wire spool in wire feeding unit</p> <p><b>P8.</b> Set polarity indicated in the welding procedure specifications</p> <p><b>P9.</b> Carry out pre-heating of the given job.</p>

	<p><b>CU3. Make Welds on Carbon Steel Plate with GMAW Flat (1F) and Flat (1G)</b></p> <p><b>P1.</b> Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirements to produce acceptable weld Maintain gap between electrode and base metal as per standard practices</p> <p><b>P2.</b> Carry out welding in Flat (1F) and Flat (1G) positions following standard procedures.</p> <p><b>P3.</b> Carry out the cleaning of root pass as per requirement</p> <p><b>P4.</b> Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects</p> <p><b>CU4. Make Welds on Carbon Steel Plate with GMAW Horizontal (2F) and Horizontal (2G)</b></p> <p><b>P1.</b> Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirements to produce acceptable weld.</p> <p><b>P2.</b> Maintain distance between electrode and base metal as per standard practices.</p> <p><b>P3.</b> Carry out welding in Horizontal (2F) and Horizontal (2G) positions following standard procedures</p> <p><b>P4.</b> Deposit root pass as per welding procedure specifications/job requirements</p> <p><b>P5.</b> Deposit filling passes as per welding procedure specifications/job requirements</p> <p><b>P6.</b> Deposit capping pass as per welding procedure specifications/job requirements</p> <p><b>P7.</b> Carry out the cleaning of passes as per requirement</p> <p><b>P8.</b> Check root, filling and capping passes for any visual discontinuities as per acceptance standards</p> <p><b>P9.</b> Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects</p> <p><b>CU2. Prepare Welding Machine for FCAW</b></p> <p><b>P1.</b> Identify welding requirements from the job, welding procedure specifications and/or technical drawings</p> <p><b>P2.</b> Carry out the pre cleaning of base metal as per requirement.</p>
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	<p><b>P3.</b> Prepare FCAW welding machine in accordance with welding procedure specifications/ manufacturer instructions</p> <p><b>P4.</b> Connect welding machine to an independent power supply</p> <p><b>P5.</b> Install the flux cored consumable filler wire spool in wire feeding unit</p> <p><b>P6.</b> Install Argon/helium gas cylinder to the FCAW machine for dual shielding if required</p> <p><b>P7.</b> Set polarity indicated in the welding procedure specifications</p> <p><b>P8.</b> Carry out pre-heating of the given job.</p> <p><b>CU5. Make Welds on Carbon Steel Plate With FCAW Vertical (3F) and Vertical (3G)</b></p> <p><b>P1.</b> Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirement to produce acceptable weld</p> <p><b>P2.</b> Maintain distance between electrode and base metal as per standard practices</p> <p><b>P3.</b> Carry out welding in Vertical (3F) and Vertical (3G) positions following standard procedures</p> <p><b>P4.</b> Deposit root pass as per welding procedure specifications/job requirements</p> <p><b>P5.</b> Deposit filling passes as per welding procedure specifications/job requirements</p> <p><b>P6.</b> Deposit capping pass as per welding procedure specifications/job requirements</p> <p><b>P7.</b> Carry out slag removal process as per requirement</p> <p><b>P8.</b> Check root, filling and capping passes for any visual discontinuities as per acceptance standards</p> <p><b>P9.</b> Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects</p> <p><b>CU6. Perform Post Welding Operations</b></p> <p><b>P1.</b> Carry out finishing work of welds following standard procedures</p> <p><b>P2.</b> Inspect weld visually and mark any visual defects, as required</p> <p><b>P3.</b> Perform Dye Penetration Test (DPT)</p> <p><b>P4.</b> Carry out repair work in accordance with approved procedures, as required</p>
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	<p><b>P5.</b> Perform post heat treatment operation as per requirement.</p> <p><b>P6.</b> Clean work area in accordance with workplace safety practices</p> <p><b>P7.</b> Maintain and store tools/equipment/consumable materials in accordance with organization guidelines</p>
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## Self-Assessment Checklist

<b>Candidate Name</b>	
<b>Registration No.</b>	
<b>Qualification</b>	<b>National Vocational Certificate in Metal Forming &amp; Processing Level 5</b>
<b>Competency Standard</b>	Perform GMAW (MIG/MAG) and FCAW Welding
<b>Purpose of Assessment</b>	<b>Formative Assessment</b>
<b>Assessment Task</b>	<ul style="list-style-type: none"> <li>• CU1. Prepare Welding Machine for GMAW (MIG/MAG)</li> <li>• CU2. Make Welds on Carbon Steel Plate with GMAW Flat (1F) and Flat (1G)</li> <li>• CU3. Make Welds on Carbon Steel Plate with GMAW Horizontal (2F) and Horizontal (2G)</li> <li>• CU4. Prepare Welding Machine for FCAW</li> <li>• CU5. Make Welds on Carbon Steel Plate with FCAW Vertical (3F) and Vertical (3G)</li> <li>• CU6. Perform Post Welding Operations</li> </ul>

I can.....

<b>Performance Criteria</b>	<b>Yes</b>	<b>No</b>
<b>P1.</b> Identify welding requirements from the job, welding procedure specifications and/or technical drawings	<input type="checkbox"/>	<input type="checkbox"/>
<b>P2.</b> Carry out the pre cleaning of base metal as per requirement.	<input type="checkbox"/>	<input type="checkbox"/>
<b>P3.</b> Prepare GMAW welding machine in accordance with welding procedure specifications/ manufacturer instructions	<input type="checkbox"/>	<input type="checkbox"/>
<b>P4.</b> Install CO <sub>2</sub> /Argon/Helium gas cylinder to the GMAW/MAG machine as per job requirement	<input type="checkbox"/>	<input type="checkbox"/>
<b>P5.</b> Install gas heater for CO <sub>2</sub> cylinder as per requirement	<input type="checkbox"/>	<input type="checkbox"/>
<b>P6.</b> Connect welding machine to an independent power supply	<input type="checkbox"/>	<input type="checkbox"/>
<b>P7.</b> Install the consumable filler wire spool in wire feeding unit	<input type="checkbox"/>	<input type="checkbox"/>
<b>P8.</b> Set polarity indicated in the welding procedure specifications	<input type="checkbox"/>	<input type="checkbox"/>
<b>P9.</b> Carry out pre-heating of the given job.	<input type="checkbox"/>	<input type="checkbox"/>
<b>P10.</b> Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirements to produce acceptable weld Maintain gap between electrode and base metal as per standard practices	<input type="checkbox"/>	<input type="checkbox"/>
<b>P11.</b> Carry out welding in Flat (1F) and Flat (1G) positions	<input type="checkbox"/>	<input type="checkbox"/>

	following standard procedures.		
<b>P12.</b>	Carry out the cleaning of root pass as per requirement	<input type="checkbox"/>	<input type="checkbox"/>
<b>P13.</b>	Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects	<input type="checkbox"/>	<input type="checkbox"/>
<b>P14.</b>	Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirements to produce acceptable weld.	<input type="checkbox"/>	<input type="checkbox"/>
<b>P15.</b>	Maintain distance between electrode and base metal as per standard practices.	<input type="checkbox"/>	<input type="checkbox"/>
<b>P16.</b>	Carry out welding in Horizontal (2F) and Horizontal (2G) positions following standard procedures	<input type="checkbox"/>	<input type="checkbox"/>
<b>P17.</b>	Deposit root pass as per welding procedure specifications/job requirements	<input type="checkbox"/>	<input type="checkbox"/>
<b>P18.</b>	Deposit filling passes as per welding procedure specifications/job requirements	<input type="checkbox"/>	<input type="checkbox"/>
<b>P19.</b>	Deposit capping pass as per welding procedure specifications/job requirements	<input type="checkbox"/>	<input type="checkbox"/>
<b>P20.</b>	Carry out the cleaning of passes as per requirement	<input type="checkbox"/>	<input type="checkbox"/>
<b>P21.</b>	Check root, filling and capping passes for any visual discontinuities as per acceptance standards	<input type="checkbox"/>	<input type="checkbox"/>
<b>P22.</b>	Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects	<input type="checkbox"/>	<input type="checkbox"/>
<b>P23.</b>	Identify welding requirements from the job, welding procedure specifications and/or technical drawings	<input type="checkbox"/>	<input type="checkbox"/>
<b>P24.</b>	Carry out the pre cleaning of base metal as per requirement.	<input type="checkbox"/>	<input type="checkbox"/>
<b>P25.</b>	Prepare FCAW welding machine in accordance with welding procedure specifications/ manufacturer instructions	<input type="checkbox"/>	<input type="checkbox"/>
<b>P26.</b>	Connect welding machine to an independent power supply	<input type="checkbox"/>	<input type="checkbox"/>
<b>P27.</b>	Install the flux cored consumable filler wire spool in wire feeding unit	<input type="checkbox"/>	<input type="checkbox"/>
<b>P28.</b>	Install Argon/helium gas cylinder to the FCAW machine for dual shielding if required	<input type="checkbox"/>	<input type="checkbox"/>
<b>P29.</b>	Set polarity indicated in the welding procedure specifications	<input type="checkbox"/>	<input type="checkbox"/>
<b>P30.</b>	Carry out pre-heating of the given job.	<input type="checkbox"/>	<input type="checkbox"/>

<b>P31.</b>	Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirement to produce acceptable weld	<input type="checkbox"/>	<input type="checkbox"/>
<b>P32.</b>	Maintain distance between electrode and base metal as per standard practices	<input type="checkbox"/>	<input type="checkbox"/>
<b>P33.</b>	Carry out welding in Vertical (3F) and Vertical (3G) positions following standard procedures	<input type="checkbox"/>	<input type="checkbox"/>
<b>P34.</b>	Deposit root pass as per welding procedure specifications/job requirements	<input type="checkbox"/>	<input type="checkbox"/>
<b>P35.</b>	Deposit filling passes as per welding procedure specifications/job requirements	<input type="checkbox"/>	<input type="checkbox"/>
<b>P36.</b>	Deposit capping pass as per welding procedure specifications/job requirements	<input type="checkbox"/>	<input type="checkbox"/>
<b>P37.</b>	Carry out slag removal process as per requirement	<input type="checkbox"/>	<input type="checkbox"/>
<b>P38.</b>	Check root, filling and capping passes for any visual discontinuities as per acceptance standards	<input type="checkbox"/>	<input type="checkbox"/>
<b>P39.</b>	Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects	<input type="checkbox"/>	<input type="checkbox"/>
<b>P40.</b>	Carry out finishing work of welds following standard procedures	<input type="checkbox"/>	<input type="checkbox"/>
<b>P41.</b>	Inspect weld visually and mark any visual defects, as required	<input type="checkbox"/>	<input type="checkbox"/>
<b>P42.</b>	Perform Dye Penetration Test (DPT)	<input type="checkbox"/>	<input type="checkbox"/>
<b>P43.</b>	Carry out repair work in accordance with approved procedures, as required	<input type="checkbox"/>	<input type="checkbox"/>
<b>P44.</b>	Perform post heat treatment operation as per requirement.	<input type="checkbox"/>	<input type="checkbox"/>
<b>P45.</b>	Clean work area in accordance with workplace safety practices	<input type="checkbox"/>	<input type="checkbox"/>
<b>P46.</b>	Maintain and store tools/equipment/consumable materials in accordance with organization guidelines	<input type="checkbox"/>	<input type="checkbox"/>

Candidate's Signature\_\_\_\_\_ Assessor's Signature\_\_\_\_\_

Date: \_\_\_\_\_

## Assessors Judgment Guide

<b>Qualification</b>	<b>National Vocational Certificate in Metal Forming &amp; Processing Level 5</b>
<b>Competency Standard</b>	Perform GMAW (MIG/MAG) and FCAW Welding
<b>Purpose of Assessment</b>	<b>Formative Assessment</b>
<b>Candidate Details</b>	Name: _____ Registration/Roll Number: _____ Signature: _____
<b>Assessment Outcome</b>	<div style="display: flex; justify-content: space-around; align-items: center;"> <span><b>COMPETENT</b> <input type="checkbox"/></span> <span><b>NOT YET COMPETENT</b> <input type="checkbox"/></span> </div> Name of the Assessor _____ Assessor's code: _____ Signature: _____

Assessment Summary (to be filled by the assessor)							
Activity	Method					Result	
Nature of Activity	Written	Oral	Observation	Portfolio	Role Play	Competent	Not Yet Competent
Practical Skill Demonstration			✓				
Knowledge Assessment		✓					
Other Requirement							



## Observation Checklist

<b>Assessment Task</b>		<ul style="list-style-type: none"><li>• CU1. Prepare Welding Machine for GMAW (MIG/MAG)</li><li>• CU2. Make Welds on Carbon Steel Plate with GMAW Flat (1F) and Flat (1G)</li><li>• CU3. Make Welds on Carbon Steel Plate with GMAW Horizontal (2F) and Horizontal (2G)</li><li>• CU4. Prepare Welding Machine for FCAW</li><li>• CU5. Make Welds on Carbon Steel Plate with FCAW Vertical (3F) and Vertical (3G)</li><li>• CU6. Perform Post Welding Operations</li></ul>		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Identify welding requirements from the job, welding procedure specifications and/or technical drawings			
2.	Carry out the pre cleaning of base metal as per requirement.			
3.	Prepare GMAW welding machine in accordance with welding procedure specifications/ manufacturer instructions			
4.	Install CO <sub>2</sub> /Argon/Helium gas cylinder to the GMAW/MAG machine as per job requirement			
5.	Install gas heater for CO <sub>2</sub> cylinder as per requirement			
6.	Connect welding machine to an independent power supply			
7.	Install the consumable filler wire spool in wire feeding unit			
8.	Set polarity indicated in the welding procedure specifications			
9.	Carry out pre-heating of the given job.			
10.	Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirements to produce acceptable weld Maintain gap between electrode and base metal as per standard practices			

11.	Carry out welding in Flat (1F) and Flat (1G) positions following standard procedures.			
12.	Carry out the cleaning of root pass as per requirement			
13.	Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects			
14.	Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirements to produce acceptable weld.			
15.	Maintain distance between electrode and base metal as per standard practices.			
16.	Carry out welding in Horizontal (2F) and Horizontal (2G) positions following standard procedures			
17.	Deposit root pass as per welding procedure specifications/job requirements			
18.	Deposit filling passes as per welding procedure specifications/job requirements			
19.	Deposit capping pass as per welding procedure specifications/job requirements			
20.	Carry out the cleaning of passes as per requirement			
21.	Check root, filling and capping passes for any visual discontinuities as per acceptance standards			
22.	Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects			
23.	Identify welding requirements from the job, welding procedure specifications and/or technical drawings			
24.	Carry out the pre cleaning of base metal as per requirement.			

25.	Prepare FCAW welding machine in accordance with welding procedure specifications/ manufacturer instructions			
26.	Connect welding machine to an independent power supply			
27.	Install the flux cored consumable filler wire spool in wire feeding unit			
28.	Install Argon/helium gas cylinder to the FCAW machine for dual shielding if required			
29.	Set polarity indicated in the welding procedure specifications			
30.	Carry out pre-heating of the given job.			
31.	Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirement to produce acceptable weld			
32.	Maintain distance between electrode and base metal as per standard practices			
33.	Carry out welding in Vertical (3F) and Vertical (3G) positions following standard procedures			
34.	Deposit root pass as per welding procedure specifications/job requirements			
35.	Deposit filling passes as per welding procedure specifications/job requirements			
36.	Deposit capping pass as per welding procedure specifications/job requirements			
37.	Carry out slag removal process as per requirement			
38.	Check root, filling and capping passes for any visual discontinuities as per acceptance standards			
39.	Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects			

40.	Carry out finishing work of welds following standard procedures			
41.	Inspect weld visually and mark any visual defects, as required			
42.	Perform Dye Penetration Test (DPT)			
43.	Carry out repair work in accordance with approved procedures, as required			
44.	Perform post heat treatment operation as per requirement.			
45.	Clean work area in accordance with workplace safety practices			
46.	Maintain and store tools/equipment/consumable materials in accordance with organization guidelines			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

## Knowledge Assessment

<b>Qualification</b>	<b>National Vocational Certificate in Metal Forming &amp; Processing Level 5</b>
<b>Competency Standard</b>	Perform GMAW (MIG/MAG) and FCAW Welding
<b>Purpose of Assessment</b>	<b>Formative Assessment</b>
<b>Candidate Details</b>	Name: _____ Registration/Roll Number: _____ Candidate Signature: _____
<b>Assessment Outcome</b>	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <b>COMPETENT</b> <input type="checkbox"/> </div> <div style="text-align: center;"> <b>NOT YET COMPETENT</b> <input type="checkbox"/> </div> </div> Name of the Assessor: _____ Assessor's code: _____ Signature of the Assessor: _____

Candidate's response is not required to be identical, but similar concepts and/or keywords must be used. Oral questioning may be used to clarify candidate understanding of topic and its application.

Questions (Candidate confidently answered questions correctly and demonstrated understanding of the topics and their application)		Satisfactory	Not Satisfactory
1.	Explain advantages of GMAW and FCAW		
2.	Differentiate between MIG and MAG		
3.	What are the types of metal deposits in MIG/MAG		

4.	Explain Specifications/ classification of electrode/s required for the job		
5.	Identify hazards associated with MIG welding and take remedial measures		
6.	Describe Welding procedure specifications (WPS)		

<b>Feedback to the Candidate</b>
<b>Candidate's Signature</b> _____ <b>Assessor's Signature</b> _____