



Protect your low NOx burner investment. Conforma Clad's tungsten carbide protection maintains critical burner component geometries, insuring that performance levels aren't sacrificed.

Conforma Clad Inc. has a proven solution to ensure that your Low NOx burner components maintain the performance that you expect.

Conforma Clad is an expert in the development and application of wear protection solutions for equipment in extreme environments, including Low NOx burners from Riley Power. Now with Conforma Clad's advanced wear protection, you get the best of both worlds – proven Low NOx burner technology that is able to maintain sustained performance by holding critical component geometries for extended run times.

The CCV[®] (controlled combustion venturi) burner was developed by Riley Power in the early 1980s to address the power industry's need for an efficient wall fired coal burner to reduce NOx emissions.

Conforma Clad provides extended performance for these CCV design features:

- Proprietary venturi coal nozzle that concentrates the coal to the center.
- Flame stabilizer ring that creates a recirculation zone for flame shape and stability.
- Low swirl spreader that divides the coal stream into 4 smaller streams.
- Spreader support tube that holds the spreader in place and can be used to house thermocouples and/or igniters.
- Protective sleeve that supports the inlet end of the spreader support tube.
- Spreader support tube legs that provide additional wear life by enabling rotation of support tubes.

Since NOx generation is affected by flame temperatures (increases exponentially at temperatures above 2750° F), short, highly turbulent flames (characteristic of earlier burner designs) generated NOx from the nitrogen & oxygen in the air used to burn the coal.

A new CCV[®] burner produces a less turbulent, slower mixing flame that results in lower NOx emissions.

Prior to Conforma Clad, Riley Power was using Stellite for wear protection on the leading edges of their Low NOx burner components. Typical replacement cycles for coal-fired applications were every 12-18 months.

Field tests show that Conforma Clad extends the operating life of these same burner components 2 to 3 times longer than that of the original unprotected component.

Integrated Coal Nozzle with Flame Stabilizer Ring

A new integrated coal nozzle with a flame stabilizer ring is now available for Riley Power CCV® Burners. The new design provides better flame attachment throughout the boiler range, and includes upgraded materials for longer service life.

The ring is now an integral part of the coal nozzle assembly, eliminating the mounting blocks and bolts used in previous versions. A 1" thick cast insert is protected by Conforma Clad tungsten carbide wear protection on the leading edges of the spreader support tube legs, the coal spreader, and flame

stabilizer ring. In addition, the latest wear resistant materials can be used in construction of the burner venturi. The support tube has been redesigned to include four support legs, allowing for periodic rotation to help extend the coal spreader wear life.

Combustion Improvements with a Conforma Clad Protected Flame Stabilizer Ring

- Better low-NOx flame attachment throughout the boiler load range
- Decreased slagging at the burner front
- Smaller secondary air diverter, minimizing surface area for slag attachment
- Decrease in NOx by 15% from previous NOx levels
- Decreased NOx sensitivity versus O2 levels
- Improvement in UBC trend

Unprotected components have the average wear rate of about 12 to 18 months. By cladding these components with Conforma Clad, you minimize the effects of severe wear and maintain OEM tolerances much longer. Although wear life is dependent on operating conditions, a 3+ year life is predictable with Conforma Clad's tungsten carbide protection.



ORDERING INFORMATION

Item	Description	CCI Reference Part Number
Flame Stabilizer Rings	Set of 4 Conforma Clad protected rings for 17" O.D. Coal Nozzle	RP-FSR-17-4
Flame Stabilizer Rings	Set of 4 Conforma Clad protected rings for 16" O.D. Coal Nozzle	RP-FSR-16-4
Flame Stabilizer Rings	Set of 4 Conforma Clad protected rings for 15" O.D. Coal Nozzle	RP-FSR-15-4
Flame Stabilizer Rings	Set of 4 Conforma Clad protected rings for 14" O.D. Coal Nozzle	RP-FSR-14-4



Riley Power CCV® Burner Assembly

Conforma Clad's tungsten carbide wear protection is in use with Low NOx burner components throughout the U.S. The areas indicated in blue show the key components affected by severe erosion that have benefited from Conforma Clad's technology.

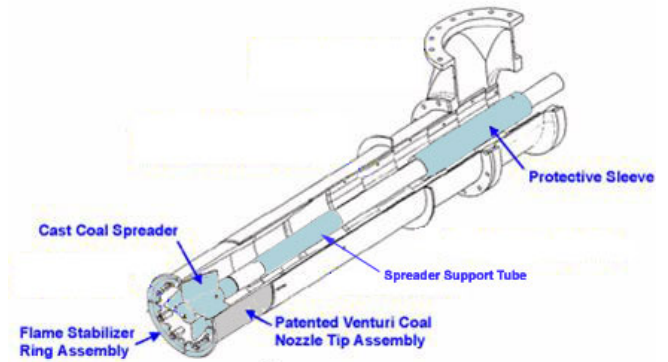


Figure 1 CCV® Burner Venturi Coal Nozzle Assembly

U.S. Patent 4,517,904



Riley Power's low-swirl coal spreader is an essential component in distributing pulverized coal to the burner flame. In order to maintain critical geometries and coal distribution patterns, the coal spreader fins are protected with Conforma Clad's tungsten carbide wear protection. Leading edges of the spreader fins receive an extra layer of protection.

ORDERING INFORMATION

Item	Description	CCI Reference Part Number
Coal Spreader	Conforma Clad protected coal spreader for 17" O.D. Coal Nozzle	RP-CS-17
Coal Spreader	Conforma Clad protected coal spreader for 16" O.D. Coal Nozzle	RP-CS-16
Coal Spreader	Conforma Clad protected coal spreader for 15" O.D. Coal Nozzle	RP-CS-15
Coal Spreader	Conforma Clad protected coal spreader for 14" O.D. Coal Nozzle	RP-CS-14



Conforma Clad's process uses infiltration brazing to bond tungsten carbide to the base material of a component forming a hard yet tough and uniform protective cladding that provides superior wear against abrasion, erosion, and corrosion, even under high temperature conditions. Because of its extremely high metallurgical bond strength, Conforma Clad resists abrasion up to 3-5 times

better than typical alumina ceramic tiles, which are also limited by their low adhesive bond strength. This severe wear protection maintains critical geometries of burner components, which means that coal spreaders, spreader tubes, spreader sleeves, and flame stabilizer rings can deliver the required performance until the plant's next scheduled outage.

Proprietary Riley Venturi Coal Nozzle concentrates the coal to the center. Pulverized coal is subsequently divided into smaller streams with the tungsten carbide clad low swirl spreader.

- The fuel inlet of the cast stainless steel venturi is protected with infiltration brazed tungsten carbide.
- One piece design provides for a smooth transition and the reduction of eddy currents that could potentially cause down stream wear.
- Superior erosion resistance of Conforma Clad's tungsten carbide material maintains critical geometries that directly impact optimal burner performance.



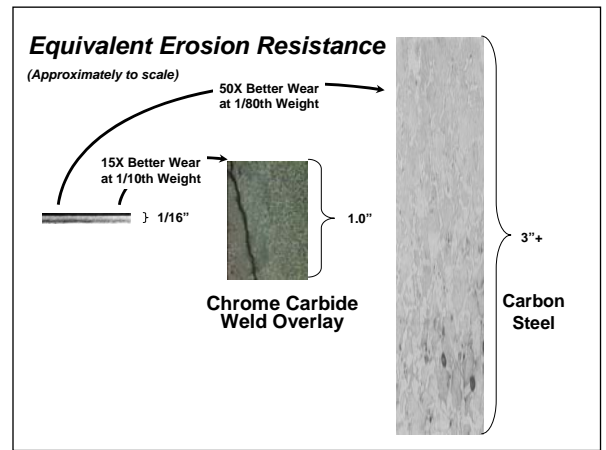
ORDERING INFORMATION

Item	Description	CCI Reference Part Number
Venturi Coal Nozzle	Conforma Clad protected 17" O.D. Venturi coal nozzle	RP-VCN-17
Venturi Coal Nozzle	Conforma Clad protected 16" O.D. Venturi coal nozzle	RP-VCN-16
Venturi Coal Nozzle	Conforma Clad protected 15" O.D. Venturi coal nozzle	RP-VCN-15
Venturi Coal Nozzle	Conforma Clad protected 14" O.D. Venturi coal nozzle	RP-VCN-14



Conforma Clad Performance Testing

One sixteenth inch (1/16") of Conforma Clad's tungsten carbide wear protection performs fifteen times (15X) better against erosive wear than an equivalent layer of chrome carbide weld overlay, and fifty times (50X) better than carbon steel. And because of its extremely high metallurgical bond strength, the cladding is up to five times (5X) more erosion resistant than typical nickel chromium alloy castings alone.



The stainless steel spreader support tube (shown on Page 3) is used to hold and maintain the spreader in the correct position. The tube has front supports (note latest versions have 4 legs which allows for repositioning in order to distribute wear).

The inner tube can be used to house thermo couplers and/or igniters.

The protective sleeve prevents pulverized coal from eroding the spreader support tube.

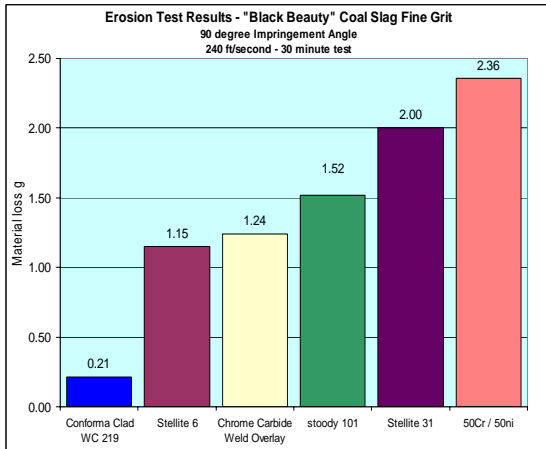
Air vanes are designed to direct the flow of air and pulverized coal.

ORDERING INFORMATION

Item	Description	CCI Reference Part Number
Spreader Support Tube	Conforma Clad Protected Spreader Support Tube	RP-SST-001
Protective Sleeve	Conforma Clad Protective Sleeve	RP-PS-001
Air Vane	Conforma Clad Protected Air Vane	RP-AV-001

Conforma Clad's Performance in the Power Generation Industry

Conforma Clad's tungsten carbide cladding provides unmatched resistance against abrasion, impact, erosion, and corrosion. While other forms of wear protection may be competitive against one of these forms of wear, only Conforma Clad offers protection against all four major forms of wear. With its high metallurgical bond strength and ability to withstand continuous operation at high temperatures, Conforma Clad is unmatched in burner applications.



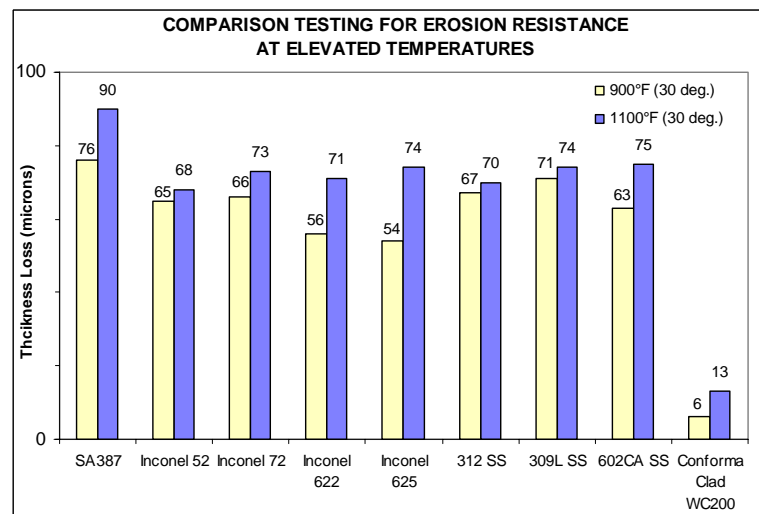
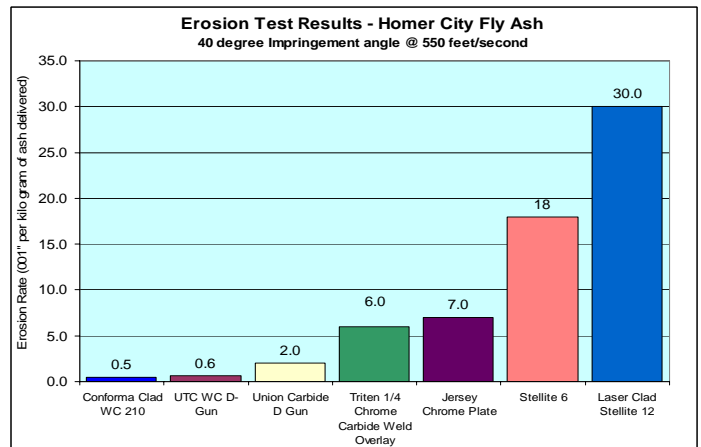
Erosion Resistance to "Black Beauty" Coal Slag

Erosion resistance is an indication of how well a material holds up to high velocity particles flowing across or into the material. Erosion resistance tests are used to quantify the amount of material lost over a certain period of operation under certain conditions.

Burner components are susceptible to erosion caused by high velocity coal and coal slag. Tests comparing the erosion protection capabilities of Conforma Clad against high velocity "Black Beauty" coal slag consistently show that Conforma Clad outperforms substitute materials in protecting critical geometry against wear.

Erosion Resistance to Homer City Fly Ash

Fly ash is a significant contributor to erosive wear in boiler applications, which include boiler tubes, furnace walls, turning vanes, struts, induced draft fans, and other ash handling components. Performance tests comparing Conforma Clad's erosion protection capabilities against high velocity Homer City fly ash, consistently shows Conforma Clad outperforms alternative erosion protection materials.



Erosion Resistance at High Temperatures

Comparison testing for erosion resistance at elevated temperatures was completed in November 2003. Test results confirm that Conforma Clad outperforms virtually all of the typically accepted alternatives for high temperature applications, including Inconels and 300 Series Stainless Steel.

TUNGSTEN CARBIDE CLADDING SPECIFICATIONS

Substrates:

Conforma Clad's tungsten carbide cladding can be applied to most carbon steels, precipitation hardened steels and most stainless steels.

Temperature:

Continuous operation at temperatures up to 1200°F (649°C) with no performance degradation. Ability to withstand transients in excess of 2000°F.

Chemical Resistance:

Compatible with chemicals commonly found in coal and fly ash including, hydrochloric acid, hydrogen fluoride and sulfuric acid.

HOW TO ORDER

A variety of Riley Power Low NOx burner components are available. Orders can be placed by calling Conforma Clad's Application Engineering Group at 812.948.2118 or Toll-Free 888.289.4590. For more information, you can call your local Conforma Clad Sale Representative, or contact us by e-mail at PGSales@conformaclad.com.

In order to insure that the correct component is ordered, we ask that you please supply the following information:

Utility or Customer Name	
Station Name	
Generating Unit Number	
Description of Component Requiring Wear Protection	
Coal Nozzle O.D.	
Burner Rotation (clockwise or counter clockwise)	
Quantity Required	
Requested Delivery Date	



Additional Conforma Clad Products for the Power Generation Industry

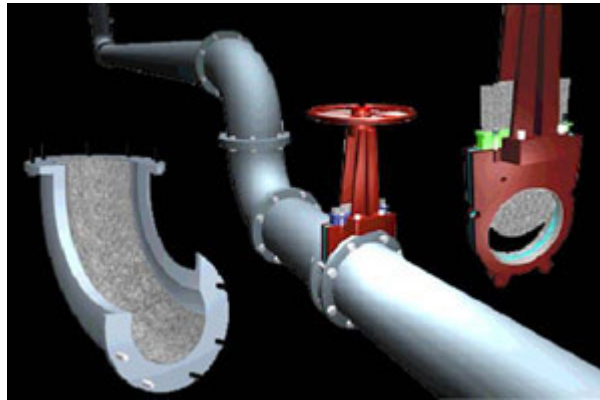


Fan Blades and Liners

- Induced Draft
- Forced Draft
- Hot Primary Air
- Cold Primary Air/Secondary Air
- Gas Recirculation
- Primary Air Booster
- Exhausters / Wizzers

Ash and Material Conveyance

- Piping
- Elbows
- Bearings & Shafts
- Hoppers
- Gates
- Augers Flights
- Cyclones
- Pitot Tubes
- Target Plates
- Rotary airlocks
- Combine tubes



Pulverizers

- Liners
- Ledge Covers
- Deflectors
- Rolls
- Bull Rings
- Wear Plates
- Exhausters

The Best Wear Protection. Period.

