IN THE CIRCUIT COURT
FOR THE THIRD JUDICIAL CIRCUIT
MADISON COUNTY, ILLINOIS

RECEIVED
SEP 15 1987

In Re: Asbestos Litigation regarding Cases filed by Schooley.	)	No. 86-L-1726 through No. 86-L-2458

NOTICE OF COMPLIANCE

COMES NOW defendant North American Refractories Company, by and through its attorneys, Coburn, Croft & Putzell, and for its Notice of Compliance hereby certifies that is has produced to the offices of Bono, Haine & Schooley copies of the following documents in response to plaintiffs' Request to Produce:

1. See sales records attached to this defendant's answers to interrogatories as Exhibit D.

2. See sales records attached to this defendant's answers to interrogatories as Exhibit D.

3. See Exhibit A attached to this defendant's answers to interrogatories.

4. Production not required by court order.

5. Copies of sample sales catalogs and sales brochures are produced as Exhibit E.

6. This defendant is unable to locate any such records.

7. This defendant has no such records concerning the use of its products as sold or distributed to the customers set forth in request for production 1 and 2 since this defendant

PLAINTIFF'S EXHIBIT NAR-1

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had no reason to believe that there were health hazards associated with the proper use of its products because of the small percentage component of asbestos usually used in wet or encapsulated form. General instructions were available to its customers regarding the application of its products, but none specifically involving the use of asbestos-containing products. See Exhibit F with respect to its Stazon and Unicote products.

8. See Exhibit B attached to this defendant's answers to interrogatories which includes documents received from the Refractories Institute concerning the potential health effects of asbestos. This defendant had no reason to believe that any such potential health effects existed with respect to its products because of their very small asbestos content primarily in encapsulated or wet form. This defendant is unable to locate any such records from I.H.F. or Iron and Steel Institute.

9. This defendant has no such records with respect to its asbestos containing products.

10. No such tests were done, funded or participated in by this defendant since this defendant had no reason to believe there were any adverse health effects associated with the use of its small line of asbestos-containing products which contained very small amounts of asbestos in encapsulated or wet form.

11. There are no such claims or records as limited by court order.

12. This defendant has been unable to locate any such records.

North American Refractories Company's Notice of Compliance with Plaintiffs' Request to Produce in Madison Count... Published by AsbestosClaims.Law
ACL Doc 21537 · Page 2 of 55 asbestosclaims.law/library/21537/2

13. Production not required by court order.

14. Production not required by court order.

15. Production not required by court order.

16. See Exhibit F with respect to the asbestos warnings provided by Eagle-Picher for this defendant's relabeled Stazon and Unicote which products were discontinued by 1971. This defendant had no reason to believe its own small line of asbestos-containing products presented any potential health hazards if properly used because of the very small percentage component of asbestos and the primarily wet or encapsulated form of the product and therefore no warnings were provided or believed necessary.

17. There are no such records.

18. There are no such records.

19. This defendant had no environmental control department manuals.

20. This defendant has no such records as limited by court order.

COBURN, CROFT & PUTZELL

By: Kenneth R. Heineman

Kenneth R. Heineman
One Mercantile Center
Suite 2900
St. Louis, Missouri 63101
(314) 621-8575

Attorneys for Defendant
North American Refractories Company

A complete line of
BASIC PRODUCTS for the ferrous,
non-ferrous, glass, cement
and lime industries

BULLETIN 133



BASIC REFRACTORIES

MAGNESITE - CHROME

brick and specials

ARCO

EXHIBIT
E

North American Refractories Company

CLEVELAND, OHIO 44114

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NARCO SATISFIES INDUS

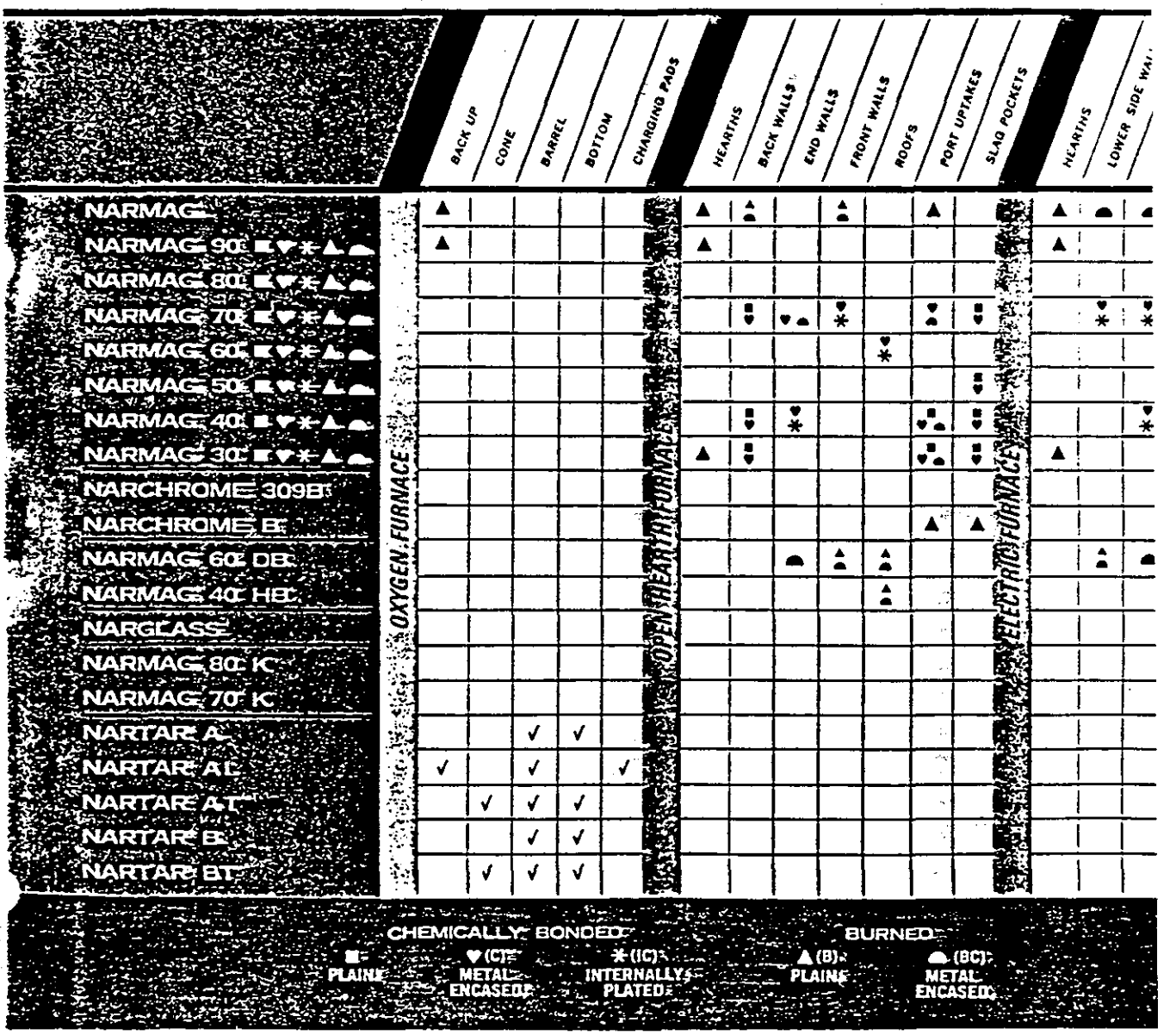


Technical advancement is moving fastest in products kno
generically as *basic* refractories. NARCO brands made fr
varied proportions of chrome ore, magnesite (MgO) or dolom
are earning high regard in every industry where the basic br
have been put to the test in critical service situations.

The performance of NARCO BASIC REFRACTORIES me
your expectations because every shipment reflects thorou
research, laboratory control of batch formulations, ultramod
manufacturing facilities, and pride in good workmanship.

The raw materials of NARCO BASIC REFRACTORIES
selected Philippine and Transvaal chrome ores, highest pur
seawater periclase (MgO) clinker, and chemical bonding age
free from silica, lime or other deleterious factors.

Precise grain sizing and maximum forming pressures c
tribute to the outstanding hot load strength of NARMAG bri
Extreme density of this series is the best defense against fur



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I D BASIC NEEDS

and slag attack. NARCO actually delivers more refractory (by weight) per dollar!

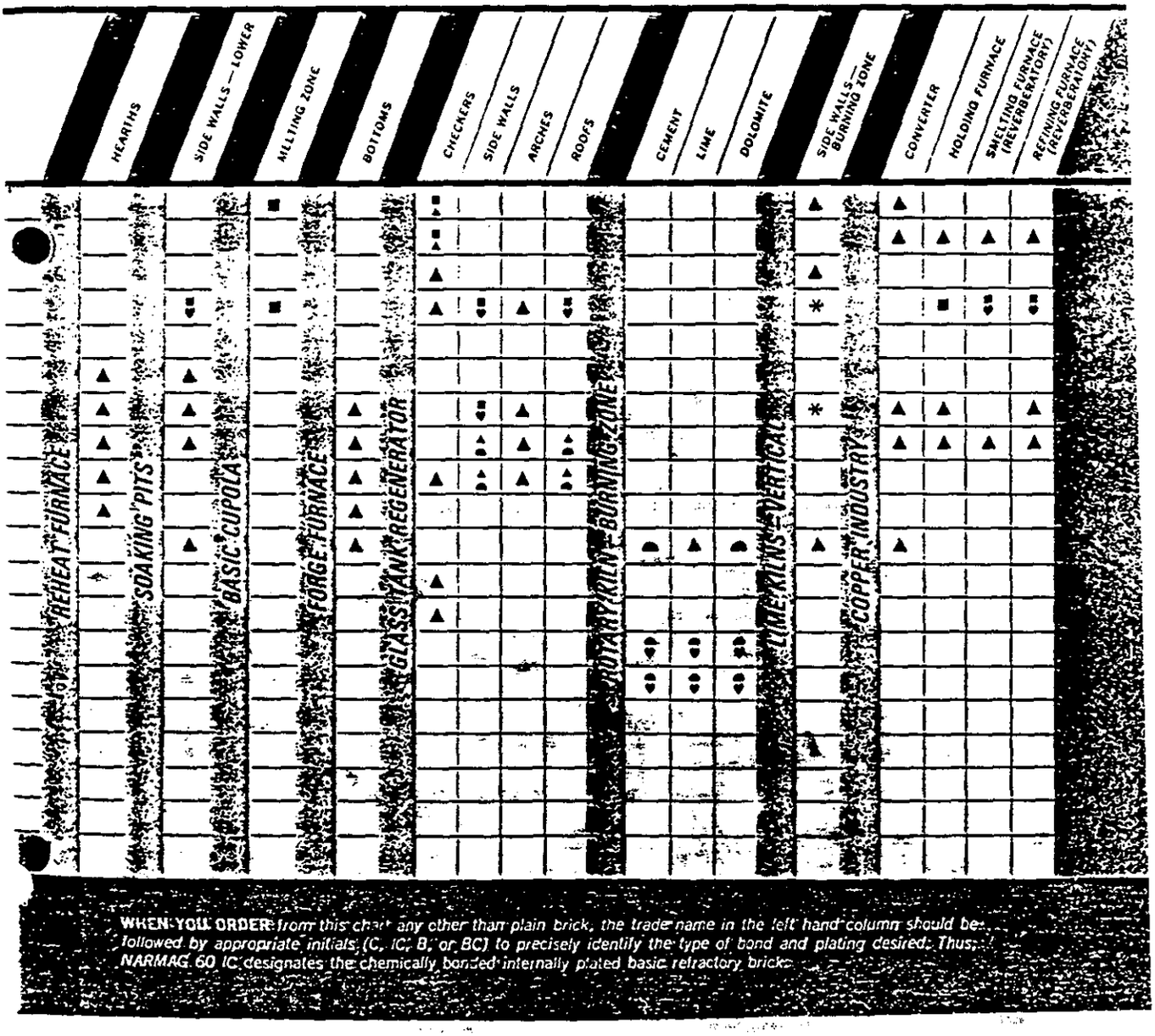
In NARMAG DIRECT BONDED BASIC BRICK, the ideal bond of periclase to chrome ore without any silicate film is achieved. Direct attachment of grains produces a new integrity of microstructure from surface to deepest interior of the brick. Static firing technique, exclusive with NARCO, is used to achieve uniform high temperature heat treatment in a motionless setting.

NARTAR BASIC REFRACTORIES are specifically matched to the wear areas of the basic oxygen furnace working lining. These are tar-bonded varieties developed to meet the "earthquake-tornado-volcano" conditions that come with each metal charge and input of oxygen. Magnesite and dolomite are bonded with pitch, and supplied unburned or tempered. The brand NARTAR A I is given a special firing - BEFORE being impregnated with pitch.



NARMAG chemically bonded 95% MgO brick in top courses of a checker setting resist high temperature cycling, oxidation-reduction atmospheres, and severe batch carry-over.

The chart below is helpful in selecting NARCO BASIC REFRACTORIES for satisfactory performance in the areas designated. Service engineers are always prepared to answer questions on applications which may have new aspects. We invite your inquiries.

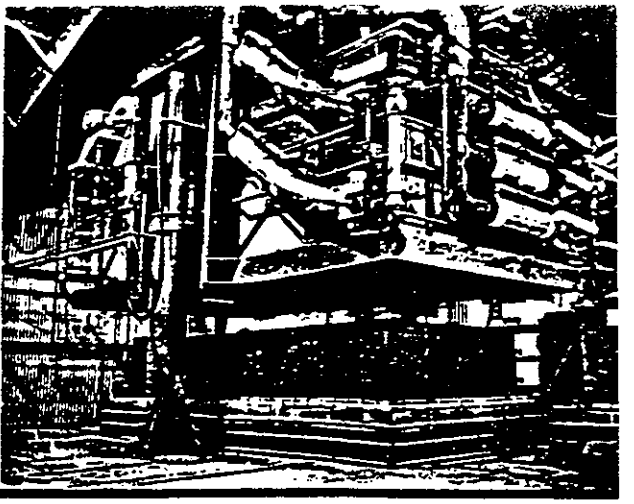


WHEN YOU ORDER from this chart any other than plain brick, the trade name in the left hand column should be followed by appropriate initials, (C, IC, B, or BC) to precisely identify the type of bond and plating desired. Thus: NARMAG 60 IC designates the chemically bonded internally plated basic refractory brick.

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STATIC FIRING ASSURES THE ULTIMATE BOND

A battery of bell-type kilns is now operating at NARCO's plant in Womelsdorf, Pa. Each kiln processes a carload of brick with no possibility of vibration to disturb compacted grains while direct bonding is under way. The bell kiln is unequalled for precise control of sustained high temperature heat treatment. Static-fired NARCO DIRECT BONDED BASIC BRICK have high strength at elevated temperatures, ultimate hot load-bearing abilities, low porosity, and the volume stability for today's furnace conditions.



Narco Specialties with Basic Properties

NARCHROME MORTAR Heat-Set, with chrome ore base is furnished dry to be mixed with water for trowel joints, patching, or spray coating. Highly refractory with maximum resistance to basic and ferrous slags.

NARCHROME MORTAR Air-Set, mixes to consistency desired for laying or coating all basic brick as well as clay and high alumina brick. Defies highly corrosive slags or oxides. Strong air-bond holds until ceramic bond develops at high heat.

NARMAG MORTAR contains over 95% MgO in a dry, finely ground heat-setting periclase formulation. Designed for use with high purity basic brick (NARMAG B) and other NARCO basic types. Affords resistance to heat, chemicals, erosion. Easily prepared for troweling or dipping.

NARCHROME CASTABLE REFRACTORY mixes and pours like concrete. This is a chrome ore base, hydraulic setting material for service to 3000°F. Excellent resistance to chemical attack by fluxes, basic slags, iron oxide slags, and molten metals. Useful in patching walls and floors of NARCHROME PLASTIC.

NARCHROME PLASTIC REFRACTORY comes ready to ram into place in walls and bottoms of furnaces, boilers, etc. Develops hard, strong monolith upon drying, even greater strength when heated. Neutral chrome body is highly resistant to most slags and mechanical abrasion.

NARMAG CM-18 GUN MIX is a straight chrome ore material, air-setting, for application with dry type nozzle mix equipment. Widely used as lining material for open hearth doors, runners, and veneering walls, hot or cold. Also used around boiler tubes and headers, and forge or reheating furnace bottoms.

NARMAG MC GUN MIX is an air-setting magnesite-chrome (approximately 70% MgO) material especially adaptable for hot application with dry type nozzle mix guns. May also be used as a ramming mix, closely related to NARMAG 70 brick. Useful in maintenance of open hearth furnace walls, hot metal mixer linings, soaking pit slag lines, etc.

NARMAG CM GUN MIX (approximately 40% MgO) is an air-setting chrome-magnesite product similar to NARMAG 40 basic brick. Method of application and uses similar to MC Mix but for conditions where 40% MgO is adequate—including lining open hearth runners.

NARCOAT C is a specially developed basic spray material for maintaining open hearth roofs. Gunned hot or cold with Narcoater slurry type gun, NARCOAT C extends life of suspended brick work, minimizes downtime, saves labor, protects against emergency shutdowns.

NARMAG CLINKER is 100% periclase grain, sized between 4 and 35 mesh. Spread loosely as a refractory bed, NARMAG CLINKER absorbs slag and scale. Crust that forms is easily removed from bottoms of slag-tap boilers, continuous pipe-welding furnaces, between skids of reheat furnaces, etc.

NARTAR RAM is a basic tar ramming mix closely related to NARTAR BRICK, made especially for use between the working lining and the back-up lining in oxygen vessels. NARTAR RAM, ready-to-use, is the preferred filler for voids or irregularities behind the working lining in BOF's.

FOR SPECIFIC INSTALLATIONS, *you may obtain the fullest information from our Technical Bulletins or consultation with experienced Service Engineers. All NARCO advisors are alert to current developments which point toward economies in heat enclosure installations. They can help you select THE EXACT REFRACTORY for most efficient and consistent control of thermal, mechanical, and chemical variants recognized as typical or unique in your processing.*

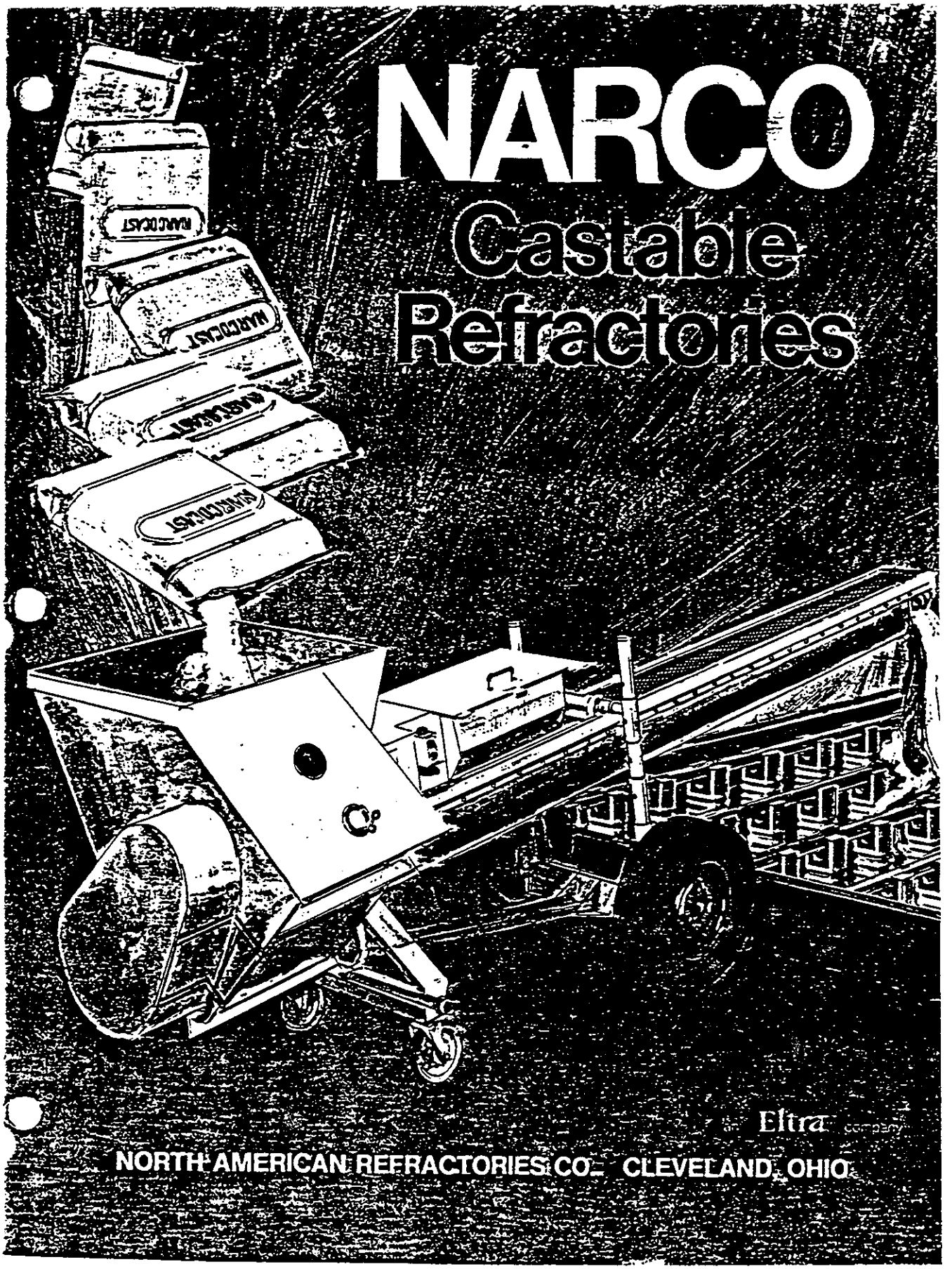
NARCO

NORTH AMERICAN REFRACTORIES COMPANY

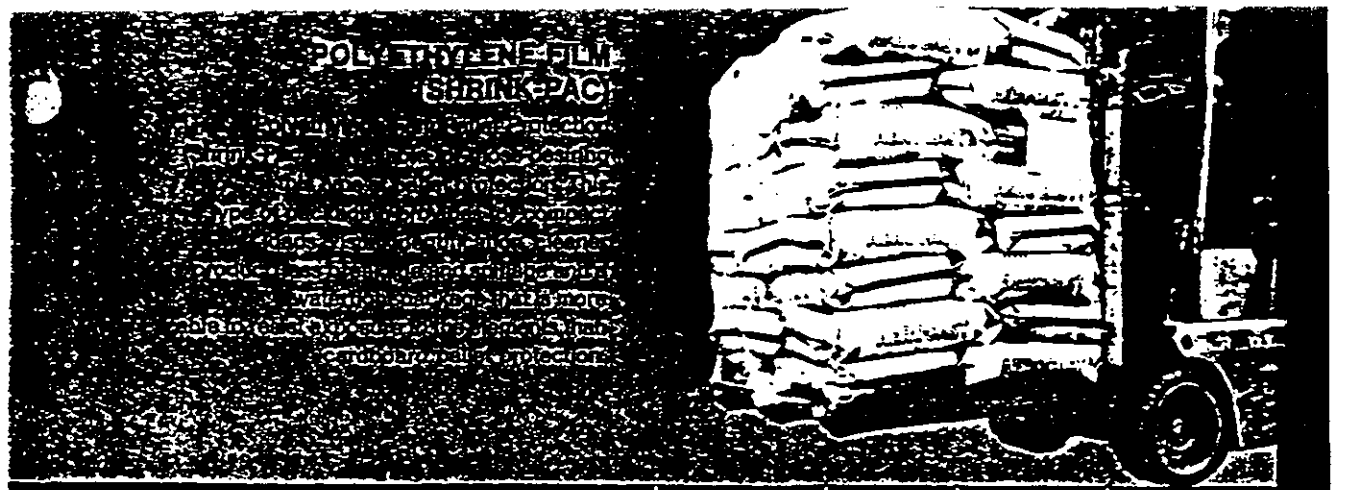
General Offices—Cleveland, Ohio 44114

District Sales Offices: BUFFALO, NEW YORK; CHICAGO, ILLINOIS; CINCINNATI, OHIO; DETROIT, MICHIGAN; HOT SPRINGS, ARKANSAS; NEW YORK, NEW YORK; PHILADELPHIA, PENNSYLVANIA; PITTSBURGH, PENNSYLVANIA

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PRODUCT	TYPE	SERVICE LIMIT °F.	INSTALLED DENSITY* LBS. PER CU. FT.	STANDARD CONTAINER
LOW-K	Insulating Fireclay	2000	63	50 Lb. Bags
NARCOCRETE	Semi-Insulating Fireclay	2450	78	100 Lb. Bags
NARCHROME	Chrome Ore	3000	159	100 Lb. Bags

AEROCAST L, LOW-K, and NARCOCRETE Insulating Castables may be gun-placed.

Pneumatic Gun-Placed Castables

NARCOGUN AR	Abr. Res. Fireclay	1200	114	100 Lb. Bags
NARCOCAST E.S. GUN	Extra Strength Fireclay	2400	127	100 Lb. Bags
NARCOCAST GUN	Fireclay	2600	127	100 Lb. Bags
SUPER NARCOCAST GUN	Fireclay	2800	131	100 Lb. Bags
NARCOGUN 28	Fireclay	2800	123	100 Lb. Bags
NARCO B.F. CASTABLE	Fireclay	3000	132	100 Lb. Bags
NARCOCAST 32 GUN	Hi-Alumina	3200	145	100 Lb. Bags
GUNCRETE	Abr. Res. Fireclay	2400	119	100 Lb. Bags
NARCOLITE GUN	Insulating Fireclay	2000	65	50 Lb. Bags

*Fireclay and Hi-Alumina Gun-Placed Castables are also available in bulk containers.

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SUPER NARCOCAST

SUPER NARCOCAST is a special super duty castable for use up to 2800°F. where operating conditions are beyond the limits of standard castables. It is composed of a balanced blend of super duty fireclay and is bonded by a high purity calcium-aluminate cement. The important characteristics of low iron content, excellent volume stability and high refractoriness commend its use where the requirements are more severe than usual at the higher temperature limit. It is recommended for new monolithic construction, patching of all types of furnace linings, soaking pit covers, burner blocks, combustion chambers, door linings and incinerators.



HIGH ALUMINA

NARCOCAST 30

NARCOCAST 30 is a 3000°F. high purity, low iron castable consisting of super duty calcined fireclays carefully combined with plasticizers and hydraulic binders. It possesses unusual volume stability and high bulk density. As added outstanding properties, it has high strength through its complete temperature range, with special emphasis on the intermediate temperature zone and better resistance to spalling. It has also been designed to withstand the effects of high sulphur fuels, reducing and hydrogen atmospheres, fluctuating temperatures, erosion and abrasion. Recommended uses are for new monolithic construction, patching in forge furnaces, billet and slab heating furnaces, burner blocks, car tops, soaking pit covers, non-ferrous melting furnaces, crucible furnaces, ladles and others.

NARCOCAST 60

NARCOCAST 60 is a hydraulic-setting, high alumina low iron 3100°F. castable. The important characteristic of this material is its outstanding spalling resistance. The high alumina content of NARCOCAST 60 assures maximum resistance to vitrification as well as increased density. These properties in addition to compatibility with various furnace atmospheres assure long service under many severe operating conditions.

NARCOCAST 32

NARCOCAST 32 is a high alumina castable suitable for service up to 3200°F. NARCOCAST 32 possesses good volume stability and resistance to vitrification and spalling. Its composition provides excellent resistance to iron oxide scale attack, furnace fumes and atmospheres. NARCOCAST 32 is available in 100 lb. moisture-resistant bags.

LOW-K

LOW-K is a lightweight hydraulic-setting castable for use to 2000 F. It was designed to provide an additional margin of strength without impairing its insulating properties. Load conditions, as found in furnace foundations and hearths, are often too great for conventional insulating castables. LOW-K provides a structural sound protective heat barrier to meet these conditions and other applications requiring additional strength. LOW-K is supplied in 50 lb. bags and requires only 63 pounds of material per cubic foot of construction.

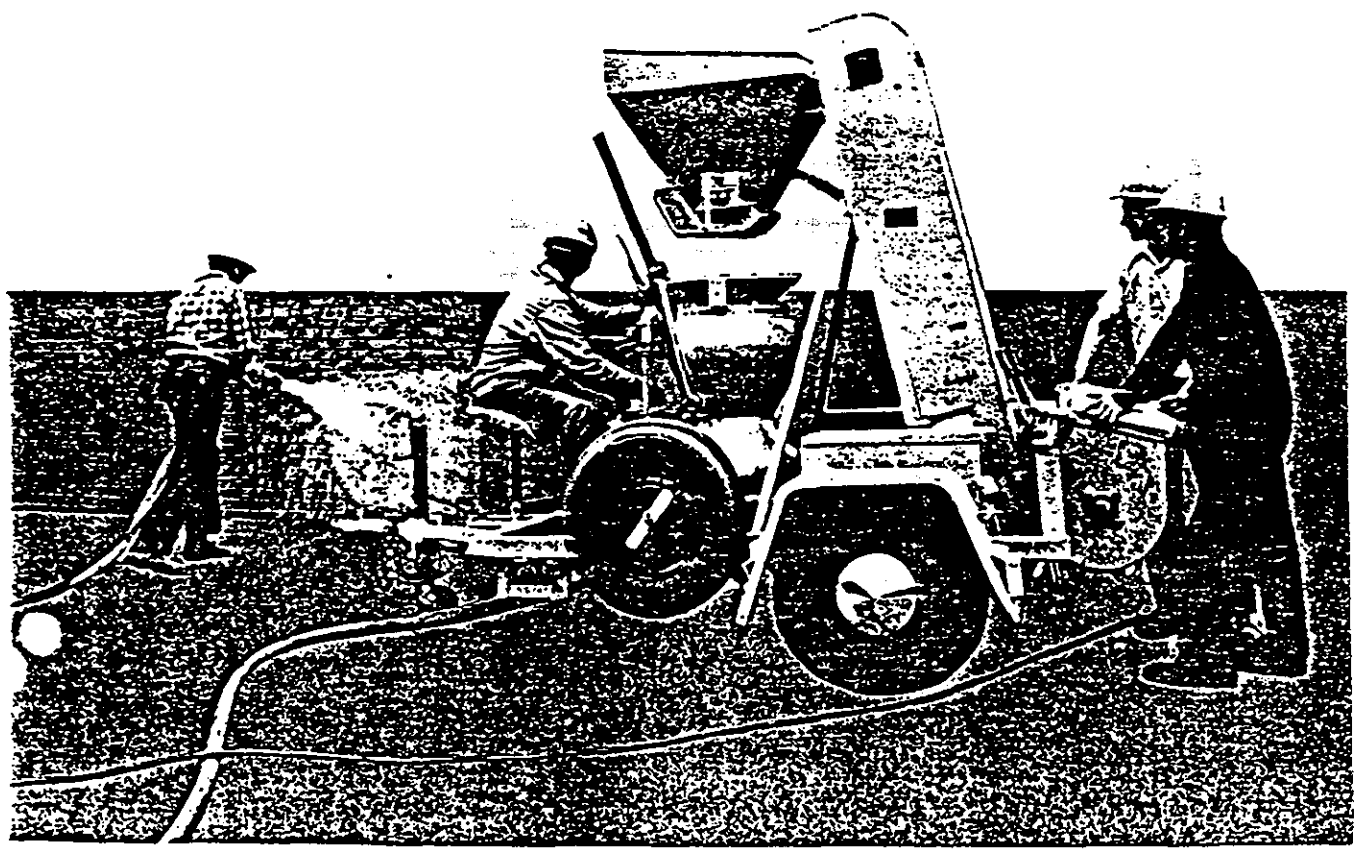
NARCOCRETE

NARCOCRETE is an insulating, hydraulic-setting castable that combines low density and abrasion resistance with refractoriness. It is suitable for use at temperatures up to 2450°F. and is shipped in 100 pound moisture-resistant bags requiring 85 pounds of material per cubic foot of construction.

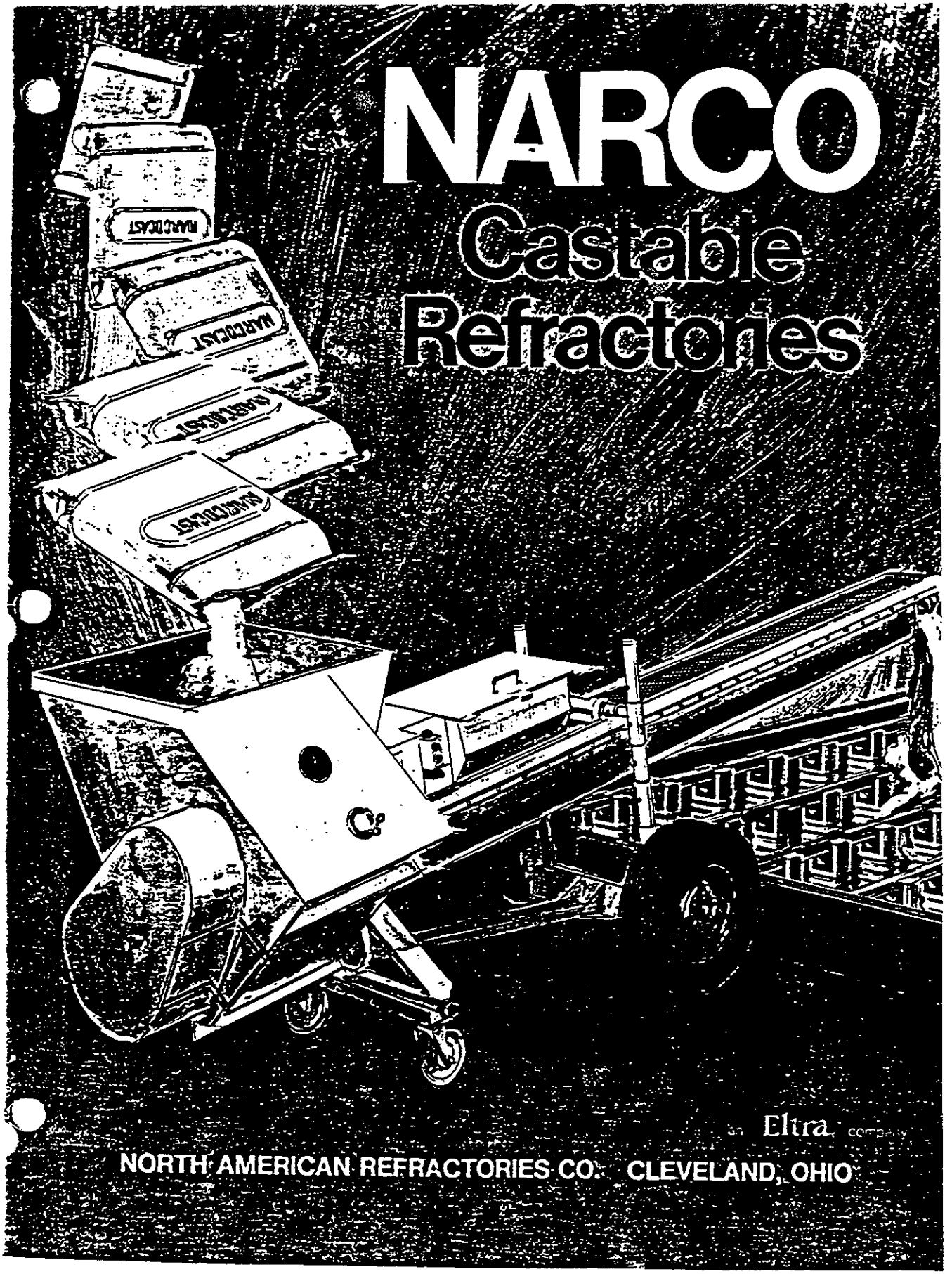
BASIC

NARCHROME CASTABLE

NARCHROME CASTABLE REFRACTORY is a chrome ore base, hydraulic-setting material which is recommended for temperatures up to 3000°F. To use, mix with clean water to the desired consistency and then pour like concrete. It has excellent resistance to chemical attack by fluxes, basic slags and molten metals. It may be used for walls and floors of water-cooled boiler furnaces and lower walls and hearths of heating furnaces where high iron oxide slags normally cause severe erosion and abrasion. NARCHROME CASTABLE is supplied dry in 100 pound bags and approximately 168 pounds of material is required to cast one cubic foot of lining.



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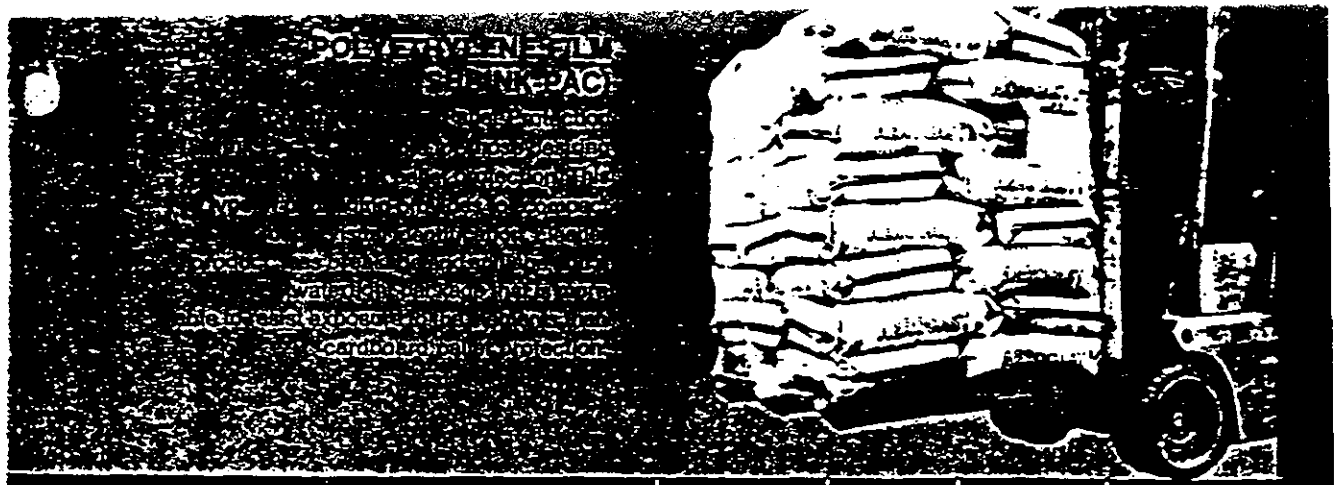
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NARCO FIRECLAY HI-ALUMINA INSULATING BASIC CASTABLES

PRODUCT	TYPE	SERVICE LIMIT °F.	INSTALLED DENSITY LBS. PER CU. FT.	STANDARD CONTAINER*
NARCON	Fireclay	2200	117	100 Lb. Bags
NARCOCAST E.S.	Extra Strength Fireclay	2400	121	100 Lb. Bags
NARCOCAST E.S. (FINE)	Extra Strength Fireclay	2400	114	100 Lb. Bags
NARCOCAST E.S. (COARSE)	Extra Strength Fireclay	2400	127	100 Lb. Bags
NARCOHEARTH E.S. (COARSE)	Extra Strength Fireclay	2350	125	100 Lb. Bags
NARCOCAST	Fireclay	2600	118	100 Lb. Bags
NARCOHEARTH	Fireclay	2600	112	100 Lb. Bags
SUPER NARCOCAST	Fireclay	2800	128	100 Lb. Bags
NARCOCAST 30	Hi-Alumina	3000	140	100 Lb. Bags
NARCOCAST 60	Hi-Alumina	3100	145	100 Lb. Bags
NARCOCAST 32	Hi-Alumina	3200	138	100 Lb. Bags
NARCOTAB	Hi-Alumina	3400	160	100 Lb. Bags
ANTI-ERODE	Hi-Alumina (Abr. Res.)	2500	127	100 Lb. Bags
AEROCAST L	Insulating Fireclay	1800	46	50 Lb. Bags
NARCOLITE	Insulating Fireclay	2000	54	50 Lb. Bags

*The Fireclay and Hi-Alumina Castables are also available in bulk containers.

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PRODUCT	TYPE	SERVICE LIMIT °F.	INSTALLED DENSITY LBS. PER CU. FT.	STANDARD CONTAINER*
LOW-K	Insulating Fireclay	2000	63	50 Lb. Bags
NARCOCRETE	Semi-Insulating Fireclay	2450	78	100 Lb. Bags
NARCHROME	Chrome Ore	3000	159	100 Lb. Bags

AEROCAST E, LOW-K, and NARCOCRETE Insulating Castables may be gun-placed.

Pneumatic Gun-Placed Castables

NARCOGUN AR	Abr. Res. Fireclay	1200	114	100 Lb. Bags
NARCOCAST E.S. GUN	Extra Strength Fireclay	2400	127	100 Lb. Bags
NARCOCAST GUN	Fireclay	2600	127	100 Lb. Bags
SUPER NARCOCAST GUN	Fireclay	2800	131	100 Lb. Bags
NARCOGUN 28	Fireclay	2800	123	100 Lb. Bags
NARCO B.F. CASTABLE	Fireclay	3000	132	100 Lb. Bags
NARCOCAST 32 GUN	Hi-Alumina	3200	145	100 Lb. Bags
GUNCRETE	Abr. Res. Fireclay	2400		100 Lb. Bags
NARCOLITE GUN	Insulating Fireclay	2000	65	50 Lb. Bags

*Fireclay and Hi-Alumina Gun-Placed Castables are also available in bulk containers.

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FIRECLAY

NARCON

NARCON is an economical durable castable recommended for poured monolithic structures at all temperatures up to 2200°F. It has good strength and abrasion resistance and is well adapted for use as a paving material around industrial furnaces, aluminum melting pots, boilers and incinerators where the floor must withstand heat and mechanical abuse.

NARCOCAST E.S.

The NARCOCAST E.S. SERIES is specifically designed for applications which require high mechanical strength and abrasion resistance. Maximum recommended temperature is 2400°F. To meet the wide range of conditions encountered in this temperature zone, NARCOCAST EXTRA STRENGTH is available in three grain sizings. Medium grain size *NARCOCAST E.S.* is designed for most general applications, and provides a dense structure to resist slagging and abrasive action. *NARCOCAST E.S. FINE* lends itself for use in casting baffles, thin sections and trowelling applications. *NARCOCAST E.S. COARSE* is designed for casting heavy or thick sections where toughness and spalling resistance is required. NARCOCAST E.S. Series is used with excellent results in boiler furnace ash pits, piers, annealing furnace car tops, tunnel kiln car areas, feed end of limestone kilns and rotary kilns, cupola charging zone and general abrasive areas up to a temperature limit of 2400°F.

NARCOHEARTH E.S.—COARSE

NARCOHEARTH E.S. COARSE was developed for heavy, massive construction in furnace walls, arches, car tops and hearths where high compression strength, resistance to abrasion and thermal shock are important. It is also well adapted for use in the charge area of rotary lime and cement kilns.

NARCOCAST

NARCOCAST is an excellent general purpose material for casting new construction or repair work at operating temperatures up to 2600°F. It is a low iron, high purity hydraulic-setting castable with a fireclay base that permits preparation of needed consistency for pouring or tamping —simply by adding water and mixing. It develops good load bearing strength hydraulically without application of heat. NARCOCAST provides an economical means of forming monolithic and intricate furnace linings, thereby eliminating the necessity of maintaining an inventory of expensive shapes. It is used in boiler arches, walls, door linings, flues, baffles, heat treating furnaces, car tops substructures and special shapes.

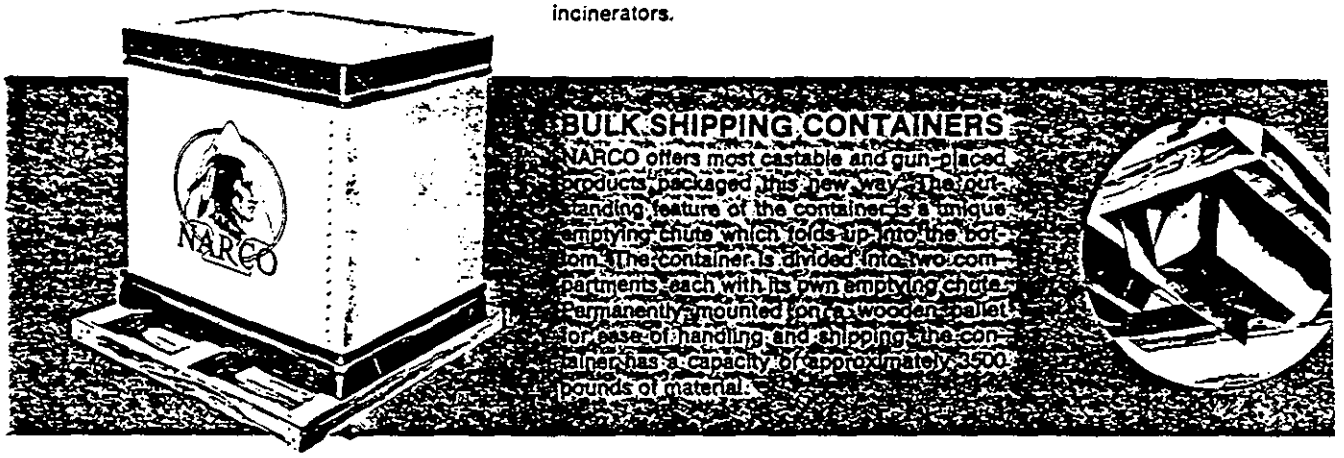
NARCOHEARTH

NARCOHEARTH is a castable similar to NARCOCAST, but possessing a slightly higher iron content. It is also suitable for a wide variety of applications where operating temperatures do not exceed 2600°F., such as boiler arches, walls, door linings, flues, baffles, heat treating furnaces, car tops substructures and special shapes.

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SUPER NARCOCAST

SUPER NARCOCAST is a special super duty castable for use up to 2800°F. where operating conditions are beyond the limits of standard castables. It is composed of a balanced blend of super duty fireclay and is bonded by a high purity calcium-aluminate cement. The important characteristics of low iron content, excellent volume stability and high refractoriness commend its use where the requirements are more severe than usual at the higher temperature limit. It is recommended for new monolithic construction, patching of all types of furnace linings, soaking pit covers, burner blocks, combustion chambers, door linings and incinerators.



BULK SHIPPING CONTAINERS

NARCO offers most castable and gun-placed products packaged this new way. The outstanding feature of the container is a unique emptying chute which folds up into the bottom. The container is divided into two compartments each with its own emptying chute. Permanently mounted on a wooden pallet for ease of handling and shipping the container has a capacity of approximately 3500 pounds of material.

HIGH ALUMINA

NARCOCAST 30

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NARCOCAST 32

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LOW-K

LOW-K is a lightweight hydraulic-setting castable for use to 2000°F. It was designed to provide an additional margin of strength without impairing its insulating properties. Load conditions, as found in furnace foundations and hearths, are often too great for conventional insulating castables. LOW-K provides a structural sound protective heat barrier to meet these conditions and other applications requiring additional strength. LOW-K is supplied in 50 lb. bags and requires only 63 pounds of material per cubic foot of construction.

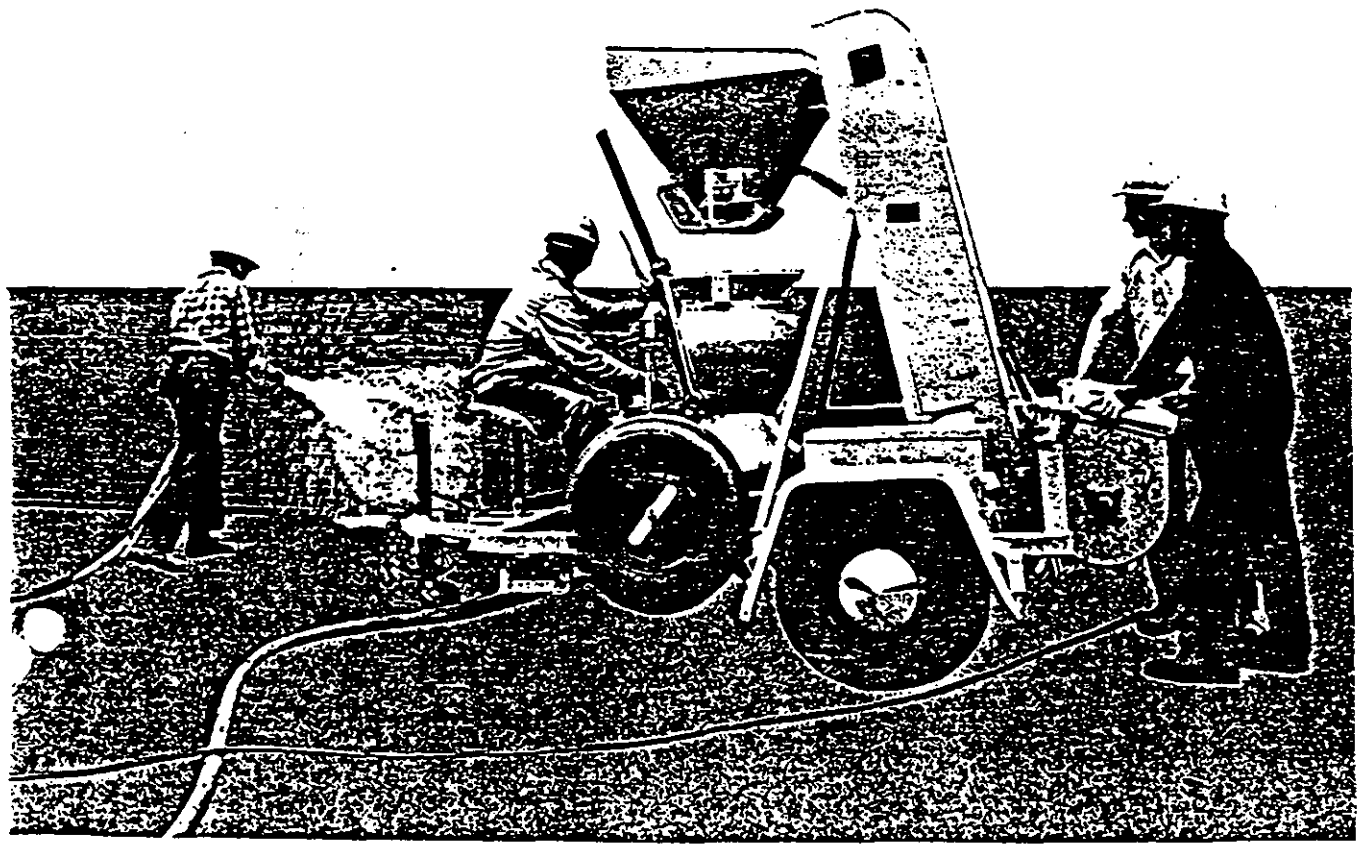
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BASIC

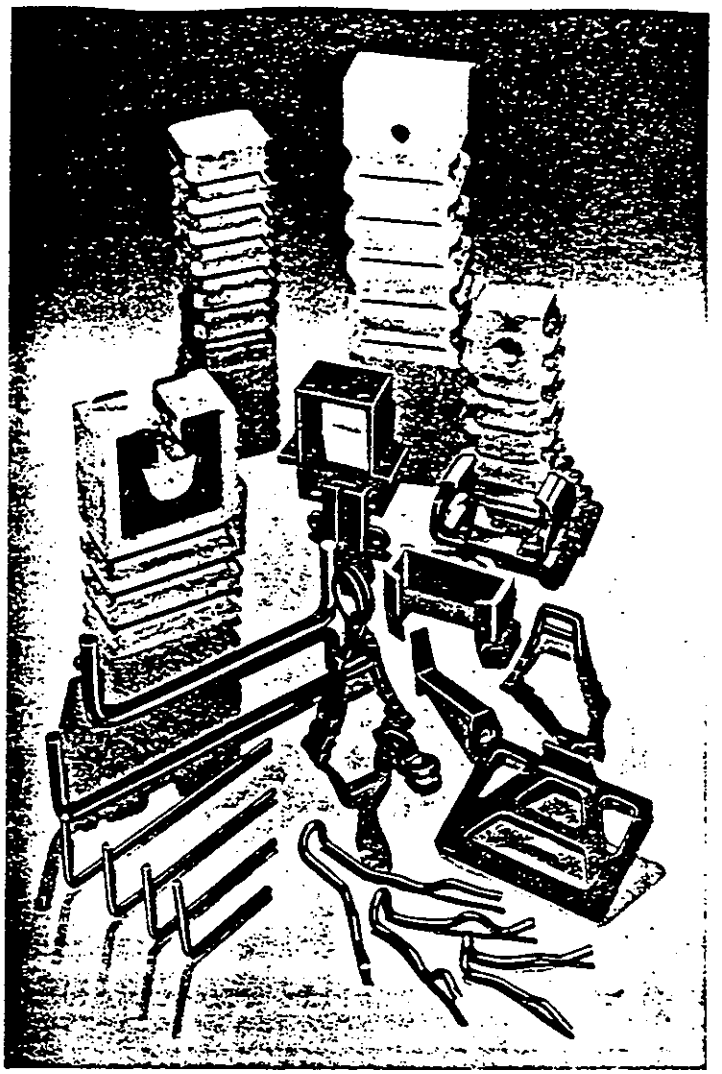
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NARCO ANCHORS AND HANGERS



For successful anchorage or suspension of plastic or castable refractories in any monolithic construction, these ruggedly designed high alloy metal anchors and refractory anchors are available. NARCO has various types in a full range of sizes for use wherever positive anchorage and full flexibility are needed. Engineering layouts and detailed anchor arrangements will be furnished on request.



North American Refractories Co.

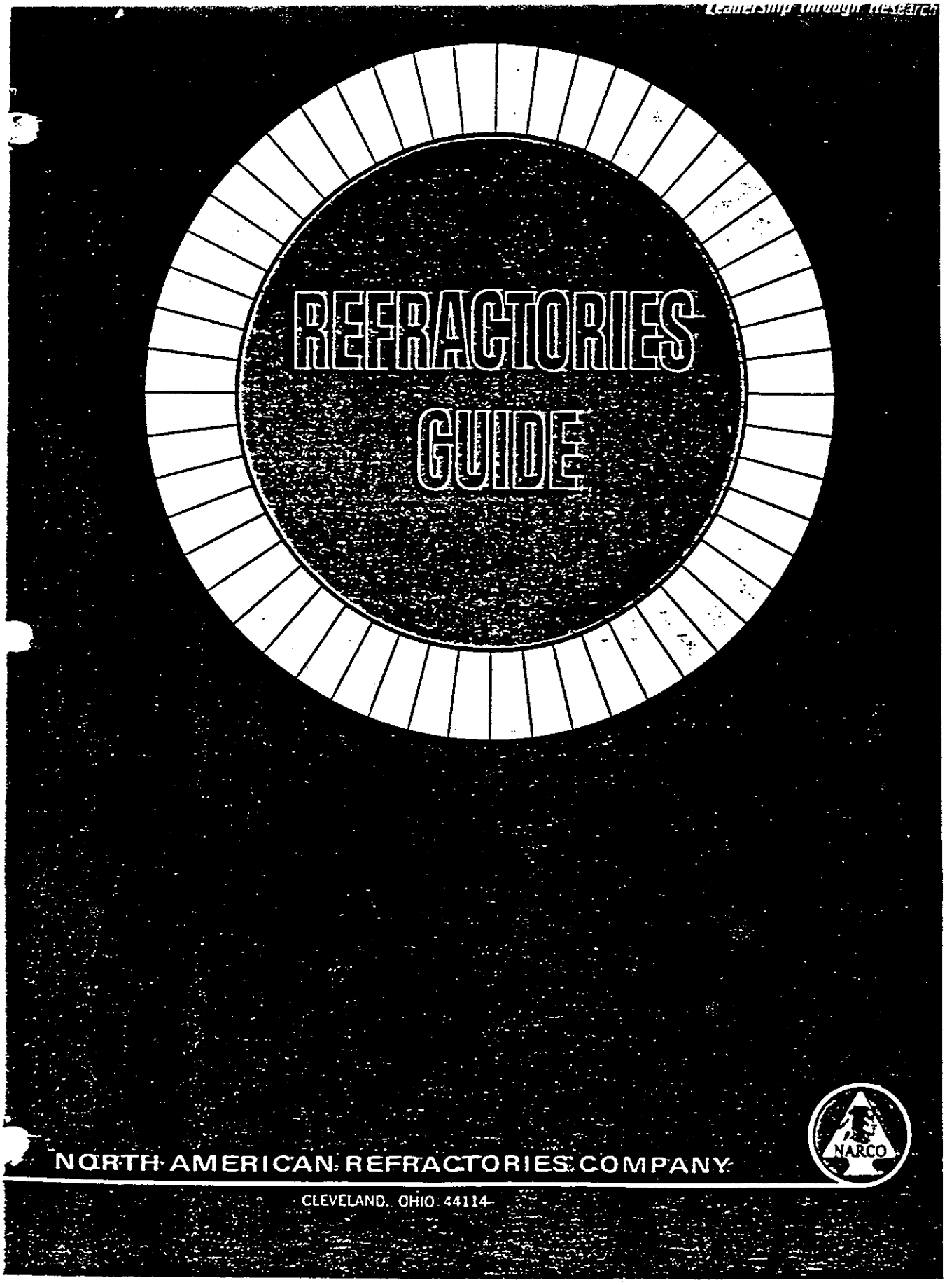
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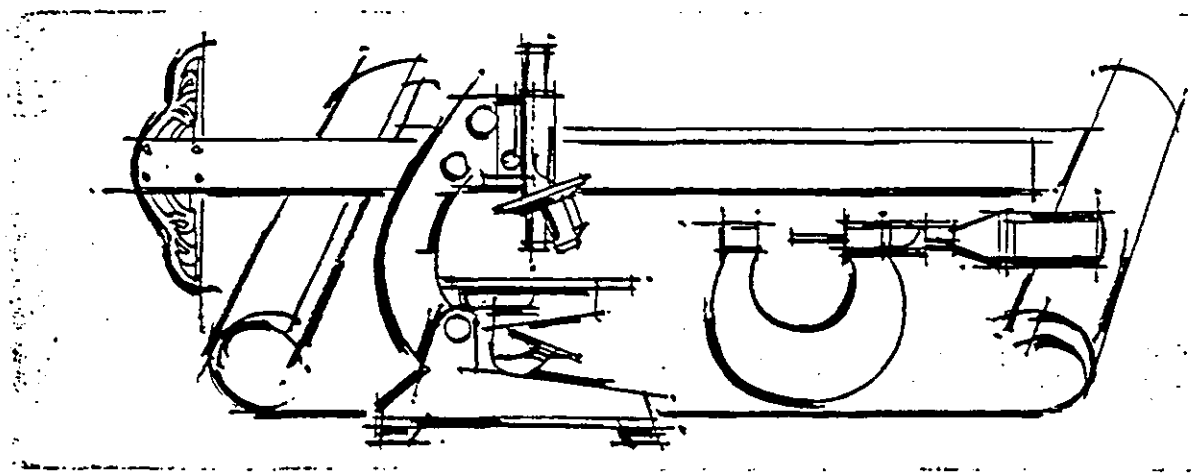
NARCO...

progress in refractory products

through research

engineering

experience



This is a guide to NARCO Refractory products. Every product listed here is a result of NARCO dedication to research, engineering, quality control. And experience.

We're specialists at NARCO. Specialists in developing and producing ultra quality refractory products from the finest raw materials available anywhere in the world. Specialists in developing the precision manufacturing processes that take maximum advantage of these materials in refractory products designed to perform to your specifications.

NARCO's years-ahead research facility sets the pace for progress. Studying, testing, challenging yesterday's outstanding refractory performance to make way for today's greatly improved NARCO products. Creating the methods that precisely control the quality of every NARCO product.

Research, Engineering, Service, Quality Control. Standing behind these NARCO products to meet, and exceed, your exacting refractory requirements.

NORTH AMERICAN REFRACTORIES COMPANY

GENERAL OFFICES, CLEVELAND, OHIO 44114

IN CANADA — NORTH AMERICAN REFRACTORIES, LTD., HAMILTON, ONT.

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NARCO

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FIRECLAY BRICK — SUPER DUTY SERVICE

PRODUCT	A. S. T. M. CLASSIFICATION & TYPE	PROCESS	P. C. E.	USES
KENTUCKY QUALITY — IRONTON, OHIO				
IRONTON S	Super Duty Regular	Dry Press	33-34 (3187° F)	General super duty service where resistance to spalling and vitrification is required. Heavy-duty boilers, incinerators, heating furnaces, ferrous and non-ferrous furnaces, cement and lime kilns.
MISSOURI QUALITY — FARBER, MISSOURI				
NARCO 68	Super Duty Spall Resistant	Dry Press	33-34 (3187° F)	General super duty service where resistance to spalling and vitrification is required. Heavy-duty boilers, incinerators, heating furnaces, ferrous and non-ferrous furnaces, cement and lime kilns.
NARCO 68N	Super Duty Spall Resistant	Dry Press	33-34 (3187° F)	For super duty service where extreme resistance to spalling is required and strength is not an important factor. Marine boilers, swing-type electric furnace roofs and similar applications.
NARCO 68 Bung	Super Duty Spall Resistant	Dry Press	33-34 (3187° F)	For malleable and air furnace roofs.
MOHAWK (High Fired)	Super Duty Slag Resistant	Dry Press	33-34 (3187° F)	For super duty service where a high fired product is required for volume stability, hot load strength, resistance to slags and carbon monoxide disintegration, as well as spalling. Complete blast furnace linings, hot metal mixers, glass tank checkers, vertical lime kilns, and rotary kilns.
ERIE	Super Duty Slag Resistant	Stiff Mud	33-34 (3187° F)	For super duty service where maximum strength and density are required for heat transfer, slagging conditions and structural stability. Checkers of all types of regenerative systems, linings for metal transfer cars and ladles.
PENNSYLVANIA QUALITY — CURWENSVILLE, PA.				
NARCO 71	Super Duty Spall Resistant	Dry Press	33-34 (3187° F)	General super duty service where resistance to spalling and vitrification is required. Heavy-duty boilers, incinerators, heating furnaces, ferrous and non-ferrous furnaces, cement and lime kilns.

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FIRECLAY BRICK — HIGH DUTY SERVICE

PRODUCT	A. S. T. M. CLASSIFICATION & TYPE	PROCESS	P. C. E.	USES
KENTUCKY QUALITY — IRONTON, OHIO				
ASHLAND BF	High Duty Blast Furnace	Stiff Mud	32-33 (3146° F)	Blast furnace linings and linings for vertical lime kilns.
ASHLAND CROWN	High Duty Slag Resistant	Stiff Mud	32-33 (3146° F)	For open hearth and glass checker service, boilers, incinerators, reheating furnaces and similar applications.
ASHLAND HIGRADE	High Duty Slag Resistant	Dry Press	32-33 (3146° F)	For general high duty service. For checker applications where a dry press product is required, boilers, incinerators, reheating furnaces of all kinds.
IRONTON	High Duty Spall Resistant	Dry Press	32-33 (3146° F)	For general high duty service. Boilers, incinerators, forging and heat treating furnaces, oil-fired furnaces, cement and lime kilns and applications where spalling is a factor.
MISSOURI QUALITY — FARBER, MISSOURI				
FARBER	High Duty Spall Resistant	Dry Press	32-33 (3146° F)	For high heat duty service where maximum strength and density are required. Checkers for all types of regenerative systems, malleable furnace sidewalls, cupolas, non-ferrous melting furnaces, blast furnace auxiliary equipment.
FARBER C	High Duty Slag Resistant	Dry Press	32-33 (3146° F)	For general checker service where the spalling resistance and dimensional tolerance of a dry press brick is required. Also for boilers, incinerators, rotary kilns, cupolas, and similar applications where slag resistance is needed.
FARBER BF	High Duty Blast Furnace	Dry Press	32-33 (3146° F)	Blast furnace linings and linings for vertical lime kilns.
FARBER SM	High Duty Slag Resistant	Stiff Mud	32-33 (3146° F)	For high heat duty service where maximum strength and density are required. Checkers for all types of regenerative systems, malleable furnace sidewalls, cupolas, non-ferrous melting furnaces, blast furnace auxiliary equipment.
OHIO QUALITY — DOVER, OHIO				
CREST	High Duty Spall Resistant	Dry Press	31½-32½ (3125° F)	For general high duty service in industrial furnaces and boilers.

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FIRECLAY BRICK — HIGH DUTY SERVICE *(Cont'd)*

PRODUCT	A. S. T. M. CLASSIFICATION & TYPE	PROCESS	P. C. E.	USES
		PENNSYLVANIA QUALITY — CURWENSVILLE, PA.		
CRESCENT	High Duty Spall Resistant	Dry Press	32-33 (3146° F)	For general high duty service. Boilers, incinerators, forging and heat treating furnaces, oil-fired furnaces, cement and lime kilns and applications where spalling is a factor.
CRESCENT C	High Duty Slag Resistant	Dry Press	32-33 (3146° F)	For general high duty service. For checker applications where a dry press product is required, boilers, incinerators, rotary kilns, vertical lime kilns, and similar applications.
CRESCENT SM	High Duty Slag Resistant	Stiff Mud	32-33 (3146° F)	For high duty service where mechanical abrasion is a factor. Cupolas, cement and lime kilns, malleable furnace sidewalls, and similar applications.

FIRECLAY BRICK — MEDIUM DUTY SERVICE

PRODUCT	A. S. T. M. CLASSIFICATION & TYPE	PROCESS	P. C. E.	USES
		KENTUCKY QUALITY — IRONTON, OHIO		
ASHCO	Medium Duty	Dry Press	30-31½ (3060° F)	For moderate temperature applications. Cooler sections of boilers, annealing and reheating furnaces operated at moderate temperatures and back-up duty.
CAVALIER	Medium Duty	Stiff Mud	30-31½ (3060° F)	For moderate temperature applications where additional strength and density are required.
		MISSOURI QUALITY — FARBER, MISSOURI		
F.F.B.	Medium Duty	Dry Press	30-31½ (3060° F)	For moderate temperature applications. Cooler sections of boilers, upper zones of cupolas, waste heat boilers, annealing and reheating furnaces operated at moderate temperatures and for back-up duty.
		OHIO QUALITY — DOVER, OHIO		
DOVER	Medium Duty	Dry Press	29-31½ (3054° F)	For moderate temperature applications. A general all around fire brick for boiler and furnace work.
DOVER SM	Medium Duty	Stiff Mud	29-31½ (3054° F)	For moderate temperature applications where additional strength and density are required.
		PENNSYLVANIA QUALITY — CURWENSVILLE, PA.		
KING	Medium Duty	Dry Press	29-31 (3040° F)	For moderate temperature applications. Cooler sections of boilers, upper zones of cupolas, waste heat boilers, annealing and reheating furnaces operated at moderate temperatures and for back-up duty.

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FIRECLAY BRICK — LOW DUTY SERVICE

PRODUCT	A. S. T. M. CLASSIFICATION & TYPE	PROCESS	P. C. E.	USES
		OHIO QUALITY — DOVER, OHIO		
BUCKEYE	Low Duty	Dry Press	26-29 (2984° F)	For low duty service. Stack and flue systems, foundations, fireplaces, kilns, and back-up purposes.
BUCKEYE SM	Low Duty	Stiff Mud	26-29 (2984° F)	For low duty applications where additional strength and density are required.
KEYSTONE	Low Duty	Dry Press	26-29 (2984° F)	For low duty service. Stack and flue systems, foundations, fireplaces, kilns, and back-up purposes.
OHIO WIRE CUTS	Low Duty	Stiff Mud — Wire Cut	20-27 (2916° F)	For paving around mills and back-up purposes.
		PENNSYLVANIA QUALITY — CURWENSVILLE, PA.		
KEYSTONE	Low Duty	Dry Press	26-29 (2984° F)	For low duty service. Stack and flue systems, foundations, fireplaces, cupolas, and back-up purposes.

HIGH ALUMINA BRICK

PRODUCT	A. S. T. M. CLASSIFICATION & TYPE	PROCESS	P. C. E.	USES
NARCAL 50	50% Alumina	Dry Press	34-35 (3225° F)	For applications requiring heat resistance superior to super duty brick. Lime kilns, top checkers in glass tanks, boilers, reheating furnace roofs, and large furnaces.
NARCAL 60	60% Alumina	Dry Press	36-37 (3293° F)	For extreme service conditions of temperature and chemical activity. Marine boilers, portland cement and vertical lime kilns, glass tank checkers and ports, reheating furnace roofs and similar applications.
NARCAL 60 N	60% Alumina Spall Resistant	Dry Press	36-37 (3293° F)	For severe service conditions requiring excellent resistance to spalling such as high temperature boilers, forge and malleable iron furnaces.
NARCAL 70	70% Alumina	Dry Press	37-38 (3321° F)	For extreme service conditions of temperature and chemical activity. Hot zones of portland cement kilns, electric furnace roofs, brass melting and lead drossing furnaces and other metal melting furnaces using basic slags.
NARCAL 70 EF	70% Alumina	Dry Press	37-38 (3321° F)	For electric furnace roof service. May be used for other high temperature applications requiring good resistance to slagging.

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HIGH ALUMINA BRICK *(Cont'd)*

PRODUCT	A. S. T. M. CLASSIFICATION & TYPE	PROCESS	P. C. E.	USES
NARCAL 80	80% Alumina	Dry Press	38-39 (3362° F)	For extreme service conditions of temperature and chemical activity. Malleable furnace bottoms, electric furnace electrode rings, hot zones of cement kilns and wherever highly basic slags must be contained at high temperatures.
NARCAL 85 B	85% Alumina	Chemically Bonded Dry Press	38-39 (3362° F)	For aluminum melting and holding furnaces. Excellent resistance to abrasion, ferrous and non-ferrous slags.
NARCAL 85 C	85% Alumina	Chemically Bonded Dry Press	38-39 (3362° F)	For aluminum melting and holding furnaces. Excellent resistance to wetting by molten aluminum. Resistant to corrosive ferrous slags.
NARCAL 90	90% Alumina	Dry Press	39-40 (3407° F)	For extreme service conditions of temperature and chemical activity. Jambs, port floors and arches, checkers of glass tanks. Aluminum melting furnaces, furnace piers, and similar applications where heavy loads or severe fluxing at high temperature are encountered.
NARCAL X	Special High Alumina	Stiff Mud	37-38 (3321° F)	For applications where service conditions are too severe for standard high alumina brick, and spalling is not a factor. Highly resistant to slagging and abrasion at elevated temperatures. For hearths of all types of heating furnaces, vertical lime kilns, boiler grate lines and severe wear areas of metal mixers and ladles.

MULLITE BRICK

PRODUCT	A. S. T. M. CLASSIFICATION & TYPE	PROCESS	P. C. E.	USES
NARMULL	Mullite	Dry Press	38-39 (3362° F)	For extreme service conditions of temperature and spalling. Has excellent volume stability and load bearing properties at high temperatures. Blast furnace stoves, furnace piers and supports.

LADLE BRICK

PRODUCT	A. S. T. M. CLASSIFICATION & TYPE	PROCESS	P. C. E.	USES
LX	Type C	Dry Press	31-33 (3115° F)	For steel mill ladles where higher refractoriness, along with a slight volume expansion is required. Basic oxygen process ladles where service conditions are too severe for conventional ladle brick.
LR	Type C	Dry Press	31-33 (3115° F)	For steel ladles where good volume stability and higher refractoriness is required. For ladle service too severe for conventional ladle brick.

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SPECIAL PURPOSE REFRACTORY BRICK

PRODUCT	PROCESS	USES
ROTEX	Dry Press	This is an unbranded fireclay brick designed for use in mantle, fireplace, and barbecue construction. Can be used for other applications where appearance and uniformity is of primary importance and refractoriness is secondary. Has excellent resistance to thermal shock such as encountered in fireplaces.
FLINT	Dry Press	For installations subject to severe abrasion and/or spalling conditions such as cold zones and chain sections of rotary kilns. Also for pavers for soaking pit areas subject to temperature fluctuations. Acid resistance applications as found in chemical plants, steel mills, cement and lime plants.
FLINT P	Dry Press	For lining blast furnace hot blast mains, uptakes and downcomers to resist dust-laden gases.
NARCAL X	Stiff Mud	For applications where abrasion resistance is required at high temperatures. Hearths of forge and heating furnaces.
NARCAL 85 B	Dry Press	For applications where abrasion and spalling resistance is required at high temperatures. Hearths of forge and heating furnaces.

SILICA BRICK

PRODUCT	A. S. T. M. CLASSIFICATION & TYPE	PROCESS	P. C. E.	USES
MU & MTU-R	Type A Roof Quality	Dry Press	3110° F	Open hearth furnace roofs, electric furnace roofs, roofs of glass melting furnaces.
LO - SP	Type A Roof Quality	Dry Press	3080° F	For electric furnace roofs and hot patching of furnaces lined with silica brick. Possesses high refractoriness and above average resistance to thermal shock.
MTU	Type B Regular Quality	Dry Press	3055° F	Applications below floor level in open hearth furnaces, glass melting tanks, swing-type electric furnace roofs, electric furnace sidewalls, vertical lime kilns, and copper reverberatory furnaces.

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BASIC REFRACTORY BRICK

BRAND	A. S. T. M. CLASSIFICATION	TYPE OF BOND	TYPE OF PLATING
		MAGNESITE	
NARMAG	95	Chemical	none
NARMAG C	95	Chemical	metal encased
NARMAG IC	95	Chemical	internally plated
NARMAG B	95	Fired	none
NARMAG BC	95	Fired	metal encased
NARMAG 90	90	Chemical	none
NARMAG 90 C	90	Chemical	metal encased
NARMAG 90 IC	90	Chemical	internally plated
NARMAG 90 B	90	Fired	none
NARMAG 90 BC	90	Fired	metal encased
		MAGNESITE - CHROME	
NARMAG 80	80	Chemical	none
NARMAG 80 C	80	Chemical	metal encased
NARMAG 80 IC	80	Chemical	internally plated
NARMAG 80 B	80	Fired	none
NARMAG 80 BC	80	Fired	metal encased
NARMAG 70	70	Chemical	none
NARMAG 70 C	70	Chemical	metal encased
NARMAG 70 IC	70	Chemical	internally plated
NARMAG 70 B	70	Fired	none
NARMAG 70 BC	70	Fired	metal encased
NARMAG 60	60	Chemical	none
NARMAG 60 C	60	Chemical	metal encased
NARMAG 60 IC	60	Chemical	internally plated
NARMAG 60 B	60	Fired	none
NARMAG 60 BC	60	Fired	metal encased
		CHROME - MAGNESITE	
NARMAG 50	50	Chemical	none
NARMAG 50 C	50	Chemical	metal encased
NARMAG 50 IC	50	Chemical	internally plated
NARMAG 50 B	50	Fired	none
NARMAG 50 BC	50	Fired	metal encased
NARMAG 40	40	Chemical	none
NARMAG 40 C	40	Chemical	metal encased
NARMAG 40 IC	40	Chemical	internally plated
NARMAG 40 B	40	Fired	none
NARMAG 40 BC	40	Fired	metal encased
NARMAG 30	30	Chemical	none
NARMAG 30 C	30	Chemical	metal encased
NARMAG 30 IC	30	Chemical	internally plated
NARMAG 30 B	30	Fired	none
NARMAG 30 BC	30	Fired	metal encased
		CHROME	
NARCHROME B		Fired	none

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BASIC ROTARY KILN LINERS

BRAND	A. S. T. M. CLASSIFICATION	TYPE OF BOND	TYPE OF PLATING
	MAGNESITE - CHROME		
NARMAG 80 K	80	Chemical Bond	None (loose plates supplied if desired)
NARMAG 80 K-C	80	Chemical Bond	Steel plate and cardboard attached
NARMAG 80 K-B	80	Burned	None (loose plates supplied if desired)
NARMAG 80 K-BC	80	Burned	Steel plate and cardboard attached
NARMAG 70 K	70	Chemical Bond	None (loose plates supplied if desired)
NARMAG 70 K-C	70	Chemical Bond	Steel plate and cardboard attached
NARMAG 70 K-B	70	Burned	None (loose plates supplied if desired)
NARMAG 70 K-BC	70	Burned	Steel plate and cardboard attached

INSULATING FIRE BRICK

PRODUCT	MAX. TEMP. OF USE °F	THERMAL CONDUCTIVITY* 800° F	1600° F	WT. PER CUBIC FOOT — LBS.	USES
A-16	1600	1.7	2.2	37.5	A-23, A-26 and A-28 are heavy duty insulating brick that can be used in almost any application, except where they are subjected to molten metal or active slagging. They have ample strength to meet the service design requirements of all but the most unusual applications. The light duty brick A-16, A-20, and A-25 also can be used directly exposed in all types of furnaces and as efficient back-up insulation in furnaces that require heavy duty linings.
A-20	2000	1.5	2.1	34.1	
A-23	2300	2.3	3.0	44.4	
A-25	2500	2.1	2.7	41.0	
A-26	2600	2.8	3.4	46.1	
A-28	2800	2.5	3.0	51.2	

*Btu/Sq.Ft./Hr./°F/In.

BONDING MORTARS

BRAND	CONTAINERS	CONDITION AS SHIPPED	RECOMMENDED TEMPERATURE OF USE MINIMUM	MAXIMUM	USES
		AIR SETTING			
NARCOSET	50-100 & 200 lb. drums 15 lb. pails	Wet	Room	3000° F	Laying all types of fireclay brick, including insulating, where a firm bond is required at all temperatures.
ALSET (Dry)	100 lb. bags	Dry	Room	3000° F	A general purpose mortar in dry form for laying all types of fireclay brick. Provides a firm bond at all temperatures.
ALSET (Wet)	50, 100, 200 lb. drums 5, 15 lb. pails	Wet	Room	3000° F	A general purpose mortar supplied in ready to use form for laying all types of fireclay brick. Provides a firm bond at all temperatures.

*Also made in Canada

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BONDING MORTARS *(Cont'd)*

BRAND	CONTAINERS	CONDITION AS SHIPPED	RECOMMENDED TEMPERATURE OF USE MINIMUM	MAXIMUM	USES
		AIR SETTING (Cont'd)			
◆ NARCO No. 101	100 lb. bags	Dry	Room	3000° F	Laying all types of fireclay brick. Formulated so that any unused material may be retempered with water for reuse. Suitable for pumping to job site through hose or pipe, i.e. blast furnace installations.
NARCO STOPPER ROD CEMENT	50-100 & 200 lb. drums	Wet	Room	3000° F	High temperature mortar designed specifically for stopper rod application.
SUPERCHIEF	100, 200 lb. drums	Wet	Room	3100° F	A kyanite base mortar in mastic form for sealing outside faces of tangential boiler tubes, protective linings for pipes and ducts and for coatings with expanded metal lath.
SUPERCHIEF T	100, 200 lb. drums	Wet	Room	3100° F	A kyanite base mortar in trowelling consistency for laying all types of fireclay and high alumina brick.
SUPERCHIEF T (Dry)	100 lb. bags	Dry	Room	3100° F	A kyanite base mortar supplied in dry form readily mixed with water to any consistency. For laying all types of fireclay and high alumina brick where a firm bond is required at all temperatures.
◆ NARPHOS 85	100 lb. bags	Dry	Room	3300° F	Laying all tpes of high alumina brick, widely used in aluminum melting furnaces to resist penetration and corrosion by aluminum alloys.
NARCOBOND L	100 lb. bags	Dry	Room	2400° F	Flues, foundations of furnaces and chimneys and other applications where water may be encountered.
		HEAT SETTING			
◆ NARCO No. 99	100 lb. bags	Dry	2200° F	3100° F	Laying all types of fireclay brick where service conditions call for a heat setting mortar.
◆ NARCOLINE COATING & MORTAR	100 lb. bags	Dry	2000° F	3000° F	Wash coating and mortar for foundry ladles, runners and spouts.
◆ STEEL-LINE	100 lb. bags	Dry	2200° F	3150° F	Extremely fine grained mortar for all types of fireclay and high alumina brick.
◆ BERLITE	100 lb. bags	Dry	2200° F	3150° F	Laying and surface coating brick exposed to molten metal or slag and other applications where graphitic mortars are required at high temperatures.
◆ CHEYENNE	100 lb. bags	Dry	2200° F	3200° F	Laying and surface coating brick exposed to molten metal or slag at high temperatures. Electric furnace roofs.

◆ Also made in Canada

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PLASTIC FIREBRICK

BRAND	TYPE OF SET	CONDITION AS SHIPPED	LBS. REQ'D. PER CU. FT. OF CONSTR.	CONTAINERS	RECOMMENDED TEMPERATURE OF USE MINIMUM	MAXIMUM	USES
FIRECLAY AND HIGH ALUMINA							
NARCO 505	Heat or Air Set	Wet	135	100 lb. cartons	2000° F 300° F	3000° F 3000° F	Lining and patching incinerator, forge furnaces, boilers, driers, and wherever repairs are required in high duty linings. Available with air-setting properties where full deep strength is required.
NOJOINT	Heat or Air Set	Wet	140	100 lb. cartons 550 lb. drums	2000° F 300° F	3000° F 3000° F	Lining and patching boiler linings, desulfurizing ladles, foundry ladles and wherever repairs are required in high duty linings. Available with air-setting properties where full deep strength is required.
NOJOINT (Fine)	Heat or Air Set	Dry or Wet	140	100 lb. Bags 100 lb. cartons	2000° F 300° F	3000° F 3000° F	Same as NOJOINT except supplied with fine grain size for hand ramming purposes. Also as a packing material between shell and brick of torpedo type transfer ladles.
NARCO SUPER 505	Heat Set	Wet	140	100 lb. cartons	2000° F	3100° F	Lining and patching heavy duty boilers, slab and billet heating furnaces, soaking pits and similar applications of severe service.
SHUR-RAM	Heat Set	Wet	145	100 lb. cartons	2000° F	3100° F	Lining and patching heavy duty boilers, slab and billet heating furnaces, soaking pits and similar applications of severe service.
NARCO-SPAR	Air Set	Wet	145	100 lb. cartons	300° F	3100° F	Lining and patching sectionally supported furnace walls, piers and arches, soaking pit covers and copings, rotary kiln firing hoods and wherever full deep strength is required throughout the lining.
NARCAL 70 B	Heat Set	Wet	165	100 lb. cartons	2000° F	3200° F	Lining and patching electric furnace roofs and center sections, combustion chambers, crucible furnaces and other applications too severe for super duty plastic fire brick.
NARCAL 80 B	Heat Set	Wet	175	100 lb. cartons	2000° F	3250° F	Lining and patching electric furnace roofs and center sections, alloy steel ladles, burner cones, slab heating furnaces and other applications requiring extremely high refractoriness and/or slag resistance.
SLAG RESISTANT (GRAPHITIC)							
BLACKJACK	Heat Set	Wet	138	100 lb. cartons		2700° F	A "glazing" type graphitic plastic for foundry applications in direct contact with metals conveyed at temperatures from 2450° F to 2700° F.
NARCOLINE	Heat Set	Wet	135	100 lb. cartons		2800° F	A "glazing" type graphitic plastic similar in application to BLACKJACK but with added stamina for temperatures from 2650° F to 2800° F.

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PLASTIC FIREBRICK *(Cont'd)*

BRAND	TYPE OF SET	CONDITION AS SHIPPED	LBS. REQ'D. PER CU. FT. OF CONSTR.	CONTAINERS	RECOMMENDED TEMPERATURE OF USE MINIMUM	MAXIMUM	USES
SLAG RESISTANT (GRAPHITIC) (Cont'd)							
BLACK PLASTIC	Heat Set	Damp	140	100 lb. bags 500 lb. drums		2900° F	A high duty plastic containing graphite for metal or slag contact service where temperatures of 2750° F - 2900° F are maintained continuously for extended periods as in holding ladles, fore-hearths and transfer ladles.
DU-RITE	Heat Set	Wet	150	100 lb. cartons		3000° F	A superdry plastic with graphite similar to BLACK PLASTIC in applications but capable of withstanding higher working temperatures in the range of 2850° F - 3000° F.
◆ BERLITE	Heat Set	Dry	152	100 lb. bags		3150° F	A fortified superduty refractory with graphite. It is extremely resistant to slag and metal build up. Supplied in dry form requiring only the addition of water to develop the proper workability for rammed or mudded linings.
NARCAL 70 G	Heat Set	Wet	162	100 lb. cartons		3200° F	A high alumina product containing graphite. May be used for lining ladles or other applications in direct contact with metals. Ladle linings in malleable or steel foundries where operating conditions are most severe.

CASTABLE REFRACTORIES

BRAND	TYPE OF SET	LBS. REQ'D. PER CU. FT. OF CONSTR.	CONTAINERS	RECOMMENDED TEMPERATURE OF USE MINIMUM	MAXIMUM	USES
REGULAR CASTABLES						
NARCON	Hydraulic	117	100 lb. bags	Room	2100° F	Paving material around melting pots in the aluminum melting industry. Open hearth charging floors. Exterior floorings around incinerators and similar applications.
◆ NARCOCAST E.S.	Hydraulic	118	100 lb. bags	Room	2400° F	New monolithic construction and patching where high strength is required. Recommended for use in boilers, ash pits, coke ovens, driers, stacks, flues, ducts, blast furnace piping, car tops and similar applications.
◆ NARCOCAST E.S. (Fine)	Hydraulic	111	100 lb. bags	Room	2400° F	New monolithic construction and patching for thin sections and where a dense structure to resist penetration of slags and metal is required.
◆ NARCOCAST E.S. (Coarse)	Hydraulic	117	100 lb. bags	Room	2400° F	New monolithic construction and patching for service where spalling is a serious condition and strength is also important.

◆ Also made in Canada

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ACL Doc 21537 · Page 32 of 55 asbestosclaims.law/library/21537/32

CASTABLE REFRACTORIES *(Cont'd)*

BRAND	TYPE OF SET	LBS. REQ'D. PER CU. FT. OF CONSTR.	CONTAINERS	RECOMMENDED TEMPERATURE OF USE MINIMUM	MAXIMUM	USES
REGULAR CASTABLES (Cont'd)						
◆ NARCOCAST	Hydraulic	116	100 lb. bags	Room	2600° F	New monolithic construction and patching in boilers, coke ovens, furnaces, incinerators, burner blocks and other applications requiring a 2600° F castable.
NARCOHEARTH	Hydraulic	112	100 lb. bags	Room	2600° F	New monolithic construction and patching for applications requiring a 2600° F castable.
◆ SUPER NARCOCAST	Hydraulic	120	100 lb. bags	Room	2800° F	New monolithic construction and patching for furnace linings of all types, soaking pit covers, burner blocks, kilns, combustion chambers, door linings, incinerators.
◆ NARCOCAST 30	Hydraulic	126	100 lb. bags	Room	3100° F	New monolithic construction and patching in forge furnaces, billet, and slab heating furnaces, burner blocks, car tops, soaking pit covers, non-ferrous melting furnaces, crucible furnace lining and others.
◆ NARCOTAB	Hydraulic	160	100 lb. bags	Room	3400° F	New monolithic construction and patching for applications where severe temperatures, loads, abrasion and erosion and similar requirements demanding a pure tabular alumina castable.
◆ ANTI-ERODE	Hydraulic	127	100 lb. bags	Room	2500° F	New monolithic construction and patching wherever conditions of extreme erosion and abrasion exceed the ability of standard castables in the intermediate temperature range.
NARCO BLAST FURNACE CASTABLE	Hydraulic	130	100 lb. bags	Room	3100° F	Designed specifically for gunning applications in new monolithic construction and patching wherever conditions call for a product with abrasion and slag resistance and exceptional high strength.
INSULATING CASTABLES						
◆ NARCOLITE	Hydraulic	54	50 lb. bags	Room	2000° F	New monolithic construction and patching in refinery units, industrial ovens, door linings, boiler water-wall backing, back-up insulation for heavy refractories and high temperature castables.
◆ AEROCAST	Hydraulic	41	50 lb. bags	Room	2000° F	Designed for back-up insulating in new monolithic construction and patching where light weight and insulating values are essential.
◆ AEROCAST L	Hydraulic	38	50 lb. bags	Room	2000° F	Designed for either hot face or back-up insulating in new monolithic construction and patching where light weight and insulating values are essential.
◆ NARCOCRETE	Hydraulic	85	100 lb. bags	Room	2450° F	New monolithic construction and patching for heat treating furnaces, annealing ovens, refinery vessels, driers, boiler baffles and similar applications where light weight and insulation are essential.

◆ Also made in Canada

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RAMMING AND GUNNING MIXES

	BRAND	TYPE OF SET	CONDITION AS SHIPPED	LBS. REQ'D. PER CU. FT. OF CONSTR.	CONTAINERS	RECOMMENDED TEMPERATURE OF USE MINIMUM	MAXIMUM	USES
◆	CARO-LINE	Heat Set	Dry	132	100 lb. bags	2000° F	2950° F	New monolithic construction and patching in acid electric furnaces, ladles, side blow converters and similar applications requiring a siliceous ramming mix at high temperatures.
	REFCOAT	Air Set	Dry	135	100 lb. bags	300° F	3000° F	Refractory coating material for spraying hot or cold surfaces in maintaining and reconditioning eroded, abraded, spalled or burned surfaces.
◆	STEEL-LINE	Heat Set	Dry	137	100 lb. bags 400 lb. drums	2000° F	3150° F	Rammed ladle linings for steel foundries, electric furnace roof delta sections and similar severe service conditions.
	HI-AL 70	Air Set	Dry or Damp	155	100 lb. bags 400 lb. drums	300° F	3200° F	New monolithic construction and patching in electric furnace roofs, ladles, non-ferrous reverberatory furnaces and similar applications requiring a high alumina ramming mix.
	RAMAL 80	Heat Set	Damp	175	100 lb. bags	2000° F	3250° F	Rammed center sections of electric furnace roofs, malleable furnace bottoms, patching of hot metal transfer cars and hot metal mixers.
	RAMAL 85	Air Set	Damp	170	100 lb. bags	300° F	3300° F	Phosphate bonded. For ramming induction melting furnace linings and other molten metal and slag contact applications.
	NARCAL 85 GUN	Air Set	Dry	165	100 lb. bags	300° F	3300° F	Phosphate bonded gun mix for hot and cold surfaces. As a furnace maintenance material for applications where temperature and slag conditions are too severe for lower alumina materials.
◆	RAMAL 90	Air Set	Dry	180	200 lb. drums	300° F	3300° F	High alumina ramming mix for new construction or patching in soaking pits, reheat furnaces, electric furnaces, burner blocks and similar applications where scale, slag, molten metals and high temperature are present.
	NARCOLINE G	Air Set	Dry	130	100 lb. bags	300° F	2950° F	Slag resistant gun mix for new construction or patching in open hearth and blast furnace runners and similar applications requiring a graphitic gunning mix.
◆	BERLITE	Heat Set	Dry or Damp	137	100 lb. bags 400 lb. drums	2200° F	3150° F	New monolithic construction and patching in ladles, cupolas, tap holes, slag holes and similar applications requiring a graphitic ramming mix for resistance to slag and metal erosion.

◆ Also made in Canada

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SILICA SPECIALTIES

BRAND	TYPE OF SET	CONDITION AS SHIPPED	CONTAINERS	RECOMMENDED TEMPERATURE OF USE MINIMUM	MAXIMUM	USES
NARCO-SIL	Heat Set	Dry	100 lb. bags	2200° F	3100° F	Laying silica brick where conditions are especially severe. Glass tank caps, upper structures of glass tanks, open hearth furnace roofs and similar applications.
MTU SILICA CEMENT	Heat Set	Dry	100 lb. bags and bulk	2000° F	3000° F	Laying and grouting silica brick. Available in two grades for coke oven and open hearth applications.
NARCO SILICA PLASTIC	Heat Set	Wet	100 lb. cartons	2200° F	3100° F	For filling small and irregular spaces in silica masonary construction, eliminating cutting of silica brick. For coke oven and glass tank crown maintenance.

BASIC SPECIALTIES

BRAND	TYPE OF SET	CONDITION AS SHIPPED	LBS. REQ'D. PER CU. FT. OF CONSTR.	CONTAINERS	RECOMMENDED TEMPERATURE OF USE MINIMUM	MAXIMUM	USES
MORTARS							
◆ NARCHROME MORTAR (Heat Set)	Heat Set	Dry		100 lb. bags	2350° F	3100° F	Laying basic, clay or high alumina brick in boilers, heating furnaces and similar installations where slagging is a serious problem.
◆ NARCHROME MORTAR (Air Set)	Air Set	Dry		100 lb. bags	Room	3000° F	Laying and coating all types of basic brick. Can be used with clay and high alumina brick where resistance to highly basic or high iron content slags is important.
◆ NARMAG MORTAR	Heat Set	Dry		100 lb. bags	2300° F	3300° F	Laying magnesite and magnesite-chrome brick where a high purity magnesite mortar is required for chemical resistance and refractoriness.
CASTABLES							
◆ NARCHROME CASTABLE	Hydraulic	Dry	159	100 lb. bags	Room	3000° F	Walls and hearths of heating and forge furnaces, open hearth doors, boiler furnace walls and floors.
PLASTICS							
NARCHROME PLASTIC	Air Set	Wet	188	200 lb. drums 100 lb. bags	300° F	3000° F	Hearths of reheating and forge furnace, bottoms of soaking pits, open hearth doors, boilers, bottoms of paper plant recovery furnaces and for general maintenance work.
RAMMING AND GUNNING MIXES							
◆ NARMAG CM-18 GUN	Air Set	Dry	184	100 lb. bags	Room	3000° F	For lining open hearth doors, open hearth runners, boiler bottom and walls or wherever a chrome material is required. May be gunned or rammed into place.

◆ Also made in Canada

BASIC SPECIALTIES *(Cont'd)*

BRAND	TYPE OF SET	CONDITION AS SHIPPED	LBS. REQ'D. PER CU. FT. OF CONSTR.	CONTAINERS	RECOMMENDED TEMPERATURE OF USE MINIMUM	MAXIMUM	USES
RAMMING AND GUNNING MIXES (Cont'd)							
◆ NARMAG CM GUN	Air Set	Dry	180	100 lb. bags	Room	3200° F	As a maintenance material for open hearth end walls, side walls, chill walls, up-take area and glass tank regenerator walls. May be gunned or rammed into place.
◆ NARMAG MC GUN	Air Set	Dry	169	100 lb. bags	Room	3200° F	As a maintenance material for electric furnace side walls and open hearth end walls, side walls, chill walls and up-take areas. May be gunned or rammed into place.
GRAIN							
NARMAG CLINKER	Heat Set	Dry	114	100 lb. bags		3500° F	Provides a loose slag absorbing refractory bed for bottoms of slag tap boilers, reheat furnaces and other applications that require periodic removal of scale and slag accumulations.

INDUSTRIAL INSULATIONS

NARCO BLOCK INSULATION	A lightweight mineral wool block insulation for temperatures up to 1900° F. Widely used for back-up purposes in linings for boilers, hot blast stoves, mains and bustle pipes, petroleum cracking furnaces and metallurgical furnaces of all kinds. Packaged in cartons and supplied in the following standard sizes: 18" and 36" lengths, 6" and 12" widths, and thicknesses from 1" to 2½" in ½" increments.
NARCO STAZ-ON	A plastic mineral wool insulation for use up to 1900° F. It has excellent plasticity and adhesive properties and may be applied to any contour. Available in 50 lb. multi-wall paper bags.
NARCO UNICOTE	A plastic mineral wool insulation for use up to 1200° F. that insulates, protects and finishes in one application. Available in 50 lb. multi-wall paper bags.
NARCO SURFA-SEAL	A weather proof protective material for coating insulations where resistance to moisture is desirable. Available in 50, 300 and 500 lb. drums.
NARCO MT INSULATING BOARD	An economical, medium-temperature, rigid type mineral wool insulation for use in applications involving hot-face temperatures in the 700° F range. Available in following standard sizes: 24" wide by 48" long and in thicknesses from 1" to 4½" in ½" increments.
NARCO MT-10 INSULATING BOARD	An economical, medium-temperature rigid type mineral wool insulation for use in applications involving hot-face temperatures in the 800° F range. Also recommended where more vibration may be encountered. Available in the following standard sizes: 24" wide by 48" long and in thicknesses from 1" to 3½" in ½" increments.

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CITY	AREA CODE	PHONE
Boston, Mass.	617	482-5050
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Chicago, Ill.	312	922-9796
Cincinnati, Ohio	513	542-2471
Detroit, Michigan	313	836-5220
New York, N. Y.	212	267-3963
Philadelphia, Pa.	215	563-2297
Pittsburgh, Pa.	412	281-4282

North American Refractories, Ltd.
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NARCO REFRACTORY PRODUCTS . . .

Progress through Research, Engineering, Quality Control

ENGINEERING AND FIELD SERVICE

Quality you can count on,
based on dedication to research.
NARCO products listed in this guide
are specifically designed to solve
your refractory problems.
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NARCO Service. Experienced NARCO
sales-service engineers are near you
to serve your needs now . . .
to continue to assist you in achieving
improved performance in the future.
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NORTH AMERICAN REFRACTORIES COMPANY

CLEVELAND, OHIO 44114

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Bulleti

PRODUCT & SERVICE EXCHANGE

INFORMATION BULLETIN ISSUED BY AND FOR NARCO CLEVELAND

PRODUCT:

NARMAG CM-18 GUN

DATE September, 1964

SALESMAN R. C. Crosson

COMPANY Great Lakes Steel

PLANT LOCATION Detroit, Michigan

GUNNING NARMAG CM-18 GUN IN OPEN HEARTH SLAG POCKETS

"Shown below is Great Lakes Steel's 'Procedure for Sealing Slag Pockets and Bulkheads.' This is now standard procedure on all rebuilds in #1 open hearth at Great Lakes. On #1 furnace, which I gunned in May, the NARMAG CM-18 GUN has held up and the furnace is running faster and hotter than on any previous campaigns. The NARMAG CM-18 GUN that was gunned into the large crack at the knuckle is still in place and the knuckle area is airtight.

This procedure, which is now being followed by Great Lakes to seal slag pockets and bulkheads, should be discussed with other open hearth shops as this represents real sales potential, particularly mills that are running or operating a number of open hearth furnaces. Proper sealing of the furnace, of course, greatly increases the efficiency and enables the open hearth shops to be more competitive."

PROCEDURE FOR SEALING SLAG POCKETS and BULKHEADS

1. Use scaffold to cover upper sections of area to be sprayed.

2. Use basic material, such as NARMAG CM-18 GUN, to seal joints, cracks and all badly spalled basic brick in upper area of throat uptakes, bullnose, etc. (Basic Brick area).

3. Use ProPac 32 or comparable material to seal all joints, cracks, sew lines, inside and outside of slag pocket bulkhead and inside and outside of checker chambers and bulkheads. (Clay brick, silica brick, and stone).

4. The lower sections of the furnace operate under negative pressure and the whole purpose of this procedure is to stop leakage of cold air into the furnaces. In some cases, it may be necessary to clean dirt out of and away from cracks and open joints before spraying.

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"As you are aware, we have been gunning NARMAG CM-18 to seal cracks in the basic brick in the upper slag pocket, chill wall, bullnose, uptakes, and bulkhead in all of their recent slag-outs. The NARMAG CM-18 is gunned from the inside of the slag pocket and has proved more economical in extending furnace life, increasing combustion efficiency by reducing leaks, and, of course, is faster and more economical than the use of bricklayers to patch with brick. This furnace will have the above slag pocket gunning or sealing done the next day. Great Lakes' open hearth people have had to find more economical methods of repair, in an effort to compete with the BOP Shop.

"On #9 furnace rebuild, they plan to do extensive gunning with CM-18 on cracked, spalled, and burned-out basic brick.

"I feel the above economical practices by Great Lakes might be of some help to other open hearth shops, in their efforts to reduce the refractory costs per ton of steel."

SALES

PRODUCT & SERVICE EXCHANGE

INFORMATION BULLETIN ISSUED BY AND FOR NARCO CLEVELAND

PRODUCT: NARMAG CM-18

DATE February, 1965

SALESMAN R. C. Crosson - Detroit Office

COMPANY Great Lakes Steel Corporation

PLANT LOCATION Ecorse, Detroit, Mich.

GUNNING IMPROVED NARMAG CM-18 ON OPEN HEARTH CHILL WALLS

"#6 open hearth was taken down for slag-out and roof patching. After slag-out, they noticed that on the west end about a 2" wide crack and a 3' spall on either side of the crack had developed, extending from the front to the back wall, on the chill wall, just above the bullnose, in the uptake. This area is all basic brick and is just above the Detrick basic shapes, in the bullnose. Rather than put scaffolding in the slag pocket and patch this area by rebricking, they asked NARCO to supervise the gunning of this area with NARMAG CM-18. They knocked 3 separate holes along the endwall, about 1' off the operating floor. These 3 holes enabled us to reach from the front to the back of the chill wall. We used a Jet Creter gun and put a 6' wand on the end of the nozzle to get close to the chill wall from outside of the endwall. With this 6' extension, we were able to get close to the cracked and spalled area and were able to control the shoot. We placed a floodlight in one hole, while gunning through another. We connected the gun to air and water alongside of and between the furnaces.

"The gunning of this new NARMAG CM-18 went smoothly. We did not premoisten, there was no dusting, and we had good adherence. We first filled out the spalled area on either side. On gunning the spalled area, we built a ledge on the bottom and built up from this and shot to a thickness of from 2" to 5". No slump or slough-off was seen, either during the shoot or when inspected the following day. We gunned and sealed the entire chill wall uptake to the thickness of the surrounding brickwork. No other preparations, other than those noted above, were taken. We then went around to the west end chill wall and did the same thing. The crack on this end was about 1" wide and there was about 1-1/2' spall on either side of this crack. The crack extended up along the side of the front and back wall. We shot 4 pallets of NARMAG CM-18 on the east end and 2 pallets on the west end. With this roof patch, slag-out and our gunning and sealing of the chill wall, uptakes and slag pocket, they hope to get 75 more heats out of this furnace.

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PRODUCT & SERVICE EXCHANGE

PRODUCTS: NARCOLINE G Gun Mix
NARMAG CM-18 GUN Gun Mix

DATE August, 1963

SALESMAN R. C. Crosson

COMPANY Great Lakes Steel Corp.

PLANT LOCATION Detroit, Michigan

OPEN HEARTH FURNACE RUNNERS

In Great Lakes Steel's bifuricated open hearth steel runners, NARCOLINE G is gunned with a Jetcreter over the surface of NARMAG CM-18 GUN gun mix or chrome plastic. The NARCOLINE G acts as a parting agent and prevents the slag and steel from adhering to the chrome backup material in the runners. The NARCOLINE G is gunned from 1/4" to 2" in thickness on the surface of the runners. There is no pre-moistening. The runners are scraped and cleaned up after each heat and re-gunned with NARCOLINE G. From 15 to 40 bags are used each time the runners are cleaned up, depending upon the condition of the runners. Present usage is approximately 16 pallets of NARCOLINE G (3000# per pallet) per week. We are supplying NARMAG CM-18 GUN for lining these runners as the existing linings are replaced. NARMAG CM-18 GUN is preferred because of labor savings. Runners can be gunned in 1-1/4 hours as opposed to 8 hours for ramming chrome plastic.

Kaiser's L-59-E has about the same properties as NARCOLINE G. We now share their requirements for open hearth runners with Kaiser on a 50-50 basis. Lawrence Refractories' C-60 and C-61 RUN-R-MIX and National Foundry Sand's gun mixes were much less expensive ($40.00 N.T. delivered). However, this material did not gun as well and did not allow the slag and metal skulls to pull free of the runners. It also cracked on drying. Cleaning up runners after each heat was very difficult.

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NORTH AMERICAN REFRACTORIES COMPANY

Technical Services Department

BULLETIN NO. 39 December, 1970

AEROGUN

AEROGUN is a new NARCO product. It is an extremely lightweight insulating gun and castable refractory for back-up service to temperatures not exceeding 1800°F. Being Vermiculite-base, it has a gunned density of 35 pounds per cubic foot and a cast density of 20 to 23 pounds per cubic foot.

AEROGUN was developed primarily to compete with Plibrico's "PLICAST AIR-LITE" where it is used for single coat application in furnace walls, roofs, soot hoppers, top decks, drum coverings, etc., as a starter layer to reduce rebound of heavy gunned castables, for back-up of plastic firebrick in boiler walls and back-up behind brick walls. As a gun mix, AEROGUN does not have to be pre-moistened, however, it is important to keep gunning pressures as low as possible to achieve the low desirable density. Gun pressure as low as 10 psi. is sufficient to place AEROGUN and maintain a density of 30 to 32 lb. per cubic foot.

AEROGUN may also be cast or trowelled and may be offered in competition to Kaiser's "VEE BLOCK MIX", Green's "CASTABLE BLOCK MIX" and General's "LITECAST 30".

AEROGUN is supplied in 25 lb. bags from our Curwensville, Pa. and Farber, Mo. plants. Price is established at $195.00 NT in full and mixed truckloads and carloads and $210.00 NT for LCL and LTL quantities f.o.b. Curwensville and Farber. Maximum discount to distributors and dealers is 15%. Please add this brand, pricing and discount to the appropriate section of your sales manual.

Typical data is shown on the reverse side of this bulletin.

TYPICAL TEST DATA - GUNNED SPECIMENS

Maximum Recommended Temperature	1800° F.
Pounds per cu.ft. gunned in place. Dried 230° F.	35
Particle Size. A.S.T.M. C92 (Wet Method)	
Retained on Tyler No. 8 Sieve (Before Gunning)	1.0%
Retained on Tyler No. 28 Sieve (Before Gunning)	45.0%
Permanent Linear Change. A.S.T.M. C269	
After Drying at 230° F.	0.0%
After Preheat at 1000° F.	-0.4%
After Preheat at 1500° F.	-0.8%
After Preheat at 1800° F.	-1.5%
Modulus of Rupture. A.S.T.M. C268	
After Drying at 230° F.	180 psi.
After Preheat at 1000° F.	115 psi.
After Preheat at 1500° F.	75 psi.
After Preheat at 1800° F.	85 psi.
Cold Crushing Strength. A.S.T.M. C268	
After Drying at 230° F.	225 psi.
After Preheat at 1000° F.	200 psi.
After Preheat at 1500° F.	135 psi.
After Preheat at 1800° F.	100 psi.
Thermal Conductivity B.T.U./Sq./Ft./Hr./°F./In.	
Mean Temp. 500° F.	0.91
Mean Temp. 1000° F.	1.13
Mean Temp. 1500° F.	1.35

Chemical Analysis. A.S.T.M. C18 (As Received Basis)

Alumina	(Al_2O_3)	9.0%
Silica	(SiO_2)	29.6%
Iron Oxide	(Fe_2O_3)	5.5%
Lime	(CaO)	32.4%
Magnesia	(MgO)	14.9%
Alkalies	($Na_2O - K_2O$)	3.1%
Loss on Ignition		5.5%

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NORTH AMERICAN REFRACTORIES COMPANY

Technical Services Department

BULLETIN NO. 18 September 29, 1961

NEW IMPROVED NARCOLITE

Notable improvements have recently been incorporated into NARCOLITE, enhancing its quality and desirability as a lightweight insulating castable. Of particular note resulting from the rearranged blend of constituents making up NARCOLITE is the improvement in its physical and chemical properties, its method of application and its ability now to meet the specifications for oil refinery requirements.

Improvement in NARCOLITE's physical and chemical properties consists of higher structural strength, especially in the intermediate temperature range; commendable volume stability under cyclic operating conditions; and, lower iron content.

NARCOLITE's method of application has now been extended to air placement, as well as pour and trowel, making it universal in use.

NARCOLITE's combination of lightweight, strength and very low thermal conductivity make it an ideal insulation behind hard surface abrasion resistant castables. These features are vitally important when considering refractory materials for oil refinery units utilizing two component linings. Laboratory test reports show that our NARCOLITE, in combination with NARCOCAST E.S. (Fine), meet the requirements in the rigid specifications set by Esso Engineering of New Jersey and Standard Oil of Indiana, and are now considered approved for composite linings.

NARCOLITE is primarily designed to serve as a back-up insulation, however, it also should be considered for single component walls in furnaces operated under favorable conditions.

Some of the suggested wide range of applications NARCOLITE will serve are:

Ducts, Breechings and Stack Linings.	Clinker Coolers.	Preheaters
Boiler Walls, Tube Decks and Baffles.	Incinerator Pits.	Furnace Walls and Roofs.
Combustion Chambers.	Oil Heaters.	Industrial Ovens.
	Hearths.	Special Shapes.
	Door Liners.	

Supplied in dry form, NARCOLITE is ready to mix with water in the field to provide the consistency desired for application. NARCOLITE is packaged in 50 lb. bags and supplied from our Curwensville, Penna. and Farber, Mo. plants.

In installations where refractory weight must be kept to a minimum, and/or

where the fuel and dollar saving benefits of an insualating refractory can be utilized to advantage, NARCOLITE offers the following:

1. Low Heat Storage - In furnaces that operate intermittently, it means savings in fuel consumption, shortens heating-up and cooling down cycle.

2. Flexible Application - Can be gunned, poured or troweled into place.

3. Light in Weight - Approximately 54 lbs. per cubic foot. Offers opportunity to cut cost of supporting steel work.

4. Low Permeability - Provides an effective monolithic sealing layer against air infiltration or gas migration, permitting more efficient furnace control.

5. High Strength - Good structural strength throughout temperature range up to maximum temperature limits.

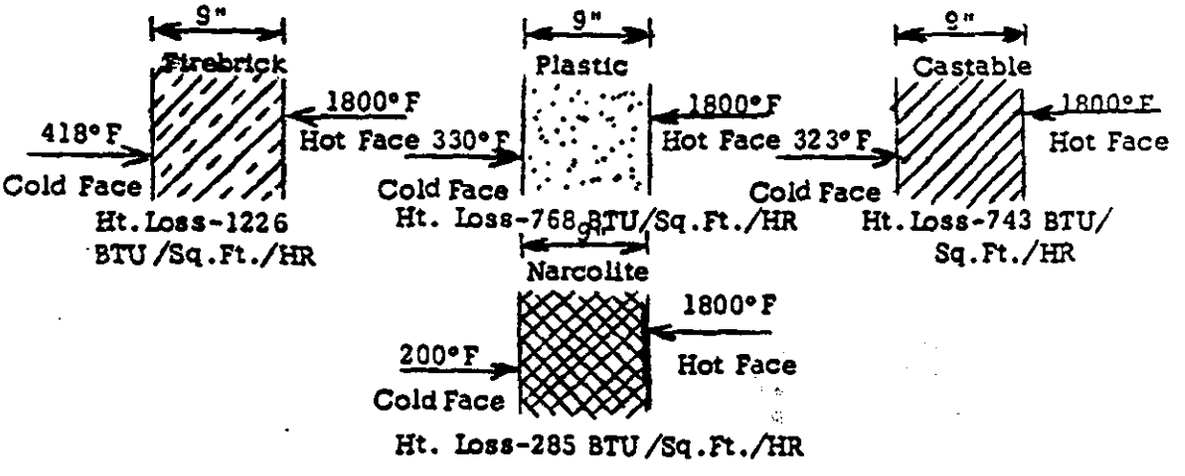
6. Permanence - Absorbs the stresses of expansion and contraction while assisting in holding the wall or structure in positive alignment.

7. Volume Stable - Negligible shrinkage at all service temperatures.

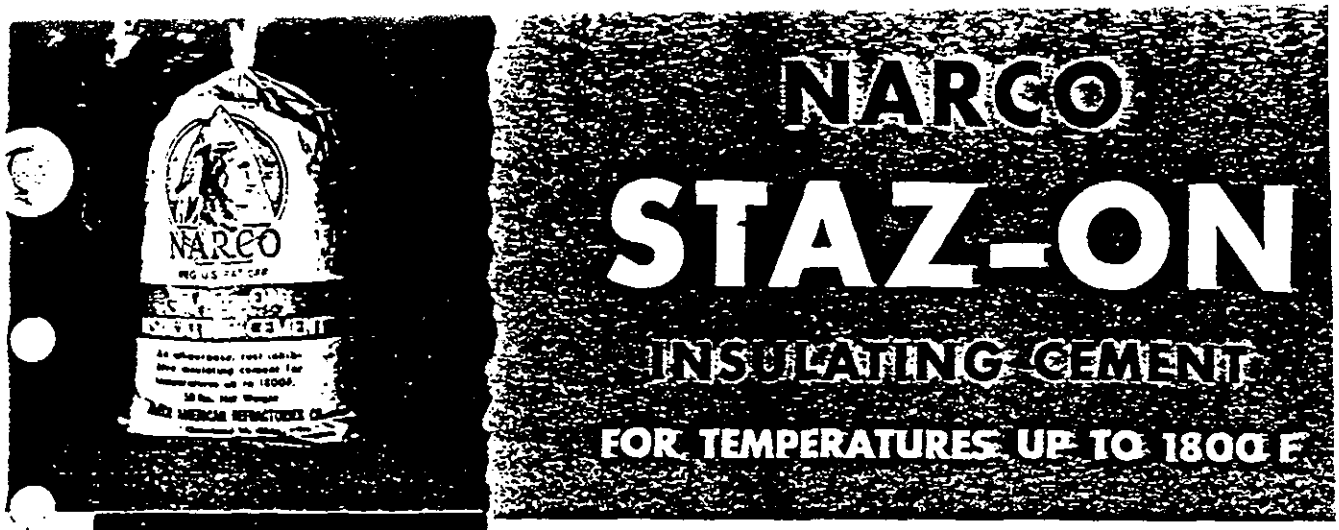
8. Resists Spalling and Thermal Shock - Attributed to its physical structure.

9. Excellent Coverage - Greater coverage per unit weight than with dense castables.

10. High Insulating Properties - Reduces heat transfer as compared to dense refractories. See Illustration Below.



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"IT STICKS"
TO HOT OR COLD SURFACES!

Narco Staz-on Insulating Cement is a unique and outstanding *High Temperature Mineral Wool* insulating material suitable for practically any type of heated equipment operated at temperatures up to 1800 F. With proper surface protection it is suitable for housed or unhoused equipment.

ADVANTAGES OF NARCO STAZ-ON INSULATING CEMENT

All-purpose—Narco Staz-on is virtually an all-purpose insulating material. It can be applied to any heated equipment, and is designed to serve under a full range of temperatures as high as 1800 F. Its exceptional plasticity and adhesiveness make it adaptable for use on all types of surfaces of heated equipment . . . including many irregular surfaces where the application of other insulation would be almost impossible. A stock of Narco Staz-on therefore adequately takes the place of many other varied types of insulation which may be used only under limited conditions.

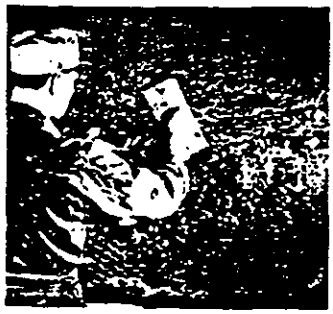
Easy-to-apply—Its ease of application means much less time out of service and a quicker, more thorough insulating job on new equipment. No special tools required; the insulation job can be done easily, in a minimum amount of time.

Increased Efficiency—Another very important characteristic of Narco Staz-on is that it gains in thermal efficiency after exposure to 1200 F and above. Actual tests show this increase to be from 3 to 4%.

High coverage—Narco Staz-on "goes a long way" because of its unusually high coverage. Its dry coverage is 50 to 55 sq. ft. 1 in. thick per 100 lb.

Reclaimability—When used at temperatures up to 1200 F, Narco Staz-on is reclaimable. It can be removed from the equipment, mixed with water, and used again. Thus the investment in Narco Staz-on is not lost whenever it becomes necessary to remove the material from equipment to make repairs. This is important especially where frequent maintenance work on equipment is necessary.

Rust-inhibitive—In addition to its natural non-corrosive properties, derived from Mineral Wool, Narco Staz-on is actively rust-inhibitive. When properly applied to an iron or steel surface, it will not cause or accelerate corrosion.



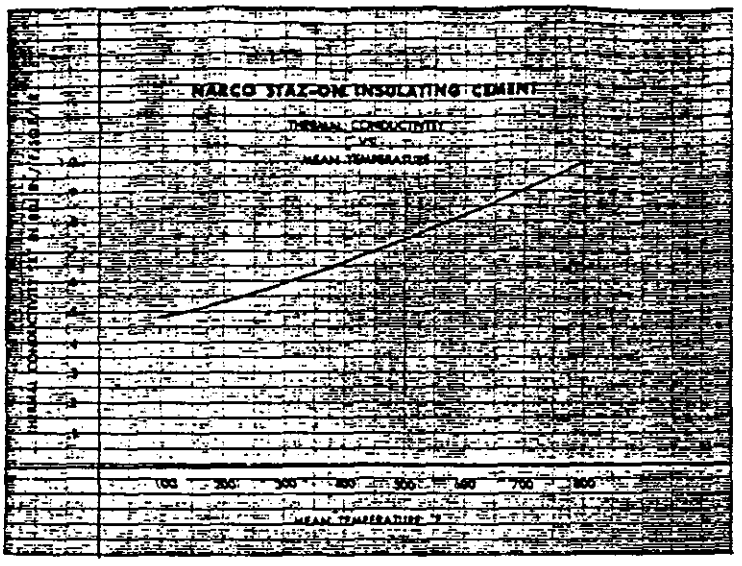
APPLICATION DIRECTIONS

1 Thoroughly clean surface of all dirt, paint, oil and loose scale. Spot Narco Staz-on on surface and trowel to required thickness in successive layers of ½ to ¾ in. thick. Next trowel Narco Staz-on to the desired smoothness. Application work is faster when equipment is heated. Allow each layer to dry before applying next coat.

2 The final layer of Narco Staz-on is troweled to a smooth finish and allowed to dry. A protective coating, or weatherproofing agent may then be applied for added protection.



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NARCO STAZ-ON CONDUCTIVITY— MEAN TEMPERATURE PLOT

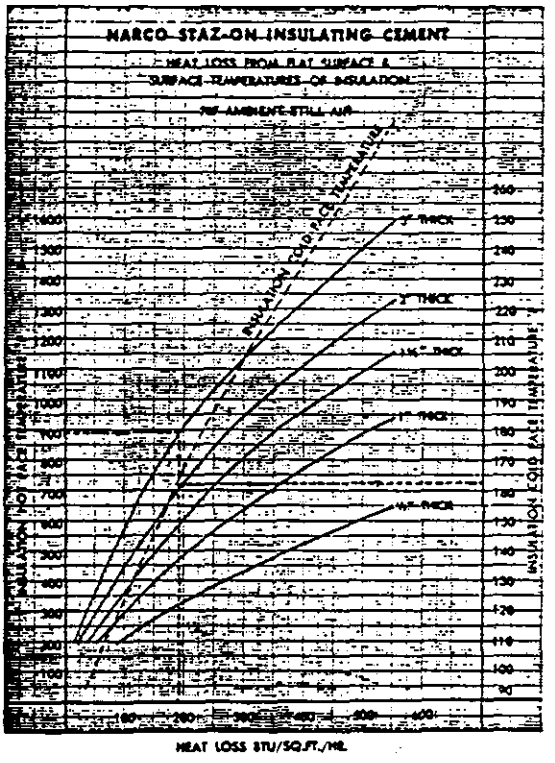
HEAT LOSS CHART (Below)

How to Use Chart

From Insulation Hot Face Temperature (900 F) Read Across to Thickness Curve (3"). From Point of Intersection Read Down to Heat Loss (185 BTU). For Cold Face Temperature read up from Heat Loss (185 BTU) to Insulation Cold Face Temperature Curve. From Point of Intersection Read Across to Insulation Cold Face Temperature (163F).

PHYSICAL PROPERTIES

Service Temperature	Up to 1800 F
Dry Coverage (Bd. Ft./100 lb. cement)	50-55
Volumetric Shrinkage (wet to dry)	18½%
Installed Density	22-24 lb./cu. ft.
Adhesive Strength to Steel	7½ psi
Compressive Strength (At 10% Deformation)	34 psi
Corrosion to Steel	None
Fire Resistance	Incombustible
Packages	Multi-wall paper bags
Net Weight Per Package	50 lb.
Thermal Conductivity (k) BTU per in. per sq. ft. per hr. per °F at mean temperatures of	
100 F	0.49
500 F	0.74
800 F	1.06



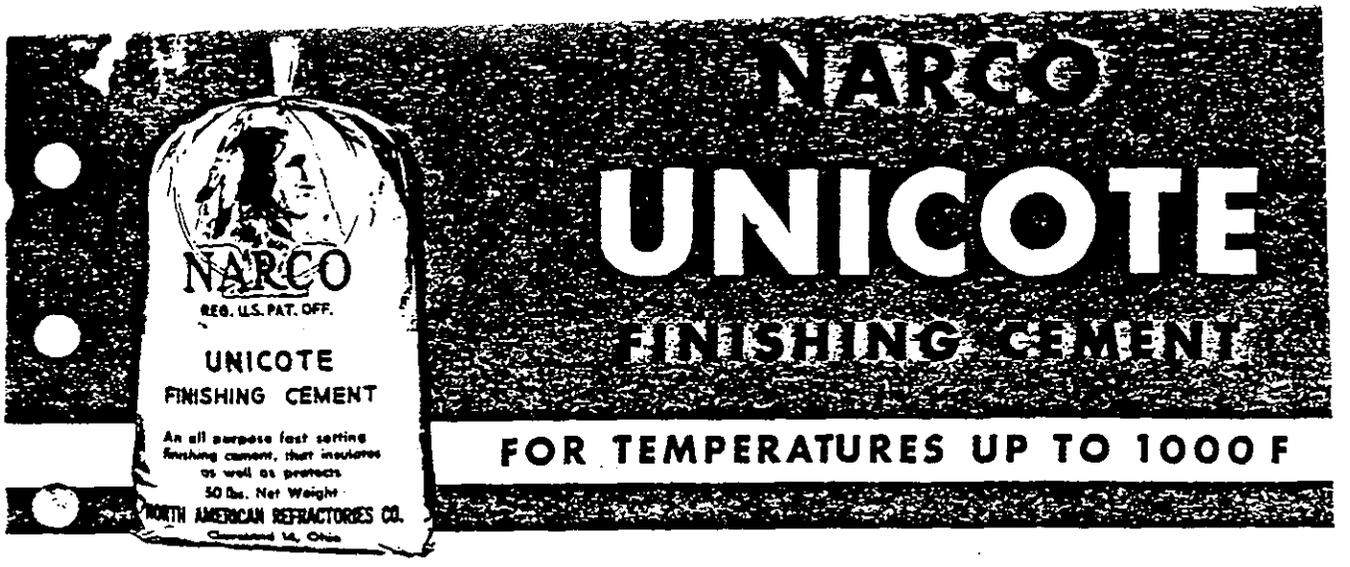
A FEW RECOMMENDED USES

- Boiler drums
- Boiler headers
- Boiler shells
- Boiler settings
- Turbines
- Convectors
- Pumps
- Valves and fittings
- Feedwater heaters
- Heat exchangers
- Economizers
- Furnaces: blast, forge, hot-air, treating, melting
- Ovens: drying, annealing, heat-treating
- Storage tanks: hot-water, oil, tar and chemicals
- Domestic furnaces, water tanks
- Steam cylinders
- Steam generators
- Ironer shoes in laundries
- Paper mill roll ends
- Digesters
- Air pre-heaters
- Annealing pit covers



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NARCO UNICOTE CEMENT
INSULATES • PROTECTS • FINISHES
. . . in one quick application

NARCO UNICOTE *gives added economy*

SINGLE COAT IS SUFFICIENT You can apply the insulation, point, seal and have a smooth, light-reflectent surface—all in one operation.

STICKS TO METAL SURFACES Narco Unicote readily adheres to cold (above 32 F) metal equipment. Hot equipment should be completely encompassed by the cement for satisfactory adhesion.

ELIMINATES WIRE MESH On inside applications, Narco Unicote needs no finishing treatment. Additional installation economy is thus achieved.

QUICK-SETTING Narco Unicote may be applied outside, under normal conditions. Withstands rain or moisture two hours after application without softening.

OUTSIDE INSTALLATIONS When Narco Unicote is installed outside it is recommended that a permanent weather protective coating be applied.

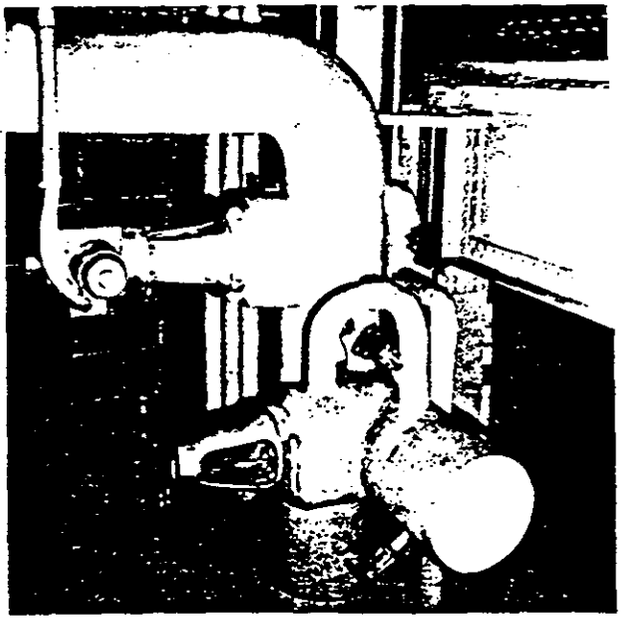
EASILY PAINTED You can apply most oil-base paints directly to Narco Unicote after it is dried. Additional coats of water-base paints may then be applied.

EXCEPTIONALLY FAVORABLE "k" FACTOR At 200 F mean temperature, the "k" factor of Narco Unicote is .50, a desirable operational advantage.

Narco Unicote is a dry, fibrous material with a mineral wo base. It forms a good bond to insulating blocks, drying to smooth, firm, crack-free surface.

Shrinkage is unusually low and it varies depending upc the rate of drying. Both volumetric and linear shrinkag are less than 1%.

Narco Unicote has exceptionally good coverage. Mixed an applied as recommended on the package, Narco Unicot covers about 155 sq. ft., ¼ inch thick per 100 lbs.



Here's another ideal application of Narco Unicote Cement—elbows, valves and fittings in a power plant.

A QUICK-SETTING RUST-INHIBITIVE
COMBINATION INSULATING and FINISHING CEMENT

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RECOMMENDED APPLICATIONS

Narco Unicote Cement has a wide and varied list of applications in the heat-control operations of today's competitive industries. Check the list below and see where Narco Unicote can institute insulation economies in your plant.

valves and fittings	ovens
storage tanks	steam cylinders
digesters	air preheaters
breechings	hot air ducts
glass and ceramic kilns	turbines
stills	piping

finishing treatment on exposed insulation surfaces

"k" Factors of Narco Unicote Cement at Various Mean Temperatures

Mean Temperature	"k"	Mean Temperature	"k"
200 F	.50	600 F	.77
400 F	.63	800 F	.90

SPECIFIC DATA

SERVICE TEMPERATURE	1000 F (one face)
COVERAGE	38 to 40 bd. ft. (wet or dry) per 100 lbs.
WATER/CEMENT BY WEIGHT	7/5 (8-8½ gal/50 lbs. dry cement)
SHRINKAGE	Negligible (both volumetric and Linear)
GREEN SET	2 hrs. (depending on application conditions)
DENSITY (INSTALLED)	32 lbs./cu. ft.
ADHESIVE STRENGTH	Exceptionally good to insulating materials and cements.
FIRE RESISTANCE	Incombustible
MOISTURE RESISTANCE	Does not soften after green set
WATER RESISTANCE	Does not soften after green set
CORROSION (STEEL)	None
SURFACE TREATMENT	Easily painted
PACKAGES	Multi-wall Kraft paper bags
WEIGHT PER PACKAGE	50 lbs. net

North American Refractories Company
GENERAL OFFICES — CLEVELAND 14, OHIO
North American Refractories Ltd. — Hamilton, Ontario
DISTRICT SALES OFFICES
NEW YORK 7, N. Y. — BUFFALO 2, N. Y. — CHICAGO 6, ILL.
PHILADELPHIA 2, PA. — PITTSBURGH 22, PA. — CINCINNATI 2, OHIO
BOSTON 16, MASS. — DETROIT 2, MICH.

Find it in the "Yellow

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CERTIFICATE OF SERVICE

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