



Module 2_{v2.0}

Next Generation Corrosion Under Insulation (CUI) Protection

Corrosion Under Insulation (CUI) is one of the costliest challenges facing the petrochemical industry today.

Find out how new CUI protective coatings from Sherwin-Williams extend lifecycles with improved corrosion resistance, flexibility and no loss of adhesion.










Heat-Flex Hi-Temp 1200

The industries next generation coating for use on high temperature steel up to 650°C.

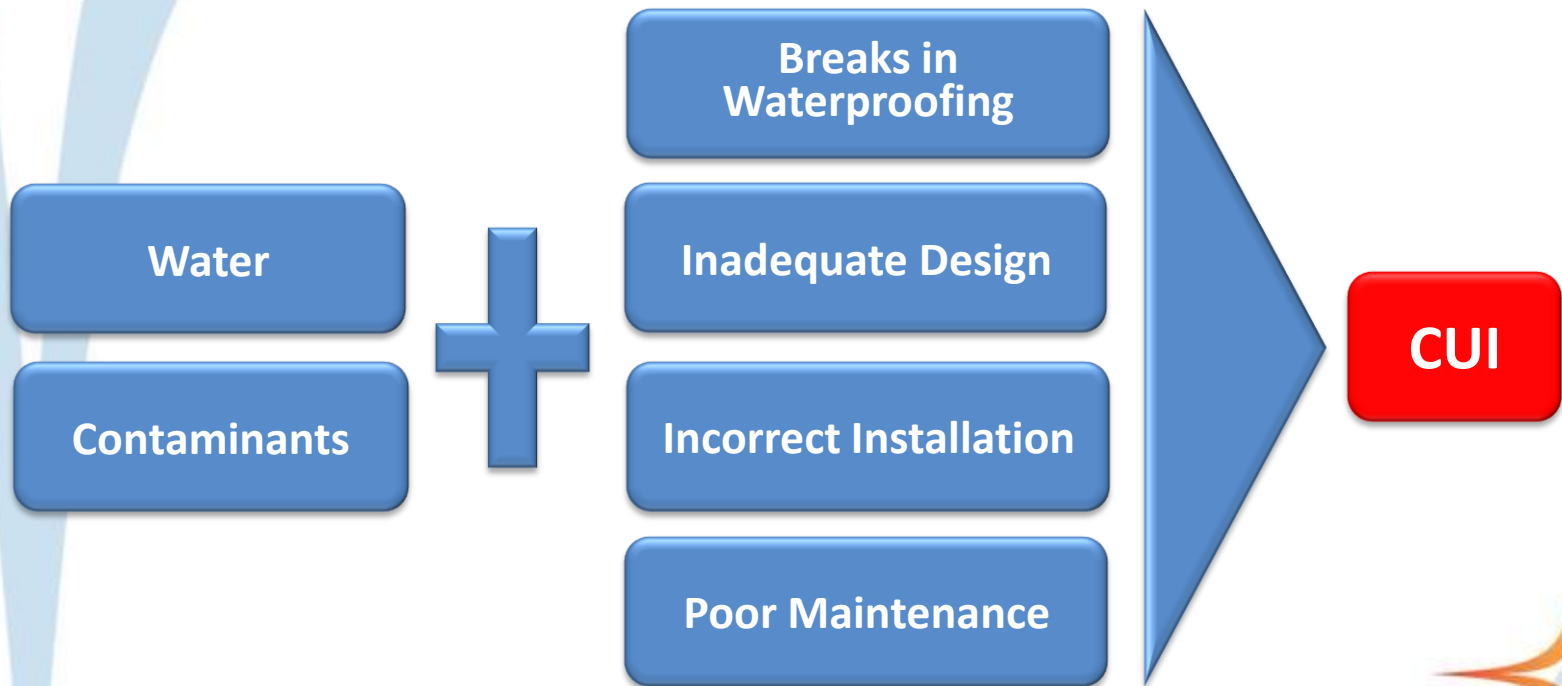
Designed to protect insulated pipes and tanks in high temperature environments from corrosion under insulation.

**SHERWIN
WILLIAMS.**

What is CUI?

-  Almost always a hidden problem
-  Observation ports give <1% visibility
-  Insulation only removed every 15-20 years
-  Coating failure & chemical attack cannot be observed
-  One of the costliest challenges attacking industry today
-  Can account for more unexpected downtime than all other causes combined
-  Serious safety implications

CUI Crime Scene



CUI Crime Scene



CUI Crime Scene



CUI Crime Scene





CUI Solutions

NACE maintains that protective coatings are the best defense against CUI in both:

- insulated carbon steel
- austenitic and duplex stainless steel

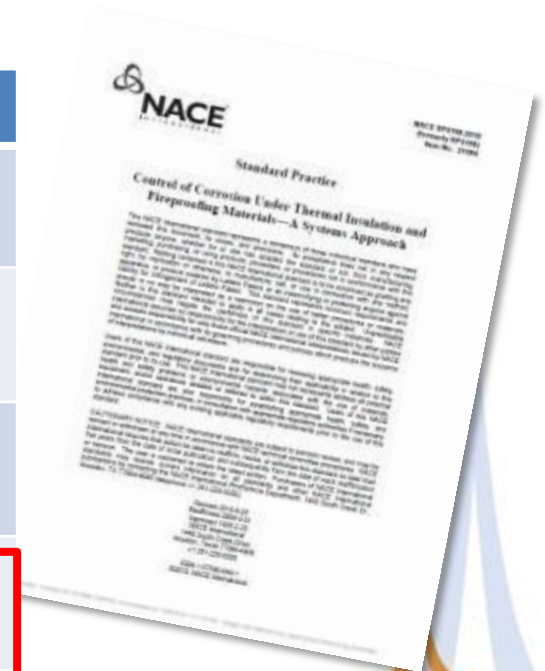
NACE SP0198-2010

Standard Practice for Control of Corrosion Under Insulation and Fireproofing Material



Sherwin-Williams Solutions

Product	Technology	Temp (°C)	DFT (µm)
Macropoxy 646 / C88	High build epoxy	-45 to 60	125-175
Phenicon HS / Epigrip C251	Epoxy phenolic	-45 to 150	2x 100-150
Epo-Phen FF	Epoxy novolac	-45 to 205	2x 100-200
Heat-Flex Hi-Temp 1200	Inert multi-polymeric matrix	-45 to 650	2x 100-150










Heat-Flex Hi-Temp 1200



A protective coating which not only combats CUI, but has **consistently outperformed alternative technologies** in rigorous tests for resistance to heat, corrosion and thermal shock.



Features

-  Provides corrosion protection in areas that also require heat resistance
-  Applicable over hot surfaces (up to 260°C)
-  Ambient cure
-  Surface tolerant
-  Effective under both acidic & alkaline insulation systems
-  Acceptable for use on cryogenic equipment
-  System DFT's as low as 250-300µm



Benefits

Second generation enhancements:

- ✦ Improved heat resistance
- ✦ Enhanced durability
- ✦ Tougher dry film - improved resistance to transportation damages
- ✦ Improved flexibility - copes better with cyclical temperature environments for high durability
- ✦ Faster dry to handle – reduced downtime
- ✦ Higher sol (vol) – lower VOC's

Film properties

<i>Enhanced Durability</i>	Heat-Flex Hi-Temp 1200	Comp A	Comp B
Abrasion Resistance (7 days)			
Milligram Loss (ASTM 4060)	189	863	695
Falling Sand (ASTM D968)	16.4 L/mil	2.4 L/mil	.8 L/mil
Flexibility (ASTM D522, 7 days)	1 3/4"	100% Failure	100% Failure
Direct Impact (ASTM D2794, 7 days)	80 in lb	<20 in lb	<20 in lb
Pencil Hardness (ASTM D3363, 7 days)	2H	4B	6B



Performance Data

➤ BOILING WATER TEST*

Scope: intended to test a coating designed for application to hot steel for resistance to heat, corrosion and thermal shock.

Objective: to test a coatings ability to

- 1 - protect steel from corrosion under boiling water conditions
- 2 - withstand severe temperature cycling for extended periods

* 80x (16h at 204°C dry + 8h at 99°C water)



Performance Data

➤ BOILING WATER TEST

BOILING WATER TEST RESULT

- ✓ No Adhesion Loss
- ✓ No Blistering
- ✓ Increased Flexibility



Performance Data

➤ CUI TEST*

Scope: an accelerated test to gauge a coatings performance in a real life scenario

Objective: to determine whether a coating will provide protection from corrosion under insulation (both acidic and alkaline) in cyclical temperature environment.

* 6 x (176°C in oven 7 days, water-saturated insulation 65°C 7 days)



Performance Data

➤ CUI TEST

CUI TEST RESULT

- ✓ Outperforming first generation products
- ✓ Excellent Rating for Rust
- ✓ Excellent Rating for Blistering

Performance Data

Corrosion Under Insulation, Calcium Silicate, 6 cycles



Competitor A Competitor B Heat-Flex[®] Hi-Temp 1200 Control Panel

Corrosion Under Insulation, Mineral Wool, 6 cycles



Competitor A Competitor B Heat-Flex[®] Hi-Temp 1200 Control Panel



Application

Customer Trial

Criteria	
Asset	Process Pipeline
Operating Temperature	Circa 190°C
Surface Prep	NACE2 / SSPC-SP10 / Sa2½
System	5 “single pass mist coats” to achieve 250µm dft
Application	Airless Spray, Graco X60 60:1 Ratio Pump



Application

Customer Trial : Feedback



“The application trial of Heat-Flex Hi-Temp 1200 was successful. The customer made very favourable comments on the ease of stirring the coating, application characteristics, film forming properties and the visual appearance (dry spray and defect free).”





Heat-Flex Hi-Temp 1200

- No Adhesion Loss
- Increased Flexibility
- Harder Initial Film
- Faster Dry Times

FEATURES

BENEFITS

- Advanced Corrosion Resistance
- Enhanced Durability
- Faster Shop Throughput

- Reduced Costs
- Saves Time
- Extended Lifecycle

VALUE PROPOSITION



Supporting White Paper

Corrosion Under Insulation The Hidden Problem

By Tim Hanratty

- CUI Exposures
- Hidden Threats
- Role of Protective Coatings
- Industry Standards





Heat-Flex Hi-Temp 1200

ReductionNot recommended*

Clean UpXylene, R2K4

Airless Spray

Unit.....30:1 Pump
Pressure.....2700 - 3000 psi
Hose.....3/8" ID
Tip0.017-.019
Filter60 mesh
Reduction.....Not recommended

Conventional Spray

GunGraco 700N
Fluid Tip0.045" - .055"
Air Nozzle.....20 cfm
Atomization Pressure.....50 psi
Fluid Pressure.....20 - 30 psi
Reduction.....Not recommended

Brush

Brush.....China bristle, small areas only
Reduction.....Not recommended

Roller

Cover1/2" woven with solvent resistant
core, small areas only
Reduction.....Not recommended

✦ Single pack, available in:

- 1 Gallon (3.78 L)

- 3 Gallon (11.34 L)

✦ Weight: 1.93 Kg/L





Heat-Flex Hi-Temp 1200

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	8.0 (200)	10.0 (250)
Dry mils (microns)	5.0 (125)	6.0 (150)
~Coverage sq ft/gal (m ² /L)	152 (3.7)	182 (4.5)
Theoretical coverage sq ft/gal (m ² /L) @ 1 mil / 25 microns dft	912 (22.3)	

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 8.0 mils wet (200 microns):

	@ 50°F/10°C	@ 77°F/25°C 50% RH	@ 120°F/49°C
To touch:	30 minutes	20 minutes	10 minutes
To handle:	90 minutes	60 minutes	30 minutes
To recoat:	3 hours	2 hours	1 hour
To ship:	24 hours*	24 hours	24 hours

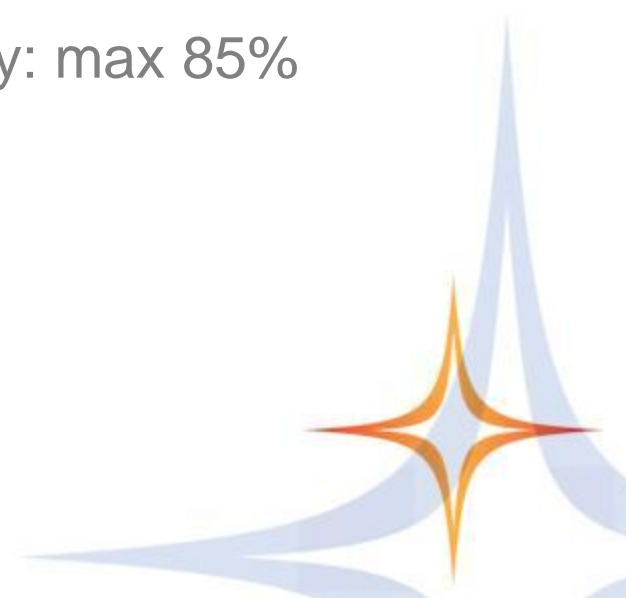
*Higher film build effects cure speed and increases ship time at lower temperatures.

Drying time is temperature, humidity, and film thickness dependent.

Shelf Life:	12 months, unopened at 77°F (25°C) Store indoors at 40°F (4.5°C) to 100°F (31°C)
Flash Point:	87°F (31°C) SETA
Reducer:	Not normally recommended*
Clean Up:	Xylene, R2K4

*Please see Performance Tips section

- ✦ Temperature (ambient & substrate):
 - min 10°C
 - max 49°C
- ✦ Relative humidity: max 85%





Any Questions?
