

# PROCESS AUDIT FOR THE ALUMINUM CASTHOUSE

## GENERAL INFORMATION ❖

Type of Operation: Primary Smelter  Primary Remelt  Secondary  Foundry  Reclamation

Furnace #: \_\_\_\_\_

## 1) FURNACE DESIGN ❖

a) Furnace Type: Melter  Holder

b) Furnace Description: Rectangular  Round  Top Charge  Tilter  Charge Bay  Door Charge

c) Furnace Capacity: Designed: \_\_\_\_\_ lbs. Actual: \_\_\_\_\_ lbs.

d) Lining Configuration:

ZONE	LINING THICKNESS	REFRACTORY TYPE/ BRAND USED	ZONE	LINING THICKNESS	REFRACTORY TYPE/ BRAND USED
Sub-Hearth	_____	_____	Upper Sidewall Back-up	_____	_____
Hearth	_____	_____	Roof	_____	_____
Ramp	_____	_____	Roof Back-up	_____	_____
Lower Sidewall	_____	_____	Jams	_____	_____
Lower Sidewall Intermediate	_____	_____	Sills	_____	_____
Lower Sidewall Back-up	_____	_____	Lintels	_____	_____
Upper Sidewall	_____	_____	Tap Out Block	_____	_____
Upper Sidewall Intermediate	_____	_____	Others (Specify)	_____	_____

e) Expansion Allowance Used:

Location: \_\_\_\_\_ Material Type: \_\_\_\_\_ Thickness: \_\_\_\_\_

f) Thermal Profile Requirements:

Hearth Hot Face: \_\_\_\_\_ Hearth Cold Face: \_\_\_\_\_

Lower Sidewall Hot Face: \_\_\_\_\_ L. S. W. Cold Face: \_\_\_\_\_

Upper Sidewall Hot Face: \_\_\_\_\_ U. S. W. Cold Face: \_\_\_\_\_

Roof Hot Face: \_\_\_\_\_ Roof Cold Face: \_\_\_\_\_

g) Combustion System: # of Burners: \_\_\_\_\_ Location: \_\_\_\_\_

Burner Type: \_\_\_\_\_

Temperature Controller/Monitoring Type: \_\_\_\_\_

Burner Alignment Issues? Yes  No

Thermocouples Placement Location: \_\_\_\_\_

h) Any Recent Changes in Furnace Design? Yes  No

If so, What: \_\_\_\_\_ Why: \_\_\_\_\_ When: \_\_\_\_\_

i) Additional Comments \_\_\_\_\_  
\_\_\_\_\_

**2) INSTALLATION REQUIREMENTS ❖**

a) In-House:    Yes     No                                       Outside Contractor:    Yes     No

b) Desired Turnaround Time (Major Repair) \_\_\_\_\_

c) Downtime Cost/Hr.: \_\_\_\_\_                                      Cost/Day: \_\_\_\_\_

d) Prefer Brick or Specialties: \_\_\_\_\_

e) If Outside Contractor: \_\_\_\_\_

    ■ Buy Material Direct:                                      Yes     No

    ■ Handle Turnkey:    Yes     No

f) Any Special Equipment Needs: \_\_\_\_\_

g) Comments: \_\_\_\_\_

\_\_\_\_\_

**3) MELTING PRACTICES ❖**

<p>a) Alloy Types Produced: _____</p> <p>    ■ How Introduce/Charge Alloys Into Furnace: _____</p> <p>    _____</p> <p>    ■ Stirring Time: _____</p> <p>    ■ Thermiting                      Yes <input type="radio"/>    No <input type="radio"/></p> <p>b) Charge Type:</p> <p>    ■ Solid Clean Scrap:    Yes <input type="radio"/>    No <input type="radio"/></p> <p>    Type: _____</p> <p>    ■ Solid Dirty Scrap:    Yes <input type="radio"/>    No <input type="radio"/></p> <p>    Type: _____</p> <p>    ■ Molten:                      Yes <input type="radio"/>    No <input type="radio"/></p> <p>    Type: _____</p> <p>c) How Charge Furnace:</p> <p>    ■ Location: _____</p> <p>    ■ Obvious Furnace Abuse During Charging:    Yes <input type="radio"/>    No <input type="radio"/></p> <p>    Location: _____</p> <p>d) Skimming</p> <p>    ■ Frequency: _____</p> <p>    ■ Tool Used: _____</p>	<p>e) Furnace Wall Cleaning:</p> <p>    ■ Frequency: _____</p> <p>    ■ Method/Tool Used: _____</p> <p>f) Stirring:</p> <p>    ■ Frequency: _____</p> <p>    ■ Stirring Time: _____</p> <p>    ■ Equipment Used: _____</p> <p>g) Dross Build Up:                      Yes <input type="radio"/>    No <input type="radio"/></p> <p>    ■ Location: _____</p> <p>h) Dross Treatment:                      Yes <input type="radio"/>    No <input type="radio"/></p> <p>i) Dry Fluxes Used:                      Yes <input type="radio"/>    No <input type="radio"/></p> <p>    ■ Purpose: _____</p> <p>    ■ Type: _____</p> <p>    ■ How Introduced: _____</p> <p>    ■ Dry Flux Chemistry: _____</p> <p>j) Alkali Attack Problems:                      Yes <input type="radio"/>    No <input type="radio"/></p> <p>    ■ Location: _____</p> <p>    ■ Why: _____</p>
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**3) MELTING PRACTICES ❖ (CONTINUED)**

k) Metal Fluxing:  
 ■ Purpose: \_\_\_\_\_  
 ■ Method/Type: \_\_\_\_\_  
 ■ Frequency: \_\_\_\_\_

l) Corundum Growth a Problem:      Yes  No   
 ■ Location: \_\_\_\_\_  
 ■ Why: \_\_\_\_\_  
 ■ Noticeable Wicking:                  Yes  No   
 ■ How Remove: \_\_\_\_\_  
 ■ Frequency: \_\_\_\_\_

m) Spinel Growth a Problem:      Yes  No   
 ■ Location: \_\_\_\_\_  
 ■ How Remove: \_\_\_\_\_  
 ■ Frequency: \_\_\_\_\_

n) Tapping:  
 ■ Depth of Heel: \_\_\_\_\_

o) What are the Customer's Production Goals?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

p) What are the Customer's Critical Refractory Issues in Melting?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

q) Refractory cost/ton of metal produced? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**4) FURNACE MAINTENANCE ❖**

a) Refractory Failure Mode: (Check the most critical wear mechanisms below)

Aluminum Corrosion/Penetration: _____	Location: _____
High Temperatures: _____	Location: _____
Abrasion/Impact: _____	Location: _____
Thermal Shock: _____	Location: _____
Alkali Salts Attack: _____	Location: _____
Corundum: _____	Location: _____
Other: _____	Location: _____

b) Comments on Above: \_\_\_\_\_  
 \_\_\_\_\_

c) Time Between Major Refractory Rebuilds: \_\_\_\_\_  
 \_\_\_\_\_

d) Refractory Maintenance Between Major Rebuilds:    Yes  No   
 What do: \_\_\_\_\_      Location: \_\_\_\_\_      Frequency: \_\_\_\_\_

e) Floor Cleaning:      Yes  No       Frequency: \_\_\_\_\_      Method: \_\_\_\_\_

f) Sludge Removal:      Yes  No       Frequency: \_\_\_\_\_      Method: \_\_\_\_\_

g) Tap-out Block: Refractory Type: \_\_\_\_\_      Brand: \_\_\_\_\_  
 Wear Mechanism:  
 Abuse: Yes  No       Erosion: Yes  No       Cycling: Yes  No       Other: \_\_\_\_\_

**5) METAL TRANSFER ❖**

a) Troughs and Launder: Yes  No

b) Troughs Preheating: Yes  No  Temperature: \_\_\_\_\_

c) Trough Lining Configuration: Type: \_\_\_\_\_ Brand: \_\_\_\_\_ Thickness: \_\_\_\_\_  
 Type: \_\_\_\_\_ Brand: \_\_\_\_\_ Thickness: \_\_\_\_\_

d) Trough Design: Cast-in-Place: Yes  No   
 Precast: Yes  No   
 Refractory Requirements: Thermal Efficiency: Yes  No   
 Abrasion/Erosion: Yes  No   
 Thermal Shock: Yes  No   
 Other: \_\_\_\_\_

e) Critical Trough Wear Areas: Locations: \_\_\_\_\_  
 Why a Problem? \_\_\_\_\_

f) Critical Trough Maintenance Issues: \_\_\_\_\_

g) Trough Coatings Used: Yes  No  Type: \_\_\_\_\_ How Apply?: \_\_\_\_\_

h) Transfer Crucibles: Yes  No

i) Transfer Crucibles Preheating: Yes  No  Temperature: \_\_\_\_\_

j) Transfer Crucibles Lining Configuration: Type: \_\_\_\_\_ Brand: \_\_\_\_\_ Thickness: \_\_\_\_\_  
 Type: \_\_\_\_\_ Brand: \_\_\_\_\_ Thickness: \_\_\_\_\_

k) Transfer Crucibles Design: Cast-in-Place: Yes  No   
 Precast: Yes  No   
 Refractory Requirements: Thermal Efficiency: Yes  No   
 Abrasion/Erosion: Yes  No   
 Thermal Shock: Yes  No   
 Other: \_\_\_\_\_

l) Critical Transfer Crucibles Wear Areas:  
 Locations: \_\_\_\_\_  
 Why a Problem? \_\_\_\_\_

m) Critical Transfer Crucibles Maintenance Issues: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**6) CASTING ❖**

a) Final Product Cast at Plant: Ingot  Sow  Foil  Die-Cast   Other \_\_\_\_\_  
 Pig  Sheet  Extrusions  Plate

What are Customer's Main Quality Concerns and/or Goals in Casting?

\_\_\_\_\_  
 \_\_\_\_\_

**7) METAL QUALITY ISSUES ❖**

a) Metal Quality During Campaign: Any Problems?: Yes  No

What is Problem(s)?: \_\_\_\_\_

Inclusions: Yes  No

Source of Inclusions: \_\_\_\_\_

Is Customer Improving Quality?: Yes  No

If Yes, How? \_\_\_\_\_

b) Filters Used: Yes  No

If Yes, Types?: \_\_\_\_\_

Location of Filters: \_\_\_\_\_

Any Problems with Filters?: \_\_\_\_\_

c) Gas Injection: Yes  No

If Yes, Why Use?: \_\_\_\_\_

If Yes, Types Used?: \_\_\_\_\_

Type Gas?: \_\_\_\_\_

Why Use Above Type Gas?: \_\_\_\_\_

De-Gas in Troughs: Yes  No

d) Filter Box Refractory Lining Configuration: \_\_\_\_\_

Working Lining Type and Brand: \_\_\_\_\_ Thickness: \_\_\_\_\_

Back-Up Lining Type and Brand: \_\_\_\_\_ Thickness: \_\_\_\_\_

Thermal Profile Requirements of Filter Box: Hot Face: \_\_\_\_\_ Cold Face: \_\_\_\_\_

Filter Box OEM: \_\_\_\_\_