Masonry Heater Association Of North America

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Introduction to the MHA

The Masonry Heater Association of North America (MHA) was formed in 1984 to advance the technology of masonry heating in North America and to increase the knowledge and skills of professional heater masons. The MHA fulfils its mandate by sponsoring laboratory research into masonry heating technology, by working with building and environmental regulators to ensure the safe and appropriate use of the technology, and by publishing information of interest to practitioners. The MHA also maintains a professional training and certification program to recognize the competency of qualified heater builders.

Membership in MHA is open to anyone and the heater mason certification program has been made as flexible as possible to encourage participation. The certification program is intended to make it easier for interested people to learn the skills and offer masonry heating technology to the public; it does not function to restrict entry to the trade.

What is a masonry heater?

An authoritative description was offered by three respected wood combustion researchers, D.R.Jaasma, C.H.Stern and J.W.Shelton:
"The chief distinguishing feature of these wood-burning appliances is their ability to store heat. Combustion of a load of fuel is intended to occur very rapidly and at high temperatures, promoting improved combustion efficiency. The energy released by combustion is transferred to the large thermal mass of the appliance, and eventually heats the living space surrounding the appliance." (A Preliminary Test Method for Masonry Heater Particulate Matter and Carbon Monoxide Emissions, 1991)

A masonry heater that is designed and built according to accepted principles promoted by the MHA and its members will burn cleanly (about 2 g/kg) and heat effectively (about 65 per cent thermal efficiency).

Why are masonry heaters not EPA certified?

Masonry heaters cannot be tested according to EPA procedures for wood stoves because:

a) the EPA test protocol requires the stove to be put on a weight scale to determine the burn rate; this is impractical with a masonry heater which can weigh 8,000 lbs or more,
b) EPA determined that starving a fire for air in order to control heat output and lengthen the burn cycle is the cause of most wood smoke; since masonry heaters do not suppress combustion air flow, they cannot be turned down to achieve the low burn rates required by EPA and might exceed the maximum EPA firing rate of 5 kg/h, depending on how the burn cycle is interpreted, and
c) they are site-built, either from prefabricated components or standard refractory materials, and tend to be configured specifically to match buyer preferences and the house in which they are installed.

In developing its wood stove emissions regulation back in 1988, the EPA was fully aware that an exemption from testing and certification for masonry heaters would not jeopardize the objective of reduced emissions from woodburning systems, as this excerpt makes clear:
"The intent of the committee was to exempt from the standards these appliances (masonry heaters) which rely on clean-burning air-rich conditions and which have high combustion efficiencies." (Federal Register Feb. 1988, EPA 40 CFR Part 60)

Profile of a heater builder

Masonry heaters are sophisticated appliances that have a long and proud history. In Europe, they were designed and hand-built by skilled craftspersons who had served extensive apprenticeships under the auspices of trade associations called craft guilds. The MHA has adapted this approach for the North American context as a way for the industry to self-regulate and increase the skills and knowledge of practitioners. A qualified heater mason can custom tailor the appliance to meet the client's specific heating requirements as well as allow a wide range of aesthetic expression. Heater builders choose to specialize in this technology because it offers an environmentally appropriate and aesthetically flexible alternative to conventional fireplaces. Heater masons are environmentally conscious professionals who support clean air initiatives and are not motivated to oppose, avoid or compromise such regulations.

Why responsible air quality regulators can permit masonry heaters

Air quality regulators recognize that the replacement of conventional wood stoves with EPA certified models produces a clear environmental benefit. Similarly, the substitution of a conventional fireplace with a masonry heater produces environmental benefits in two ways; firstly by reducing smoke emissions and secondly by displacing the consumption of other heating fuels.

While a masonry heater can be an attractive and appealing feature of a house, its principal function is as an efficient heating appliance. This characteristic distinguishes the masonry heater from the strictly decorative and wasteful conventional wood burning fireplace. In this context, regulators should be aware that while decorative gas fireplaces may not emit significant particulate emissions, they waste natural gas, a fuel that releases greenhouse gases both when it burns at the point of use, as well as upstream during its extraction, refining and distribution. The use of a masonry heater for heating produces no net greenhouse gas emissions. A clear environmental benefit.

A practical method for the acceptance of masonry heaters

Because the emissions and efficiency performance of a masonry heater is embodied in its structural design, it is valid and appropriate to prescribe certain characteristics in a definition used for regulatory purposes. Because a masonry heater is a sophisticated, site-constructed device that may be configured in a variety of ways to meet buyer preference and the physical setting, it is valid and appropriate to require the heater mason to have professional accreditation.

The MHA has developed a simple means by which air quality regulators can confidently permit the use of masonry heaters. It consists of two parts:

1) a prescriptive definition of a masonry heater with which an untrained person could easily distinguish between a masonry heater and a conventional fireplace, and
2) a requirement that the unit be constructed or confirmed by a certified heater mason to increase certainty that it is indeed a heater and not a fireplace.

Below is the proposed text of a definition and professional accreditation under which a masonry heater may be accepted by air quality regulators.

Proposed language for the acceptance of masonry heaters in sensitive airsheds

To be deemed to meet the EPA emissions requirements for wood stoves, the design and construction of a masonry heater must conform to the following:

1. A masonry heater is a solid fuelled heating system of predominantly masonry construction having a mass of at least 800 kg (1760 lb) (excluding chimney and foundation), and having an overall average wall thickness of not more than 250 mm (10 in.). It achieves heat storage by the routing of exhaust gases through internal heat exchange channels in which the flow path downstream of the firebox includes at least one 180 degree change in flow direction, usually downward, before entering the chimney. The shortest distance between the firebox exit and chimney entrance is not less than twice the largest firebox dimension. It is equipped with doors that are intended to be in the closed position during the burn cycle. Its combustion air supply system is configured to produce a burn rate greater than five kilograms of fuel per hour. The chimney has a maximum flue size of 8 in. x 12 in. (200 mm x 300 mm) nominal rectangular dimensions, or 8 in. (200 mm) round.

2. The masonry heater is constructed by a person who holds a valid certificate of qualification issued by the Masonry Heater Association of North America, or the holder of such a certificate verifies in writing that the heater complies in all respects with item 1. above.

How masonry heaters compare with other woodburning appliance types

Note the dramatic reductions in emissions in post 1991 heaters, the result of research by MHA members.

1998 "Best Professional Judgement" Emission Rates (EPA-600/R-98-174a) [Ref. 1]

Appliance type	smoke g/kg
Conventional fireplace	17.3
Conventional Stove	18.5
EPA certified non-catalytic stove	6.0
EPA certified catalytic stove	6.2
Masonry heater	3.0

Actual test results of masonry heaters

Type	Brand	Lab	smoke g/kg	# of burns	Ref.
Contraflow	Heat-Kit1	OMNI	5.6	7	8
Contraflow	Heat-Kit1	Lopez	4.5	1	3
Contraflow	Heat-Kit1	VPI	2.5	15	2
Contraflow	Tulikivi	OMNI	5.7	7	8
Contraflow	Tulikivi	Lopez	3.7	21	
		↑ Pre-1991 air systems ↑			
		↓ Post-1991 air systems ↓			
Contraflow	Tempcast	OMNI	3.0	7	7
Contraflow	Heat-Kit2	Lopez	1.3	29	4
Grundofen	Biofire	OMNI	1.9	7	8
Grundofen	Custom	OMNI	1.4	7	8
Grundofen	D.W.& S.	VPI	1.0	20	2
Grundofen	D.W.& S.	OMNI	0.9	10	6
Swedish	Mastercraft	OMNI	1.9	7	5
Swedish	Royal Crown	OMNI	1.4	7	7

References

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3. N. Senf, Recent Laboratory and Field Testing of Masonry Heater and Masonry Fireplace Emissions, presented at the 87th Annual Meeting of the Air and Waste Management Association, Cincinnati, June 19-24, 1994. http://mha-net.org/msb/html/papers-n/awma01/p-awma1.htm
4. N. Senf, Very Low Emissions Cordwood Combustion in High Burn Rate Appliances - Early Results with Possible Implications, presented at the 88th Annual Meeting of the Air and Waste Management Association, San Antonio, 1995. http://mha-net.org/msb/html/papers-n/awma02/p-awma2.PDF
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6. S.G. Barnett, In-Home Evaluation of Emissions from a Grundofen Masonry Heater, OMNI-80119-01, prepared for Mutual Materials Company, The Masonry Heater Association of North America, and Dietmeyer, Ward and Stroud, Seattle, (1992).
7. R. Bighouse, S.G. Barnett, In-Home Evaluation of Emissions from a Temp-Cast 2001 Masonry Heater, prepared for Temp-Cast 2000 Masonry Heater Manufacturing, Inc., Port Colborne, (1992).
8. S. G. Barnett, Summary Report of the In-Home Performance of Five Commercially Available Masonry Heaters, OMNI 80132-01, prepared for the Masonry Heater Association of North America, Reston, (1992).

Excerpts from the Heater Mason Training and Certification Policies and Procedures Manual

Requirements for Certification

Professional Credentials Required

A candidate for MHA certification must demonstrate a working knowledge of relevant housing and fuel burning regulations, and sufficient knowledge of masonry work by providing proof* of successful completion of at least **ONE** of the following:
(a) a bricklayer apprenticeship program
(b) certification issued by the Hearth Education Foundation (formerly WHERF)
(c) certification issued by Wood Energy Technology Transfer Inc.
(d) or an equivalent professional credential deemed acceptable to the MHA **AND** at least **ONE** of the following:
(a) 40 hours of work under the direct supervision of an MHA certified heater mason
(b) successful completion of an MHA Hands-on Workshop and Test
* Proof of certification or participation, i.e. copy of certificate, diploma, letter of successful completion. Other credentials can be judged for their equivalency.

Field Experience

A candidate must provide evidence of a working knowledge of masonry heater design and construction as set out in the MHA Occupational Analysis Manual. The required evidence must consist of verifiable documentation of **THREE** masonry heater construction projects completed within the past five years. The candidate must have served as the lead mason on at least **TWO** of the required projects. Required documentation for EACH of the three projects must consist of the following:
(a) **ONE** photograph of the heater in the process of construction and **ONE** photograph of the finished unit
(b) a thorough description of the heater including firebox dimensions, overall dimensions, wall thicknesses, main materials used, etc.
(c) the name and address of the client, and the date of construction.

Examination

(a) The candidate must achieve a passing grade on the MHA examination. The passing grade is 70 percent.
(b) The candidate may take the examination before the other certification requirements are met, but certification will not be granted until all requirements are satisfied.

Maintaining MHA Certification

Annual Certification Renewal

To maintain MHA certification in good standing, a certificate holder will pay an annual renewal fee of $50.

Continuing Education Requirement

Within each five year period after certification, the certificate holder will successfully complete an MHA continuing education workshop and test, or other relevant professional credential deemed equivalent by the MHA. Failure to comply with the continuing education requirement will result in withdrawal of certification.

This is masonry heating . . .

the warmth and beauty of the natural fire

the warmth and beauty of natural materials

a renewable energy solution

the environmentally responsible way to burn wood at home.