Masonry Heater Association Of North America

MHA News

Volume 9 Number 1 Fall 1997

1997 MHA Annual Meeting Report

In This Issue

May 23 - 30 1997 at Wildacres Retreat, Little Switzerland, N.C.

Introduction

The 1997 Annual Meeting was a big success. All who attended were pleasantly surprised at the uniqueness of the setting in the Smokey Mountains, the excellent facilities, and 3 gourmet meals per day.

The peaceful atmosphere and lack of distraction allowed us to get a large amount of work accomplished. John Gulland walked us through the fine points of developing a certification program, and by this time next year, there should be fully certified Custom Masonry Heater Designer/Builders. A draft "Heater Mason's Reference Manual" was rolled out and reviewed, and is now ready for a final edit.

Technical Highlights

After a day long, very vigorous discussion, there is now an offical MHA Masonry Heater Definition.

Special guest was Heikki Hyytiäiinen, who travelled from Finland at our invitation. Heikki held several sessions with us, including a general discussion on several active current research initiatives in Europe on woodstove emissions. Another session went into technical details of Heikki's own work with a consortium of European manufacturers and universities and funded in part by the European Economic Community (EEC). A third, very enthusiastically received, session was on commercial and domestic bakeoven design and construction.

Several hands-on sessions were also well received. Included were a dry run on a masonry skills competency test, a contraflow white oven installation, and a burn unit that was used to demonstrate a German flue gas analysis system.

Masonry Heater Association Of North America MHA News

Volume 9 Number 1 .... Fall 1997

Published by:

The Masonry Heater Association of North America

Elected Officers: 97/97

President	*Pat Manley*
Vice President	*Albie Barden*
Secretary	*Norbert Senf*
Treasurer	*Rod Zander*

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Membership Policy:

Membership is open to anyone with an interest in masonry heating .

Annual membership dues:

Voting	200.00 (US)
Associate	100.00 (US)

IMPORTANT NOTE: Please check the membership list in the current issue and notify us immediately of any errors in your address, phone numbers, or dues status.

Contact the editor if the information published in this issue's membership list needs correction.

Comments from Participants during the meeting:

Jerry Frisch:

When I first agree to a N.C. meeting at Wildacres, I said "O.K., not much to loose?" Then, when I purchased the plane ticket to N.C. for $568.00, I thought "Jeez, I could have gone to Hawaii for 4 days including hotel for $355.00". I thought, not again, for me. But I went anyway.

However, when I got there, settled in, etc. I started to realize that this is a place that I will never be able to beat or, for that matter, match. I will be #1 on the 1998 sign up sheet. The food is beyond comparison. The rooms are AAAA+. And talk about peace and quiet - I have not heard a phone or TV or even radio in 7 days. (7th heaven? I think so.) And all for $250 room and board and cost sharing (it's true). Check it out.

And, the benefits have been worth twice the cost and time spent. Believe it or not, at age 64 3/4 I am still learning more and more stuff about heaters and ovens. This is an opportunity no one should pass up.

"You snooze, you loose". Hope to see you here in 1998. Save the date. Don't be late. Yours......J.E.F.

Pat Manley :

We would be hard pressed to find a better location for our annual meeting than Wild Acres. It is a peaceful and beautiful place. The friendly staff is clearly dedicated to serving our needs, and the food was great (and plenty of it). Sharing the week with the bassonists was an added extra. I knew I would come away knowing more about heaters, but bassoons too? Thanks to all who participated. I'm looking forward to next year already.

John Fisher :

I think it was an ideal setting for us to focus on our favorite thing. The bassoonists were great neighbors

David Moore :

Based on my experience this week, I predict that the South will rise again, but just not as early as everywhere else. Good place to get away to; rather than a rat race - more like a duck race

Gary Hart :

Good food, relaxing location, beautiful views, lower heart rate. Thank You! We need more hands on

Ben Sotero :

Very informative. Learned a lot. Glad I came.

Other Comments :

Wildacres is a great place for a meeting. No distractions like TV or radio. Nestled on a mountain top, truly a place to get a lot of work done

Breakfast should be earlier in the morning (7:00 - 7:30 perhaps) so day can be started

Report by Heikki Hyytiäiinen

MHA meeting - success in a cultural surrounding

The North American masonry heater family is not great in number but it is strong in mind. Still, it is important that the Association could use in its cooperative efforts all those positive forces like Tom Stroud, Albert Barden (officials of past and present) and many others. I missed them at WA.

It was an pleasure to be present at the meeting, even if it meant long days in sessions and discussions. A very special touch to this work was given by the cultural atmosphere we could feel so strongly. I believe that a good portion of culture besides technical and business know how will help you in the future to keep your organization strong.

When the issue of education was discussed we missed most strongly the experience of Albie, the pioneer of the masonry heater culture in USA.

Thank you all who were able to be present at the very successful meeting at Wild Acres 1997

Photo Report

Ben Sotero makes wet dust on the wetsaw

A new generation of stove masons. Corey Hart tries his hand as Keith Hedin looks on. Next year, the actual test will be 6 courses of bricks, within a 1/8" tolerance, within a time limit.

Marcel Ouellette tries his hand at 4" CMU's - very tricky unless you are used to them.

Gary Hart finishes up the burn unit for combustion testing.

The beautiful library at Wildacres became our headquarters for meetings. Ben Sotero and John Zamkotowicz discuss an aspect of certification as part of a small task group.

The dining hall - savoring yet another gourmet meal. The food was outstanding

.

Jerry Frisch demonstrates a master's technique

Pat Manley and David Moore square up a base for a certification masonry skills test

Jerry Frisch shares a joke with Marcel Ouellette and Tom Trout on the patio high in the Smokey Mountains.

Tim Custer starts work on his burn unit.

Notes from the 1997 Annual Meeting of the Masonry Heater Association of North America

by Janet Spencer

24 May 1997, 0900

Attendees: Norbert Senf, Leila Nulty-Senf, Heikki Hyytiäiinen, Aila Rapeli, Jerry Frisch, Marcel Ouellette, Rod Zander, Pat Manley, Gene Hedin, Keith Hedin, Marty Pearson, Tom Trout, Gary Hart, Korey Hart, John Fisher, Ben Sotero, and Janet Spencer.

Mike House of Wild Acres presented an orientation and overview of the Wildacres history and philosophy.

Following the orientation, those in attendance debated the merits of the week's agenda. It was finally decided that the majority of those in attendance desired both hands-on sessions as well as classroom theory sessions. So, the agenda was shuffled to get all the technical and business meeting items completed by Tuesday, at which point the bricks-and-mud sessions would begin.

Norbert Senf distributed drafts of his discussion paper regarding definition of masonry heaters.

Minutes from the 1996 annual meeting were distributed by Janet Spencer, and they were approved. It was noted the minutes had been available on the MHA Home Page since September.

Rod Zander presented the Treasurer's Report, which identified a balance of $18,743.87 as of May, 1997. He also reported that MHA had been re-incorporated as a not-for-profit, since it was originally incorporated under non-profit standing -- reserved for religious groups. The United States' Internal Revenue Service is now satisfied with MHA's tax situation, and the back fees owed the law firm which holds our incorporation have been brought up to date. Rod also read a letter from his wife, Lui, in which she regretted being unable to continue as Treasurer for MHA. The attendees elected Rod to fill the remainder of her term, as he is familiar with the process. The Treasurer's report was approved.

Pat Manley, president, is to send a letter of thanks to Lui Collins for her outstanding efforts in correcting a several-year-old difficulty with the financial record-keeping of MHA.

In the administrator's report, Janet Spencer reported the MHA had received approximately 175 requests for information through the mail at the BIA offices during the past year. It was perceived that the drop in mail requests had been offset by the number of individuals obtaining information through the MHA Home Page. Also noted was the lack of any recent magazine articles concerning masonry heaters; the consensus among attendees was that the Internet site was much more worthy of funding and effort than typical PR efforts. The printing cost for a new four page color brochure was quoted at $3,800 for 20,000 copies by two different printers. This did not include layout or editing text. Attendees felt this was very reasonable. Viewing of photographs collected during the past year was slated for after dinner. Janet suggested replacement of the MHA answering machine with a newer, more reliable model. After brief discussion, it was decided to replace the answering machine with AnswerCall service from Bell Atlantic.

As a prelude to the Secretary's Report, Norbert Senf had president Pat Manley give a summary of his introduction into computers. Then, Norbert commented that email is at the same level in communications technology that the facsimile used to occupy, and it is an edge which small businesses can use to their advantage. A Web Page from a small entity can have just as much or more impact as that from a large corporation.

The One and Two Family Dwelling Code meeting was attended by Jerry Frisch. John Gulland had been hired to help with the application process. Though MHA's application was rejected, it is not altogether bad; MHA is now a full-fledged member in the process.

MHA News is more of a technical journal this year. Portions which are complete are already available on the Home Page. Absence of the paper version is noted, however. MHA is encouraging members to become part of the electronic virtual community. Since dues are the only source of funding, MHA needs to keep as many members involved as possible.

Discussion of the MHA Masonry Heater Definition:

Colorado's legislature placed a ban on conventional fireplaces in certain regions. A technical committee composed of Rick Crooks, Walter Moberg and Tom Stroud proposed an “MHA masonry heater definition" definition. When Colorado accepted this definition, N.Senf wrote a letter to W. Moberg expressing the problems with the technical committee's definition, which had been written such that a Tess fireplace would qualify as a masonry heater.

Subsequently, Washington regulators faced banning fireplaces in a similar manner as Colorado, and wrote the Colorado Masonry Heater definition into the regulations. But the Colorado regulations were loose enough that Jim Buckley was able to get a Buckley-Rumford fireplace approved as a masonry heater. Walter Moberg wrote a letter to the HPA Masonry Heater Manufacturers' Caucus chairman complaining about the Rumford fireplace passing as a masonry heater in Colorado. Jim Buckley, Jerry Frisch, Norbert Senf, and others, discussed the situation via email, and Norbert has drafted a paper to address the definition of masonry heaters. Washington state's legislation has now adopted the ASTM masonry heater definition instead of the Colorado definition. If the MHA adopts an official masonry heater definition, Colorado is very interested in seeing it.

The fireplace is the only combustion appliance which doesn't require certification. Regulators will use our program and definition if we develop it, because they don't have to reinvent the wheel. We could discuss emissions, but there isn't much mileage out of it. Europeans measure CO because it is easy. In North America, we measure particulate matter, not CO. CO is not a health issue. We've looked at the relationship between CO and PM in masonry heaters, and there does not appear to be a strong correlation. After rounds of testing, we've learned a combustion appliance could be a bathtub, but if the air-fuel mixture is right, it burns cleanly. Should it therefore be named a masonry heater? We should take the high ground and say "emissions isn't a problem" and go on. The Colorado regulations have a spatial requirement, a 2-to-1 ratio, so inspectors can pull out a tape measure. However, a $200 surface thermometer can give information proving the surface temperatures of a masonry heater get to 120F and hold it.

break for lunch

24 May 1997, 1330

Attendees: Norbert Senf, Leila Nulty-Senf, Heikki Hyytiäiinen, Aila Rapeli, Jerry Frisch, Marcel Ouellette, Rod Zander, Pat Manley, Gene Hedin, Keith Hedin, Marty Pearson, Gary Hart, Korey Hart, John Fisher, Ben Sotero, John Zamkotowics and Janet Spencer.

Discussion of Masonry Heater Draft Definition:

*The outside chimney will be a sticking point. Make recommendations, but do not mandate.

*limit wall thickness to 10 inches. Greater than 10 inches extends heat transfer cycle to greater than 24 hours. It is understood you build one fire a day, not a fire every other day. Heat travels through the heater wall at a rate of approximately 1 inch every 45 minutes. For passive solar greenhouses, anything over 5 inches is a waste, because one only needs to transfer heat from day through the night.

*Heikki noted the heaters being built in Finland have a 50C surface temperature, and 55C is optimum. Also, the surface temperature 50 cm above the loading door can be as high as 200C.

*North American masonry heaters which are underfired (grated heaters) have twice the PM emissions of overfired (non-grated heaters).

24 May 1997, 1930

Viewing of photos submitted for new MHA brochure

25 May 1997, 0900

Attendance: J. Fisher, J. Frisch, J. Zamkotowics, J. Spencer, J. Gulland, B. Sotero, G. Hedin, K. Hedin, G. Hart, K. Hart, M. Ouellette, M. Pearson, N. Senf, L. Nulty-Senf, R. Zander, P. Manley, H. Hyytiäiinen.

Certification ensures a consistent knowledge in the field, while shortening the learning curve. As Jerry Frisch commented, "We're all playing the same game."

John Gulland pointed out that there are two parts to a training/certification program: the academic portion and the physical portion. Certification is useful because it establishes legitimacy, credibility, and recognition. It gives MHA control over definitions and descriptions with regulatory agencies. Certification also protects consumers, while adding to the customer confidence/comfort level.

Determining the path to certification are the established criteria. Then, a system is put into place to measure those criteria. Finally, those meeting the established criteria as measured through the system, are endorsed by MHA and regulators.

The attendees were broken up into small task groups to refine the steps to MHA's certification.

After discussion and presentation of task group findings, the meeting broke for lunch.

RECONVENE

25 May 1997, 1330

Attendees: J. Gulland, H. Hyytiäiinen, J. Frisch, J. Fisher, N. Senf, P. Manley, R. Zander, B. Sotero, G. Hedin, K. Hedin, G. Hart, K. Hart, J. Zamkotowicz, J. Spencer, L. Nulty-Senf, M. Pearson, M. Ouellette, D. Moore.

Proposed Criteria:

Attempt to Quantify: By This Mechanism: Submit to MHA:

1. Background

    Formal Training
    Photocopy of cert./I.D.

2a. Hands-on Practicum

    Min. 3 projects in 5 years
    Letters & Photos from clients

2b. MHA sponsored workshop
    Letter from cert. builder
    or apprenticeship upon satisfactory completion

3. Theory Comprehension
    At home exam

Training: 1) a reference manual, 2) classroom session, 3) apprenticeship

Code of Ethics: send letter in duplicate to certificate applicant, which they must sign and return to become certified.

- How do we decide there has been a violation?

- what do we do if there has been a violation?

John Gulland then expanded to set up the policy framework: certification requirements, how they are achieved, documentation, wording of certificates, program documents, promotional material, media release, registration form and cost, response forms and which letter goes out at each step in the certification process, the reference manual, occupational analysis, and then the Web-posted member registry and certified builders list.

The consensus upon what MHA could reasonably require for criteria for certification was as follows:

1) Other certifications, diplomas, letters of successful completion (e.g. HEARTH, WETT, bricklayer apprenticeship or courses, CSI, Kit Manufacturer training or equivalent) and year achieved.

2) Field experience. 3 photos with name, address, date, description ; completed within the last 5 years. Two of the three must be candidate's own job, not just as an assistant.

3) MHA training. Self study of reference manual, and a passing grade on examination.

Next, the issue of the cost for certification was opened for debate. Finally settled upon the fact membership yearly costs $200; the application fee should be $300 ($200 of which is waived if request for application is received during the first 12 months of membership). The application fee includes the reference material, policy manual, study guide, and occupational analysis manual. The exam fee should be $100, and annual renewal of certification is $50.

The session adjourned for dinner.

25 May 1997, 1945

Attendees: J. Zamkotowics, G. Hedin, B. Sotero, D. Moore, M. Pearson, J. Fisher, J. Gulland, J. Frisch, N. Senf, P. Manley, R. Zander, M. Ouellette, J. Spencer.

Review/ Revision of Draft Reference Manual.

26 May 1997, 0930

Attendees: B. Sotero, J. Gulland, G. Hedin, M. Ouellette, N. Senf, L. Nulty-Senf, H. Hyytiäiinen, R. Zander, D. Moore, P. Manley, T. Trout, M. Pearson, K. Hedin, J. Zamkotowics, J. Spencer, J. Fisher.

Postponed budget discussion, and already covered ASTM review. Unfinished business included the reference manual changes and revisions. Already completed was the proposed wording for MHA masonry heater definition. The attendees voted to accept the corrected version of the masonry heater definition.

A discussion regarding next year's meeting location followed. It was decided to stay with Wildacres for 1998, while individuals prepared to present alternative locations on the West Coast for the 1999 annual meeting.

Next, Heikki Hyytiäiinen gave a slide presentation on the history of "Finnish" style masonry heaters. Included were slides of one of the first attempts in North America, a heater built in Long Island, circa 1985... Tom and Norbert were part of the team involved in construction. Around the year 800 AD, the Vikings brought stone pile heaters to what is now Finland. Heikki contended this was the beginning of Finnish culture, because the people could now stay in one place and be warm. The chimney and damper came from Sweden in 1400, with disastrous effects -- the Finns had wood shingled roofs which caught fire from sparks exiting the chimneys. The Swedes had experienced no such catastrophe because their roofs were tiled. Around 1750, the kachelofen was developed in Austria, and in 1767 the 5 tube Swedish kachelofen was invented. The contraflow design arrived in 1850, and allowed space for heat expansion of the inner core. During the 1940's World War II, prompted the development of a bake oven which utilized only 2 pieces of wood.

The current heater being built by Heikki has a narrow firebox which is 32 cm wide and 55 cm deep. For a sauna stove, approximately 2 inches above the combustion chamber is a stone reservoir.

The assembly adjourned for lunch.

26 May 1997, 1330

Attendees: B. Sotero, M Pearson, T. Trout, J. Frisch, J. Fisher, J. Gulland, P. Manley, R. Zander, M. Ouellette, L. Nulty-Senf, N. Senf, K. Hedin, G. Hedin, D. Moore, J. Zamkotowicz, H. Hyytiäiinen, J. Spencer.

Slide presentation of current heater and oven construction in Finland, by Heikki Hyytiäiinen.

1515, last item of serious business: page 9 and continuing through on revision/review of draft Heater Reference Manual

MHA Masonry Heater Definition

The following definition passed by a unanimous vote at the 1997 MHA meeting. See notes above for details of the discussion, also “Defining Masonry Heaters”, below:

A masonry heater

1.) is a solid fueled heating system of predominantly masonry construction having a mass of at least 800 kg (1760 lb), excluding chimney and foundation.

2.) is designed to burn at a burn rate greater than 5 kg/hr. Burn rate is defined as the weight of fuel charge divided by the actual burn time. Standard masonry heater types, as illustrated in ASTM E1602-94, shall be deemed to attain this value.

3.) is deemed to meet EPA emissions requirements for woodstoves by virtue of: a) the above design principle and b) the substantial existing database of masonry heater PM-10 emissions test results

4.) is equipped with doors that substantially enclose the firebox and which are intended to be in the closed position during the burn cycle.

5.) is designed, under normal operation, to burn with a maximum chimney entry temperature of 350C (662F)

6.) is constructed of sufficient mass such that under normal operating conditions the external surface of the heater, except in the region immediately surrounding the fuel loading door(s), does not exceed 110C (230F).

7.) achieves heat storage by routing of exhaust gases through internal heat exchange channels in which the flow path downstream of the firebox includes at least on 180 degree change in flow direction, usually downward, before entering the chimney.

8.) has a maximum chimney flue size of 8" x 12" (200 mm x 300 mm) or 8" (200 mm) round.

9.) has a maximum overall average wall thickness of 10" (250 mm).

10.) is capable of achieving a minimum average surface temperature of 50C (120F) with a design fuel load, on a design heating cycle.

11.) Shall not penetrate the house envelope.

Larry Lamont, 1949-1996

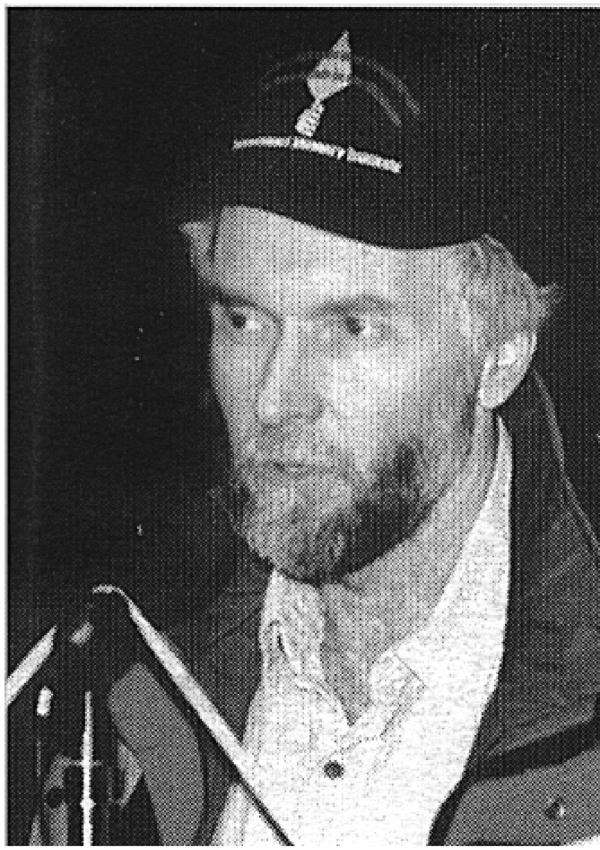
by Carolyn Green & Peter White

reprinted from " New Maritimes", May/June 1996

We first met Larry Lamont in 1982 and soon became fast friends. He was easy to like: he touched people in a special way. He was a social activist, community builder, mason-restoration craftsperson, a neighbour, and friend who embraced life with enthusiasm.

Larry started his long career as a social activist early in life. In 1970, while he was still a student at the University of New Brunswick, he ran for the provincial New Democratic Party. After once again running for the Party in the 1982 New Brunswick provincial election, he moved to Halifax where he worked in many elections, always helping in the organizational trenches. Any time there was a Party meeting, convention, or election, Larry was there. He was especially popular because he was "the guy with the truck" and was always generous enough to lend itwhen needed.

Working for the NDP represented only a portion of Larry's commitment to social change. he was also very interested in international development issues. He trained to become a journeyman mason, and this enabled him to go overseas as a CUSO development worker in1980. He spent two years in southern Sudan helping local masons develop new methods of making bricks, but he admitted that his real love was making houses and other brick structures with local artisans. Back in Canada, Larry supported CUSO's work, as well as that of a number of other internationally focused groups, such as OXFAM, Amnesty International, and the Nova Scotia-Cuba Association.



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As a community builder, Larry was especially interested in development projects and the cooperative movement. In New Brunswick, he helped in community development projects and with the Capital Credit Union in Fredericton. He was one of the leaders behind developing the Direct Charge Co-op in that city. After moving to Halifax, he worked in the cooperative movement and served on the Board of the Halifax Metro Credit Union. More recently, Larry helped in the drive to establish a co-op store in Lower Sackville. He began driving to Windsor every couple of weeks for the family groceries just so he could shop co-op.

Larry the community builder was also Larry the mason and craftsperson. He combined his political beliefs and values with his profession. He was always active in the union, the International Union of Bricklayers and Allied Crafts, and in the early '90s it hired him for two years to lead a union-sponsored literacy programme. In 1995, he was instrumental in forming the Halifax Bricklayers Workers' Cooperative. He knew this might be a risky venture, but he believed in it. He specialized in building masonry heaters and other energy-efficient fireplaces. He gained considerable skill in home renovation by restoring his family's own historic home, as well as other nearby homes. The craftsmanship in these houses serves as a model for neighbourhood improvement.

For Larry, political activism started in the neighbourhood. He always tried to shop Canadian, shop union, and shop local, even when it cost more. He was involved in municipal politics and was a community leader in recycling. Before Halifax started its own programme, Larry would collect discarded recyclables in his basement until he had a truckload to take to the recycling depot.

As a friend, Larry was unparalleled. He often helped those in need, sometimes by hiring them to work on his home restoration projects. He was always fun to be with, mainly because of his many enthusiasms. In recent years, Larry embraced Scottish culture, joined the Clan Lamont Society, and bought a kilt. He would host annual Robbie Burns dinners and invite his friends. Before long, some of us were sporting kilts in our own plaid! Larry was always ready to embark on new experiences, and new adventures: "Let's go canoeing and camp for the weekend!"; "Let's go and see what it's like to kayak!"; "I'm joining an old-timers hockey league. Why don't you come along?"

Larry was always modest about his amazing accomplishments. But none of his accomplishments was greater than his development of a personality and lifestyle that served as a model for others to follow. Maybe Larry sometimes worked too hard, but there was always so much to do, so many more experiences to embrace and savour. He thrived on hard work, just as he thrived on learning and new experience.

Larry would have laughed at all this high praise: he had a self-deprecating sense of humour and loved telling bad jokes. He would have said, with a big smile, "I'm just an ordinary guy." Indeed he was. Just an extraordinary guy.

Larry Lamont died on May 18th while sea-kayaking near East Ragged Island, Shelburne County. A long-time friend and fellow craftsperson, Barry Bower, also died in this tragic accident. Larry is missed by his mate Margie Macdonald and their two daughters, Lisa and Miranda, by his mother Olive and brother Charlie, and by his community, neighbours and friends.

E-mails

Feedback on the MHA web site:

Date: Tue, 25 Feb 1997 13:02:16 -0500 (EST)

Norbert:

Irene and I sold our Maple Valley home and moved on Jan. 15. We are renting a home in Kent WA. until our new home is completed. (About Nov. 1). There was about a 2 week period that our computer was shut down due to the lack of telephone service and some more time before we checked our e-mail. We found some very interesting correspondence between heater members. I also did some white ovens probably ten or so years ago. Never thought much about it, we just did them. And, as you said, a skilled mason can figure out the basic construction to prevent failures.

I did an interesting heater project last Nov. I completely gutted an inside double fireplace. The owners had an insert down and a heatilator on the second floor. We left what brick walls we could and built the firebox down and put an oven (white) upstairs. We also added a hot water coil. I was a litte nervous as this was my first two story heater. It is working just great! The people love it. The wife has always been bothered by allergies and the heater relieved them a lot. They will be great referrals. He just can't believe how it heats.

We're getting many more inquiries form the MHA website. I told you previously abut the one in B.C. Also have heard recently from folks in Port Angeles, Poulsbo, Yakima, and several others. We are very happy with the site and it's presentation. Nice Job Norbert! Keep up the good work and the interesting topics as well.

Later...Jerry and Irene Haupt

April 5/97

Thank you for the information. I will pass it on to Ben.

We have hits from all over the world. I spend considerable time giving out information. We have not done any jobs through the website as yet, but I am sure we will. The MHA membership has and is a great source for us and we are and will remain current. Ben is trying to plan in the meeting. I was planning to come, but after seeing the heavy work schedule I feel it would be counterproductive for me.

Regards,

Kathleen Sotero

On the Road to Certification

Project Update: Certified Heater Mason Program

by John Gulland

After lots of discussion and the passage of time, the project to develop an MHA Heater Mason Certification Program is fully underway. The first two components of the program are in final draft form and ready for review and approval by the membership at its annual meeting in May. The last two components can be developed within three or four months of a go-ahead from the MHA executive. This means that within as little as six months the MHA could be in a position to issue certificates of qualification to masons that meet its requirements. The project has momentum and the goal is in sight. It is quite an accomplishment for a small band of intrepid heater masons spread all over North America. The project got started last fall when I received approval to proceed with the preparation of the occupational analysis manual (OA). The OA manual reads sort of like a job description and answers the question: What skills and knowledge does a person need to be considered a qualified heater mason? The manual is only seven pages long, but each entry packs a lot of meaning and, as a whole, the manual defines in considerable detail what the work of a heater mason entails. The OA manual also contains summary tables that candidates can use in their learning and exam preparation efforts and which may also be used by MHA in an apprenticeship-based program, should it decide to go that route as the program matures.

The second major component is the Heater Mason's Reference Manual, which will be issued in final draft form before the annual meeting. Written in plain language with no unnecessary jargon, the manual sets out the basic framework for the design and construction of effective heaters. The manual concentrates on the work of heater masons rather than kit assemblers, so it does not read like a how to manual (do this, then do that, etc.). Instead, it offers design and construction guidelines and strategies, leaving the final decisions up to the mason. This respects the principle that a qualified heater mason builds a product that is customized to meet the specific needs of the client - the cookie-cutter approach used for most other heating systems does not apply.

The reference manual also includes a comprehensive bibliography of other books, manuals, articles, standards and research papers that users can get to complete their library of available knowledge of masonry heating. Perhaps the most important role of the manual is to help define what we mean when we talk of masonry heaters in a North American context. The manual is intended to be refined and expanded as time passes and the program develops further. I think it is a great start, and, along with the OA manual, provides a secure foundation for a heater mason certification program.

So, what comes next? Before the MHA can issue certificates of qualification, it must have a way to measure competence in the necessary skills. The best way to measure skill is to have a qualified person observe the candidate for certification as they build a masonry heater. But this is much too expensive and is not a realistic option. A less expensive method is to have the candidate complete a written examination. Note, however, that a written examination does not measure the sort of skills needed by a heater mason. It can only measure the knowledge that tends to accompany the needed skills. This problem makes the development of each examination question a tricky proposition, requiring a fair amount of thought and analysis. To understand just how tricky the process is, try this: pick an aspect of masonry heater construction and write yourself a sample exam question, then analyze it to see what it measures. Most standard questions tend to measure vocabulary, reading comprehension or memory. These skills have little to do with the ability to build a masonry heater correctly.

I can work with the MHA to develop an examination that is reasonably effective at revealing if a candidate has the necessary background knowledge to be a successful heater builder. But passing an examination is not the only criteria for certification, and this is where the fourth and final component of the MHA certification program comes in.

The MHA needs a certification policy manual that sets out all the conditions required to achieve certification and how to maintain certification in good standing. The initial criteria can involve things like the number of years of experience in conventional masonry work, the completion of other related courses such as those offered by the masonry industry, Hearth, WETT and so on. These criteria, combined with a satisfactory grade on the examination, can produce a reliable measure of competence.

To maintain their certification in good standing, certificate holders might be required to pay an annual certification renewal fee, or to attain continuing education credits by attending annual meetings, or being an MHA member so they receive the newsletter, or some combination of these and other options. The preparation of the certification policy manual involves making a number of important decisions that will guide the program for a long time to come.

The current members of MHA are in the enviable position of being among the first in North America to achieve certification as Heater Masons. Many members are highly experienced builders, so they serve as both teachers and learners; as decision-makers in the agency that issues the certificates as well as candidates for certification. A few members will have to help me to develop the examination so will be reviewing and approving exam questions. But don't let the apparent conflict bother you. These circumstances arose for every new professional certification program that was ever developed. Consider these two points: first, the examination itself is not the only criteria for judging competence, and second, the easiest route to certification is to simply pass the exam and submit your supporting documentation, but not be involved in all the development work. Those few members who must review exam questions have a much harder job than those who achieve certification by the normal route.

The MHA is on the brink of creating a new trade for North America. Of course, many of you are already professional heater builders, but to the public and inspectors you are just a bunch of guys, indistinguishable from anyone else who claims to know all about masonry heaters. You are about to turn a corner into recognized, certified professionalism, a step that will have meaningful impacts on the future of masonry heating on this side of the Atlantic. It's too early to pop the cork on the champagne, but it won't be long now.

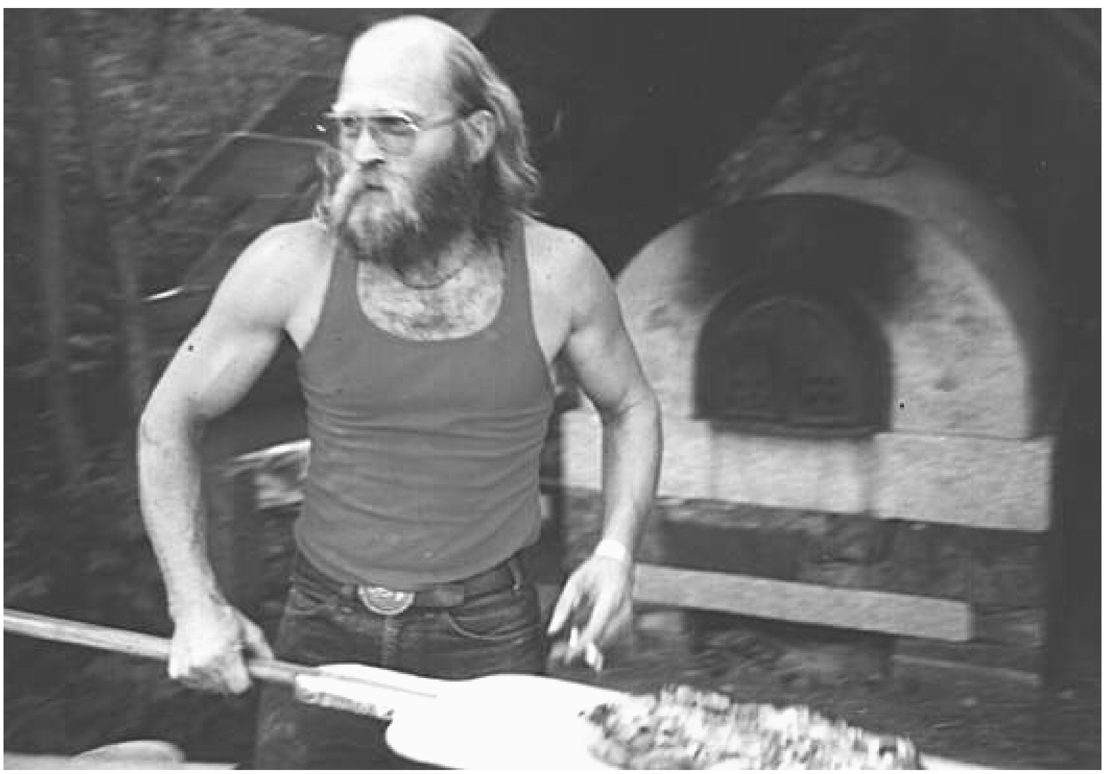

Figure 2. Master Mason and Baker Dale Hisler hosts a pizza party for MHA Members, 1986 . Dale built this authentic Québec Oven in New Hampshire

Defining Masonry Heaters - A Discussion Paper

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INTRODUCTION

New advanced masonry fireplace designs have raised the issue of where the dividing line between masonry heaters and masonry fireplaces should be drawn. This discussion paper is intended to help delineate these issues for the Masonry Heater Association of North America (MHA) voting membership, since this is who the task of masonry heater definition rests with.

There are currently four definitions, none of them entirely adequate because they all lack a performance criterion. If MHA does not come up with a solid definition, then anything made of bricks and producing even a little bit of heat can be billed as a masonry heater.

Today, in 1997, emissions is a non-issue in masonry heater definition, since recent testing has shown that fireplaces can also be made to burn cleanly simply by ensuring flaming combustion and avoiding smoldering. Heat storage and efficiency should be the main criteria for defining masonry heaters.

Criteria for Defining Masonry Heaters

A range of criteria can be used to define masonry heaters. They can be performance criteria or prescriptive criteria.

Prescriptive criteria are often used in building codes. For example, for masonry fireplaces, "*the wall thickness at the firebox shall be 8" or greater*". Prescriptive criteria are easier to verify on-site by a building inspector.

Masonry heaters are better described with performance criteria, since it is performance that makes them unique, not appearance. For example, we can require a masonry heater to have a heat exchanger, but what if the heat exchanger in a particular design doesn't work? We are better off to specify what a heat exchanger should *do*, rather than how it should *look*. An example of a performance criteria would be "a *masonry heater must store at least 50% of the available heat that is released from the wood*".

Performance criteria include:

- Heat storage
- Efficiency
- Surface Temperature
- Emissions
- Burn rate

Prescriptive criteria include:

- Weight
- Firebox measurements
- Heat exchanger wall thickness
- Intended use and location

DISCUSSION OF EXISTING DEFINITIONS

(See Appendix for full text of existing definitions)

ASTM

The ASTM masonry heater definition is part of ASTM E1602-94, Standard Guide for Construction of Solid Fuel Burning Masonry Heaters. This Standard Guide was the result of eight years of effort by MHA members.

Due to the slow nature of the ASTM consensus standards process, the Standard Guide is not yet framed in rigorous code language. It is framed in near-code language, however. As a consensus standard, it is exactly that: a consensus of all the opinion in the industry and related fields. The final document was passed by a vote of all 60,000 ASTM members worldwide.

The intent of the masonry heater definition in the ASTM Standard Guide is clear: a masonry heater must

- store a “substantial” portion of the heat released from the wood fuel
- weigh at least 800 kg.
- be constructed primarily of masonry

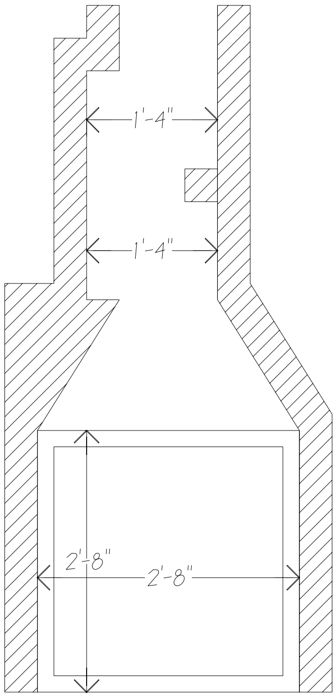
What is “substantial heat storage”? In order to extend the definition into code language, we must define the term “substantial”. This is the main issue for the MHA membership to consider, and is discussed in detail later in this paper.

One and Two Family Dwelling Code (OTFDC)

MHA has recently applied for masonry heater-specific additions to the masonry fireplace section of OTFDC. Getting masonry heater-specific language added to the masonry fireplace section of the building code will be very helpful for custom heater builders, as well as their clients.

The proposed OTFDC definition is essentially an expanded version of the ASTM definition. It adds that a masonry heater’s intended use is as a main or significant supplemental heat source. To address some of the shortcomings of the prescriptive Colorado definition (below), it adds to the heater description that the gas path normally makes at least one 180 degree bend. In also states that a masonry heater is designed to be operated with the doors closed.

Figure 3. A 32" Masonry Fireplace with Two 16" Horizontal Flue Channels



Colorado

Colorado was the first state to ban fireplaces on the basis of air quality. An MHA Colorado Legislative Task Force, consisting of Walter Moberg, Tom Stroud, and Rick Crooks, negotiated an exemption for masonry heaters.

The Colorado process was adversarial in nature. The regulation hinges on a so-called "MHA masonry heater definition", that was drafted essentially to satisfy state regulatory lawyers, who considered the ASTM definition to lack rigor. It is a prescriptive definition, based on making firebox and flue length measurements. At a minimum, it only requires a horizontal flue run the same length as either the firebox height or width (whichever is greater). For example, for a 32" x 32" fireplace firebox, a 16" horizontal zigzag is all that is required to meet the Colorado definition (See Figure 1., left, for one possible interpretation). I expressed a written concern at the time[1] that this definition not be used as a precedent in other jurisdictions.

Both a Moberg fireplace and a modified Buckley Rumford fireplace have been approved in Colorado as masonry heaters. To meet the minimum Colorado definition, a standard masonry fireplace does not require much modificaton, as Figure 3 illustrates. This clearly emphasizes the need for establishing the dividing line between masonry fireplaces and masonry heaters, and the need for an MHA Masonry Heater Definition that has been sanctioned by a vote of the membership.

Washington

Washington state passed a fireplace regulation in 1996, after negotiations with an industry Technical Advisory Group, or TAG. Although it is a fireplace regulation, it includes a masonry heater definition based on the Colorado definition.

R-2000

R-2000 is a Canadian voluntary housing performance standard. The performance criterion is that the house shall have 50% of the energy consumption of a conventionally built house. The R-2000 program has been very successful in Canada since its inception more than ten years ago. It is also influential - many of its pioneering provisions have migrated into the National Building Code.

Masonry heaters inadvertently were excluded from R-2000 when a woodstove air consumption standard was imposed. To remedy this situation, Canadian MHA members entered a consultation and negotiation process with R-2000, and a masonry heater rule resulted that addresses masonry heater definition and installation. The process included a Canadian government funded study of masonry heater air consumption issues, carried out by Lopez Labs[2].

Main points include:

- Masonry heater must meet ASTM definition
- Neither heater or chimney may penetrate the house envelope (no outside chimneys)
- Heater operation must specifically preclude the possibility of open door use (no open fireplaces)

DISCUSSION OF MASONRY HEATER CRITERIA

1.) Heat Storage

Heat storage is the main feature that distinguishes masonry heaters from woodstoves and fireplaces. It is the key element that allows a fast burn rate, thus simultaneously optimizing wood combustion yet not overheating the heated space. This is a key point and cannot be overempathized. A high heat release rate in the firebox accompanies the high burn rate, but because of a limited loading door size and internal flue gas heat exchange channels, only a fraction of the available heat is released to the space during the burn.

Little data is available on the relative amount of heat storage of masonry heaters compared to other appliances. Test data is needed before firm conclusions can be drawn. Before appropriate testing can be conducted, two things are necessary:

- a definition of heat storage
- a test method for heat storage.

Heat Storage Definition

The amount of heat theoretically available for storage can be defined as the higher heating value (HHV) of the fuel, minus the stack loss during the burn. The actual amount of heat stored can be defined as the theoretical amount minus the amount released to the heated space during the burn phase. Almost all of this instantaneous heat release will occur through the loading doors. We can express heat storage as a ratio, (actual)/(theoretical maximum), and term it heat storage fraction (HSF).

Heat Storage Test Method

By definition, all heat storage takes place during the burn. Given the reasonable assumption that all of the immediate heat release occurs through the loading doors, it follows that measuring the heat release during the burn will allow us to calculate the amount of heat storage. If we cover the loading doors with a well insulated, low mass black chamber, then all of the heat released through the doors will be transferred to the air in the chamber. We can move air through the chamber with a fan and measure the airflow rate and air temperature rise. This will determine the instantaneous heat output.

Aside from the insulated box, additional apparatus required are a variable speed fan, two thermometers, a Pitot tube, and a draft gauge (manometer). In addition, a standard stack loss test is performed, which requires an stack gas analyzer.

An alternate method might be to use a point-and-shoot infrared thermometer. These instruments have recently become affordable, and make it possible to take large numbers of surface temperature readings very easily. It would be simple to do a time-temperature record of the whole heater surface, as well has the loading doors. Thus, the heat output of the heater and the doors could be calculated directly, without doing a stack loss.

Appliance Comparison

We know what a traditional masonry heater is and what a traditional masonry fireplace is. In between are a number of "advanced masonry fireplaces". We need to draw a line between masonry heaters and non masonry heaters, but don't know exactly where to draw this line. For comparison purposes, we can define an appliance range with a traditional masonry heater at one end and a standard masonry fireplace at the other. We can do this, in terms of actual appliances for which data is available, as follows (the relative ranking of the appliances marked "(?)" is unknown):

Table 1. Categorization of 6 Tested Appliances

Category	Specific appliance	Description
Masonry Heater	Tempcast	conventional masonry heater with heat exchange channels and firebox doors conforming to accepted design rules
?	Frisch-Rosin (modified)	advanced masonry fireplace with substantial heat exchange channels and large airtight ceramic glass doors
?	Moberg	advanced masonry fireplace with some heat exchange channels and large airtight ceramic glass doors
?	Frisch-Rosin (unmodified)	advanced masonry fireplace with no heat exchange channels and large airtight ceramic glass doors
?	Buckley-Rumford (unmodified)	advanced masonry fireplace with no heat exchange channels, with optional large airtight ceramic glass doors (i.e., open fireplace burn mode is not specifically excluded)
Masonry Fireplace	Standard Code Fireplace	conventional masonry fireplace with optional non-airtight doors

Although we don't know the HSF, we know that, in terms of HSF, a Tempcast is a masonry heater. We also know that, in terms of HSF, a standard code fireplace is not a masonry heater. Since a criterion for a masonry heater definition might be defining a threshold HSF value, we can define the (as yet unknown) Tempcast HSF value to be on the masonry heater side of the threshold, and the standard code fireplace value to be on the fireplace side (Table 2).

Table 2. Heat Storage Comparison for 5 Appliances (Note: invalid without data)

Appliance	Heat Storage Fraction, HSF	Is it a Masonry Heater?
Tempcast	?	Yes
Frisch-Rosin, modified	?	?
Buckley-Rumford, modified	?	?
Moberg	?	?
Standard Code Fireplace	?	No

Discussion

A number of factors will affect HSF. The main parameter by far will be heat loss through the loading doors during the burn. Therefore, firebox shape and size, and door size will be key elements affecting heat storage. For an appliance to operate as a masonry heater, a fast burn rate is required. To withstand the accompanying thermal stress, door glass must be ceramic instead of the tempered glass found on conventional fireplaces. Ceramic glass is more transparent to infrared radiation than tempered glass, so the heat loss through the glass will be significant.

Firebox shape and size is also an important factor. Certain firebox designs such as the Rumford and the Rosin were in fact originally created to maximize the amount of heat radiation from the firebox opening. These firebox designs could, in fact, have a lower HSF than a standard masonry fireplace with airtight glass doors, which has a deep firebox and a lower opening.

2.) Efficiency

Appliance efficiency is another criterion that we can use to define a masonry heater. They are marketed as advanced, high performance appliances, so it is reasonable to include a minimum efficiency requirement as part of a masonry heater definition.

A credible database on masonry heater and masonry fireplace performance has been developed over the last 6 years. Main data sources are Virginia Polytechnic Institute (VPI)[3,4], OMNI Environmental[5,6,7,8,9,10], and Lopez Labs[11,12,13,14,15,16,17,18].

The database on masonry heater and masonry fireplace efficiency, while credible, is not large. While we have enough data on which to base some conclusions, there are still areas of controversy.

All efficiency data available is based on US-EPA style stack loss measurements. This leads to some technical problems[19] when determining efficiencies for appliances that have high amounts of dilution air, such as fireplaces. Therefore, data for fireplaces has higher margins of error than data for masonry heaters (Reference 17). Shelton et al. (Reference 19) have suggested 400% excess air as a limit for obtaining accurate efficiency data via the stack loss method. An example error analysis using Lopez data is provided in Appendix 2.

The second issue is ambient (outside) air temperature. Most of the data in the database, regardless of laboratory, has been generated at relatively high (greater than 60F) ambient air temperatures. With colder air, as one would find in most realistic heating situations in North America, high excess air appliances suffer a much higher efficiency penalty than appliances that operate near the optimum excess air level for domestic wood combustion of approximately 150 - 300%. Therefore, reported efficiencies for fireplaces in the literature are probably consistent, but too high.

3.) Emissions

Emissions has been the main regulatory focus in residential wood combustion (RWC). Masonry heaters, without exception, burn cleanly. Just exactly how cleanly is a matter for research and debate. From a regulatory perspective, the US-EPA limit of 7.5 g/h of particulate matter (PM) emissions has become the accepted benchmark for clean burning in the United States and Canada.

A significant database of masonry heater and masonry fireplace emissions data has been generated in the last 6 years. Both appliance types are “non-affected facilities” in the US-EPA woodstove standard, and have had to develop “equivalent” test methods to establish “equivalent” compliance. US-EPA so far has ruled that only field test data under actual in-home use conditions is acceptable. MHA, Western States Clay Products Association (WSCPA), OMNI and Lopez Labs have been the main players in developing this field testing database, and this effort has been described elsewhere (Reference 14).

As John Gulland points out[20], emissions, in particular the most harmful emissions, are produced by smoldering. In other words, the whole emissions issue is obscured (no pun intended) by the smoldering component. If we acknowledge this unique and complex aspect of wood combustion explicitly, it adds an extremely useful context to the emissions debate.

Since masonry heaters by definition are designed to burn fast and not smolder, they burn cleanly. In fact, they do so without much effort, unless there are fundamental design errors. An example of erroneous design is the use of underfire combustion air, which recent testing (References 6, 14) has shown to raise particulate emissions significantly during the cold start phase. Even with underfire air, masonry heaters are still comfortably under the US-EPA limit.

The preamble to the US-EPA woodstove regulation recognizes the inherent clean burning nature of masonry heaters:

> The 800 kg cutoff was established as an easy means of excluding the high-mass fast-burn wood-burning appliances known as “Russian stoves” or “European tile stoves.” These devices typically operate at hot, fast burn rates and cannot be dampened. It is also unlikely that they are capable of meeting the 5 kg/hr minimum burn rate. *The intent of the committee was to exempt from the standards these appliances which rely on clean-burning air-rich conditions and which have high combustion efficiencies. It should be noted, however, the exclusion does not apply to appliances which exceed the 800 kg threshold only because of masonry or other materials which are not sold by the manufacturer as integral parts of the appliance*[21]. (emphasis added)

Emissions from both a conventional masonry fireplace or an advanced masonry fireplace can vary dramatically, depending on operator influence, since a fast burn is not the only option available. The operator can maintain a brisk, bright fire until the charcoal phase, or (typically, for the owner of a conventional fireplace (Reference 5)) allow smoldering to occur. This is a very real problem with the current “US-EPA audited blind in-home field testing” protocol, since simple operator coaching by the manufacturer can have a much greater effect on emissions performance than any claimed appliance superiority.

Most of the recent work at Lopez Labs has been a study of fueling protocol effects on appliance performance. A Lopez protocol for describing fueling parameters in detail has been developed. Only a small amount of work in this area has been done elsewhere to date.

Emissions is an unimportant component of masonry heater definition. A reasonably well-designed masonry heater burns cleanly without much effort.

Reduced burn rates that try to emulate fireplaces might be a problem, but this is outside the realm of established masonry heater practice. This is an issue, however, for advanced masonry fireplaces.

4.) Burn Rate

A high burn rate goes hand in hand with heat storage. Again, heat storage allows a burn rate to be used that is higher than that required to supply the immediate heating needs, in contrast with conventional metal woodstoves. All woodburning appliances have a *critical burn rate*, a rate below which flaming combustion changes to smoldering combustion. In conventional US-EPA certified stoves, the critical burn rate threshold is reduced by means of elaborate, precisely tuned secondary air systems and associated techniques. This is necessary because the appliance is required to target the immediate heating need of the space over a wide range of heat outputs. In modern houses, the average heat requirement is often quite low. Burning wood cleanly AND slowly is difficult.

With fireplaces, burn rate has traditionally not been an issue, because fireplace performance has not been investigated with modern methods until recently. Ten years ago, there was no reliable data on masonry fireplace emissions, efficiency or usage patterns under actual in-home conditions. Advanced masonry fireplace design is still in its infancy. Many questions remain unanswered, and more test data is needed. If advanced fireplaces make claims to be masonry heaters, they must be able to make those claims based on performance, and performance claims must be backed with test data obtained under a variety of operating conditions.

In the meantime, it seems reasonable to maintain the US-EPA “non-affected facility” criterion of a minimum 5 kg/hr burn rate as a definition requirement for masonry heaters.

5.) Firebox Measurements

The relationship between firebox dimensions and heat exchange flue length was used as the basis for the Colorado masonry heater definition. At the time, there was a need for a narrow legalistic definition to satisfy the requirements of the state’s regulators and their lawyers, who had no familiarity with masonry heater principles and disputed them with some vigor.

A Moberg fireplace and a modified Buckley Rumford fireplace have been accepted by Colorado as meeting their masonry heater definition. Clearly, this emphasizes the need to define where the dividing line between fireplaces and masonry heaters actually is.

6.) Heat Exchanger Configuration and Wall Thickness

Masonry heaters are primarily heating appliances. In order to function properly, overall wall thickness must be within certain limits. If the masonry facing around the heat exchangers is too thick, then it is impossible to reach the required surface temperatures. Instead, the thermal lag (thermal time constant) increases beyond the accepted useable period of 24 hours. In other words, there is too much heat storage.

At 68F room temperature, the heat output from a vertical radiant panel is given in Table 3, below. The last column compares the heat output for a typical North American masonry heater with 100 ft^2 of radiant surface, constructed with different wall thicknesses:

Table 3. Surface Temperature versus Heat Output for a Vertical Radiant Panel

Surface Temperature, degrees Fahrenheit	Heat Output, BTU/hr. per sq. ft. of Surface	**Heat Output, kW per $10m^2$ of Surface ($10m^2$ = 100 ft^2)**
80	33	1.0
120	105	3.1
160	200	6.0

Table 4. Comparison With German Wall Thickness Standards for Masonry Heaters[22]

Construction Style	Wall thickness at Firebox, cm.	**Heat Output, kW per $10m^2$ of Surface**
"heavy"	12.0 - 14.0 (= 4 ¾ - 5 ½ in.)	7.0
"medium"	10.5 - 12.0	10.0
"light"	8.0 - 9.5	12.0

Clearly, if we build a heater with a typical surface area of 100 sq. ft. (the surface area that is adjacent to the firebox and heat exchange channels), fire it with a design fuel charge, and it only reaches a surface temperature of 80 degrees F., then we have a heater with unacceptable performance. For the client, spending $10,000 to achieve a 1kW output would be a waste of money, from a heating standpoint. It would also be unethical for a builder to imply that he is providing the client with a masonry heater.

To prevent this, a serious masonry heater such as the Tempcast uses a maximum overall wall thickness at the heat exchangers of around 7". If we get much thicker than 8", surface temperature performance will suffer. For an advanced masonry fireplace to be a masonry heater, it must be able to demonstrate an acceptable minimum surface temperature under normal operation. 120ºF (50ºC) is a reasonable minimum, and is well below comparable European standards (Table 4).

A masonry heater definition, based on performance, should be prescriptive in specifying the maximum overall wall thickness that is allowable at the heat exchange channels. Experience tells us that a heater with 12" thick walls is not a serious heating appliance. Therefore, a reasonable maximum allowable wall thickness would be 10".

7.) Intended Use and Location

A masonry heater is a serious heating appliance, not just a decorative architectural element in the house. Because it is a radiant heating system, location is important. Central location is best. If it is located on an outside wall, it must not penetrate the insulated house envelope.

Any masonry appliance that penetrates the house envelope, as is typical for conventional masonry fireplace, should be defined as not being a masonry heater. The Canadian R-2000 regulation for masonry heaters (see Appendix) goes one step farther by prohibiting the use of outside chimneys.

PROPOSED WORDING FOR MHA MASONRY HEATER DEFINITION

A masonry heater

- is a heating system of predominantly masonry construction having a mass of at least 800 kg (1760 lb), excluding the chimney and foundation.
- is designed to burn at a burn rate greater than 5 kg/hr. Burn rate is defined as the weight of fuel charge divided by the burn time. Standard masonry heater types, as illustrated in ASTM E1602-94, shall be deemed to attain this value.
- is deemed to have a particulate emissions level of less than 7.5 g/kg by virtue of a) the above design principle and b) the substantial existing database of test results.
- is designed to burn with the loading doors closed. An exception may be made for loading doors smaller than 1 ft^2 in area.
- is constructed of sufficient mass such that under normal operating conditions the external surface of the heater, except in the region immediately surrounding the fuel loading door(s), does not exceed 100°C (230°F).
- has a maximum overall wall thickness of 10” (250mm).
- *(Note this proposed provision would be simpler than mandating HSF measurements):*
  is capable of achieving a minimum average surface temperature of 50°C (120°F) with a design fuel load, on a design heating cycle. This measurement shall be carried out with an infrared thermometer such as a Raytek ST-2L or equivalent. A minimum of 10 equally spaced measurement points over the heater surface, excluding the heater top, shall be used. No measurement points shall fall within 6” (150 mm) of the loading doors.
- shall not penetrate the house envelope.
- *(this requirement becomes redundant, but may be desirable from a building code point of view)*: achieves heat storage by 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.

Note: for the text of the final definition that was passed at the 1997 MHA meeting, see page 8.

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APPENDIX 1:

Full Text of Existing Masonry Heater Definitions

ASTM Masonry Heater Definition

3.2.14 masonry heater—a vented heating system of predominantly masonry construction having a mass of at least 800 kg (1760 lbs.), excluding the chimney and heater base. In particular, a unit designed specifically to capture and store a substantial portion of the heat energy from a solid fuel fire in the mass of the appliance through internal heat exchange flue channels; enable a charge of solid fuel mixed with an adequate amount of air to burn rapidly and more completely at high temperatures in order to reduce emission of unburned hydrocarbons; and be constructed of sufficient mass and surface area such that under normal operating conditions, the external surface of the heater (except in the region immediately surrounding the fuel loading door(s)), does not exceed 100ºC (230ºF).

From:

Standard Guide for Construction of Solid Fuel Burning Masonry Heaters

ASTM Designation: E 1602 - 94

Published by:

American Society for Testing and Materials
1916 Race Street Philadelphia, Pa 19103
215-299-5400

Proposed One and Two Family Dwelling Code (OTFDC) Masonry Heater Definition

A masonry heater is a heating system of predominantly masonry construction having a mass of at least 800 kg (1760 lbs.),excluding the chimney and foundation, which is designed to absorb a substantial portion of the heat energy from a rapidly-burned charge of solid fuel by:

a) 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, and

b) being constructed of sufficient mass such that under normal operating conditions the external surface of the heater, except in the region immediately surrounding the fuel loading door(s), does not exceed 100°C (230°F).

Note: Three characteristics distinguish the masonry heater from the masonry fireplace: first, it is designed to be operated with its tight-fitting loading door(s) closed; second, it is intended to function as the primary or a significant supplementary heating system for a house; and third, the chimney serving the heater is not usually supported by the body of the heater, but rather is located behind or beside the masonry heater where it may share a common wall with the heater facing.

Reason: This definition is provided on the assumption that some users of the code may not be familiar with the characteristics of masonry heaters and so that the code user has context for the provisions referring to masonry heaters.

Colorado Masonry Heater Definition

substantially the same as Washington definition, below

Washington State Masonry Heater Definition

MASONRY HEATER is a wood burning device designed and intended for domestic space heating or domestic water heating, which meets the following criteria:

1. An appliance whose core is constructed primarily of

manufacturer-built, supplied or specified masonry material (i.e., stone, cemented aggregate, clay, tile or other non-combustible non-metallic solid materials) which weigh at least 1,760 pounds (800 kg);

2. The firebox effluent travels horizontally and/or downward through one or more heat absorbing masonry duct(s) for a distance at least the length of the largest single internal firebox dimensions before leaving the masonry heater; Where, for the purposes of this subparagraph:

2.1 Horizontal or downward travel distance is defined as the net horizontal and/or downward internal duct length, measured from the top of the uppermost firebox door opening(s) to the exit of the masonry heater as traveled by any effluent on a single pathway through duct channel(s) within the heater (or average net internal duct length for multiple pathways of different lengths, if applicable). Net internal duct length is measured from center of the internal side or top surface of a duct, horizontally or vertically to the center of the opposite side or bottom surface of the same duct, and summed for multiple ducts or directions on a single pathway, if applicable. For duct channel(s) traversing horizontal angles of less than ninety degrees from vertical, only the new actual horizontal distance traveled is included in the total duct length.

2.2 The largest single internal firebox dimension is defined as the longest of either the length or width of the firebox hearth and the height of the firebox, measured from the floor of the combustion chamber (hearth) to the top of the uppermost firebox door opening(s).

R-2000 Requirements for Masonry Heaters

Masonry heaters must exhibit the following characteristics in order to be eligible for use in R-2000 homes:

- Outside combustion air must be supplied directly to the unit, with sizing meeting local codes or as per CSA B415.
- Conform to ASTM Standard Guide for the Construction of Solid Fuel Burning Masonry Heaters E1602 - 94. In it a masonry heater is described as: a vented heating system of predominantly masonry construction having a mass of at least 800 kg excluding chimney and heater base. In particularly, masonry heaters are designed specifically to (1) enable a charge of solid fuel mixed with an adequate amount of air to burn rapidly and more completely at high temperature, and (2) to capture and store a substantial portion of the resulting heat energy in the mass of the appliance through internal heat exchange flue channels, and (3) to gradually release the stored energy to the space to be heated.
- Exhibit no underfire air during the ignition phase of the burn.
- The appliance must have gasketed firebox doors or milled doors that are specifically designed for use in masonry heaters and prevent combustion product spillage. Pivoted dampers shall be permanently labeled so as to indicate their proper position during operation.
- The appliance should not be designed, manufactured or installed so that it can be used as an open fireplace. This may be achieved by limiting interior chimney size to 70 sq. in. (0.042 m^2) or using other approved methods.
- The chimney and masonry heater must not penetrate a wall exposed to an unheated space. If installed against an insulated outside wall, a vented 100mm airspace is to be maintained between the heater facing or chimney and the wall.
- Basement installation is not recommended. If a “downdrafting” heater (as described in ASTM E1602 - 94) is specified, then a bypass damper must be provided and at least 1m of refractory liner provided after the damper.
- There must be a carbon monoxide (CO) alarm in the room where the masonry heater is installed. The alarm may operate by battery or be hard wired.
- All units shall be installed by personnel designated by the manufacturer of a modular unit or by qualified masons having taken the Wood Energy Technical Training (WETT) course or other approved courses.

APPENDIX 2:

Stack loss sensitivity comparison using Lopez data:

One of the Lopez flue gas analyzers is a German TESTO 342. It is widely used there by sweeps and furnace technicians (Germany has mandatory furnace efficiency testing). It uses a chemical oxygen cell, has a microprocessor controlled autocalibration routine, and comes with calibration certificates for the following accuracies:

Temperature above 100C: +/- 0.5%

Oxygen : +/- 0.2 Vol. % absolute

Adding and subtracting these error levels to representative Lopez data we get the following:

Note how the uncertainty of the efficiency measurement increases with increased stack oxygen (excess air)

Contraflow Test HK-F-40: (upper end of measured efficiency range)

	Stack Oxygen %	Excess Air %	Stack Temp °F	Overall Efficiency %	Error
Value from Test	12.43	247	401	74.47	
Add 0.2% O_2				74.14	
Add 0.5% Temp				74.05	
Subtract 0.2% O_2 and 0.5% Temp				74.87	1.1%

Contraflow Test HK-D-04: (middle of measured range)

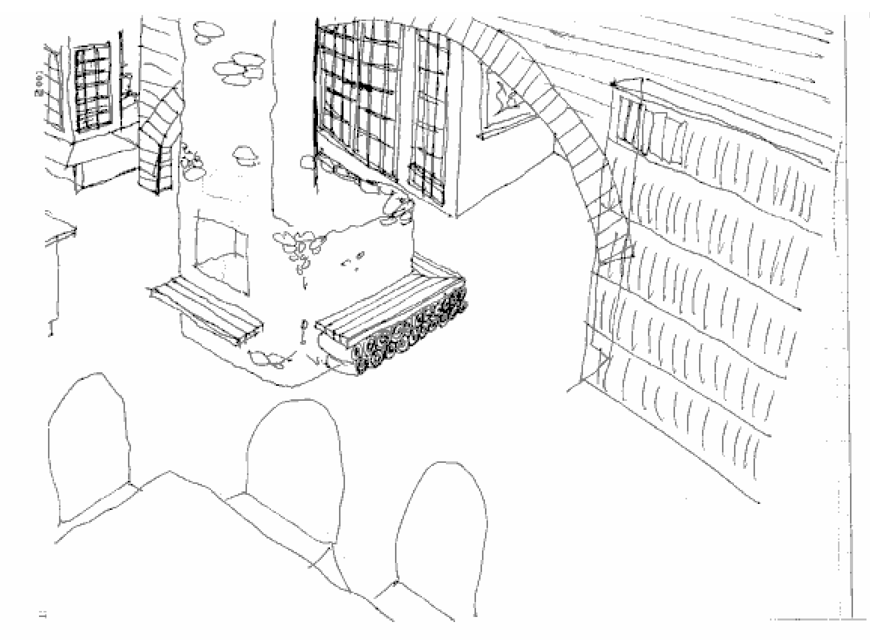
	Stack Oxygen %	Excess Air %	Stack Temp °F	Overall Efficiency %	Error
Value from Test	14.56	330	385	67.41	
Add 0.2% O_2				66.76	
Add 0.5% Temp				65.54	
Subtract 0.2% O_2 and 0.5% Temp				69.20	5.4%

Frisch Rosin Test B-09: (Rosin fireplace with glass door and Frisch air supply - middle of measured range)

	Stack Oxygen %	Excess Air %	Stack Temp °F	Overall Efficiency %	Error
Value from Test	16.51	476	420	55.31	
Add 0.2% O_2				55.83	
Add 0.5% Temp				52.10	
Subtract 0.2% O_2 and 0.5% Temp				58.23	11.1%

Rosin Test FC-A01: (Rosin fireplace with glass door and standard 2 “cowbell” air supply - middle of measured range)

	Stack Oxygen %	Excess Air %	Stack Temp °F	Overall Efficiency %	Error
Value from Test	19.21	1234	343	26.10	
Add 0.2% O_2				18.63	
Add 0.5% Temp				14.87	
Subtract 0.2% O_2 and 0.5% Temp				34.94	76.9%



Occupational Analysis of Masonry Heater Designers, Builders and Kit Assemblers

MEMO

Date: September 20, 1996

To: Reviewers of the draft Occupational Analysis manual

From: John Gulland

Here are some suggestions to assist you in your review of this draft occupational analysis manual.

An occupational analysis is not a "how to" manual but rather a list of the skills necessary for a person to function successfully in this particular field. Maybe the best way to read it is as a sort of job description for heater builders. In fact, to extract the most meaning from each entry, precede it with the words "a qualified heater builder will be able to . . . " Another way to verify the quality of each entry is to ask yourself, "If I were hiring an employee to do this work, would he or she need to have this skill?" Are there skills that "your" employee would have to posses to satisfy you that are not found in this analysis? Those are the ones we need to add.

Implicit in each entry is the ability to test if the candidate for certification possesses the skill, and this suggests that each entry should have a performance component that can be tested. For example: "Locate and correctly interpret code requirements", has two performance indicators: to locate and to interpret correctly; we can find ways to test these skills. If you have a suggestion for an additional entry, ask yourself if it is a skill that can be tested.

The first section, work safely, and various components of other sections, contain skills that MHA doesn't want to bother teaching or testing. Competence in these skills may be assumed in candidates who meet the entry requirements. Some further analysis is required to sort out a match between entry requirements and needed skills that can be assumed.

I see an occupational analysis as the foundation of any training program. Getting this part right will help to ensure that all other components(i.e. reference manual, course workbook, examinations, etc.) will have a source you can fall back on to determine accuracy, completeness and relevance, and as a defense against challenge.

I hope you find this draft useful. I look forward to hearing your comments.

Sincerely

John Gulland

Figure 4. Adobe Bakeoven, Carmel Mission, Carmel, California

Masonry Heater Association of North America Occupational Analysis Manual for Masonry Heater Designers, Builders and Kit Assemblers

DRAFT issued for review and comment 09/18/96 (Note: this list was discussed and revised at the 1997 Annual Meeting)

Note: Although entry requirements are not properly part of the skills analysis, but are rather an element of a policy manual, I thought it might be useful to consider them as part of this exercise. Here is a very preliminary version of entry requirements, just for discussion purposes:

Minimum entry requirements for Kit Assemblers:

1. proficiency in reading, writing and basic mathematics

2. minimum of ____ years of experience building masonry chimneys and fireplaces, confirmed by a letter of verification from an employer, supplier, or other acceptable person

3. meet the requirements for basic certification of at least one of the following:

- a recognized training course for masons

- WETT

- HEARTH

- CSIA/NCSG

Minimum entry requirements for masonry heater Designer/Builders:

1. proficiency in reading, writing and basic mathematics

2. minimum of ____ years of experience assembling masonry heaters from factory-built kits confirmed by a letter of verification from an employer, supplier, or other acceptable person, or

3. minimum of ____ years of experience designing and building masonry heaters confirmed by a letter of verification from an employer, supplier, or other acceptable person

4. not less than three letters from clients who have had heaters built by the candidate and who are satisfied with the work of the candidate and performance of the heater

5. meet the requirements for basic certification of at least one of the following:

- a recognized training course for masons

- WETT

- HEARTH

- CSIA/NCSG

Requirements for MHA Certification

A A certified Masonry Heater Kit Assembler shall demonstrate proficiency* in the skills listed in sections 1, 2, 3, 5,6, 7, 8, 10 of this manual

B A certified Masonry Heater Designer/Builder shall demonstrate proficiency* in the skills listed in all sections of this manual

* Proficiency in each skill area shall be determined through a combination of the following: verification of relevant past experience, competency as certified by a current or previous employer or supervisor, customer endorsements, relevant educational credits, and oral, written or practical testing

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 Practice personal hygiene on the job site by wearing proper clothing and washing to avoid contamination.

1.9 Follow proper procedures for lifting and moving heavy objects to avoid injury.

1.10 Use fork lifts, dollies, hand trucks and motor vehicles safely and in compliance with company and legal regulations.

1.11 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.

1.12 Maintain a safe, tidy work environment and remove all obstacles and impediments.

1.13 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

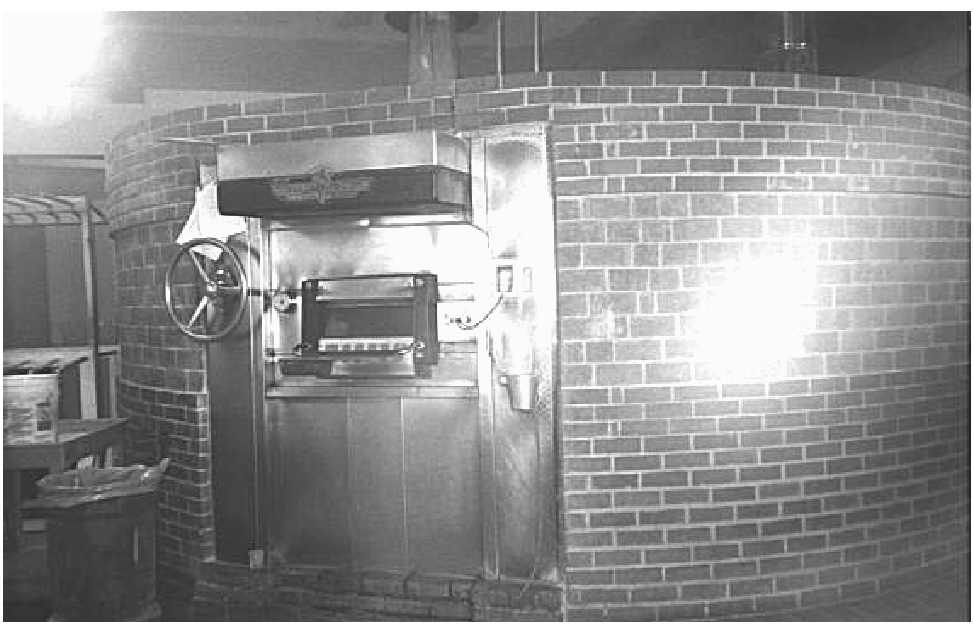


Figure 5. Farjas oven at Acme Bakery, Berkley, CA

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 (additional requirements for designer/builders)

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 Design or specify a chimney with characteristics that will effectively vent the products of combustion and satisfy code requirements.

Figure 6. Early Alan Scott oven at Cafe Beaujoulais, Mendocino, CA

4.5 Specify the material and layout for the heater facing that would meet the customer's aesthetic and practical objectives.

4.6 Specify metal components such as doors, lintels and dampers that will meet duty requirements and code requirements for a particular masonry heater.

4.7 Determine the need for a by-pass damper and/or chimney damper in a particular heater based on its design features and installation characteristics.

4.8 Design a baking oven to meet customer objectives for heat and size.

4.9 Design a capping slab that will prevent leakage of combustion gases and control heat output from the top of the heater.

4.10 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, manufacturer's instructions and requirements for safe and effective venting.

6.3 Gather all necessary components, tools and equipment required to carry out the specified work.

6.4 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 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.

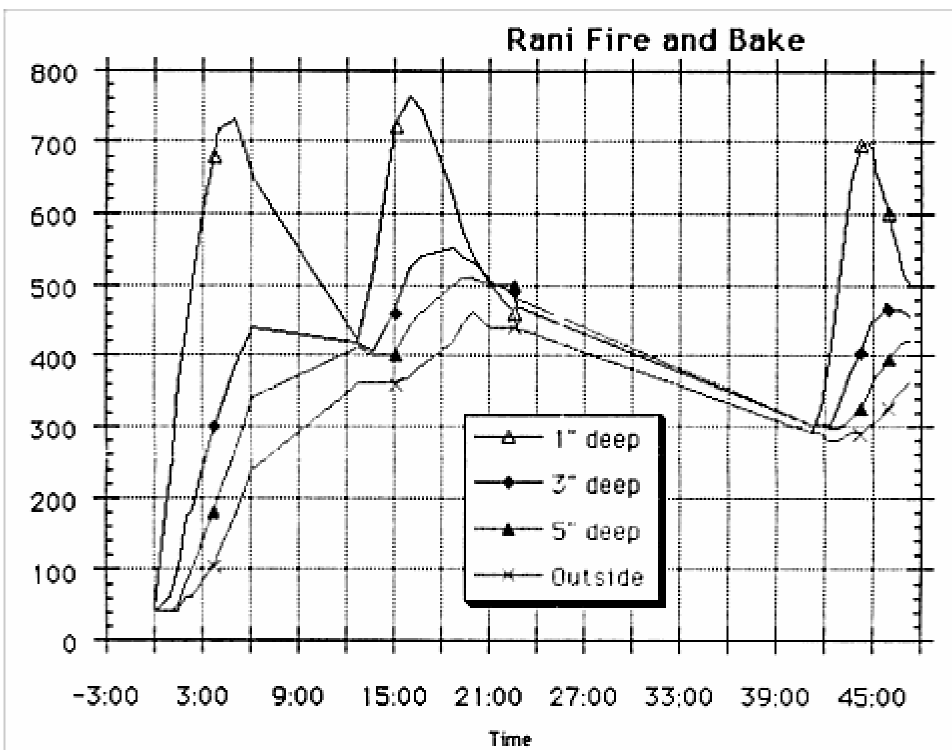


Figure 7. Temperature profile through oven arch, commercial Alan Scott oven. From upcoming book by Alan Scott and Dan Wing

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 the facing materials in the correct order and placement and using properly prepared mortars according to the manufacturer's instructions.

8.9 Install metal components such as doors, lintels and dampers with sufficient allowance for expansion to prevent stress, cracking and damage.

8.10 Install expansion joints according to manufacturer's instructions.

8.11 Install a hearth extension to meet code requirements.

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.

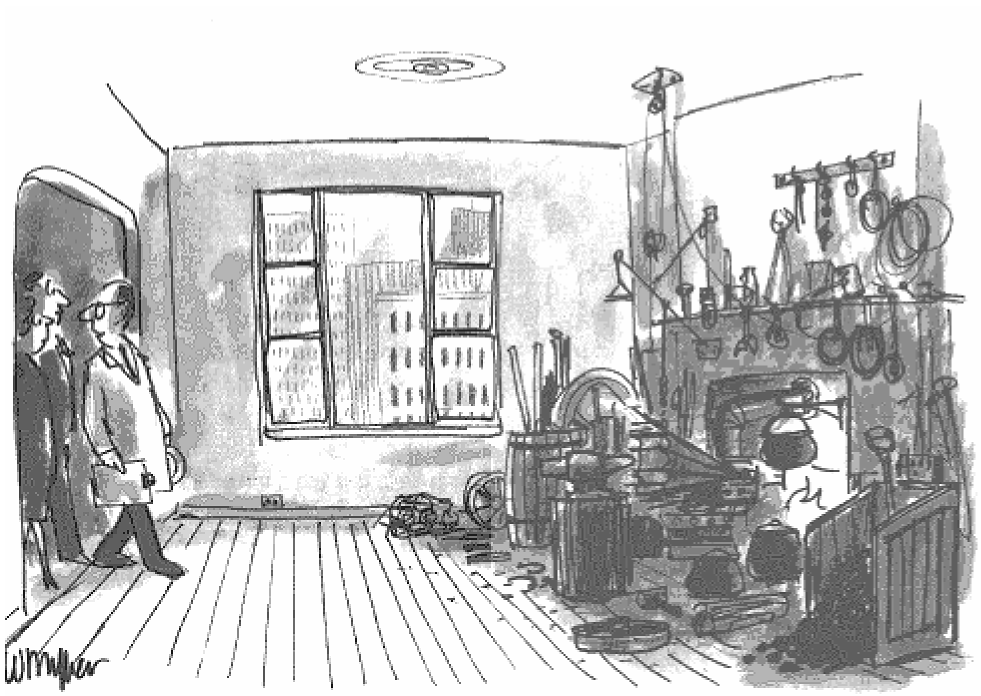
8.14 Return the room/building to its original condition by removing installation debris and disposing of it as required by local authorities, and by cleaning the installation site.

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 (additional requirements for designer/builders)

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.



"Another interesting feature of this apartment is the working fireplace."

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 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 beused.

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 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 documentation.

10.7 Provide the customer with the name and telephone number of the person to call for assistance with problems or further advice.

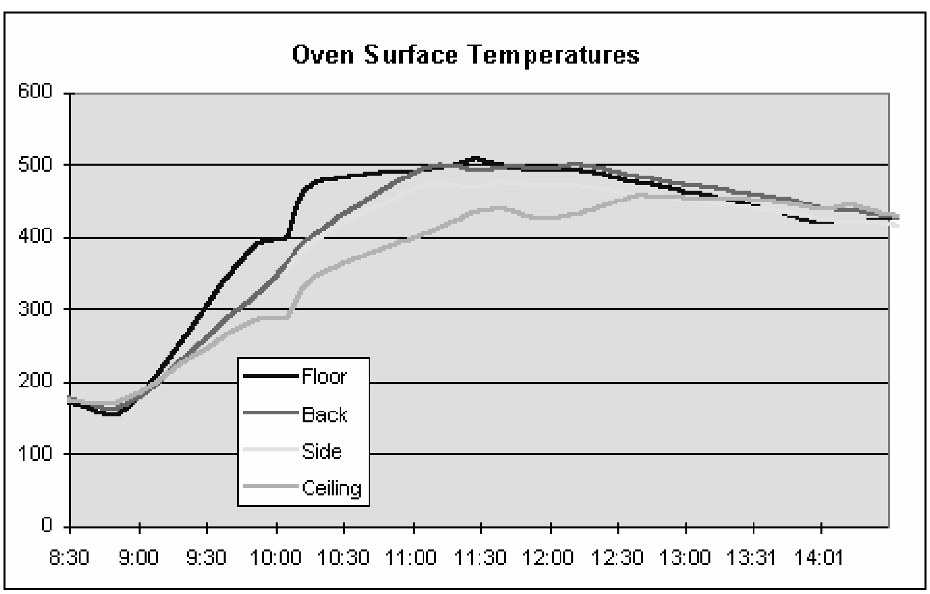


Figure 8. Surface temperatures inside a contraflow white oven.

Minutes of the 1996 MHA Annual Meeting

March 21 & 22, 1996

Government House Hotel and Conference Center
Charlotte, North Carolina

recorded by Janet Peddycord

1996 MHA Annual Meeting Attendance

Thursday, March 21

Tim Custer
Richard Ellison
Jerry Frisch
Lou Frisch
Gary Hart
Korey Hart
Gene Hedin
Lettie Hedin
Larry Lamont
Pat Manley
Walter Moberg
David Moore
Leila Nulty-Senf
Janet Peddycord
Stan Sackett
Norbert Senf
Tom Trout
Lui Zander
Rod Zander

Friday, March 22

Tim Custer
Richard Ellison
Jerry Frisch
Lou Frisch
Gary Hart
Korey Hart
Gene Hedin
Larry Lamont
Pat Manley
David Moore
Janet Peddycord
Stan Sackett
Norbert Senf
Tom Trout
Rod Zander
Buck Beckett

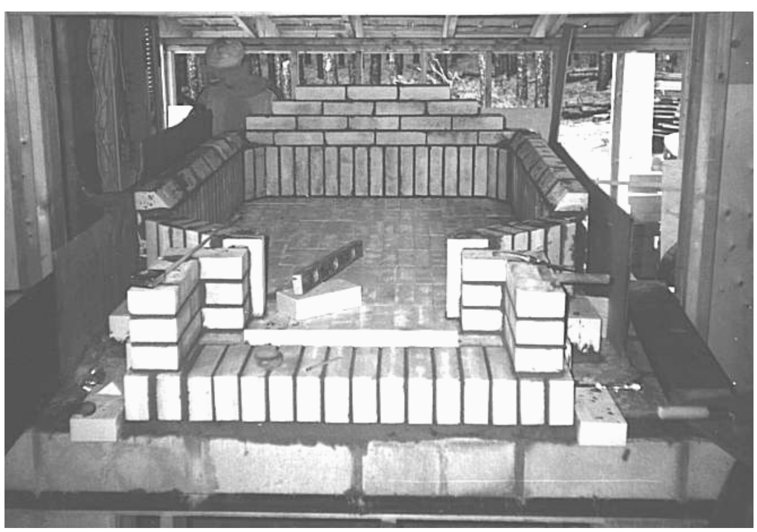


Figure 9. An Alan Scott style oven under construction, 1993. Little Stream Bakery, Perth, Ontario. This oven has been baking 1800 loaves a week since it was built.

Thursday, March 21, 1996 Afternoon Session

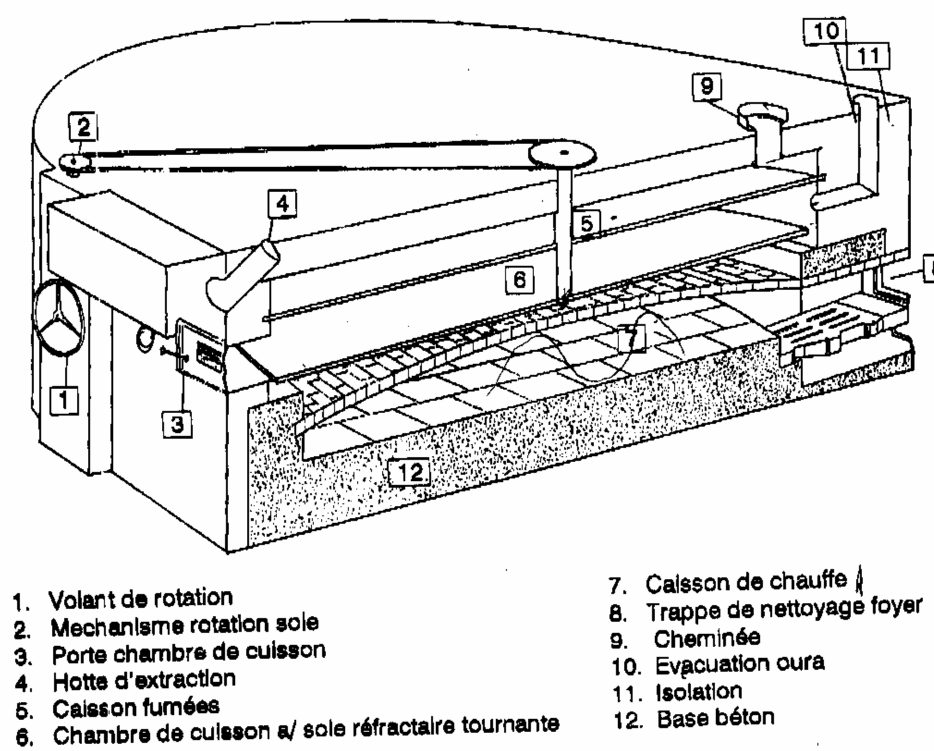
The afternoon session convened at 2:00. Jerry Frisch began by relating the testing program that occurred. The Western States Clay Products funded the test at San Rafael at McNear Brick. Three tests were run simultaneously. Jaasma set up a dilution tunnel, Omni used their AES sampler, and Jerry Frisch used his Condor sampler. The wood Jerry brought wasn't dry enough to be used thanks to the rainy weather, and it had to be put on a brick kiln to get dried down to the required 20% moisture content. The new firing protocol chooses from cordwood or 4"x 4" fuel load. The required fuel load is 1.5% of the floor dimension of the unit, multiplied by 7. We are also now allowed to recharge the fuel load once during the test. Thus, if a log rolls off and begins to smoke, you can choose to recharge your fuel load at that time rather than being unable to touch it and have it lower the performance of your unit as tested. Also, the test now goes from when the flue reaches 25 degrees above ambient temperature and then back to 25 degrees above ambient temperature. Since that can take from 18 to 24 hours with a masonry heater, our apparent particulate grams per hour is lower.

Norbert brought up the fact that being environmentally friendly requires user involvement, not a push button approach. Jerry Frisch then related that how the fuel is stacked in the unit is important. He told how the post graduated students attempted to light a fire in a Tulikivi model, by using one piece of wood as the required fuel load. They were surprised when it wouldn't burn. Only testing and education can give us the results we need. Jerry has about $10,000 in equipment and the equivalent of $200,000 worth of testing under his belt because he has done the rebuilding of the heaters himself. He's run over 50 tests on his units using his own equipment, and has built up some expertise and a database. Offering testing facilities for $250 a day, Jerry has a chimney a heater can be linked to, and a forklift available to move the units around. It takes about 24 hours to get the filters dried and weighed, to determine the performance of the unit. He is hoping to get an air duct system "stamped" out of firebrick so it can be used anywhere.

The current ideal is to use 6" to 8" diameter wood. When we started using masonry heaters in the United States, we followed European schedules, which state 4" diameter pieces. Norbert related that the European heaters are smaller than those Stateside, and therefore to operate at peak efficiency, different sized wood must be used. Stan Sackett can't recall ever selling the Tulikivi T1000, the smallest unit of the line. Pat Manley said he cut down on his splitting duties this year when he found out that our heaters were more efficient with the larger pieces, and Jerry Frisch says he quarters 8" to 12" diameter pieces.

Stan Sackett thought that perhaps we should start a heater owner database, so we know where masonry heaters are located. We could start as Masonry Heater club and for a small fee (approximately $30 per year) we could send out a newsletter once or twice a year. It could

Figure 10. Spanish Farjas Commercial Oven with Revolving Hearth



include reminders to clean the unit in the fall prior to the heating season, articles comparing top burn to bottom burn, and swap recipes for their bake ovens. It would be great publicity, and the owners are eager to share and show off their units to friends. Norbert suggested we start online. He related the story of a client who called him wanting a heater. This client's sister had one. Norbert gave the Web site address to the individual, who saw his sister's heater online when he visited the site. The individual called his sister, and his sister went online to see the picture of her ten year old heater, then sent Norbert a nice letter and shared recipes she'd been using.

Jerry Frisch brought up the subject of the ASTM standard. There are errors in the current version. The headings for Figure 3 and Figure 4 are switched with each other, and the number given in Figure 1 as clearance to combustibles is wrong. The extension in section 5.4.3 wasn't intended to stop sparks, but to limit radiant heat. There were questions as to whom corrections should be directed, and if the standard could be used on the MHA Web site, or if it would violate the copyright.

Stan Sackett brought up the idea that we should use the phrase "efficient masonry fireplace" when speaking of our units, because a building inspector will want to see a UL tag for a "heater", and an insurance agent doesn't want to know that you intend to heat your home primarily by burning wood.

Next, the subject of the 1997 Annual Meeting was broached, and whether we should follow the HPA to Reno next year. Rod Zander proposed that we choose a naturally heated environment (unlike the hotel in which we were holding our meeting!) and have some hands-on sessions at that time. Stan Sackett agreed that coveralls, bricks, and a bucket of "mud" would be much more fun. Norbert Senf felt that if MHA was pushing education, we ought to schedule such hands-on sessions for our membership.

Stan Sackett asked if perhaps we should tie-in with the New Brick Show. Mason contractors could have a heater half built, and then build the rest in a seminar. Also if we had a text forthcoming, MHA could sell it or charge for a training session. Unfortunately, the masonry supply business is reactive instead of proactive, so perhaps this is not the best expo to attend if we only choose one. Norbert Senf said he could relate better to the old Wood Heating Alliance than the Hearth Products Association. Jerry Frisch brought up the National Sweeps convention. He claimed that sweeps eat up hands-on stuff, and would love our heaters.

Grumbling, Rod Zander complained about the lack of "dialog" and hands-on opportunities. He wanted to know if it was necessary to forge an alliance with another organization at all. Gene Hedin motioned that Rod Zander be put in charge of the hands on session, and Norbert Senf seconded the motion, thus the motion was carried!

Rotating training sessions through the regions was recommended by Stan Sackett, who also recommended that we obtain a list of masonry contractors in the selected region and invite them to attend our technical sessions. Norbert mentioned the idea that if membership wasn't a prerequisite to attend the session, MHA might charge $50 for the session, and our members could very well gain a source for intelligent referrals in the future from these now "educated" mason contractors.

Gary Hart mentioned that he thought the National Sweeps Convention would be in Seattle in 1997 in March or April. The members present lofted the idea of holding a seminar at Jerry Frisch's shop a couple of days before this convention on the design and evolution of the Heatkit, and have another session a couple of days afterwards.

At this point, Lui Zander voiced that she was hearing two distinct concerns. First was that we wanted and needed to establish training and certification for existing members now; and then perhaps as a five year plan, recruit and train new members. MHA should focus on the importance of what we do for the current membership. Then, using this information as a template for success, build upon it.

Once again, the certification issue appeared for discussion. Stan Sackett felt there should be three classifications; Class 1 to build kits, Class 2 to hand build a heater with brick, and Class 3 to design and build a masonry heater. For now, he admitted, Class 3 would be difficult to quantify, so MHA should focus on Class 1 and Class 2 certification. David Moore mentioned that we ought to say "training" rather than "certification", since granting certification might cause MHA to be liable in the event a MHA certified mason errs.

Rod Zander says we need to go ahead and do this for members. If it is for us, we should do it for us, on our turf. We could announce it on the Internet Home Page, if we wanted it to be open to others, but there should be a fee for non-members. At this point, Tom Trout brought up the idea of doing the training session at a retreat for non-profit associations called Wild Acres, that would run about $140 per person, per week, all meals and lodging included. Stan Sackett enthusiastically exclaimed that he'd rather be doing that than just talking. Tom Trout then also mentioned that a professor from the University of Maryland would be willing to interview about six or seven members to create roughly 600 questions in an effort to form a skills exam. This would cost approximately $300 per day for three days.

The consensus was to attempt this hands-on session in April or early May of 1997. In the discussion which followed, the members present hashed out a rough agenda. Jerry Frisch said that the actual testing of a unit would take about three hours. Rod suggested that we pay to bring in some other experts, such as Heikki Hyytiäiinen, Ernst Rath or his son. When Jerry Frisch suggested a four day session, Norbert Senf commented that a program of that length would need some intense evaluation. Members would have to disassemble any heaters built on the site, however, which lead to an aside as to why not create jobs specifically for the training session. The observation was made that it was much easier to find the job and then invite others to come and learn, than to plan a training session around a job that doesn't exist. It was Norbert Senf's suggestion that we go ahead and complete this first training session/annual meeting at the Wild Acres site as a litmus test of our abilities to coordinate such sessions. Then, perhaps MHA could expand to other sites for training.

Rod Zander moved that we have our meeting at Wild Acres, and Tim Custer seconded the motion. The motion was carried. Gene Hedin inquired as to Wild Acres' location, and was informed that it is in Little Switzerland, North Carolina. Tom Trout volunteered to coordinate the set up and agenda of this meeting. Members' consensus was to purchase the plane fare for Heikki Hyytiäiinen, in the belief that he would be more than willing to participate if we covered that expense.

Norbert Senf inquired as to how many people we should plan to attend, and if non-members were invited, how much they should be charged. Stan Sackett felt that $200 for members to attend the session (covers the room and board, plus incidentals) and $395 for non-members would be reasonable. Rod Zander inquired if it would be best to set up a committee to clarify the where, when and how much of this session. Lou Frisch motioned that Gary Hart, Rod Zander, and Tom Trout be that committee, and Stan Sackett seconded the motion; the motion carried.

Tom Trout claimed the pottery studio would only hold 12 to 15 masons, to which Rod Zander commented that we should keep the session small in the interests of best serving those attending the seminar. Norbert Senf pointed out that a larger meeting would require more planned curriculum. This meeting should be limited to members only, and attempting to motivate the members to show up. Rod Zander motioned that members cover their individual expenses and the MHA covers the costs to get Heikki and seminar materials to the site. Tom Trout seconded the motion, and the motion was carried.

At 5:10, Pat Maley made the motion to adjourn the day's meeting, and Gene Hedin seconded the motion. The meeting adjourned.

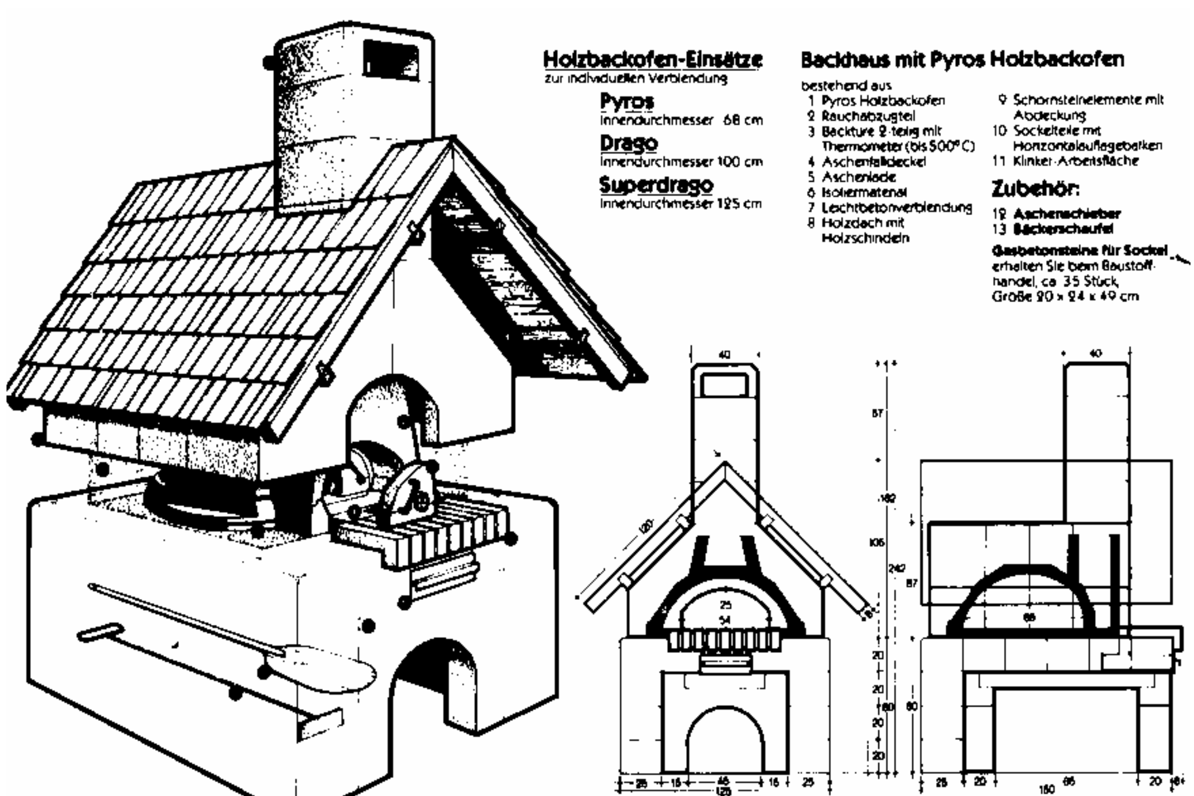


Figure 11. Biofire Backyard Bakeoven

Friday, March 22, 1996 Morning Session

The morning session began with a preliminary report from Tom Trout regarding the proposed seminar/ 1997 annual meeting at Wild Acres.

He communicated that the management runs sessions either Friday evenings through Sunday mornings, or Monday afternoons through Friday mornings. If family is invited to attend, there must be a corresponding agenda for the family members.

The membership tentatively planned to attend April 21 through April 28, 1997. However, the Wild Acres management will not commit to a decision until December of 1996, in all likelihood. It was noted that this will not allow the membership to take advantage of the Saturday night layover discount on airfares, but it was felt that the room and board fees were so reasonable, that any loss of discounts was more than equitable.

Then, the membership sat down to take a preliminary version of the competency test, prepared by Jerry and Lou Frisch. This was followed by a review session. Any items which were stated unclearly, or to which Jerry's proposed answer seemed dubious, were reworked until the membership was satisfied.

The meeting was adjourned at approximately 12:30.

Friday, March 22, 1996

Afternoon Session

Elections were held upon the convening of the afternoon session.

Jerry Frisch nominated Pat Manley for president, and Tom Trout seconded the nomination. Jerry Frisch nominated Albie Barden for vice president, which was also seconded by Tom Trout. Lou Frisch nominated Norbert Senf as secretary; a nomination seconded by Tom Trout. Lou Frisch then nominated Lui Zander for treasurer, which Pat Manley seconded. Rod Zander then moved that the proposed slate of nominees be accepted as officer for the 1996 to 1998 term, which was seconded by Gene Hedin, and the motion was carried.

Lou Frisch had prepared a tentative budget for the 1996-1997 year. Administration expenses for BIA were slated at $5000, Public Relations was proposed $2000, and the newsletter was allotted $750. Trips were calculated at $900, mostly for Norbert Senf's work with organizations like the AWMA, and Combustion Canada.

$500 was budgeted for the 1997 Annual Meeting, and $2000 for the IRS and accountant. This totalled to $11,150. It was noted that dues income for 1996 is only $8500, and that not much more incoming revenue is expected for the year. Either the membership must be increased, which hopefully will occur as lapsed members see the new enthusiasm and direction the MHA is taking; or the budget must decrease in the future. Rod Zander moved that the budget be approved as stated, and Lou Frisch seconded the motion.

Janet Peddycord then distributed a questionnaire to stimulate thought for long range planning. The members noted that to its credit, MHA generates personal connections between heater builders, provides an organized front for the industry, and an impartial information clearinghouse to the public. It was noted that

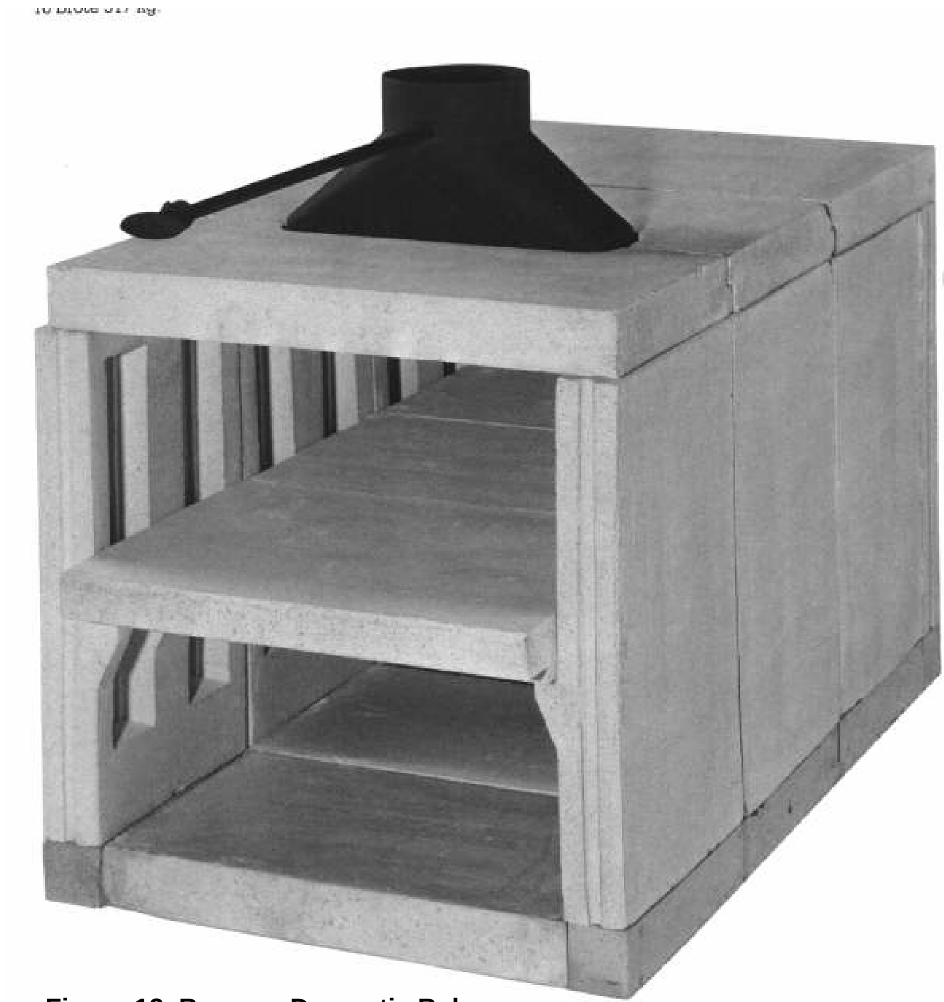


Figure 12. Brunner Domestic Bakeoven

the MHA has a solid product to offer that has hundreds of years of tradition and a safe performance record. Among some of the difficulties that have habitually been encountered, slow or lack of goal attainment was one of the largest concerns. The members felt that perhaps a lack of organization, including the evidence of lacking parliamentary procedure and AV materials at the annual meeting, was one of the reasons goal attainment was so frustrating and haphazard.

Attempted solutions in the past have been follow up phone calls to committee members, and letters to those who have not renewed memberships. Focusing upon the needs of the MHA membership, the members concluded that a true newsletter was needed to consistently put the MHA and its issues before the membership in a timely fashion.

Norbert Senf stated that he was willing to write up minutes and newsletter items, if someone would download and print out the document and ensure its disbursement. Fulfillment was the biggest consumer of time in his publication endeavors.

The newsletter should come out four times a year. Janet Peddycord volunteered to send out a Newsbrief on April 22, 1996, as a first effort towards the formation of a newsletter.

Tom Trout, Pat Manley, Rod and Lui Zander are to have set up an agenda for the 1997 MHA meeting in time to include in this newsletter.

Another vital need is a method to communicate to each of the members on the processes by which we build heaters, and share this information.

At this point, a deadline for investigation of the creation of a training manual was set, in order to let Janet Peddycord know within two weeks what the outcome will be. The members are also to send a list of sources to her, as well, by the end of April, so a preliminary "Yellow Pages" of supplies and suppliers may be compiled and distributed by mid to late May.

Looking into the future, the members present were asked what they wanted to see for MHA in the next 10 years. Lou Frisch mentioned apprenticeships, and a more defined networking of masons.

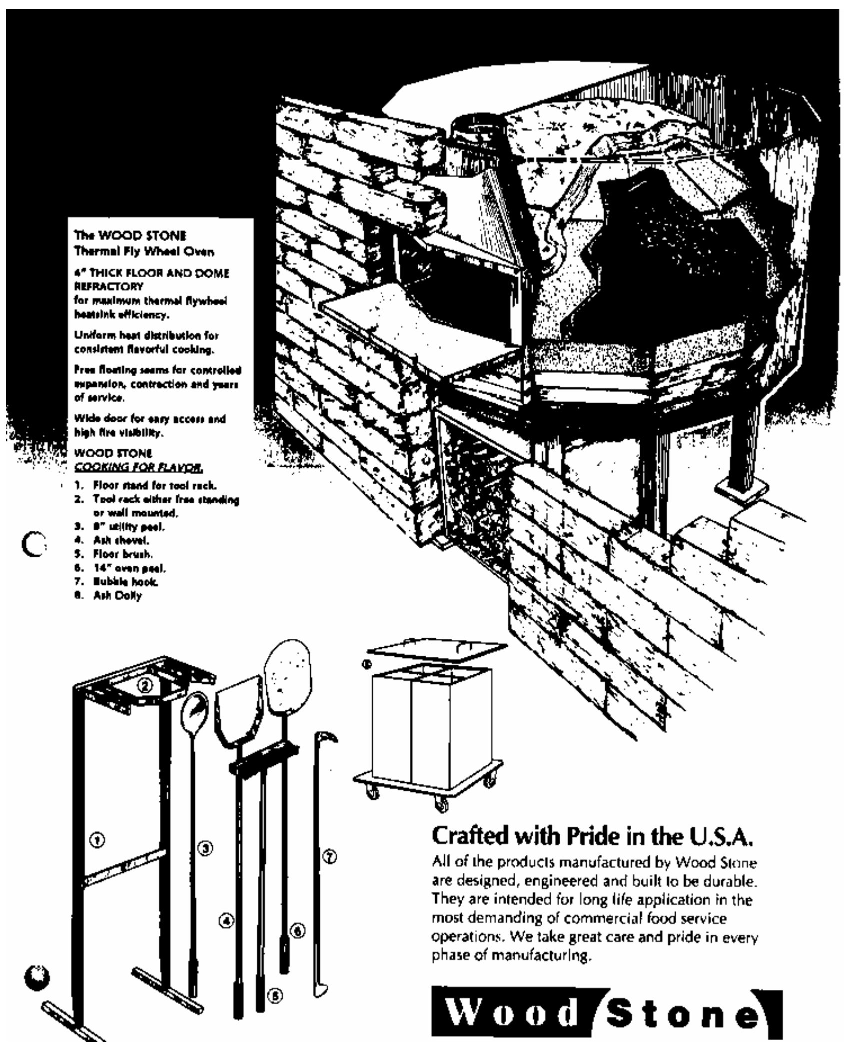
Jerry Frisch said he wanted a construction manual and a chapter to be present in the Masonry Contractors' training guide.

David Moore felt the MHA should be actively taking advantage of any technologies that advance heater construction, as well as the potential to develop a permanent school for the craft of masonry heater construction. It was mentioned that the timberframers have a six week course. If they aren't confident enough to build a unit after that time, at least they are educated and know to whom they may turn for construction.

Norbert Senf expressed a desire to take advantage of the current interest in green building construction and environmental protection, and thus ride the ground swell of public sentiment to gain more mileage from our efforts.

At this point, 4:20 in the afternoon, the final session of the annual meeting was concluded, and the meeting adjourned.

Figure 13. Woodstone Precast Bakeoven



Janet Peddycord is to mail out the MHA By-Laws to the members, which also includes the mission statement.

Lou Frisch commented that it was the best meeting ever, and congratulated Pat Manley for all he'd accomplished during his tenure as president.

Figure 14 French Commercial Oven. East Wallingford, Vermont, 1984. Firebox is underneath hearth.

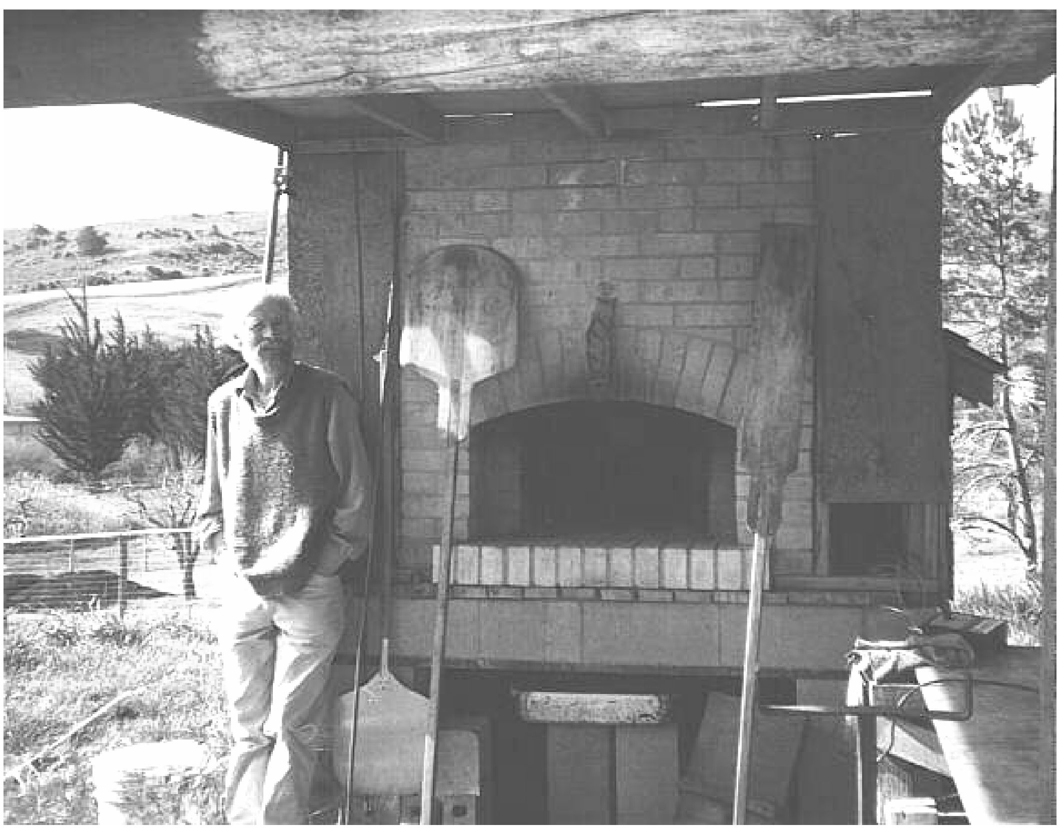


Figure 15. Alan Scott with his home oven, Petaluma, CA.

MHA Applies for Building Code Recognition

(copy of Secretary's e-mail to MHA e-mail list):

December 26, 1996

Hello Everyone:

This is to let you know that MHA has applied for OTFDC (One and Two Family Dwelling Code) recognition of masonry heaters in the building code. As usual, we left everything to the last minute. We hired John Gulland to prepare the actual language, and did send it out to those few parties who expressed interest for comment. We also sent it out to Jim Buckley and Dave Johnston, two experts on masonry code provisions. We've gotten very positive comments so far, and for your information, below is the actual proposed wording:

Masonry Heater Association of North America (MHA) submission proposing changes to the CABO One and Two Family Dwelling Code

Overall rationale

Masonry heater building has a short history of only about 20 years as a commercial activity in the North America. The MHA is a professional association of masonry heater builders that was formed to advance the technology of masonry heating in North America and to increase the knowledge and skills of professional heater masons. The MHA has succeeded in its mandate by sponsoring laboratory research into masonry heating technology and by publishing information from U.S. and international sources of interest to practitioners. The MHA is currently developing a professional training and certification program that will recognize the competency of qualified heater builders.

The proposals that follow are intended to provide code users with only those specific requirements that will assist them in judging the suitability of masonry heaters for use in one and two family dwellings. Except as noted, the existing requirements for masonry fireplaces and chimneys may be applied to masonry heaters.

Location of provisions in the Code: the MHA does not prejudge the most effective way of presenting requirements for masonry heaters in the OTFD, but offers the suggestion that for clarity a new section may be created toward the end of Chapter 10 after Section 1003 Masonry Fireplaces.

Proposal #1

Definition

A masonry heater is a heating system of predominantly masonry construction having a mass of at least 800 kg (1760 lbs.), excluding the chimney and foundation, which is designed to absorb a substantial portion of the heat energy from a rapidly-burned charge of solid fuel by:

a) routing of exhaust gases through internal heat exchange channels in which the flow path downstream of the firebox includes at least one180 degree change in flow direction, usually downward, before entering the chimney, and

b) being constructed of sufficient mass such that under normal operating conditions the external surface of the heater, except in the region immediately surrounding the fuel loading door(s), does not exceed 100°C (230°F).

Note: Three characteristics distinguish the masonry heater from the mainly decorative masonry fireplace: first, it is designed to be operated with its tight-fitting loading door(s) closed; second, it is intended to function as the primary or a significant supplementary heating system for a house; and third, the chimney serving the heater is not usually supported by the body of the heater, but rather is located behind or beside the masonry heater where it may share a common wall with the heater facing.

(Reason: This definition is provided on the assumption that some users of the code may not be familiar with the characteristics of masonry heaters and so that the code user has context for the provisions referring to masonry heaters.)

Proposal # 2

Add new referenced standard to Section 4702 as follows:

ASTM E 1602-94 Standard Guide for Construction of Solid Fuel Burning Masonry Heaters Section 100*

(Reason: ASTM E 1602-94 is the most technically accurate and complete regulatory document available on Masonry Heaters. Although it is called a guide for construction, its content and presentation are similar to that found in an installation code (please see Section4. Significance and Use). The standard does not require the use of proprietary or specific commercial products, nor impose limitations on which individuals are permitted to build masonry heaters. Since the concepts of masonry heating may be new to some users of the code, this reference is warranted as a means to provide additional guidance in assessing suitability.)

Proposal # 3

Seismic reinforcing

Seismic reinforcing shall not be required within the body of a masonry heater whose height is equal to or less than 2.5 times its body width and where the masonry chimney serving the heater is not supported by the body of the heater. Where the masonry chimney shares a common wall with the facing of the masonry heater, the chimney portion of the structure shall be reinforced in accordance with Sections1003.2 and 1003.3.

(Reason: Masonry heaters do not normally exceed eight feet in height and are of a stable shape, so they do not require seismic reinforcing. Also, masonry heaters are constructed of a core of standard refractory bricks and/or precast refractory components which is surrounded by an outer shell of brick, block or stone. An expansion joint is provided between the core and shell to prevent the build up of stresses which could lead to cracking. Differential expansion between the heater components and metal reinforcing could lead to cracking and failure.)

Proposal #4

Masonry heater clearance.

Wood or combustible framing shall not be placed within 4 inches (102 mm) of the outside surface of a masonry heater, provided the wall thickness of the firebox is not less than 8 inches (203 mm) and the wall thickness of the heat exchange channels is not less than 5 inches (127mm). A clearance of at least 8 inches (203 mm) shall be provided between the gas tight capping slab of the heater and a combustible ceiling. The required space between the heater and combustible material shall be fully vented to permit the free flow of air around all heater surfaces.

(Reason: One of the objectives in the design of masonry heaters is to produce a relatively even surface temperature and this is achieved by progressively reducing wall thicknesses downstream of the firebox. If the wall thickness of the heat exchange channels where to exceed about 5 inches, the surface temperature could be too low and the heat release rate too slow for effective space heating. In fact, many masonry heaters of European design have wall thicknesses of as little as 2.5 inches. However, insufficient performance data for thinner wall heaters exists in North America to propose minimum clearance requirements at this time. Also, masonry heaters are by definition heating systems and so ideally they are constructed in an open space of the dwelling rather than against a wall; where they are located at minimum clearance to combustible construction, free ventilation of the space must be provided.)

Proposal # 5

Construction of masonry heaters.

Construction practices and material usage in building masonry heaters shall be in accordance with the requirements of ASTM E 1602.

(Reason: To provide additional guidance for users of the code regarding specific construction practices and material usage in the construction or inspection of masonry heaters.)

-------End of proposals-------------

Comments are welcomed

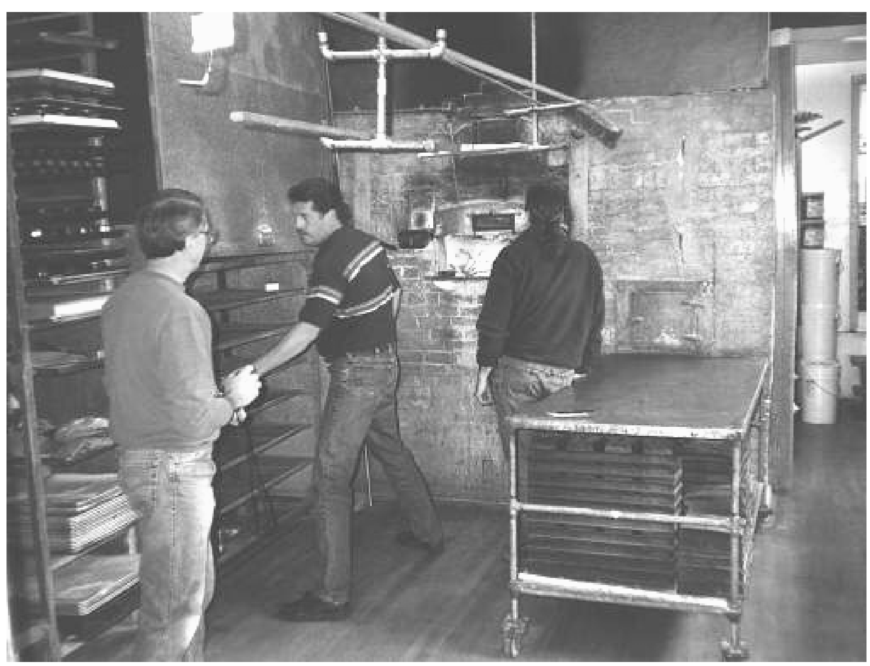


Figure 16. Jerry Haupt and Pat Manley witness a firing of the oven at the Black Diamond Bakery, Black Diamond, Washington, after the 1995 MHA Meeting. This oven has been in continuous use since the turn of the century and has a 10 foot by 12 foot hearth.

MHA Membership List as of September 28, 1997

Company	State/ Prov	ZIP	Name	Email	Voice	Fax	Address	Town	Dues
Bohemia International Inc.	FL	33170	Vashek Berka	Vashek@mindspring.com	305.246.5414	247.184	18875 S.W. 220 St.	Miani	97
Black Magik Chimney Sweeps Inc.	NS	B3N 1R3	Marcel J. Ouellette	@	902.477.9856	479.3311	31 Purcell's Cove Rd.	Halifax	97
Brick Stove Works	ME	04574	J. Patrick Manley	@	207.845.2440	845.244	374 Nelson Ridge Rd.	Washington	97
Colonial Associates Inc.	NY	10520	Frank Pusatere	@	914.271.6078	-	48 Radnor Ave.	Croton on Hudson	97
Comfort Technologies	IL	61554	Ken Caldwell		309.346.4524		226 Maple Park	Pekin	97
D. Larsen Masonry Construction	MN	56601	Richard Larsen	@	218.751.0523	-	10801 Jackpine Rd. NW	Bemidji	97
Deer Hill Masonry Heat	MA	01026	Steve Bushway	@	413.634.5792	634.5037	224 West St.	Cummington	97
Foyers Radiants DeBriel	PQ	G0R 1M0	Gabriel Callender	@	418.387.8961	596.2734	C.P. 220	St-Eduard-de-Frampton	97
Fry Masonry Construction	MI	49091	Doug Fry	@	616.651.9289	651.9289	66605 N. Lakeview	Sturgis	97
Gene Hedin Masonry Builders	MN	55811	Eugene Hedin	glhedin@ computerpro.com	218.729.9096/ 800.773.6564	-	5907 Old Miller Trunk Hwy.	Duluth	97
Gimme Shelter Construction	WI	54406	Mark Klein/ James McKnight/ Dave Shantz	gimme@ coredcs.com	715.677.4289/ 366.2956	same	P.O. Box 176	Amherst	97
Gough Masonry Ltd.	ON	P6A 6J8	George Gough	@	705.253.4314	945.1480	834 Old Garden River Road	Sault Ste. Marie	97
Heating Research Co.	NH	03601	David Lyle	@	603.835.6109	-	Box 300	Acworth	97
James Allman Masonry	PA	16063	James W. Allman	@	412.452.0994		206 Hillside Drive	Zelienople	97
Kachelofen Unlimited	OR	97544	A. Michael D'Arcangelo	@	503.846.6196	-	1407 Caves Camp Road	Williams	97
Kent Valley Masonry	WA	98038	Jerry Haupt	KVMMasonry@ aol.com	206.432.0134	413.1771	23631 S.E. 216th St.	Maple Valley	97
Keystone Masonry Ltd.	MN	R2W 2H1	Carl Oehme		204.586.1726	586.1726	607 Manitoba Ave.	Winnipeg	97
Lopez Quarries	WA	98203	Jerry Frisch	@	206.353.8963	742.3361	111 Barbara Lane	Everett	97

Maine Wood Heat Co.	ME	04957	Albie Barden	mwhcoinc@ agate.net	207.696.5442	696.5856	RFD 1, Box 640	Norridgewock	97
Masonry Stove Builders	PQ	J0X 2Y0	Norbert Senf	mheat@ mha-net.org	819.647.5092	647.6082	RR 5	Shawville	97
Mason's Masonry Supply	ON	L5T 1A2	Paul Mason	@	905.670.1233	-	6291 Netherhart Road	Mississauga	97
Mastercraft Masonry	WA	98674	Stan Homola	@	360.225.5699	same	P4800 N.W. 411th Circle	Woodland	97
Mid Atlantic Masonry	PA	17318-0277	Fred Salazar and Douglas Hargrave	@	800.213.0903	717.854.1373	P.O. Box 277	Enigsville	97
MTC Construction	WA	98597	David R. Moore	@	360.458.4866	-	11817 Vail Rd. S.E.	Yelm	97
New England Hearth and Soapstone	CT	06756-1202	Rod Zander	nehearth@bigfoot .com	860.491.3091	491.3091	127 North Street	Goshen	97
Olenych Masonry Inc.	NY	13740	Brian/Marcia Olenych	olenych@ digital-marketplace.net.	607.832.4373/ 800.250.6485	832.4561	HC 65 Box 3	Bovina Centre	97
Pearson Masonry	RI	02864	Martin Pearson	MPearson52@aol .com	401.333.6583	-	40 Rhodes St	Cumberland	97
Positive Chimney & Fireplace	MI	49601	Herbert K. Smith		616.775.7941	775.0761	6717 E. M-115	Cadillac	97
Sackett Brick Co.	MI	49001	Stanley Sackett	sackett@ aol.com	616.381.4757 /800.848.9440	381.2684	1303 Fulford Street	Kalamazoo	97
Sleepy Hollow Chimney Supply	NY	11717	Ray Colucci / Fred Schukal	Fschu@Erols.co m	516.231.2333 /800.553.5322	231.2364	85 Emjay Blvd.	Brentwood	97
Sotero Masonry and Construction	CA	95001	Ben Sotero	yellobkrd @aol.com	408.688.0509	684.1327	PO Box 804	Aptos	97
Temp-Cast Enviroheat Ltd.	ON	M4N 3R1	John LaGamba	staywarm@ tempcast.com	416.322.6084	486.3624	P.O. Box 94059, 3332 Yonge St.	Toronto	97
Top Hat Chimney Sweeps	OH	44125	Timothy Custer	@	216.524.5431	-	12380 Tinkers Creek Rd.	Cleveland	97
Tulikivi U.S. Inc.	VA	22902	Yona Smith	@	804.977.5500	977.5164	255 Ridge-McIntire Rd.	Charlottesville	97
Vesta Masonry Stove Inc.	NC	28714	Tom Trout	@	704.675.5247	675.5666	373 Old Seven Mile Ridge Rd.	Burnsville	97
Aaron's Ltd. Chimney Services, Inc.	MO	63025	Gary Hart	@	314.938.4318	-	2850 Riverbend Acres	Eureka	96

Alternate Energy Systems	NY	12972	Bill Derrick	minaska @aol.com	518.643.9374	643.2012	Box 344	Peru	96
Belden Brick and Supply Co.	MI	49504	Paul Belden IV	@	616.459.8367	459.8421	620 Leonard St. N.W.	Grand Rapids	96
Jamie Paiken Masonry	OR	97520	Jamie Paiken	@	503.482.4379	482.4379	600 Cove Rd.	Ashland	96
MGM	WI	53916	Mark Greinert		414.887.1053		113 E. Mill St.	Beaver Dam	96
Moberg Design/ Firespaces	OR	97205	Walter Moberg	@	503.227.0547	227.0548	921 S.W. Morrison St., Suite 440	Portland	96
Patzer & Co. Masonry	IL	60174	Steve Patzer	@	708.584.1081	-	3N 743 RTE 31	St. Charles	96
Pyro Mass	QC	H2W 2C6	Marcus Flynn	@	514.844.9824	843.5331	4390 Coloniale	Montreal	96
Soapstone Heating Systems of N.A.	BC	V0K 1Z0	Walter Obergfell	@	-	-	C-35-RR1 McMillan Rd	Lone Butte	96
Thermal Mass Fireplaces	WY	83001	David (Buck) Beckett	@	307.733.4029	733.4029	P.O. Box 1562	Jackson Hole	96
Thermal Mass Inc.	NH	03561	Erik Nilsen	@	603.444.6474	-	RR 1 Box 367	Littleton	96
Wilkening Fireplace Co.	MN	56484	Don & Gary Wilkening	wilkening@ hearth.com	218.547.1988 /800.367.7976	547.3393	HCR 73 Box 625	Walker	96
Woodland Stoves and Fireplaces	MN	55415	Peter E. Solac	@	612.338.6606	339.3391	1203 Washington Ave. South	Minneapolis	96

ASSOCIATE (NON-VOTING)

Alexander Construction	Lonnie Alexander	100 Raintree Rd.	Sedona	AZ 86351	602.284.9669		96
Aug. Rath jun AG	Dr. Ernst Rath	Walfischgasse 14	A-1010 Wien	Austria	+43 1 /513 44 26-0	+43 1 /513 89 17	97
BoB Gossett Masonry Design	Bob Gossett	8204 Midvale Rd.	Yakima	WA 98908	509.966.9683		96
Gary Walker, mason	Gary Walker	Box 3	Campton	NH 03223	603.726.3231	-	96

Hearth Warmers	Mark McKusick	294 Jacksonville Rd.	Colrain	MA 01340	413.624.3363	624.3367	96
High Country Stoves	Larry James	415 S. 5th. St.	Laramie	WY 82070	307.745.4488	745.4488	96
Hot Rock Masonry	Steve Cohan	PO Box 526	Eastsound	WA 96245	206.376.5505	376-5552	97
N.Y. States Chimney Sweep Guild	John Pilger	136 Floyd St.	Brentwood	NY 11717	516 273 1180	273 1180	96
Ronjan Inc.	G. Ronald Telfer	#412 - 801 Darwin Ave	Victoria	BC V8X 2X7	250.475.6545	same	97
Suite 210	Sam Foote	Suite 210, 170 Yonge St. S.	Aurora	ON L4G 6H7	905.727.6950		96
Woodland Way, Inc	Peter Solac	1203 Washington Ave. So.	Minneapolis	MN 55415	612.338.6606	339.3391	96
	Robert Herderhorst	6910 Navaho Trail N.E.	Bremerton	WA 98310-9408	360.396.2366		96

Construction Experience of “White” Upper Chamber Bakeoven Option for Contraflow Heater

by Marcus Flynn

I first became aware of white upper chamber bakeovens about two years ago, but, not having access to the necessary technical information, never offered it as an option to my clients. Also contributing to my apathy towards white ovens was my belief that their only advantage over the standard black ovens was that the bake chamber remained clean. My clients would never inquire about the white oven option and I would even as a general rule try to dissuade them from opting for the black oven on the grounds that it was primarily a novelty feature which most clients seemed to abandon using once their initial enthusiasm had worn off. I have nevertheless built several “black” upper chamber ovens.

Last season I received a couple of inquiries from prospective clients who had first been in touch with a competitor, who I knew built only white ovens. It seemed that at least in terms of bakeoven technology, some of my clients were better educated than myself.

Eventually the situation arose where a client said “ OK, you’ve got the job as long as you build me a white oven.” My construction experience was as follows, based on a design by Masonry Stove Builders:

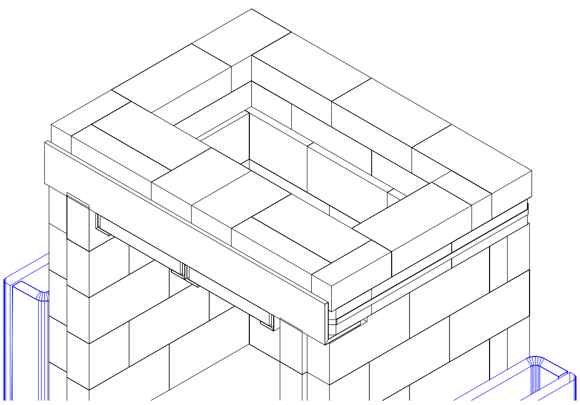


Figure 17

After building a standard firebox I began corbelling straight off the angle iron lintel over the firebox opening, using the bond indicated in the plan (Figure 17, Figure 18). The lower end corners of the bricks, corbelling up to form the firebox ceiling, were not cut back at an angle as is standard. This gave a “stepped” rather than a smooth angled firebox ceiling. I was initially concerned about the potential drag that this stepped firebox ceiling might produce. After firing the heater, however, it became evident that any drag or confluence was negligible. The stepped ceiling may even be of benefit in that it promotes mixing of the smoke, flame and secondary air as it rushes up towards the throat. The corbelling was stopped approximately 7 ½” from the rear wall of the firebox which had been laid straight up (ie., no corbelling off the rear wall).

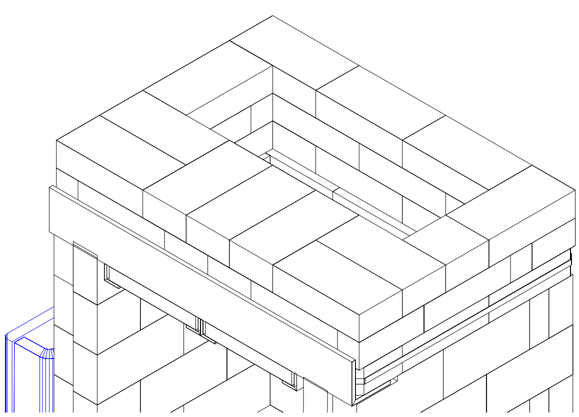


Figure 18

The next course (Figure 19) formed the portion of the smoke path beneath the oven hearth slab. This course has one slot or opening of approximately 3” at the rear of each side of the core. These slots allow the gases which flow under the oven hearth slab to exit into the side channels. The two bricks forming the front course were cut back, allowing the smoke path to extend as far forward under the hearth slab as possible.

The oven's side walls were then laid up four courses high and a conventional vaulted oven ceiling cast in place. A 1/8" gasket board was used to prevent bonding of the cast vault to the upper surfaces of the bricks forming the side walls.

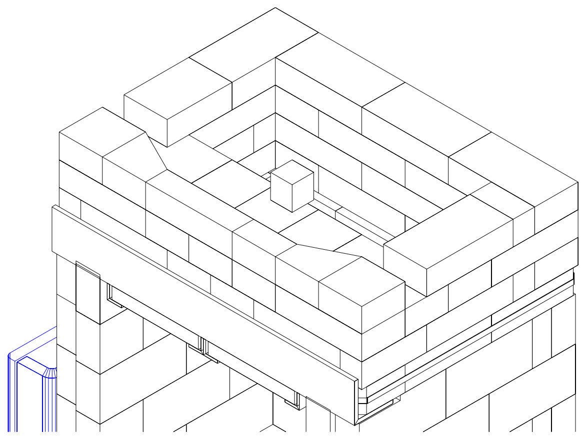


Figure 19

At this point a slab was cast (separately, on the floor) 3" thick by 27" wide (width of core) and just slightly higher than the highest point of the extradus at the rear end of the cast oven vault. This slab would form the rear wall of the oven chamber. It also bridges the throat, deflecting approximately 25% of the gases under the hearth slab.

The hearth slab was also cast at this time (also separately on the floor). I was warned that that precautions against leakage had to be taken with white ovens, so I set out to make the bake chamber as tight and well gasketed as possible. For this reason the hearth slab was cast exactly to the square of the oven's side and rear walls (less 1/8" all round to allow space for gasketing). Here an angle finder was used to account for any possible variation of square between the rear and side walls. As the rear wall slab had just been cast a piece of wood was temporarily inserted in its place for measuring purposes. The molds for the two slabs were neatly lined with clean plastic. The bottom surface of the slabs, ie that which was cast against the plastic on the bottom of the molds, would be the surface visible inside the oven chamber. This gave a smooth shiny easily cleanable surface texture on the hearth and rear wall.

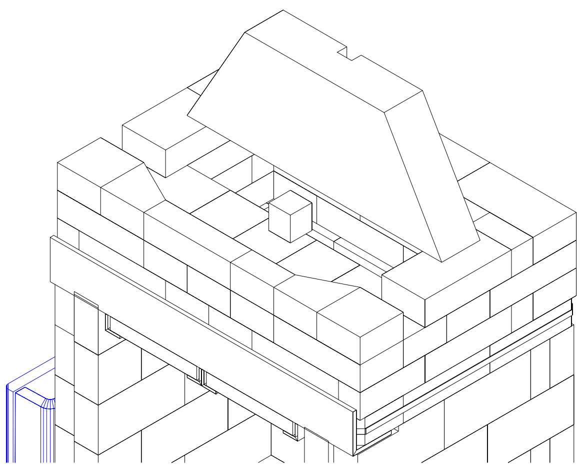


Figure 20

Once cured, the slab for the oven rear wall was set in place dry (Figure 20), and the line of the extrados of the cast arch marked off against it. After being taken outside, the slab was cut down with a grinder to the line marked. The top rear edge of this slab was ground round to improve smoke flow over the oven vault.

The slab then had a 1/8" role board gasket inserted between it and the rear surface of the side walls and the rear edge of the vault. The rear face of the slab was then gasketed where the side walls of the core would push up against it. The rear wall of the core was then laid up along with the side walls which are at this point only as long as the throat is wide. These were laid up to the capping slab level. The two short portions of the side walls brace the rear slab tightly against the rear faces of the vault and side walls. Bringing the side walls of the core up to capping slab height ensures that the gases flow over the vault before entering the side channels rather than pouring straight over the side of the throat into the channels and bypassing the vault.

For the portion of the front wall of the core above the oven vault, a precast refractory lintel was used rather than bricks, in an attempt to relieve some of the pressure of the core's front wall (the portion above the vault) from the middle of the vault.

The last step was to insert the hearth plate. The side and rear inside surfaces of the bake chamber were lined with 1/8” role board gasket up to the thickness of the hearth slab (about 2 ½”). The gasket was glued in place with the smooth side out, to reduce its tendency to tear as the hearth slab was slid in. Before the hearth slab was slid in, about 1/64” was ground off its lead corners and its edges checked for lumps, etc. The slab was then carefully slid into place, paying attention not to scuff or tear the gasket and thus destroy the seal.

One thing concerning me before starting the job was the extra time it would take. I found though that the extra time needed to build the white oven against the simpler black oven was made up for by the simplicity of the bond for the firebox ceiling corbelling, and the fact that I didn’t have to make angle cuts on the ceiling bricks as I had always done.

Besides the inside of the white oven not becoming coated with carbon deposits and fly ash, it does have the following differences over its black counterpart:

- the oven can be used during combustion.
- once the gasketed oven door is closed, there are no openings in the bake chamber. The black ovens always have a slight draw through the bake chamber, even when the damper is closed. This results in much of the cherished “baking vapours” being drawn out through the throat in the rear of the bake chamber’s vault.
- no buildup of carbon deposits on the glass inspection panel in the oven door means that the oven contents can be judged “cooked” without having to check by opening the oven door, causing sudden temperature drop in the bake chamber.
- as secondary combustion does no occur in the bake chamber there is much less stress on the oven’s door and the surrounding brickwork.

After an appropriate number of curing fires, the heater was brought up to temperature with two large fires. The hearth and rear wall of the oven became too hot to touch even momentarily without getting burnt. Since it is now the end of April, I will have to wait until the next heating season for a full assessment of the heater's performance.

Potentially worrying observations were:

- the section of the smoke path beneath the oven's hearth may become blocked with fly ash. A small cleanout door could easily be placed beneath the oven door, giving access to the under-hearth channel - although I relied on the velocity of the gases keeping this clear.
- it seems that there is a concentration of heat towards the rear of the heater due to the core's smoke path running through the rear, rather than the centre of the mass. Whether this will affect the overall efficiency of the heater or not, I don't know.
- the oven's bake chamber is about 7" to 8" shorter than the standard black oven.

This season I am enthusiastically offering the white oven as a low cost, practical option! Comments and feedback are welcome.

Pyro Masse, Montréal, April 1996. (Marcus Flynn)