

# **Assessment Evidence Guide**

## **For**

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**Level-3**

**Furnace Operator**  
**(Formative Assessment)**

*8<sup>th</sup> -12<sup>th</sup> March 2021*



**National Vocational & Technical**  
**Training Commission**

<b>Title of Qualification:</b> Furnace Operator	CS Code:	Level: 3	Version:
<b>Competency Standard Title:</b>  <b>Operate Electric Melting Furnace</b>	<b>Assessment Date (DD/MM/YY):</b>  <b>Assessment Time:</b>		

Candidate Details	Name: .....  Registration/Roll Number:.....
Guidance for Candidate	<p><b>To meet this standard, you are required to complete the following within the given time frame (for practical demonstration &amp; assessment):</b></p> <p><b>Assessment Task 1:</b> Candidate is required to:  <b>Operate induction furnace for melting of given metallic charge</b></p> <p><b>Assessment Task 2:</b> Candidate is required to:  <b>Operate direct arc furnace for melting of given metallic charge</b></p> <p><b>Assessment Task 3:</b> Candidate is required to:  <b>Operate Indirect arc furnace for melting of given metallic charge</b></p> <p><b>And complete:</b></p> <ol style="list-style-type: none"> <li><b>Knowledge assessment test (Written or Oral)</b></li> <li><b>Portfolios at the time of assessment (if any)</b></li> </ol>
Minimum Evidence Required	<p><b>During a practical assessment, under observation by an assessor, you will complete:</b></p> <p><b>Assessment Task 1</b></p> <ul style="list-style-type: none"> <li>Inspect the lining of the crucible and condition of induction coil.</li> <li>Fill the crucible of the induction furnace with raw material</li> <li>Maintain the pressure of circulating water for cooling of induction coils.</li> <li>Switch on the furnace power supply.</li> <li>Inspect the movement of trunnion and tilting bail.</li> <li>Adjust the frequency of thyristor according to the requirements.</li> <li>Reset control panel to delete the previous settings.</li> <li>Increase the amperes of the supply to maintain the required temperature.</li> <li>Tilt the furnace to pour out the slag and molten metal</li> <li>Tilt the furnace to pour out the molten metal in ladle.</li> </ul>

	<p><b>During a practical assessment, under observation by an assessor, you will complete:</b></p> <p><b>Assessment Task 2</b></p> <ul style="list-style-type: none"> <li>• Inspect the lining and condition of slog and tap holes of furnace.</li> <li>• Inspect the condition of electrodes and their movement.</li> <li>• Inspect the accessories of gas supply and tilting mechanism of furnace</li> <li>• Allow to enter the charge into the furnace.</li> <li>• Place the lid containing the three electrodes into position.</li> <li>• Adjust the position of electrodes to adjust proper distance between electrodes and charge.</li> <li>• Allow the electric current to pass through the electrodes to carry out melting process</li> <li>• Tilt the furnace to one side to allow the slag to pour out.</li> <li>• Tilt the furnace to other side to allow the molten metal to pour out</li> </ul>
	<p><b>During a practical assessment, under observation by an assessor, you will complete:</b></p> <p><b>Assessment Task 3</b></p> <ul style="list-style-type: none"> <li>• Inspect the lining of furnace and charging door of furnace.</li> <li>• Inspect the condition of tap hole and electrodes of the furnace.</li> <li>• Inspect and set the oxygen supply accessories.</li> <li>• Charge the furnace with material to be melted through charging door.</li> <li>• Follow the safety precautions of charging.</li> <li>• Allow the electric current to pass through the electrodes to carry out melting process</li> <li>• Allow the oxygen to enter into the melt at suitable time</li> <li>• Remove the slag from the surface of molten metal with safety precautions.</li> <li>• Open the tapping hole to pour out the molten metal.</li> </ul>
	<p><b>Portfolios required at the time of assessment (if any) for</b></p>

*Continued on following page*

**Assessors Judgment Guide** (to be completed by the Assessor and signed both by the assessor and the candidate after the assessment)

Candidate Details	Name: ..... Registration/Roll Number: ..... Candidate Signature: .....
Assessment Outcome	COMPETENT <input type="checkbox"/> NOT YET COMPETENT <input type="checkbox"/> Name of the Assessor: ..... Assessor's code: ..... Signature of the Assessor: .....

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							

Each Assessment Task (with performance criteria)				
Assessment Task 1		Description of assessment task 1		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
	Inspect the lining of the crucible and condition of induction coil.			
	Fill the crucible of the induction furnace with raw material			
	Maintain the pressure of circulating water for cooling of induction coils.			
	Switch on the furnace power supply.			
	Inspect the movement of trunnion and tilting bail.			
	Adjust the frequency of thyristor according to the requirements.			
	Reset control panel to delete the previous settings.			
	Increase the amperes of the supply to maintain the required temperature.			
	Tilt the furnace to pour out the slag and molten metal			
	Tilt the furnace to pour out the molten metal in ladle.			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Assessment Task 2		Description of assessment task 2		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
	Inspect the lining and condition of slog and tap holes of furnace.			
	Inspect the condition of electrodes and their movement.			
	Inspect the accessories of gas supply and tilting mechanism of furnace			
	Allow to enter the charge into the furnace.			
	Place the lid containing the three electrodes into position.			
	Adjust the position of electrodes to adjust proper distance between electrodes and charge.			
	Allow the electric current to pass through the electrodes to carry out melting process			
	Tilt the furnace to one side to allow the slag to pour out.			
	Tilt the furnace to other side to allow the molten metal to pour out			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Each Assessment Task (with performance criteria)				
<b>Assessment Task 3</b>		<b>Description of assessment task 3</b>		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
	Inspect the lining of furnace and charging door of furnace.			
	Inspect the condition of tap hole and electrodes of the furnace.			
	Inspect and set the oxygen supply accessories.			
	Charge the furnace with material to be melted through charging door.			
	Follow the safety precautions of charging.			
	Allow the electric current to pass through the electrodes to carry out melting process			
	Allow the oxygen to enter into the melt at suitable time			
	Remove the slag from the surface of molten metal with safety precautions.			
	Open the taping hole to pour out the molten metal.			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

<b>Title of Qualification:</b>	CS Code:	Level:	Version: 01
<b>Competency Standard Title:</b>	<b>Assessment Date (DD/MM/YY):</b>  <b>Assessment Time: 30 min</b>		

Guidance for Candidate	<b>To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.</b>
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**Assessors Guide** (to be completed by the Assessor and signed both by the assessor and the candidate after the assessment)

Candidate Details	Name:..... Registration/Roll Number: Candidate Signature: .....
Written Assessment Outcome	COMPETENT <input type="checkbox"/> NOT YET COMPETENT <input type="checkbox"/> Name of the Assessor: ..... Assessor's code: Signature of the Assessor: .....



<b>Title of Qualification:</b>	CS Code:	Level:	Version: 01
<b>Competency Standard Title:</b>	<b>Assessment Date (DD/MM/YY):</b>  <b>Assessment Time:</b> 30 min		

### WRITTEN ASSESSMENT

Question	Candidate's answer
1. What is the material of electrodes used in electric arc furnaces?	The electrodes of electric arc furnaces are made carbon or graphite.
2. What is the difference between direct arc furnace and indirect arc furnace?	Direct arc furnace contains three vertical electrodes and indirect arc furnace contains two horizontal electrodes. In direct arc furnace arc is produced between electrodes and charge of the furnace while in indirect arc furnace arc is produced between two electrodes and arc does not touches the charge.
3. Define electromagnetic induction.	Electromagnetic induction is the production of electromotive force across an electrical conductor in a changing magnetic field.
4. What are the two types of induction furnace?	Two types of induction furnace are following. i. Core type or low frequency induction furnace ii. Coreless type or high frequency induction furnace
5. Write any three advantages of electric furnaces over gas furnaces,	i. Electric furnaces required far less maintenance than gas furnaces. ii. Electric furnaces are one of the least expensive furnaces to purchase and install iii. Electric furnaces do not give off any dangerous emissions that could potentially cause harm.