SERIES F-010

FURNACE MANUAL

LAB-TEMP, INC.
624-630 Third Avenue
Ford City, PA 16226
Phone: 412-763-2700
Fax: 412-763-8120

INSTRUCTION MANUAL

MODEL NUMBER	F-010-WI-KA-1.25-8-12
SERIAL NUMBER	1052-95F
OPERATING TEMPERATURE	25 TO 1100 DEG. C
ELEMENT TYPE	KANTHAL A1
NUMBER OF ZONES	1
THERMOCOUPLE TYPE	TYPE K
FURNACE POWER REQUIREMENTS	6.4 AMPS, @ 115 VAC, 60 Hz, 1 ph.

ACCESSORIES PURCHASED

PORT

END CAPS

SUPPORT BRACKETS

THESE MATERIAL SAFETY DATA SHEETS ARE INCLUDED

THERMATEX

ALUNDUM CEMENT

EMBEDDING INSTRUCTIONS

CONTENTS

Also included:

West Controller Manual
Eurotherm Solid State Relay Manual

SECTION I -- DESCRIPTION

The F Series furnaces are versatile, portable, benchtop units which were designed to allow access through the ends with customers' equipment. This makes the F Series ideal for installation into test frames requiring load train ports or any process with reactor tubes. A stainless steel shell allows for easy cleanup. Several different insulation types may be used in the construction. A vacuum formed refractory fiber composes the bulk amount. Material Safety Data Sheets are enclosed for your review if any modifications are required.

Normal Operating Range: Ambient to rating provided on the Furnace Data Tag and the cover of this manual.

> Some F Series furnaces will have their operating ranges lowered due to different unit features purchased. Please review the front page for your furnace's limitations.

Heating: The heating elements are positioned in a ceramic holder. Some elements may be open windings (you will be able to see the coils). Most elements are shipped with the windings embedded in a cement for protection. This cement may fall out because the unit was not heated to the maximum operating temperature to help cure the cement. Do not be alarmed if some cement has fallen out. The repair procedure is covered on a separate sheet under the heading "Instructions for Embedding Windings".

The heating element is indicated on the cover for your particular furnace(s). There are two types that may have been used:

Nichrome V has a recommended maximum rating of 1850 Deg. F (1010 Deg. C) and Kanthal A1 or eq. has a recommended maximum rating of 2200 Deg. F (1204 Deg. C).

Your furnace rating may not be as high as the windings due to the actual construction, the ID versus OD, and several other factors. If you desire to operate your furnace above the maximum rating on the Furnace Data Tag, please consult the factory.

Recommended control is a zero firing or phase angle SCR unit.

Power Requirements: The power for each furnace is different and is written on the front page of this manual for quick review. The power will also be indicated on the Furnace Data Tag.

SECTION I -- DESCRIPTION CONTINUED

Sensor: A thermocouple sensor may be provided with the furnace. The typical location for the control sensor is within 1/4 in. from the elements. This helps to prevent overheating if a large specimen is used. Some customers may prefer to control off the specimen which may lead to premature element failure due to overheating, especially when reaching the maximum rating.

Mounting: If purchased, a mounting assembly will be attached to the furnace with a diagram (Figure 2) included with this manual. Normally, leg levelers are provided with support brackets used for benchtop operations.

SECTION II -- INSTALLATION

IMPORTANT: Please do not throw away any shipping packages until you are sure all the components are received. Most options will be attached to or part of the furnace itself. The main items not attached to the furnace are the end caps, if provided.

FURNACE BURNIN PROCEDURE:

NOTE: The furnace has gone through the initial bakeout procedure required for the Whiteline insulation.

LOCATION: Position the oven on a bench or install in the test frame following the mounting arrangement drawings (optional item). Check for the length of power cord required for your control system.

SECTION III -- WIRING CONNECTIONS

ELECTRICAL: A terminal block has been provided for easy connection by you. Please refer to Terminal Block Connections, Figure 1, for the correct position for the power leads and jumpers. A romex feedthrough has been provided as the strain relief for your power cable. Please make sure that your wiring meets all local electrical codes.

NOTE: If a control system has been purchased with the furnace, the electrical connections have already been attached. Refer to the controller instruction manual for the temperature control operation.

CAUTION: Always have power turned off when connecting the control system to a furnace. This will prevent electrical shocks and element burnout.

SECTION IV -- OPERATION

Once the control system has been wired up to the block and the cover installed, place the end caps (if provided) into position, power up the control system to test the components, then take the furnace up to a reasonable operating temperature for a short test following the controller manual instructions.

CAUTION: Do not run up to maximum operating temperature until all components have been positioned properly. If permanent fixtures are required, then we suggest running the unit at maximum allowable heating rate to determine the time frame for your system to reach the maximum operating temperature.

Control Thermocouple Positioning:

A. The final position for the control thermocouple is determined by your requirements. This may become a trial and error procedure. It is recommended to have an additional thermocouple and recorder for the test. A heavy gage thermocouple has been provided for the control sensor.

B. Heat the furnace up to the desired rate and record the specimen's heating rate. There may be a difference between the furnace rate and specimen rate. The specimen may not even reach the furnace temperature. This will allow you to readjust the operating temperature of your control system or switch the thermocouples around and operate off the specimen. Always monitor the element temperature to ensure that you do not operate continuously above the maximum element rating.

CAUTION: Do no place anything on the windings, this may cause premature element failure by creating a hot spot on the elements. There is also a potential for the elements to short out on metal specimens, especially with high voltage applications.

You may have to repeat the test several times before the results meet your specifications. It is difficult to position the control T/C at the factory due to the limited information on the exact load.

C. The furnace has resistive elements. The elements do change resistance excessively when reaching maximum operating temperatures. Complex Current Limiting SCR systems are required to operate the furnaces. Some units are designed to operate off standard line voltage; however, the amperage will be above 45 Amps. In most smaller units, a stepdown transformer is required to assist in the operation. The Kanthal Super 33 element has excellent heat up rates. Different loads will affect the furnace's actual heating rate.

SECTION V -- MAINTENANCE

HEATING ELEMENTS: The elements should last more than two (2) years unless overheated due to improper control system, chemical attack causing corrosion, physical abuse from the operator, or specimen breakage. After the initial heat up, it is recommended that you inspect the terminals for tightness, it may be necessary to tighten them.

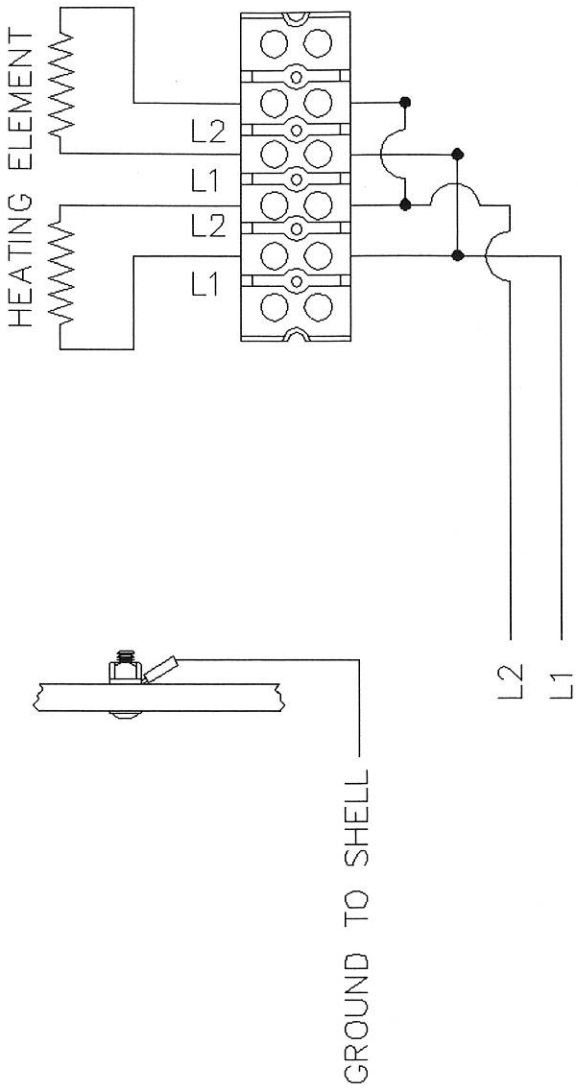
END CAP MACHINING: These end caps can be purchased with or without bore. If purchased without bore, the following steps may help you with machining them to fit your needs:

CAUTION: You must wear a respiratory protective device when machining the insulation.

1. Most caps will be sent split without a center hole. This means you will have to bend the half sections together with a hose clamp or some other way. Please make sure that you use a wood backing to drill into, this will prevent breakage of the insulation. For small holes use a regular drill bit, it may dull faster if you are drilling multiple holes. For larger holes, purchase a hole saw with the correct OD for your requirements.

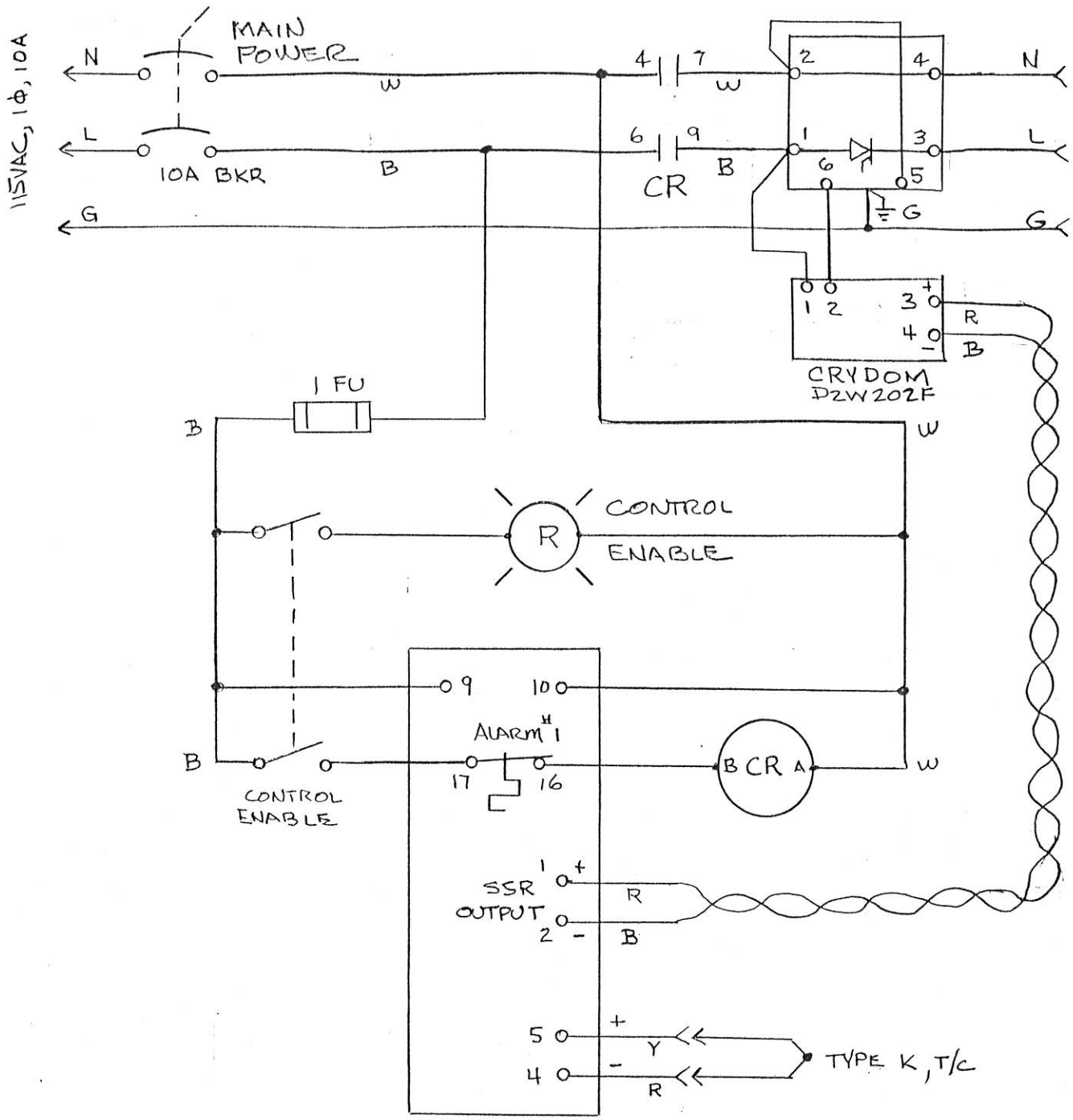
2. With a correct size hole saw place in a drill press or drill. Drill into the Whiteline cap keeping a vacuum sweeper handy to collect the dust and pieces. A normal hole saw does not have the depth required for a 2 in. thick piece. You may need to flip the piece over and continue drilling. Discard center pieces and check for fit.

PARALLEL CONNECTIONS FOR
A SINGLE ZONE FURNACE
@ 115, 208, OR 230V AC W/COMMON GROUND



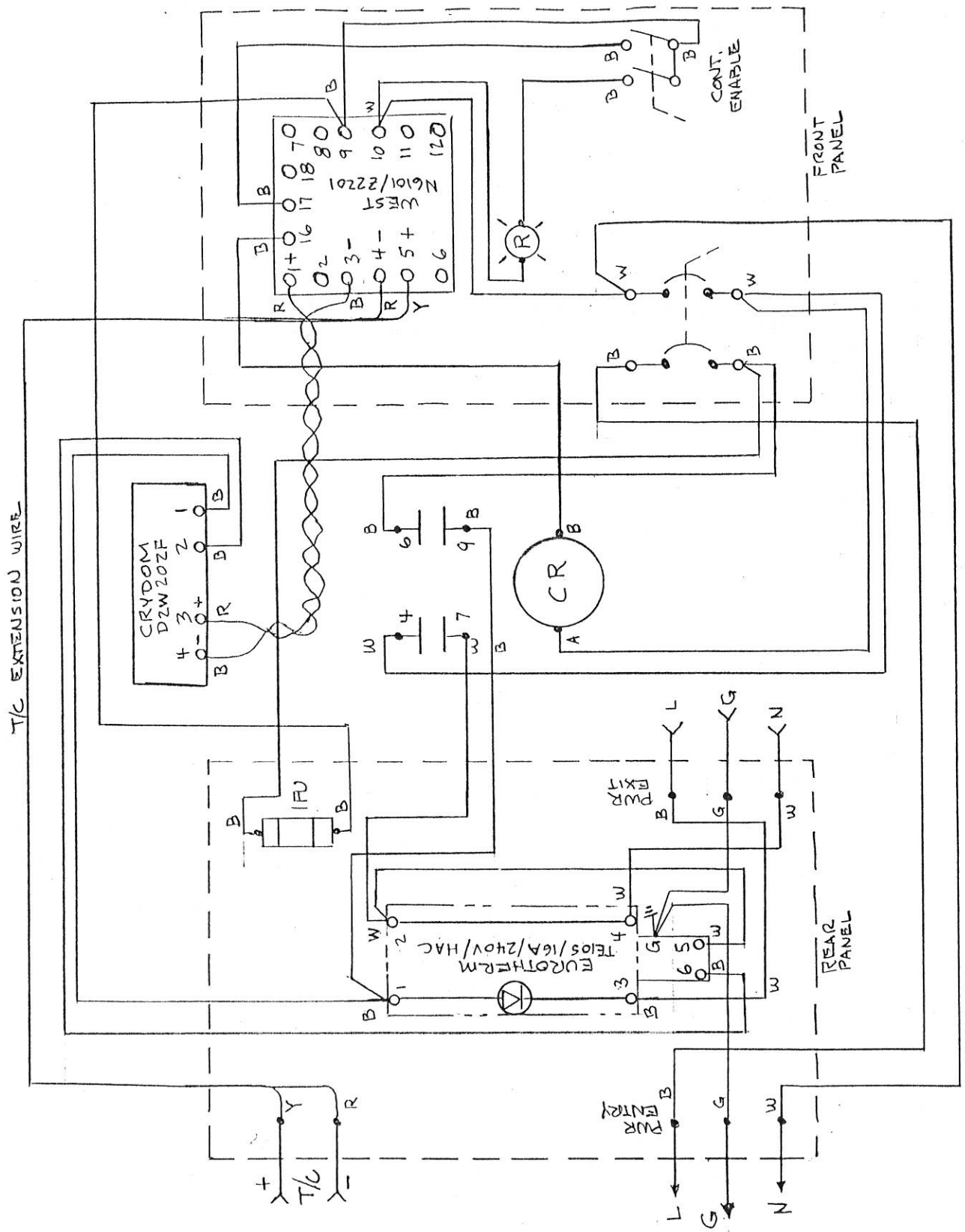
		LTAE069
	DATE: 5-23-95	
DWG. EJB	REV.0	
SCALE: 1/2=1"		

SERIES F-010
FURNACE, SINGLE ZONE
CONSTRUCTION.



WEST MODEL
N6101/Z2201
TEMP. CONTROL

bobar instruments inc.
INSTRUMENT SYSTEMS / CONTROL SYSTEMS
2491 GREENSBURG ROAD, NEW KENSINGTON, PA. 15068
Phone: (412) 339-3565



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Phone: (412) 339-3565

NORTON

MATERIAL SAFETY DATA SHEET

HAZARD RATING

SECTION I NAME AND PRODUCT

MANUFACTURER'S NAME: Norton Company	CONTACT: Neil N. Ault
ADDRESS (STREET, CITY, STATE AND ZIP CODE): New Bond Street, Worcester, MA 01606	EMERGENCY TELEPHONE NO.: 617 - 853-1000
TRADE NAME, COMMON NAME OR SPECIFICATION: ALUNDUM Cement EA162	APPROVED BY N.N. Ault DATE 3/4/85
CHEMICAL FAMILY OR PRODUCT TYPE: Refractory Oxide	

SECTION II COMPOSITION

CHEMICAL NAME	wt%	COMMON NAME	REG.* (Y/N)	CAS #	OSHA PERMISSIVE EXPOSURE LIMIT	ACGIH TLV	CA
Aluminum Oxide Al_2O_3	81	Alumina	Y	13-28-1	15 Mg/m^3 Total	10 Mg/m^3 Total	
Free Silica, SiO_2	4	Quartz	Y	1480-60-7	.3 Mg/m^3 Total	.3 Mg/m^3 Total	
Titanium Oxide, TiO_2	5	Titania	Y	13463-67-7	NAIF	10 Mg/m^3	
Since the free quartz is in mixture, OSHA recommends an exposure limit of 4.3 Mg/m^3 for total dust and 1.7 Mg/m^3 for respirable dust.							

* Materials are regulated by OSHA 29 CFR 1910.1200, Hazard Communication Standard, and/or the Massachusetts General Law Chapter 111F, Right To Know Regulations

SECTION III PHYSICAL AND CHEMICAL DATA

BOILING POINT	N/A	MELTING POINT	1800°C.	SPECIFIC GRAVITY	3.5
VAPOR PRESSURE	N/A	PERCENT VOLATILE BY VOL.	None	VAPOR DENSITY	N/A
EVAPORATION RATE	N/A	SOLUBILITY IN WATER	None	SOLUBILITY IN ALCOHOL	None
SOLUBILITY IN OTHER SOLVENT	N/A	APPEARANCE AND ODOR	Granular Material		

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: N/A	(METHOD USED) N/A	FLAMMABLE LIMITS LEL N/A	UFL N
EXTINGUISHING MEDIA: N/A			
SPECIAL FIRE FIGHTING PROCEDURES: N/A			
EXPLOSION POTENTIAL: N/A			

SECTION V HEALTH, FIRST AID AND MEDICAL DATA

PRIMARY ROUTE(S) OF ENTRY	ACUTE AND CHRONIC HEALTH EFFECTS AND EFFECTS OF OVEREXPOSURE	FIRST AID AND MEDICAL INFORMATION
INHALATION	Acute: coughing, shortness of breath Chronic: cough, may cause impaired pulmonary function & respiratory disease if	Remove to fresh air. Artificial respiration as needed. Obtain medical assistance.
INGESTION	TLV is exceeded. Inert granular material	None
SKIN CONTACT & ABSORPTION	Abrasive	Wash skin
EYE	Inert hard granules	Treat for particle in eye
OTHER POTENTIAL HEALTH RISKS	Not known	None special

SECTION VI CORROSIVITY AND REACTIVITY DATA

STABILITY UNSTABLE ☐ STABLE ☒ POLYMERIZATION MAY OCCUR ☐ WILL NOT OCCUR ☒

INCOMPATIBILITY (MATERIALS TO AVOID)

None

DECOMPOSITION PRODUCTS

Some combined water from clay at high temperature.

CONDITIONS TO BE AVOIDED

No special conditions.

SECTION VII STORAGE, HANDLING AND USE PROCEDURES

NORMAL STORAGE AND HANDLING

When dust is generated, use appropriate dust respirators or keep dust levels below recommended TLV-PEL levels. See OSHA 29CFR1910.1000 (Air Contaminants), and CFR1910.94 (Ventilation)

NORMAL USE

Same as above

STEPS TO BE TAKEN IN CASE OF LEAKS OR SPILLS

Same as above

WASTE DISPOSAL METHOD

Standard landfill methods consistent with applicable Federal, State and local laws.

SECTION VIII PERSONAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE) As needed, approved dust respirator. See OSHA CFR1910.134

VENTILATION	LOCAL	Recommended
	MECHANICAL (GENERAL)	Recommended
	OTHER	NAIF
PROTECTIVE GLOVES		Recommended
EYE PROTECTION		Recommend, see OSHA 29CFR1910.122
OTHER EQUIPMENT		NAIF

MEASURES TO BE TAKEN DURING REPAIR AND MAINTENANCE OF CONTAMINATED EQUIPMENT THAT HAS BEEN IN CONTACT WITH THIS MATERIAL

See "Normal Storage and Handling" in Section VII.

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE None

OTHER PRECAUTIONS NAIF

FOR COMPANY USE

The information and recommendations set forth herein are taken from sources believed to be accurate as of the date hereof; however, Norton Company makes no warranty with respect to the accuracy of the information or the suitability of the recommendations, and assumes no liability to any user thereof.

*** N/A=NOT APPLICABLE

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LABORATORY TEST OVENS and FURNACES
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INSTRUCTIONS FOR EMBEDDING WINDINGS

Embedding work to take place after the elements are installed in the furnace shell and the leads are attached to the terminal block.

1) Mix the powder with Distilled water to form a thin paste, it should look like a thick mud. The paste must be able to go into the ceramic holder grooves.

2) Work the paste into the grooves. The paste must go between the coils.

3) When all patchwork is completed, immediately apply power to the elements to dry the cement. This prevents possible surface rusting of the iron chromium windings. The cement turning light gray in color indicates that it is dry.

4) At this time, the cement is still powdery and any excess can be removed with a fine emery cloth or sandpaper. After the furnace has been heated to operating temperature, the cement will harden.

5) If patching is required after operation, repeat steps 1 through 4.

Attached: Norton's MSDS for the embedding cement.

Lab Temp

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MATERIAL SAFETY DATA SHEET

IDENTITY: THERMALITE H BOARD

SECTION I

SUPPLIED BY: Thermatex Corp.
4521 Warren Ave.
Newton Falls, OH 44444

TELEPHONE: (216) 872-5751
DATE PREPARED: 11-23-92
PREPARED BY: A. Ekar

SECTION II - HAZARDOUS INGREDIENTS & IDENTITY INFORMATION

HAZARDOUS INGREDIENTS	OSHA PEL	ACGIH TLV	OTHER LIMITS	PERCENT
Refractory ceramic fiber				70
CAS NO. 142844-00-6				
Dust - respirable	5 mg/m³			
Dust - total		10 mg/m³		
Proposed limit	1 fiber/cc			
Thermatex Corp. workplace exposure guideline			1 fiber/cc	
Fused silica				20
CAS NO. 60676-86-0				
Respirable dust	0.1 mg/m³	0.1 mg/m³		
Amorphous silica				<6
CAS NO. 7631-86-9				
Total dust	6 mg/m³	10 mg/m³		
Crystalline silica (cristobalite)				
CAS NO. 14464-46-1				
Respirable	0.05 mg/m³	0.05 mg/m³		

This product as supplied does not contain cristobalite; however after exposure to temperatures over 1800°F, cristobalite is formed. Avoid breathing "after service" dusts. A NIOSH approved respirator for crystalline silica should be used.

SECTION III - PHYSICAL & CHEMICAL CHARACTERISTICS

BOILING POINT: n/a
VAPOR PRESSURE: n/a
VAPOR DENSITY: n/a
SOLUBILITY IN WATER: Nil

APPARENT DENSITY: 0.29 - 0.38 g/cc
MELTING POINT: >3000°F
EVAPORATION RATE: n/a

APPEARANCE & ODOR: Odorless, white to cream colored shape. Temporary color change occurs during burn out of organic binder.

SECTION IV - FIRE & EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED): None FLAMMABLE LIMITS: n/a
Above 350°F the organic binder (<5%) burns out.

EXTINGUISHING MEDIA: Water, CO_2, chemical foam

SPECIAL FIREFIGHTING PROCEDURES: None

UNUSUAL FIRE & EXPLOSION HAZARDS: None known. If dry product is exposed to water, liquid or moisture, completely dry before using. Wet or damp product can create an explosion hazard at very high molten metal temperatures.

SECTION V - REACTIVITY DATA

STABILITY: Stable

CONDITIONS TO AVOID: None

INCOMPATIBILITY (MATERIALS TO AVOID): Hydrofluoric acid and strong alkalies.

HAZARDOUS DECOMPOSITION OR BYPRODUCTS: Traces of oxides of nitrogen and carbon (only during organic binder burn off)

HAZARDOUS POLYMERIZATION: Will not occur

CONDITIONS TO AVOID: None

SECTION VI - HEALTH HAZARD DATA

ROUTES OF ENTRY:
- INHALATION: Yes
- SKIN: Irritating
- INGESTION: Possible but unlikely

HEALTH HAZARDS:

ACUTE: Causes mechanical irritation of eye, skin and upper respiratory and gastrointestinal tracts.

CHRONIC: May cause lung damage. Long term (lifetime) animal inhalation studies have been inconclusive. Other animal studies have shown refractory fiber to cause cancer of the pleura.

CARCINOGENICITY:

NTP: Yes. NTP in 1992 identified respirable crystalline silica as a substance that is reasonably anticipated to be a human carcinogen.

IARC MONOGRAPHS: Yes. IARC has classified ceramic fiber as a possible lung carcinogen for humans (Group 2B) based on animal studies. IARC has

classified crystalline silica as a probable carcinogen to humans (Group 2A). IARC states that there is sufficient evidence in animals and limited evidence in humans that crystalline silica is a carcinogen.

OSHA REGULATED: No

SIGNS & SYMPTOMS OF EXPOSURE: Temporary irritation or soreness in throat or nose. Temporary skin irritation or rash. Temporary irritation or inflammation of eyes.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: As with any dust, pre-existing upper respiratory and lung diseases may be aggravated.

EMERGENCY & FIRST AID PROCEDURES:

Inhalation - Remove to fresh air. Drink water to clear throat and blow nose to evacuate fibers.
Skin - Wash affected areas gently with soap and water.
Eyes - Flush with copious amounts of water. If irritation persists see a physician.
Ingestion - Contact physician immediately. Do not induce vomiting.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING & USE

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: Reuse if possible, otherwise scoop up and place in container for disposal. Use vacuum to clean up dust. Use dust suppressant where sweeping is necessary.

WASTE DISPOSAL METHOD: Wastes are not hazardous as defined by RCRA (40 CFR Part 261). Dispose to landfill in accordance with federal, state and local regulations.

PRECAUTIONS TO BE TAKEN IN HANDLING & STORAGE: Refer to note in Section II regarding cristobalite in "after service" dust.

SECTION VIII - CONTROL MEASURES

RESPIRATORY PROTECTION: If dust concentration exceeds 1 fiber/cc or "after service" crystalline silica exceeds 0.05 mg/m^3 use a NIOSH / MSHA respirator as outlined in the following description of the minimum acceptable respirator type for different concentrations (8 hour TWA):

0 - 1 fiber/cc
Optional disposable dust respirator (e.g. 3M 9970 or equivalent)

Up to 5 fibers/cc or up to 10X the OSHA PEL for cristobalite
Half-face, air purifying respirator equipped with high efficiency particulate air (HEPA) filter cartridges (e.g. 3M 6000 series or equivalent)

Up to 25 fibers/cc or 50X the OSHA PEL for cristobalite (2.5 mg/m³)
Full face, air purifying respirator with high efficiency particulate air (HEPA) filter cartridges (e.g. 3M 7800 with 7255 filters or equivalent) or powered air purifying respirator (PAPR) equipped with HEPA filter cartridges (e.g. 3M W3265S with W 3267 filters or equivalent)

>25 fibers/cc or 50X the OSHA PEL for cristobalite (2.5 mg/m³)
Full face, positive pressure supplied air respirator (e.g. 3M 7800 with W9435 hose and W3196 regulator connected to clean air supply or equivalent)

Insulation surfaces should be lightly sprayed with water before removal to suppress airborne dust. As water evaporates during removal, additional water should be sprayed on surfaces as needed. Only enough water should be sprayed to suppress dust so that water does not run onto the floor of the work area. To aid the wetting process, a surfactant can be used.

After refractory ceramic fiber removal is completed, dust suppressing cleaning methods such as wet sweeping or vacuuming, should be used to clean the work area. If dry vacuuming is used, the vacuum must be equipped with a HEPA filter. Air blowing or dry sweeping should not be used. Dust suppressing components can be used to clean up light dust.

If airborne fiber of cristobalite concentrations are not known, as a minimum protection, use properly fitted half face, tight fitting, air purifying respirator with HEPA filter cartridges.

LOCAL EXHAUST: Use if necessary to keep dust level below PEL / TLV especially if cutting, filing, sanding or machining.

MECHANICAL (GENERAL): Usually adequate.

PROTECTIVE GLOVES: Recommended as required to prevent skin irritation.

EYE PROTECTION: Goggles or safety glasses with side shields. Do not wear contact lenses.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Long sleeved and long legged, loose fitting clothing should be worn to prevent skin contact with fibers.

WORK & HYGIENIC PRACTICES: Wash work clothes separately from other clothing. Rinse washer thoroughly.

DISCLAIMER