

Assessment Evidence Guide

For

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Level-2

Module name
(Formative Assessment)

8th -12th March 2021



**National Vocational & Technical
Training Commission**

Title of Qualification: Melter	CS Code:	Level: 2	Version: 01
Competency Standard Title: Melt Ferrous Material (Cast Steel) in Induction Furnace	Assessment Date (DD/MM/YY): Assessment Time:		

Candidate Details	Name: Registration/Roll Number:.....
Guidance for Candidate	<p>To meet this standard, you are required to complete the following within the given time frame (for practical demonstration & assessment) as per the instructions given in Annexure A:</p> <p>Assessment Task 1: Candidate is required to: Identify required specifications for melting.</p> <p>Assessment Task 2: Candidate is required to: Select materials.</p> <p>Assessment Task 3: Candidate is required to: Verify metal charges to melting</p> <p>Assessment Task 4: Candidate is required to: Charge furnace</p> <p>Assessment Task 5: Candidate is required to: Monitor melting process</p> <p>Assessment Task 6: Candidate is required to: Take sample of molten metal.</p> <p>Assessment Task 7: Candidate is required to: Perform refractory repair to crucible.</p> <p>Assessment Task 8: Candidate is required to: Monitor tapping of molten metal</p> <p>Assessment Task 9: Candidate is required to: Tap the furnace</p>

	<p>Assessment Task 10: Candidate is required to: Control Hazards</p> <p>And complete:</p> <ol style="list-style-type: none"> 1. Knowledge assessment test (Written or Oral) 2. Portfolios at the time of assessment (if any)
Minimum Evidence Required	<p>During a practical assessment, under observation by an assessor, you will complete:</p> <p>Assessment Task 1</p> <ul style="list-style-type: none"> • Identify mould requirements • Identify any special melting requirements for the job • Identify safety procedures for the required melting operation • Follow regulations relevant to foundry and individual melting <p>Assessment Task 2</p> <ul style="list-style-type: none"> • Raise requisition as required according to standard operating procedures. • Take charge analysis in accordance with standard operating procedures. • Convert charge analysis to furnace charge weight using standard operating procedures. • Weigh the charge according to standard operating procedures. <p>Assessment Task 3</p> <ul style="list-style-type: none"> • Select required components to give the required metal specification • Calculate required charge of each component • Recommend changes/additions to the charge • Monitor the preparation of the charge including checking for contaminants <p>Assessment Task 4</p> <ul style="list-style-type: none"> • Follow emergency/safety procedures as necessary. • Pre-Heat materials if required according to standard operating procedures. • Charge materials into furnace using standard operating procedures. • Identify suitable areas for emergency unloading of molten metal and kept available. <p>Assessment Task 5</p> <ul style="list-style-type: none"> • Check furnace is in operational condition • Maintain furnace at optimum operating condition to standard operating procedures. • Identify metal/alloy specification for required melting • Charge batches of scrap periodically to attain required melt quantity • Monitor melt to ensure the product meets specification <p>Assessment Task 6</p> <ul style="list-style-type: none"> • Take sample for chemical analysis • Apply remedial action as required to standard operating procedures. • Hold furnace temperature to standard operating procedures. • Add alloying elements if required • Achieve final melt charge as per requirement • Check temperature of metal and adjustment if necessary.

	Assessment Task 7 <ul style="list-style-type: none"> • Identify specific areas of the refractory if repair is required • Select appropriate refractory materials to meet specifications. • Install refractory using appropriate techniques and tools to meet the job specification.
	Assessment Task 8 <ul style="list-style-type: none"> • Check pouring area is secure and that all non-essential personnel are excluded • Check all members of pouring crew are wearing appropriate and in good condition personal protective equipment • Ensure escape routes are known in advance by all members of the pouring crew • Check pouring is undertaken at correct temperature and in efficient order • Ensure moulds are ready to receive liquid metal • Ensure proper placing of ladle • Attach purging pipe to the ladle
	Assessment Task 9 <ul style="list-style-type: none"> • Identify quantity of the required metal • Carry out tap rate to standard operating procedures. • Tap heat safely according to standard operating procedures. • Perform purging operation • Remove purging pipe attached to ladle
	Assessment Task 10 <ul style="list-style-type: none"> • Identify hazards in the metal melting/pouring process • Assess the risks arising from those hazards • Implement procedures to control those hazards in line with procedures and duty of care
	Portfolios required at the time of assessment (if any) for

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
1.	Identify mould requirements			
2.	Identify any special melting requirements for the job			
3.	Identify safety procedures for the required melting operation			
4.	Follow regulations relevant to foundry and individual melting			
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
1.	Raise requisition as required according to standard operating procedures.			
2.	Take charge analysis in accordance with standard operating procedures.			
3.	Convert charge analysis to furnace charge weight using standard operating procedures.			
4.	Weigh the charge according to standard operating procedures.			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Assessment Task 3		Description of assessment task 3		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Select required components to give the required metal specification			
2.	Calculate required charge of each component			
3.	Recommend changes/additions to the charge			
4.	Monitor the preparation of the charge including checking for contaminants			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Assessment Task 4		Description of assessment task 4		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Follow emergency/safety procedures as necessary.			
2.	Pre-Heat materials if required according to standard operating procedures.			
3.	Charge materials into furnace using standard operating procedures.			
4.	Identify suitable areas for emergency unloading of molten metal and kept available.			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Assessment Task 5		Description of assessment task 5		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Check furnace is in operational condition			
2.	Maintain furnace at optimum operating condition to standard operating procedures.			
3.	Identify metal/alloy specification for required melting			
4.	Charge batches of scrap periodically to attain required melt quantity			
5.	Monitor melt to ensure the product meets specification			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Assessment Task 6		Description of assessment task 6		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Take sample for chemical analysis			
2.	Apply remedial action as required to standard operating procedures.			
3.	Hold furnace temperature to standard operating procedures.			
4.	Add alloying elements if required			
5.	Achieve final melt charge as per requirement			
6.	Check temperature of metal and adjustment if necessary.			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Assessment Task 7		Description of assessment task 7		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Identify specific areas of the refractory if repair is required			
2.	Select appropriate refractory materials to meet specifications.			
3.	Install refractory using appropriate techniques and tools to meet the job specification.			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Assessment Task 8		Description of assessment task 8		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Check pouring area is secure and that all non-essential personnel are excluded			
2.	Check all members of pouring crew are wearing appropriate and in good condition personal protective equipment			
3.	Ensure escape routes are known in advance by all members of the pouring crew			
4.	Check pouring is undertaken at correct temperature and in efficient order			
5.	Ensure moulds are ready to receive liquid metal			
6.	Ensure proper placing of ladle			
7.	Attach purging pipe to the ladle			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Assessment Task 9		Description of assessment task 9		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Identify quantity of the required metal			
2.	Carry out tap rate to standard operating procedures.			
3.	Tap heat safely according to standard operating procedures.			
4.	Perform purging operation			
5.	Remove purging pipe attached to ladle			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Assessment Task 10		Description of assessment task 10		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Identify hazards in the metal melting/pouring process			
2.	Assess the risks arising from those hazards			
3.	Implement procedures to control those hazards in line with procedures and duty of care			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Title of Qualification: Melter	CS Code:	Level: 2	Version: 01
Competency Standard Title: Melt Ferrous Material (Cast Steel) in Induction Furnace	Assessment Date (DD/MM/YY): Assessment Time: 30 min		

Guidance for Candidate	To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.
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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:

Title of Qualification: Melter	CS Code:	Level:2	Version: 01
Competency Standard Title: Melt Ferrous Material (Cast Steel) in Induction Furnace	Assessment Date (DD/MM/YY): Assessment Time: 30 min		

WRITTEN ASSESSMENT

Question	Candidate's answer
1. Name few equipment and tools used for ferrous material casting?	<ul style="list-style-type: none"> • Induction Melting Furnace • Immersion type thermocouple (1300 C) • Charging hoist • Optical pyro meter • Handling tools • PPE kits
2. Name few raw material used for casting?	<ul style="list-style-type: none"> • Iron • Aluminum • Steel • Copper • Zinc
3. What types of metals/materials can an induction furnace melt/heat?	<ul style="list-style-type: none"> • Induction equipment can melt/heat virtually all metals and materials including, gray and ductile iron, steel, copper and copper-based alloys, aluminum, zinc, reactive metals, precious metals, silicon and graphite.
4. What is induction melting furnace?	<ul style="list-style-type: none"> • An induction furnace consists of a nonconductive crucible holding the charge of metal to be melted, surrounded by a coil of copper wire. A powerful alternating current flows through the wire. • It generates heat by electromagnetic induction to melt scrap metal
5. How does a melting furnace work?	<ul style="list-style-type: none"> • Melting furnaces are used to overheat solid materials until they liquefy. • A melting furnace generates overhot temperatures that exceed the metal's melting point and cause decomposition of its physical structure which leads to liquefaction.
6. How hot can induction heating get?	<ul style="list-style-type: none"> • Induction heating finds applications in processes where temperatures are as low as 100°C (212°F) and as high as 3000°C (5432°F).
7. Name few types of casting processes?	<ul style="list-style-type: none"> • Sand Casting • Die casting • Centrifugal Casting • Gravity Die Casting • Low pressure casting

Question	Candidate's answer
8. What are the limitations for induction treatment process?	<ul style="list-style-type: none"> the engineering benefits of the process may outweigh cost concerns. Otherwise, for low volume projects the coil and tooling cost usually makes the process impractical if a new coil must be built.

Annexure A: