



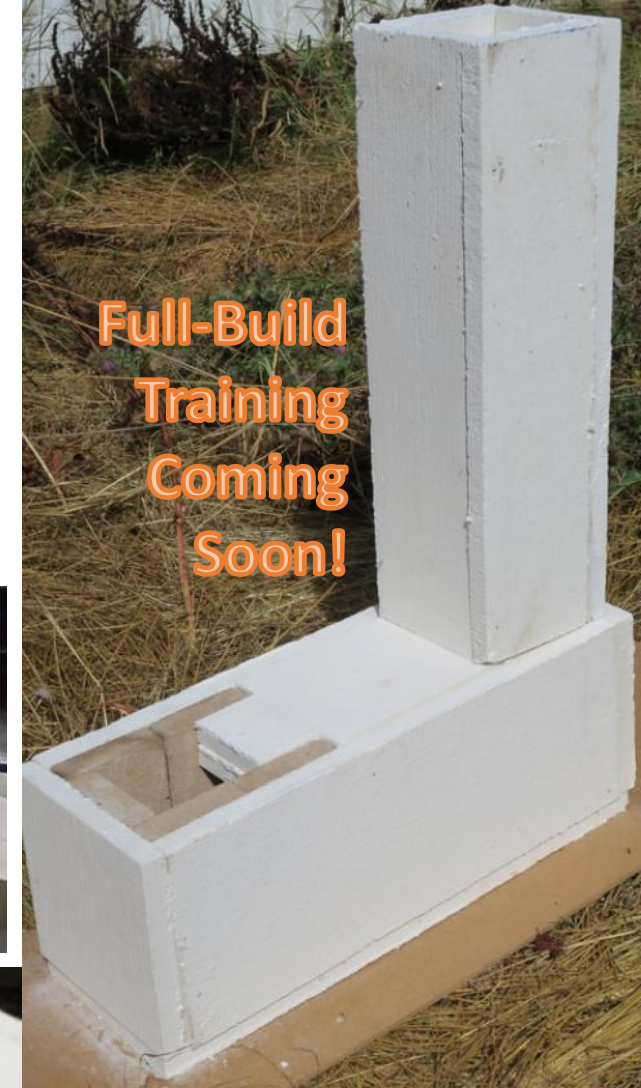
Decentralized Energy Defense

Adaptable! Lightweight J-Tube Ceramic Heating Core

*Suitable for
outdoor or
emergency heat,
cooking, baking*



Overview for
Building
Using
Refractory
(Ceramic)
Boards



For free consults or more info, contact:

Signal

WhatsApp

Telegram



This document gives an overview of a simple J-Tube, Biomass Heating Core, adaptable to many heating & cooking systems.

For more detail:

vimeo.com/ondemand/rmh
permies.com/w/rmh-builders-guide
walkerstoves.com/innovations

email: Leslie@ResilientVillageUkraine.org

Introducing Ukraine's **Defiant Heat**

- material efficiency
- scalability
- emergency resilience

Lightweight portable Combustion unit



Suitable for
outdoor or
emergency
heat,
cooktop.
Add Oven!

Outdoor

*Deliver
critical heat
where
needed*

An ecological,
wood or
biomass
emergency
heating &
cooking
solution



ResilientVillageUkraine.org

Adaptable Ceramic core



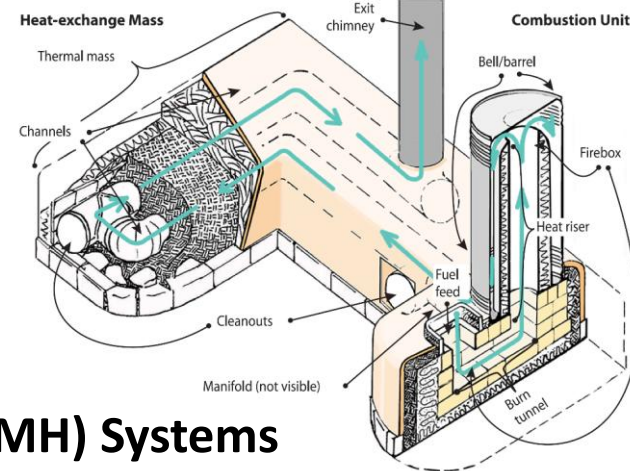
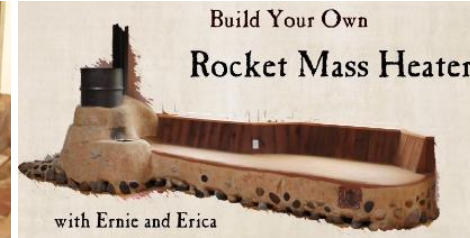
Indoor

Rocket Mass

Heating (RMH) Systems

Use the same core to create infinite styles. Salvaged components (cob, brick, concrete, metal) can be used throughout.

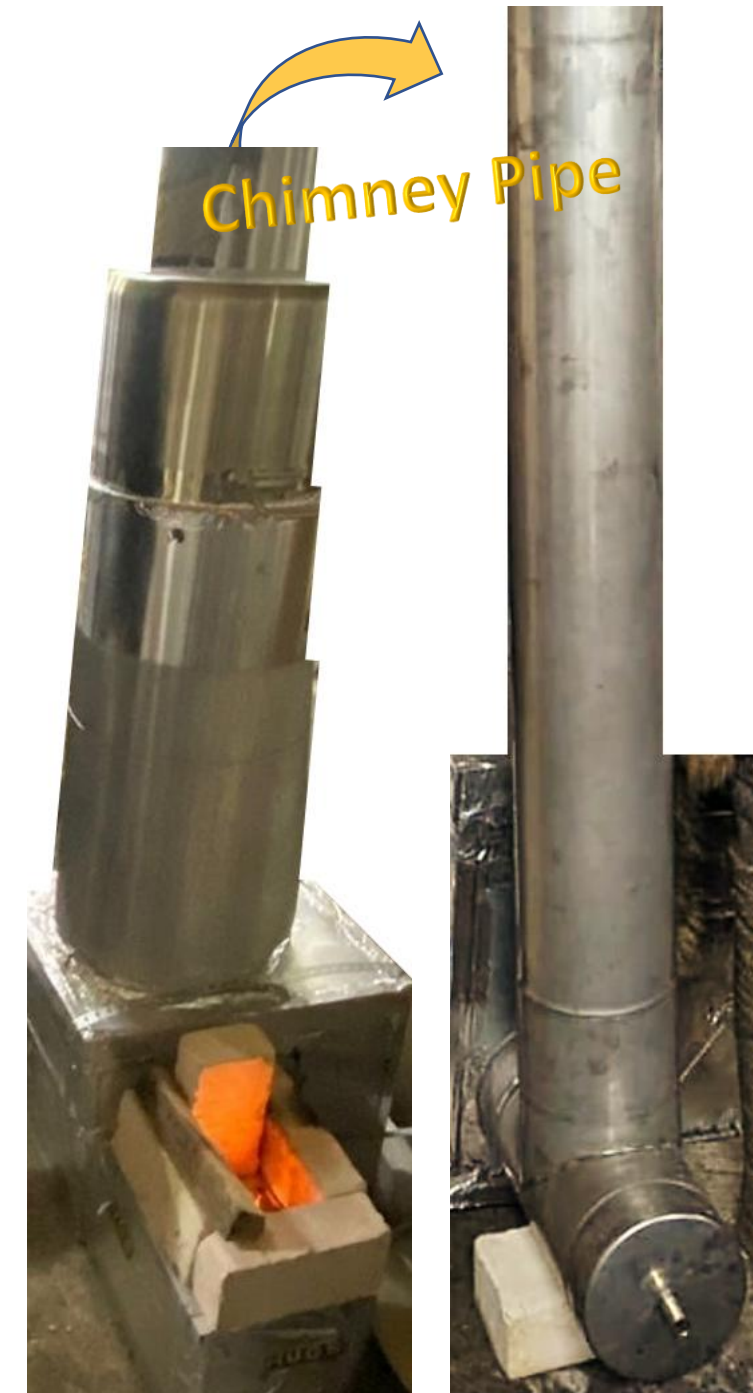
After **3-4 hours burn time**
these heat storage systems can yield
24-48 hours of heat,
using small wood trimmings
and assorted biomass



First Project Goals



- Build a quick heating core that can be used for many applications.
- Estimated completion:
 - 10 – 30 work hours after gathering materials sources
- Recommended for out-buildings and emergency usage until engineering specifications and housing code can be adapted. When used indoors, proper exit chimney pipes must be installed. Running a straight, vertical installation through the roof is highly recommended since very little heat will exit the building. This makes the thermal "draw" minimal, so not as easy to get gases drawn up and outdoors.
- The system could be built with a thermal storage mass and cooking surface or serve as an efficient stand-alone wood/biomass heater wherever an exhaust chimney pipe can be set up.
- If cob & masonry materials can be sourced, various forms of mass thermal storage can be added to extend the warmth generated by a 2-4 hour burn time - up to 48 hours by using this design as the heating core for a full Rocket Mass Heating System.
- Contact us for free consultations.



Rocket Heater Combustion Chamber Using Refractory (Ceramic) Boards



Construction Materials

- Ceramic Board – new or used, 2 sheets, ~ 2.5 cm, 1m x 1m sheets
- 10 Split (thin) firebricks
- Heat-resistant stove cording (rope seal) - 538°C (1020°F), 14 mm suggested, 2 m for one heating unit (lower temp sufficient for barrel to manifold. However, extra cord may be used for door of a batch box design in the future, requiring higher heat resistance: 1260°C)
- Stove rope adhesive (see last slide for temperature range)
- Plumber's tape

Additional material options:

see slide # 13 “Finishes for Ceramic Board Cores”

See next four slides for:

Chimney pipe

Manifold

Bell or Barrel options





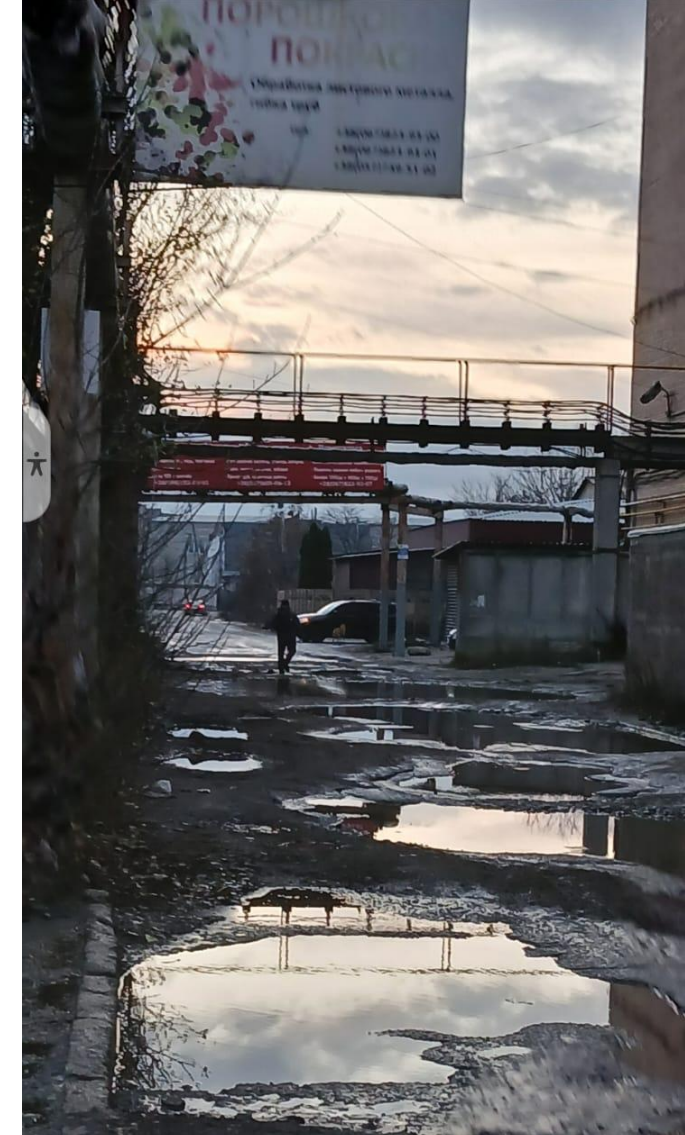
Chimney pipe

- 152mm (6 inch) single/double wall up to 3 feet above roof
- Accessories
- T joints - 3 (mass/chimney, 2 cleanouts)
- End cap
- Butterfly valve
- Chimney cap + screening
- Chimney installation package to match size of pipes used - 152mm

OPTIONAL:

Thermal Mass Bench Heat Conductor (Function of size and layout)

- Option 1 stratification chamber
half barrel or similar aluminum/steel sheeting
- Option 2 ducting/chimney pipes $\geq 152\text{mm}$ – single wall
Length depends on size of thermal mass bench



Challenges of Sourcing Materials in Ukraine

Lacking a car much of the time, shopping at the metal bazaar in Kharkiv turned into a full-day challenge. For unusual materials, like ceramic fiber boards, it helps to find a heating expert. Online options exist, but it is best to see the material before purchasing if possible.

RMH Pipe Diameter and Room Size

- **Small Rooms/Small Cabins (100–200 sq ft / 10–20 m²):**

Use a **100mm (4-inch) system**. This smaller diameter keeps the system in scale with the lower heat requirement.

- **Average Room/Small House (200–500 sq ft / 20–45 m²):**

A **150mm (6-inch) system** is considered the standard size for most homes, efficiently heating a moderate space, often requiring a 150mm x 150mm or 150mm x 200mm firebox.

- **Large Room/Open Plan (500–1000+ sq ft / 45–90+ m²):**

A **200mm (8-inch) system** is needed for larger spaces, typically employing a batch box design to handle the increased fuel load.

Key Design Principles

- **Heat Riser Diameter:** The core diameter (heat riser) is usually 150mm for standard, with 200mm used for higher output needs.

- **System Sizing:** A 150mm (6-inch) rocket stove is generally sufficient to heat a 34x30 shop (approx. 1000 sq ft) when used as a batch box design, though 200mm is safer for larger, poorly insulated, or open-plan areas.

- **Avoid Scaling Down:** Reducing the ducting size by 50% can cut flow area by 75%, causing performance issues, so sticking to the standard 150mm or 200mm for the heat riser is critical.

For most residential applications, a **150mm (6-inch) system** is recommended to balance heat output and efficiency.

Simple
“drum”
from
rolled thin
steel sheet
with
solid top
to
withstand
535+ C
BUT:
too thin
for
long-term,
safe use



Standard: Drums or Barrels

Common industrial steel drum sizes in Ukraine

- 55-Gallon Drum (Standard): 200–210 litre**
These standard industrial, cylindrical, welded containers are widely used for shipping liquids and solids, with standard dimensions typically featuring a diameter of about 584 mm (23 inches) and a height of 876 mm (34.5 inches) - preferably with a clamp-on lid for easier assembly.
or

- 35-Gallon Drum:** A 34.7 Liter, 166mm (17-inch) diameter steel food barrel can be used.

Unless you are trying to heat a large house, a 6" system may be right, which just happens to be the largest size that will conveniently work with a 35 gallon drum.

The drum should be removable for cleaning and servicing. Stove cording with thermal adhesive is generally used to give a tight seal between the manifold and drum/barrel bottom.

A Clean Barrel for the Bell

The bell is steel or stainless steel, airtight, and free of unsuitable paints and debris. You can approach finding the right barrel in a number of ways:

1. Get a recycled barrel, such as a food-grade 55-gallon drum. Remove the paint by abrasion, which means sand-blasting, sanding, or grinding; OR burning the barrel outdoors. See sidebar, "Pocket Rocket," later in this chapter.
2. Salvage an old water-heater tank or similar cylinder: remove all fittings and contents. Taking steps to prevent pressure explosion, leave one end sealed and cut the other open. Remove surface paint as above. Interior enamels may be left in place or removed.
3. Purchase a clean, unvarnished stainless steel drum directly from a manufacturer. (If varnished, remove varnish by abrasion or burning, as above.)
4. Commission a custom stainless or weathered-steel cylinder (or a similar column shape, such as an octagon or hexagon) from a qualified local welder. To maintain performance comparable to barrels we've tested, the steel should be at least 12-gauge, 20 to 24-inch inside diameter, 28 to 40" interior height, with airtight construction including an airtight lid or sealed top.

Protect the clean, bare metal with a heat-tolerant coating. You can use a high temperature paint or enamel, such as engine block or woodstove paints rated for 1200 to 2000°F, but we more often simply use food-grade oil such as coconut or safflower oil, and cure the barrel in place like a cast-iron pan.

For decorative options, see "Barrel Decoration," in Appendix 6.

Experimenting with Manifold & Bench Options

- Stratification chamber versus pipe to be decided
- Dependent on available materials at best price

**For the Portable Version
No Manifold or
Bench Is Needed**



Pipe systems are the long-time standard >>



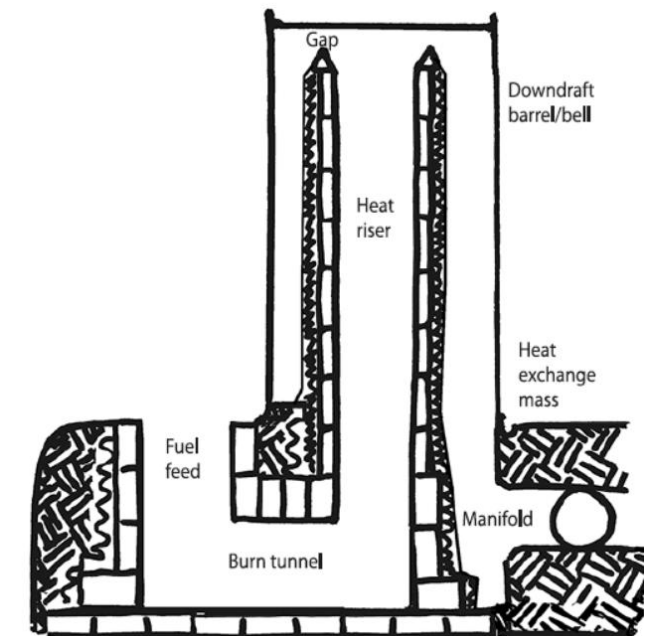
<< Very little info is available on stratification chambers.



**A
Simple Manifold**

>>

Designed ourselves for a small location in an automotive workshop.
Kharkiv,
December 2025.



Kharkiv ProtoType Tests



Working with Limited Resources

Note: Pallets were the only available material to use as a level platform. Since rain and ice storms had thoroughly soaked everything in this tight outdoor space, fire danger was minimal.

Success under Difficult Conditions

20+ hours over a 4-day period, the core was exposed to wet conditions. Although priming the fire was challenging, the core fired up beautifully for all 6-8 tests.



Hot gases exit at the bottom of the barrel. The manifold then directs the gases thru the piping – either out the chimney or first into a storage area like a thermal bench.

Manifold



Low heat signature outside



< SEALED! All gases exit chimney pipe

TOOLS

to bring, find at debris sites, or purchase:

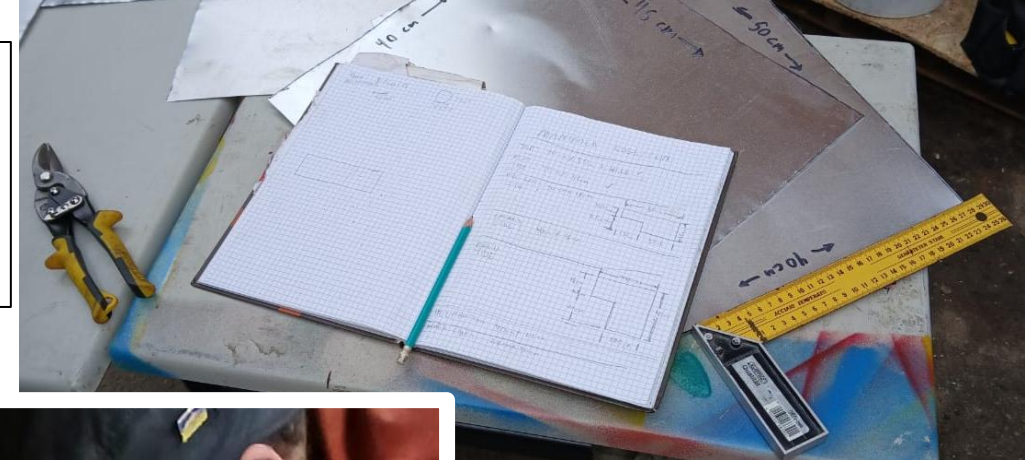
- Utility or pocketknife, bread cutter, hand saw (for ceramic board)
- Builder's level –1 meter long is best
- Builder's square
- Probe-type chimney thermometer
- Tin snips
- Measuring tape
- 30-40 Finishing nails (or similar gauge wire)
- PPE: Safety mask & goggles, gloves
- Basic tools: Pliers, Wrenches, Hammer, assorted nails, screwdriver, assorted screws
- Chimney roof framing, possibly heater foundation: dimensional lumber, insulation
- Firewood and fire starter – small sticks, tree branches, construction trimmings (no treated lumber), cardboard, paper, charcoal, straw, animal dung, etc. Must be dry!

For masonry/cob work:

- Shovel & pitchfork or similar tools (full sized and hand tool versions)
- Wheelbarrow
- Buckets and mixing trays for mortar and cob
- Brick hammer and chisel
- Mason's trowel
- Tarps, burlap/plastic fstorage bags or plastic sheeting 1 or 2 at least 4 meters long and 2 meters wide total
- Metal mesh screening (about 1/8" for sifting sand and up to 1" for simple rocket stove model)

NOTE:

We design these resilience projects with lack of electricity in mind. You certainly may use power tools!



Cutting Ceramic Boards:

Hand Saw/

Fine-Tooth Saw:

A good alternative for manual, controlled cuts, offering a smoother edge than a utility knife on very thick pieces.

or

Utility/Insulation Knife:

Use a knife with a long, sharp blade. Score the foam, then make several passes to cut through the depth.

Hot Spots

Materials used must meet or exceed heat requirements

The Rocket Mass Heater Builder's Guide, Ernie & Erica Wisner
vimeo.com/ondemand/rmh permies.com/w/rmh-builders-guide

	Celsius	Fahrenheit
Firebox exterior	~ 315 C	~ 600 F
Burn tunnel & heat riser	650 – 1100+ C	1200 – 2000+ F
Heat exchanger - Barrel exterior (Top is hottest)	315 – 537+ C	600-1000+ F
Connecting pipes	still hot to the touch	but gradually cooling
Exhaust/Chimney	60 – 90 C	140-190 F
Mass	38 – 148 C	100 – 300 F

Rocket Mass Heater Internal Combustion Temperature Maximums



Refractory materials must withstand 2000+ F
Actual temperatures vary based on design, type of fuel, and point in the burn (burn phase)



infrared (IR) thermometer
also commonly known as a temperature gun or non-contact pyrometer. It is an essential diagnostic tool used to measure surface heat.



Finishes for Heating Cores

Use recycled materials as much as possible to keep cost low and give new life to war debris.

Ceramic board is the most expensive component. Used pieces could be extracted from old heating systems where insulation from extreme heat is needed. From recycled heating systems and automotive hoods to factory trimmings from new boards.

For example, a destroyed oven may provide:

- ceramic core insulation board
- thermal braiding from oven door.
- heat-resistant metal, hardware...

Suggested Research:

Even small pieces of board could be fitted together over a pre-cut exterior metal panel with thermal glue to adhere the smaller pieces together and firmly attached to the metal. Vermiculite could be glued in place as a filler.

Questions and concerns could be posted at Permies.com with very active ongoing conversations including top experts in the field.

Outer Components Stand-Alone Heating Core

Consider:

- Aluminum sheeting (guage to be decided)
- L-shaped and corner bracing
- Handles for the 2 sections if portability is needed
- Hinges to secure the 2 sections - oven braiding recommended for the joint where the two pieces connect

Outer Components
For an internal core that will be covered with a more permanent exterior

Even lightweight aluminum sheeting with plumber's tape for strapping, can secure the combustion chamber







Suggested Pattern Layout for Cutting Boards
Assuming 2 refractory boards, @ 1 meter x 1 meter
trimmings can make a small manifold



CAUTION!

- Handle ceramic fiber carefully.
- Use hand tools whenever possible.
 - Frequently clean the work area with HEPA filtered vacuum or wet sweeping to minimize the accumulation of debris.
 - Do not use compressed air for clean-up.

Wear industrial leather gloves and work clothes, which are loose fitting at the neck and wrists.

Where abnormally high dust concentrations occur, use appropriate PPE:

- As necessary, wear goggles or safety glasses with side shields
- NIOSH/FFP2 respirators should be provided for use on a voluntary basis
- For low dust concentrations Respiratory Protection is not required
- Soiled clothes should be cleaned to remove excess dust before being taken off (e.g. use vacuum cleaner, not compressed air).
- Wash work clothes separately

			% Weight
			85%
			15%
Safety Data Sheet			
Following Regulations (EC) No 1907/2006, (EC) No 1272/2008 & (EC) No 2008/67			
SDS Number: 201 Date of first revision: 17 May 2021 Date of last revision: 01 June 2025			
Section 1 - Identification of product			
1.1. Identification of Product			
TradeName: Clearfil Whit Pack, CeraLink 102, CeraLink 102, CeraLink 140, CeraLink 141, CeraLink 141 Wrap HT, KavoBond 12C Bonds and Shapers, KavoBond 2300B Bonds and Shapers, KavoBond 2300B Bonds and Shapers, KavoBond 2300B Shaper, KavoBond 2300B Shaper Plus X7, Thermacryl A, Thermacryl AG, Thermacryl HPT, Thermacryl HT, Thermacryl LT, Thermacryl LQ.			
The above mentioned product contains Refractory Ceramic Fibre (RCF)/ Polyimide-based glass fibres for high temperature uses)			
CAS number: 10324-84-0 CAS Name: Hexamethylenesiloxane, aluminosilicate Regulation number: EC 217-010-020-02			
1.2. Use of Product			
One of the products is restricted to professional users for application as thermal insulation, heat shields, heat containment, gaskets and expansion joints at temperatures up to 1400°C in industrial furnaces, ovens, kilns, boilers and other processes employed and in the aerospace and automotive industries. Products are not intended for direct sale to the general public. * Primary Use: Manufacture of fibre (this use refers to the initial production of the fibre and is therefore not relevant to the downstream user). * Secondary Use: Consumption rate set by dry rubbers and articles made to section 8). * Tertiary Use: Installation, removal (industrial and professional), maintenance and service life (industrial and professional) (subject to section 8).			
Section 2 - Hazard identification			
Hazard Statement: Spraying of the product			
Classification of the product			
UK: THERMAL CERAMICS LIMITED Walsley Road, Broomfield Rush, Mansfield NG21 6RN Tel : +44 (0) 191 354 4020 Fax : +44 (0) 191 354 1568			
Website:			
www.morganthermalceramics.com info@mcgroup.co.uk			
1.4. Emergency information			
Tel : +44 (0) 191 863 873 Language: English Opening hours: Only available during office hours			
Section 3 - Hazard identification			
3.1. Classification of the substance mixtures			
3.1.1 Classification according to Regulation (EC) No 1272/2008 Skin Irritation, Labeling and Packaging regulation (CLP) 1272/2008.EC RCF-AI has been classified as a 1B carcinogen.			
3.1.2 Additional Information The International Agency for Research on Cancer (IARC) published in 2001 that group 2B ("possibly carcinogenic to humans") remains the appropriate classification for RCF-AI based on weight of evidence. In National Program of Regulation (EC) No 1272/2008 as published 18 June 2008, the classification "as stated" has been removed for all types of respirable silica dusts (MPPV). 			
3.2. Labeling Elements			
Hazard pictograms	Danger	GHS No.	Pictogram
Refractory Ceramic Fibres (Respirable-silicatic acid)	(C) (Xn) 1272/2008	[GHS 08]	[H350]
Hazard pictogram GHS 08 			
Signal Word : Danger			
Hazard Statements : (S) may cause cancer by inhalation (H350) (S) do not handle or eat safety instructions have been read and understood (P201)			
Precautionary statements : (P201) Use personal protective equipment as required (P201) (P273) Other hazards which need to be considered			
CHRONIC EFFECTS FOR CRISTALLINE SILICA These products may contain crystalline silica. Inhalation/exposure of respirable crystalline silica dust may cause delayed lung injury (silicoziosis). IARC International Agency for Research on Cancer notes that there is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica in the form of quartz or cristobalite from occupational exposure to finely divided silica dusts as occurring in human Group 1 of carcinogens (Group 1 of carcinogens) [1]. In making the latest updated evaluation the Working Group noted however that carcinogenicity in humans was not detected in all animal circumstances studied			

See Material Safety Data Sheet (MSDS)
for more safety guidelines & handling protocols.

ceramicfiber.net/MSDSCeraTex.pdf
morganadvancedmaterials.com/media/1o4hzvnl/203-eu-english.pdf

Now Available!

Coming soon:

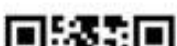
Ukrainian version

Workshops to build your own

Signal



WhatsApp



Telegram



email: Leslie@ResilientVillageUkraine.org

Seeking Expert Review

Careful measurements, logs, photos, videos, and time stamps will be kept for the prototype. Current plan is to have the EkoPich design evaluated by an engineering authority for emergency and outdoor usage to start. Eventually, the design will be adapted to include a thermal storage bench for safe use in homes.