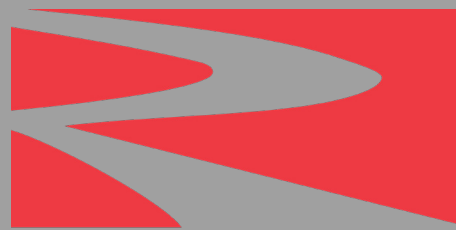


Ceramic
Welding



RESCO[®]
PRODUCTS, INC.

www.RescoProducts.com

Ceramic Welding

A Ceramic Welding service for the repair of refractory brickwork and monolithic linings of coke ovens and other furnaces.

Ceramic Welding

- The RESCO Ceramic Welding system has been in use commercially for more than 3 decades.
- Numerous contracts have been serviced in North America.
- Repairs are carried out to damaged refractory brickwork or furnace linings.
- Resco Ceramic Welding powders can be custom made to suit a wide range of refractory appliances.
- Refractory brickwork is maintained at or near the oven or furnace temperature.
- Disruptions to production are kept to a minimum.
- Coke oven battery or furnace life can be extended.
- Chimney emissions can be reduced.



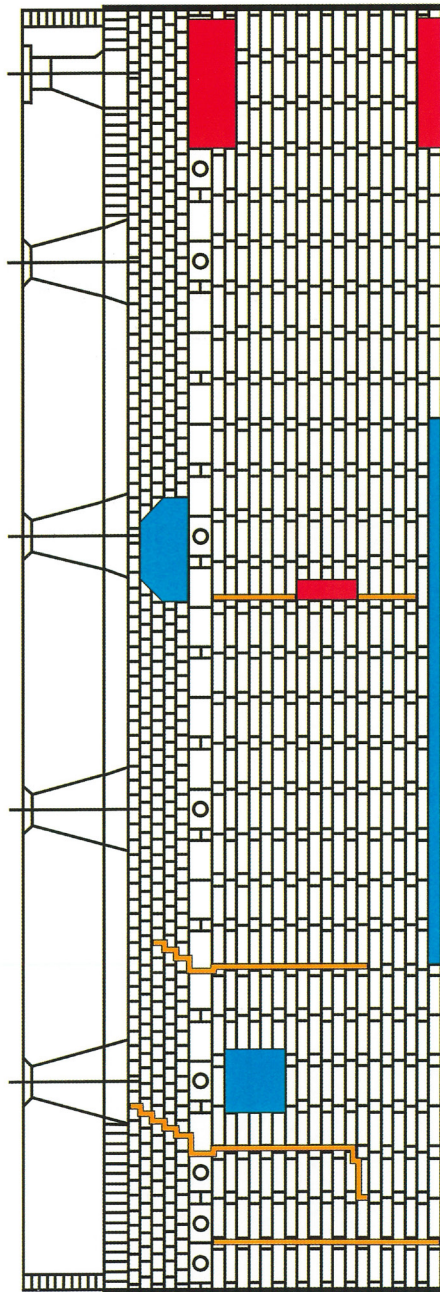
FS Silica Weld
Powder

Fireclay Weld
Powder

Silica Weld
Powder

Ceramic Welding

Typical Repairs



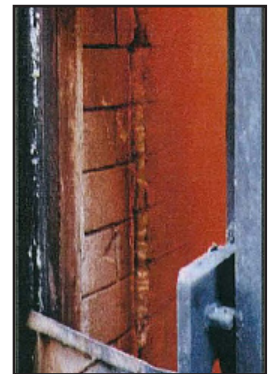
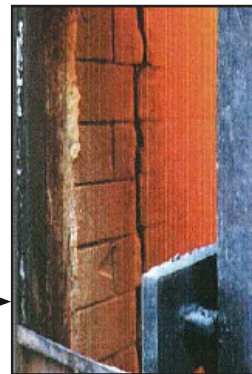
- HOLE TO FLUE
- SPALL
- CRACKS/OPEN JOINTS



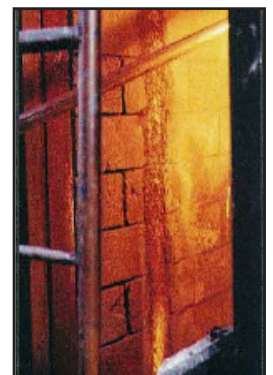
Severe damage to oven wall caused by a defective ram head, shown before and after repair.



Welding damaged roof blocks and undercut using a water cooled lance.



Severe crack to oven wall shown before cleaning, after cleaning, during welding and completed



Coke Oven

Ceramic Welding-Coke Ovens

- RESCO has a long history of repairing coke oven plants and are a full line supplier of refractories in North America.
- Machine technology, equipment innovation, and ceramic welding powder formulations enable RESCO to carry out repairs to any part of a coke oven chamber.



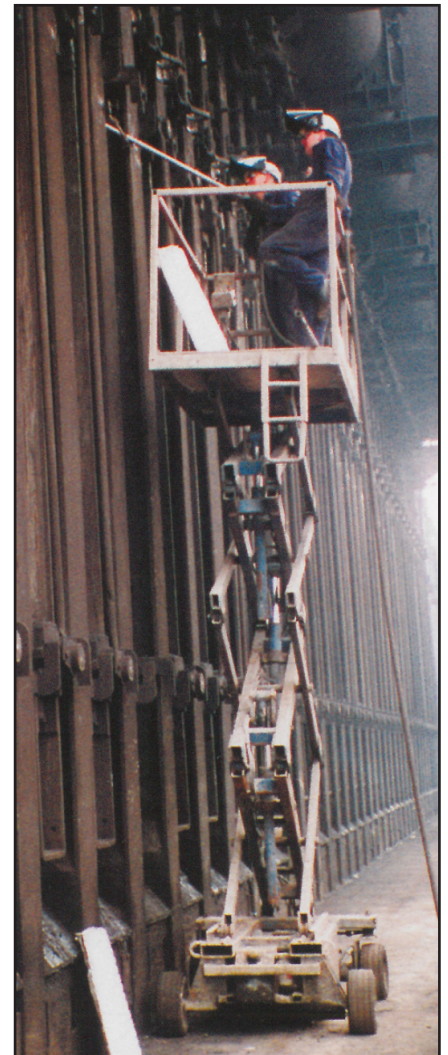
Ceramic welding from coke side bench



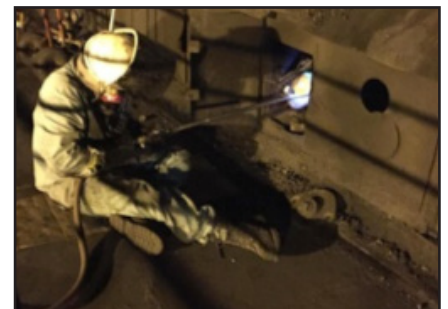
Ceramic welding end flue damage



The oven temperature is carefully monitored to ensure optimum ceramic welding conditions as well as protecting the oven from further damage.



Preparing a 19 foot coke oven for ceramic welding repairs



Repairing gas gun damage

FS Silica Weld
Powder

Fireclay Weld
Powder

Silica Weld
Powder

Ceramic Welding

The Process

- Precisely graded refractory material of similar chemical and physical properties to that of the refractory to be repaired is blended to an exact formulation with specific metallic oxidants

- The ceramic welding powder is conveyed in compressed air and mixed with oxygen before passing through a lance to the repair area

- The powder ignites when it comes into contact with the hot refractory substrate

- The exothermic reaction of the metallic constituents raises the temperature to 3540 - 3720 degrees Fahrenheit. *

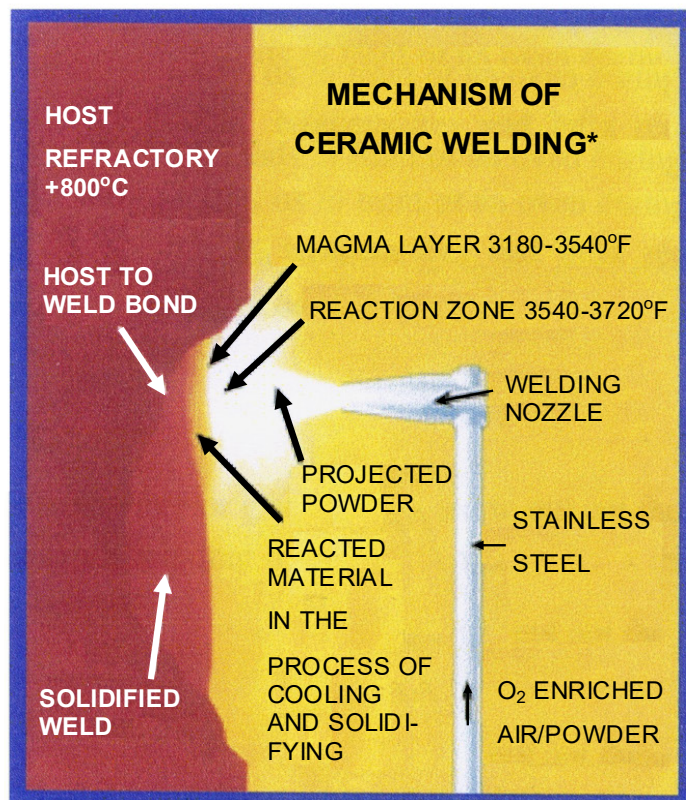
- This heat is sufficient to flux the ceramic welding material and fuse it to the partially melted substrate

- The repair is then carried out by depositing ceramic weld until the correct profile is restored

- The ceramic weld develops similar crystalline characteristics to the host brickwork providing a long lasting repair



From left to right: damaged wall prior to repair, welding in progress, finished repair.



*These figures relate to Silica Type 'S' ceramic welding powder

Ceramic Welding

The Equipment

- RESCO currently has two models of ceramic welding machines available.
- The SP150 is a pneumatically operated, trolley mounted machine which has a proven track record.
- The SP100 is a smaller version of the SP150, which is ideal where access is limited.
- Both machines can apply up to 220 pounds of ceramic welding powder per hour.
- Refractory cleaning is achieved by using pneumatic tools or grit blasting techniques.
- The majority of repairs are carried out using standard stainless steel lances. For special applications, water cooled lances are used.



Ceramic Welding Powder

RESCO ceramic welding powders for use in coke oven repairs include:

- Silica Type "S" is suitable for the majority of coke oven repairs.
- Fireclay Type "D" is used for fire brick or chamotte applications.
- Al-SiL Type "L" is a higher alumina version of Type D
- Type "FS" is a silica based material with a high resistance to thermal shock.
- Ceramic welding powders can be custom made to suit a wide range of refractory applications.



SP150 Ceramic Welding Machine

FS Silica Weld
Powder

Fireclay Weld
Powder

Silica Weld
Powder

Coke Oven

The Ceramic Weld

- RESCO ceramic welding powders are carefully formulated to match the refractory under repair.

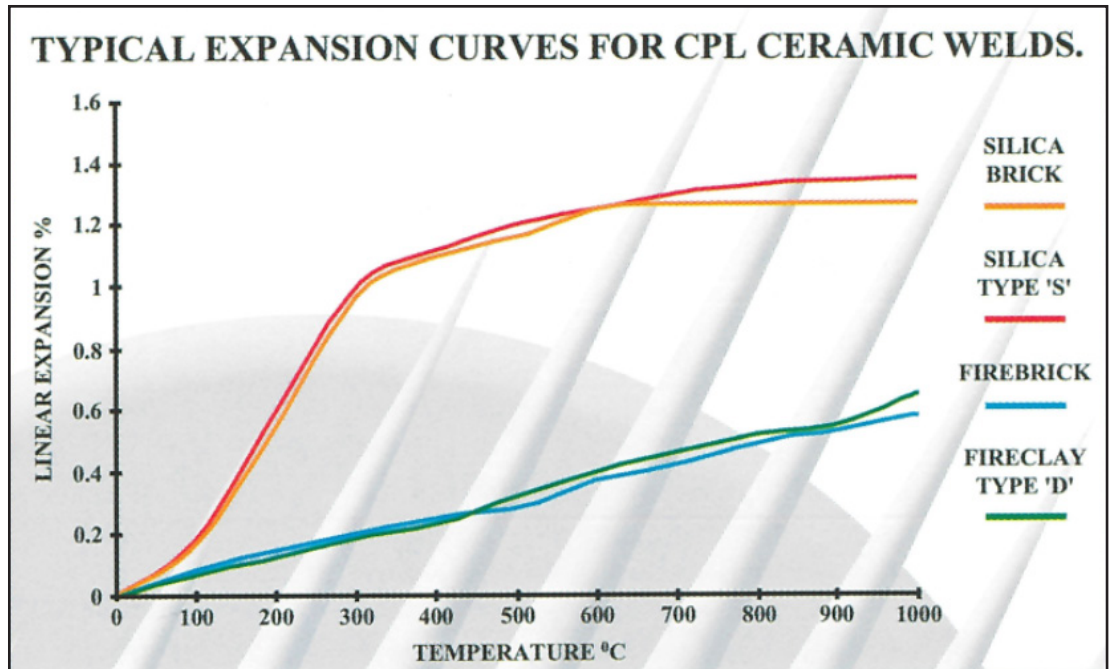
- There is excellent adhesion between RESCO ceramic weld and refractory brickwork.

- RESCO ceramic weld exhibits similar expansion characteristics to the substrate material.

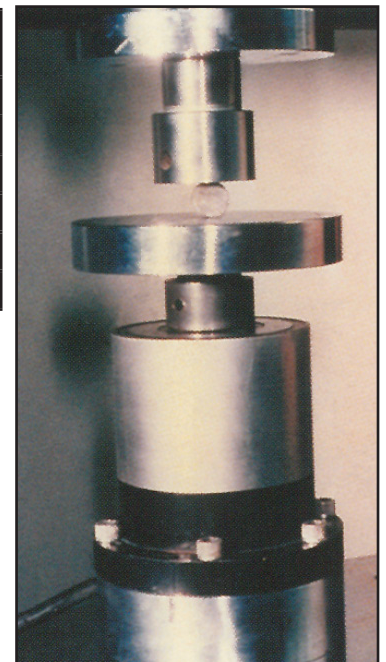
- Similar chemical and physical properties are evident between RESCO ceramic welds and their refractory hosts.

- The crystal structure of the ceramic weld modifies with time and temperature.

- RESCO welding powders and ceramic welds undergo rigorous laboratory testing to ensure that high standards are maintained.



	Silica Type 'S' ceramic weld	Silica Brick
Apparent density, pcf	113	109-114
Actual density, pcf	151	144-147
Open porosity, % volume	17	<21.0
Thermal conductivity, 1832 °F (BTU/(ft ² ,hr,°F, in))	11.7	11.8
Cold crush strength, psi	2755	>2900
Refractoriness under load (DIN 1064), °F	3000	3020



The interface bond is clearly shown in these ceramic weld samples prepared for physical and chemical analysis

Ceramic Welding Expert

Thomas Gisewhite



ES Silica
Weld Powder

Fireclay
Weld Powder

Silica
Weld Powder

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