

Chemical Resistant Chimney Liner Brick in Red Shale and Buff-Colored Fire Clay

Today chimney design and construction require more technical expertise than they did only a few years ago.

It is now increasingly important to predict lifetime operation conditions for new chimneys. Only by doing so can the chemical resistance requirements as well as the structural and thermal requirements be met.

In this connection, a protective lining for the chimney is necessary to guard against the potentially harmful effects of fuel changes, reduction of load, installation of equipment that reduces combustion gas temperatures, intermittent operation, and the increasing use of "wet stack" FGD systems.

Belden Chimney Liner Brick provides resistance to a variety of corrosive conditions ranging from wet saturated flue gas laden with sulfurous condensation at approximately 125°F to high concentrations of sulfuric acid at 250°-325°F.

Belden Chimney Liner Brick provides a column lining that is not only less expensive than comparable liner systems but more durable. Furthermore, when installed correctly, liner repair costs with Belden Brick are minimal. Existing Belden Brick liners have served many decades without need for significant maintenance.

Another advantage with Belden Chimney Liner Brick is that its corrosion resistance allows flexibility

in the choice of fuels, and will not limit minimum temperatures within the chimney or use of the chimney under partial load.

Belden Chimney Liner Brick are available in both red shale and buff-colored fireclay and meet ASTM C-980, Types I and II. Selected from Belden Brick's own shale and clay deposits, the raw materials are carefully crushed and ground before being fired to temperatures of approximately 2000°F. The result is very strong, dense brick with low absorption and high resistance to chemical attack. Individual units are wirecut on five sides to provide the best possible bonding surface. Both stretcher and header brick are custom-chamfered by Belden to the size specified by the designer for individual chimney liners to obtain tighter mortar joints and quicker construction.

Belden recommends that chimney liner brick be used only with chemical resistant mortar formulated for ongoing contact with corrosive gases. Mortar manufacturers should be consulted for their recommendations in connection with chemical resistant chimney liner construction. For names and addresses of mortar manufacturers, please contact The Belden Brick Company, P.O. Box 20910, Canton, OH 44701-0910. Telephone: 216/456-0031; FAX 216/456-2694.



A SAMPLING OF BELDEN BRICK STACK LINER INSTALLATIONS

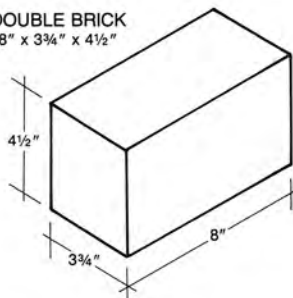
1. Columbus and Southern Electric Co./Division of A.E.P. Conesville, Ohio
2. Ohio Power Company / Division of A.E.P. Zanesville, Ohio
3. Indiana Electric Power Co., Indianapolis, IN
4. Potomac Edison Company, Baltimore, MD
5. Colorado Utility Electric Assoc. - Salt River Project Hayden, CO
6. Meade Paper Company, Chillicothe, Ohio
7. United States Steel Corp., Gary, IN
8. TVA - Allen Station, Memphis, TN
9. Great Lakes Steel Company, Detroit, MI
10. TVA - Widows Creek, Alabama

Belden Chemical Resistant Chimney Liner Brick Technical Information

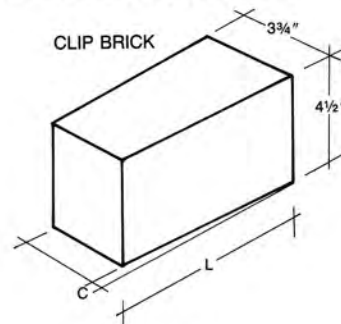
SHAPES AVAILABLE

(In Red Shale or Buff Fireclay)

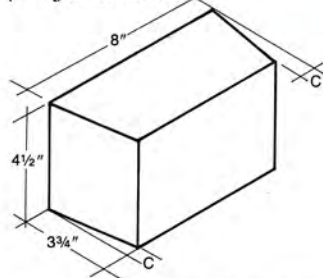
DOUBLE BRICK
8" x 3 3/4" x 4 1/2"



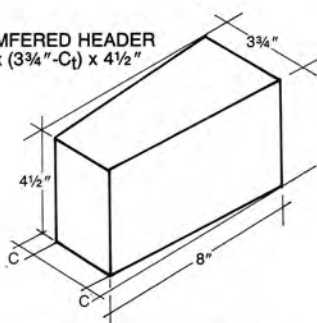
CLIP BRICK



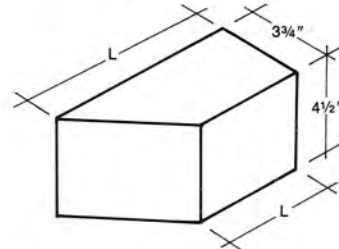
CHAMFERED STRETCHER
(8"-C₁) x 3 3/4" x 4 1/2"



CHAMFERED HEADER
8" x (3 3/4"-C₁) x 4 1/2"



JAMB BRICK



Note: Total Chamfer(C₁) equals 2 x c. C₁ is available in 1/16" increments only. Dimension lines designated as 'C' can be custom manufactured to the size specified by the designer for any chimney liner diameter desired. Dimension lines designated as 'L' can be custom manufactured to the size required up to and including 8"

Typical Physical Properties of Belden Shale and Fireclay Acid Resistant Brick Products

All Belden acid resistant chimney lining brick are manufactured to conform to or exceed ASTM C980 and are available in either Type I or Type II. Minimum requirements regarding the ASTM C980 specification standards are listed in the table below.

PROPERTY	TEST STANDARD	RED SHALE	BUFF FIRECLAY	REFERENCE
Bulk Density, lbs./cu. ft.	ASTM C-20	139-141	145-148	PSI (Professional Services Industries, Inc.)
Water Absorption, %	ASTM C-20	3.14-3.46	3.22-3.55	" "
Solubility in Sulfuric acid. Loss in mass, %	ASTM C-980	2.2-3.9	2.1-3.1	" "
Apparent Porosity, %	ASTM C-20	7.42-8.06	7.76-8.51	" "
Apparent Specific Gravity, grams/cc	ASTM C-20	2.54-2.55	2.61-2.62	" "
Modulus of Rupture, p.s.i.	ASTM C-67	1900-3560	2210-2600	" "
Compressive Strength, p.s.i.	ASTM C-67	21,390-22,650	21,060-23,600	" "
Tensile Strength, p.s.i.	ASTM C-1006	3195-3390	1675-3285	" "
Modulus of Elasticity, p.s.i.	ASTM C-885	6.98-7.97x10 ⁶	6.68-6.84x10 ⁶	" "
Poisson's Ratio	-	.125-.193	.125-.127	" "
Coefficient of Expansion, in/in/°F x 10 ⁻⁶	-	4-5.5	2-3.5	Corrosion and Chemically Resistant Masonry ⁽¹⁾
Thermal Conductivity, BTU-in./hr.-ft. ² -°F	ASTM C-236	7-9	6-10	" "
K Factor, BTU/sq. ft./in./hr.	ASTM C-177	8	9	" "

(1) Corrosion and Chemically Resistant Masonry Materials Handbook by Walter Lee Sheppard, Jr., P.E.B. Chem., M.S. C.C.R.M., Inc., 1986

PROPERTIES	TYPE I	TYPE II	METHOD OF TEST
Minimum Compressive Strength Gross Area p.s.i. (average of 10 brick)	8,500	10,000	ASTM Designation C 67, Section 10
Water Absorption Maximum % by 2 hr. Boiling Test (average of 10 brick)	6.0	4.0	ASTM Designation C 20, Section 10
Maximum Average Weight Loss by H ₂ SO ₄ Boil Test, %	20	12	ASTM Designation C 980, Section 6
Permissible Maximum Variation - Warpage Maximum Face and Diagonal Dimensions up to and incl. 9 1/2 in. (mm)	1/8 (3.0)	1/8 (3.0)	ASTM Designation C 67, Section 12
Maximum Permissible Variations in Dimensions Between Largest and Smallest Brick in a Random Sampling of 10 Brick, %			ASTM Designation C 67, Section 11
Height	3	3	
Length	5	5	
Width	5	5	

The information provided above has been furnished as a general guide-line for the design of corrosion-resistant construction. We cannot guarantee the data reported nor can we assume any liability in connection with its use. Please contact the Belden Brick Company for specific recommendations.

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