

Masonry Heater Association

Occupational Analysis Manual for Masonry Heater Designers and Builders

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Introduction

Requirements for MHA Certification

- a) A certified Masonry Heater Designer/Builder shall demonstrate proficiency in the skills listed in all sections of this manual
- b) Proficiency in each skill area shall be determined through a combination of the following:
 - (i) verification of relevant past experience,
 - (ii) competency as certified by a current or previous employer or supervisor,
 - (iii) customer endorsements,
 - (iv) relevant educational credits,
 - (v) and oral, written or practical testing
- c) See the Heater Mason Training and Certification Program Policies and Procedures Manual for detailed certification criteria.

How to Use This Manual

This is the key document that defines the special skills required of those who build masonry heaters. You must be able to demonstrate competency in each of the skills listed in all of the sections of the manual. The MHA reference manual and the written examinations use the skills listed in this manual as a reference point for their contents.

You can use this manual as a checklist of your own skills as you prepare for certification, and you can use it to assess employees or others whose competency in heater design and construction you are asked to evaluate.

1. Work Safely

- 1.1 Select, wear, adjust and maintain eye protectors to ensure correct fit and optimum protection.
- 1.2 Select, wear, and maintain foot protectors suitable for the job to be performed to ensure correct fit and optimum protection.
- 1.3 Wear and adjust ear protectors to ensure correct fit and optimum protection.
- 1.4 Wear, adjust and maintain protective clothing to ensure correct fit and optimum protection.
- 1.5 Wear and maintain hand protectors to ensure correct fit and optimum protection.
- 1.6 Select, wear and maintain dust masks and respirators, as appropriate, to ensure adequate protection against airborne contaminants.
- 1.7 Select and maintain a hard hat and use when appropriate and/or required by local regulations.
- 1.8 Follow proper procedures for lifting and moving heavy objects to avoid injury.
- 1.9 Use fork lifts, dollies, hand trucks and motor vehicles safely and in compliance with company and legal regulations.
- 1.10 Secure loads to prevent shifting and damage to components or injury to passengers and other traffic during transportation; use hold-down devices properly and tie ropes using proper knots.
- 1.11 Maintain a safe, tidy work environment and remove all obstacles and impediments.
- 1.12 Follow the requirements of the applicable health and safety legislation.

2. Analyze customer requirements and give advice

- 2.1 Explain the operational and performance characteristics and limitations of masonry heaters compared with other hearth and heating system options.
- 2.2 Through discussion, determine the heating, fire viewing, and decor requirements of the customer.
- 2.3 Explain the characteristics of optional facing materials so that the customer can make an informed choice.
- 2.4 Prepare sketches showing location options and provide advice on the most effective locations for performance, aesthetics and safety.
- 2.5 Explain limitations of system locations such as outside walls and confined areas in relation to safety, system performance and code requirements.
- 2.6 Identify and explain masonry heater and component options which would meet customer objectives.

- 2.7 Give advice on heating capacities of various masonry heater options in relation to size, layout and energy performance of particular buildings and confirm that these basic principles are understood by the client.
- 2.8 Explain venting requirements, options and limitations of masonry heaters in accordance with code requirements, building characteristics and manufacturer's installation instructions.
- 2.9 Explain how a tight building envelope and the operation of high-capacity exhaust systems could influence the performance of a masonry heater, and give advice on ways to minimize the negative influence.
- 2.10 Give advice on the prospects for distributing heat effectively from specific masonry heater installations.
- 2.11 Give advice on building permit requirements, procedures for obtaining a permit and information that may be required for insurance purposes.

3. Develop System Designs

- 3.1 Based on discussion with the client, determine the type, size and configuration of the heater, including associated components such as bake oven, facing options, water coils, heated bench, wing wall, etc.
- 3.2 Perform heat output calculations based on firebox size, firing cycle, and wall thickness of the heater to develop a design that will meet the client's heating requirements.
- 3.3 Specify foundation requirements in writing, citing code requirements where applicable.
- 3.4 Locate and correctly interpret code requirements on minimum clearances, hearth extensions and material thicknesses for masonry heaters and apply these requirements correctly for all such appliances.
- 3.5 Locate and correctly interpret requirements for clearance reduction systems.
- 3.6 Locate and correctly interpret code requirements on minimum clearances for chimneys and apply these requirements correctly to a variety of configurations.
- 3.7 Locate and correctly interpret requirements for access for cleaning of internal passages.
- 3.8 Determine minimum installation clearances by correctly applying information found in manufacturer's instructions for factory-built masonry heaters.
- 3.9 Prepare clear and accurate drawings of heater assemblies and chimneys for approval by clients and to accompany building permit applications.

4. Design Masonry Heaters

- 4.1 Design a firebox of a shape and size that will maximize performance and meet customer objectives for heat output.
- 4.2 Design heat transfer passages of a shape and size that would provide sufficient gas flow and heat transfer surface area for a particular firebox.
- 4.3 Design the means of access for cleaning of all areas in which deposits may accumulate.
- 4.4 Determine the need for a by-pass damper and/or chimney damper in a particular heater based on its design features and installation characteristics
- 4.5 Determine the need for a gas slot and design and construct one if required.
- 4.6 Assess the need for an outdoor combustion air supply based on code requirements and installation details; install an outdoor air supply that meets performance and safety objectives.
- 4.7 Design or specify a chimney with characteristics that will effectively vent the products of combustion and satisfy code requirements.
- 4.8 Specify the material and layout for the heater facing that would meet the customer's aesthetic and practical objectives.
- 4.9 Specify metal components such as doors, lintels and dampers that will meet duty requirements and code requirements for a particular masonry heater.
- 4.10 Design and construct a baking oven to meet customer objectives for performance and size.
- 4.11 Design and construct a heated bench to meet customer objectives.
- 4.12 Design a capping assembly that will prevent leakage of combustion gases and control heat output from the top of the heater.
- 4.13 Design a heater assembly with sufficient allowance for the thermal expansion of each component in order to prevent cracking, separation and damage.

5. Prepare Job Cost Estimates

- 5.1 Evaluate the requirements for the installation by properly interpreting code requirements and noting any special parts and unusual installation requirements.
- 5.2 Compile a complete list of all necessary components on the proper form; look up and accurately record prices.
- 5.3 Develop an estimate of shipping costs based on company vehicle costs or in consultation with various transport companies.
- 5.4 Estimate the time required to complete the work and calculate and record labor charges in accordance with company policy.
- 5.5 Total, date and sign the cost estimate, provide one copy to the customer and file remaining copies of the estimate in accordance with company policy.

6. Review Installation Requirements and Prepare for the Installation

- 6.1 Read and correctly interpret installation drawings and specifications, and assess all significant installation issues before leaving for the site.
- 6.2 Review installation requirements to confirm that the correct type and size of chimney has been selected or exists for the heater according to code requirements, regional alternatives, manufacturer's instructions and requirements for safe and effective venting.
- 6.3 Determine local building permit requirements and comply with these as appropriate.
- 6.4 Determine that work by other trades has been completed satisfactorily to permit construction of the masonry heater.
- 6.5 Gather all necessary components, tools and equipment required to carry out the specified work.
- 6.6 Load materials, equipment and documentation into the service vehicle so that damage is prevented in transit.

7. Uncrate and Inspect Components

- 7.1 Inspect unopened crates carefully and record visible damage on the appropriate form.
- 7.2 Uncrate components carefully to avoid damage and injury.
- 7.3 Dispose of crate materials safely by flattening nails and staples and coiling and disposing of banding and other materials.
- 7.4 Compare parts list or packing slip to crate contents to ensure that all necessary components have been included.
- 7.5 Inspect components and report any shipping damage using the proper form in keeping with company policy.

8. Assemble Factory-built Heater Kits

- 8.1 Identify, select, use, and maintain hand and power tools and measurement devices required for the assembly, service and repair of masonry heaters.
- 8.2 Inspect an existing chimney to confirm that it is free of damage, complies with applicable code requirements and is suitable for the masonry heater to be installed according to local building codes and manufacturer's instructions.
- 8.3 Gather the necessary tools, components and materials required for the assembly process.
- 8.4 Prepare for installation by protecting building components from dust or other damage.

- 8.5 Review installation instructions for components to be installed and note special requirements or potential problem areas.
- 8.6 Perform necessary measurements to confirm that the masonry heater and its chimney can be installed with provision for minimum installation clearances in accordance with manufacturer's instructions.
- 8.7 Assemble the core components in the correct order and placement and using properly prepared mortars according to the manufacturer's instructions.
- 8.8 Install expansion joints according to manufacturer's instructions.
- 8.9 Install the facing materials in the correct order and placement and using properly prepared mortars according to the manufacturer's instructions.
- 8.10 Install metal components such as doors, lintels and dampers with sufficient allowance for expansion to prevent stress, cracking and damage.
- 8.11 Install a hearth extension to meet relevant code requirements or manufacturer's installation instructions.
- 8.12 Install a gas-tight, permanent connection between the heater and its chimney.
- 8.13 Install the combustion air supply components according to manufacturer's installation instructions and local codes, as appropriate.
- 8.14 Return the room/building to its original condition by removing installation debris and disposing of it as required by local authorities, and by cleaning the installation site.
- 8.15 Record installer's name and date of installation or service in an appropriate location on the appliance or owner's manual.

9. Identify, select and use appropriate masonry units and mortars

- 9.1 Select appropriate masonry units for the construction of a firebox and its heat exchange channels based on anticipated temperature, thermal expansion and physical strength requirements.
- 9.2 Select the appropriate mortar for heater core components and prepare it for use according to manufacturer's instructions.
- 9.3 Assemble heater core components in the proper order and alignment and using the correct amount of mortar.
- 9.4 Install metal components such as doors, lintels and dampers with sufficient allowance for expansion to prevent stress, cracking and damage.
- 9.5 Select appropriate masonry units for the heater facing based on anticipated temperature, thermal expansion and physical strength requirements.
- 9.6 Select the appropriate mortar for the facing components and prepare it for use according to manufacturer's instructions.

- 9.7 Select and install a suitable material in a space of the correct dimension to create an expansion joint that will accommodate the anticipated thermal expansion of adjacent components.
- 9.8 Install the facing components in proper alignment and using the correct amount of mortar.

10. Advise Client of Proper Operating and Maintenance Procedures

- 10.1 Provide the client with the builder's or manufacturer's operating instructions for all components installed; thoroughly explain the contents, pointing out any special instructions.
- 10.2 Review with the customer the heater manufacturer's break-in instructions and ensure that their importance and the consequences of not following them are fully understood.
- 10.3 Explain fuel requirements and how to fire the appliance to minimize creosote formation and maximize efficiency; explain or demonstrate proper fuel loading and kindling procedures and explain fueling frequency and any special features of the heater and how these are to be used and operated.
- 10.4 Review temperatures likely to be encountered, point out suitable temperature ranges and explain the techniques by which these temperatures are to be achieved and maintained in accordance with manufacturer's or builder's instructions.
- 10.5 Explain routine system maintenance requirements and recommend an appropriate maintenance schedule for major components which, if followed, would ensure the system would function safely and efficiently.
- 10.6 Explain warranty policy and limitations for each component as set out in manufacturer's or builder's documentation.
- 10.7 Provide the customer with the name and telephone number of the person to call for assistance with problems or further advice.
- 10.8 Provide a form for the customer's signature acknowledging that the operating and maintenance instructions and warranty have been received and understood.