**6469Re: [MHAmembers] Firebrick density for oven hearths**

*Expand Messages*

* Alex Chernov

May 29 9:47 PM

Hello, everyone.

Here are my thoughts on the topic, which we actually discussed on this forum several times already.

Without question, density and thermal conductivity of the bricks used for hearth (baking surface) have effect on heat transfer to bread. I would agree that very dense and conductive bricks/tiles may transfer heat too fast for even baking, and I trust Derek’s personal experience, however, let’s take a look at technical data for bricks most people use:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Density g/cm2 | Porosity % | Conductivity  W/mK |
| Austrian tiles | **2.00** | 20.00 | **1.20** |
| Withacre-Greer | **2.27** | **15.00** | **1.50** |
| Alsey Medium Duty | 2.09 | **21.00** | **1.20** |
| Alsey Jet-DP High Duty | 2.14 | 19.90 | **1.20** |
| Super Duty Alsey or Empire | **2.27** | 15.00 | **1.20** |
| Harbison-Walker Clipper DP | **2.27** | 15.30 | 1.27 |

Best properties (for bread ovens) are marked in RED; worst in BLUE.

Resources used to create the table:

<http://wgpaver.com/firebrick/>

<https://ssfbs.com/documents/SMITHFIELD_UNBRANDED.pdf>

<https://ssfbs.com/documents/Jet_D.P._High_Duty_Firebrick_.pdf>

<http://www.thomasnet.com/productsearch/item/30717516-16529-1014-1067/pti-thermal-solutions/alsey-pilot-dp-super-duty-firebrick/>

<http://www.wgpaver.com/wp-content/uploads/2013/02/Thermal-Conductivity-of-Firebrick.pdf>

<http://supplies.foundryservice.com/Asset/Clipper-DP-Data-Sheet.pdf>

Note that some data points require conversion to the same reporting format.

All beliefs and experiences aside, one can see that standard Withacre-Greer firebick actually has worst properties: one of the highest densities, lowest porosity and higher conductivity…

 Based on the above and my own experience I do not believe there will be huge difference between use of most firebricks, except extremes of the range.

I am not sure why Derek did experience difference with bottom of the loaves burning with super duty tiles.  One idea is that may be the difference comes from the fact that WG firebrick was set on edge with at least 4.5” (or more?) of the same material with the same thermal conductivity and density and the super-duty tiles were probably set in sand or clay mortar, which definitely has lower density and lower conductivity, creating a low-conductivity buffer. This could potentially lead to initially hotter surface layer especially if one measures air temperature instead of shooting the hearth with infrared. At the same time having a lower-conductivity buffer beneath tiles should also result in slower heat transfer in subsequent bakes, after initial surface heat is removed…A kind of a contradiction… Did you experience something like that on subsequent loads, Derek?

As to John’s experience with his baker, I am not convinced that there was negative effect on baking environment from using these bricks. I think what is most at play here is baker getting used to his routine and typical environment (which has obviously changed, even if slightly, with use of brick with slightly different properties.) and inability or lack of desire to adjust. Look at the properties above and note that Alsey Jet-DP is a better, more porous brick with lower conductivity…

My own experience with Alsey Jet-DP High Duty brick is that they are very similar to Alsey medium-duty, which is the best brick overall for oven construction in my opinion, except hearth surface as it is just too soft and porous and surface does not last that long.

I personally believe that porosity is the most important characteristic for bread baking. The higher it is with overall strength and wear resistance the better. This is why I like Alsey medium duty and the Austrian tiles I import, which are in fact high-duty by Alumina content (37%) but otherwise are very porous and with lower conductivity.  To answer Derek’s question about Austrian tiles, we had nothing but great experience with them. I learned about these tiles from John Fisher, who used them extensively in his ovens with great results, which gave me confidence to start importing them.

While everyone agrees that tiles make a better hearth, the problem is that we have no firebrick tiles with good properties available in North America. All tiles are manufactured as super-duty. All are super dense and quality of these tiles (Harbison-Walker, Alsey or Mt. Savage) is poor, plus it is very inconsistent from batch to batch: warped surfaces, broken edges and corners, pitted and scratched surface... Tiles from Austria, on contrary, offer superior consistent quality and great properties.Yes, it is a challenge to purchase a container load and sit on them for a few years, but it gives me peace of mind and assurance of quality throughout the entire oven. I just brought in a new load, so they are available for purchase. Interensted people should send me private email with their inquiries.

Best,

Alex Chernov  
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**From:** "Derek Lucchese bothhandsbread@... [MHAmembers]" <MHAmembers@yahoogroups.com>  
**To:** "MHAmembers@yahoogroups.com" <MHAmembers@yahoogroups.com>   
**Sent:** Saturday, May 28, 2016 12:55 PM  
**Subject:** Re: [MHAmembers] Firebrick density for oven hearths

For what it's worth, this has been my experience as well.  I can only (easily) get 1'x1'x2.5" firebrick tiles where I live that are high-duty, and with these I have also experienced more burning of bottoms of bread at 'lower' temperatures, compared to the original hearth I used to bake with (built 15 years ago) which was Whitacre Greer firebrick on edge.  With my old hearth I used to start baking at 700 deg. F plus temps with retarded/refrigerated proofed dough without a problem.  Once I replaced my hearth, I couldn't start any higher than about 630 deg. F.

I know for two of the other commercial ovens I've built it's also been true -- the high duty tiles lead to more burned bread bottoms.  Medium duty bricks used for hearth, although more annoying to install, anecdotally, more gently transmit heat at high temps.

I'd be curious to hear from Alex on this subject about his Austrian tiles that he sells.  Hey Alex, what experience are your baker clients having when they use these for their hearths?  And what are the properties of those tiles?

Derek Lucchese  
  
  
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On Saturday, May 28, 2016 12:27 PM, "norbert.senf@... [MHAmembers]" <MHAmembers@yahoogroups.com> wrote:

Here's an interesting exchange with John Rousseau today:  
  
It is in backwards order, but I will paste the original inquiry here:  
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On Sat, May 28, 2016 at 7:47 AM, John Rousseau <[john@...](mailto:john@...)> wrote:

Gentlemen,

We recently replaced a 14 year-old oven floor, built with low duty red firebrick, with high heat firebrick (Alsey).

The customer reported that with the new high-heat floor his slim baguettes burned at 650F whereas with the old low-duty bricks the bread did not burn.

He complained enough that we went back, removed the high-heat bricks and replaced them with the same but new low-duty red firebricks.

He was then happy to report that the bread did not burn at 650F.

Could either of you explain why this phenomenon might be happening?

Does this mean even a medium duty firebrick would perform better on an oven floor than a high-duty one?

Very best

John  
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---------- Forwarded message ----------  
From: Norbert Senf <norbert.senf@...>  
Date: Sat, May 28, 2016 at 12:21 PM  
Subject: Re: high-heat vs low-duty firebrick  
To: John Rousseau <john@...>

Hi John:

It is interesting that you have such a specific example. It would be very cool if I had a sample of each of those bricks and could measure the properties, in order to be able to say "for high heat baguettes without burned bottoms, you need a hearth material with a density of xx". Since both bricks are made from fireclay, there's a good chance that the density would predict the conductivity.

American flatbread uses soapstone for the hearths in their primitive ovens, which have a trench down the centre for the fire.

Have a good one..................Norbert

On Sat, May 28, 2016 at 12:13 PM, John Rousseau <[john@...](mailto:john@...)> wrote:

Hide message history

Hi Norbert,

Yes please post this. I would be very interested in the responses.

So, the high-heat bricks are more conductive so that is why the bread is burned?

The low duty bricks lasted over 12 years with weekly bread baking.

Wondering whether to use medium duty bricks on an oven floor rather than high duty if it means less burning….?

Of course, the low or medium duty bricks would cool faster, too, and that would make it more challenging for a pizza bake at high temperatures – floor cooler than reflected heat from walls & roof means the toppings are cooked but the crust is not.

Thanks for your info

John

From: Norbert Senf [mailto:[norbert.senf@...](mailto:norbert.senf@..." \t "_blank) ]   
Sent: May-28-16 12:58 PM  
To: John Rousseau <[john@...](mailto:john@...)>  
Cc: Alex Chernov <[alex\_stovemaster@...](mailto:alex_stovemaster@...)>  
Subject: Re: high-heat vs low-duty firebrick

With the styrofoam example, obviously you can reverse it. If the styrofoam were insulating firebrick and both it and the soapstone were at 650F, one would scorch the bread because of conductivity 4X that of brick, and the other would not bake it enough on the bottom, because it doesn't have enough BTU's stored in the brick because of low density.................N

On Sat, May 28, 2016 at 11:28 AM, Norbert Senf <[norbert.senf@...](mailto:norbert.senf@...)> wrote:

Hi John:

Do you mind if I post this discussion to the MHA list, as it is very interesting?

The heat transfer from the bricks to the bread is governed by the brick's thermal properties, which are its density, heat capacity, and conductivity.

You could weight both bricks, assuming they are the same size, and know if there was a density difference.

You could find out the heat capacity (specific heat) by heating both bricks in an oven to say 450F steady state, and dump them both into a separate gallon container of water and measure the temperature rise.

My guess would be the main difference is in conductivity.

If you are in an outhouse at 0C and sit on a styrofoam toilet seat, or a soapstone toilet seat, you would notice a huge difference in ass warmth ;-)

Both of these materials are at the same temperature, the main difference here being conductivity, although the other properties differ as well.......................... ......N

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Very best

John

John Rousseau

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