TECHNICAL PROPOSAL
Insulation of Skoda Turbine
Union BC

Section 1: Product Information

TEMP-COAT 101 is a spray applied liquid ceramic insulation capable of insulating substrates ranging from -80˚F to 350˚F. TEMP-COAT 101 adheres directly to the substrate blocking moisture and helping to curb CUI issues and provides a seamless insulating system. TEMP-COAT 101 is not affected by moisture and humidity like conventional insulation systems which insulating abilities severely diminish once exposed to environmental conditions.

TEMP-COAT 101 is the oldest registered name in liquid ceramic coatings and has been serving industry for over 20 years. TEMP-COAT 101 carries a 10 year product warranty which is the strongest in the insulation coating industry.

Section 2: Project Description

System: Turbine

Substrate Material: Carbon Steel

Internal Temperature of Substrate: 150˚C(302˚F)

Ambient Conditions: 25˚C(77˚F)

Project Requirements: Insulate turbine to maintain process temperature and provide personnel protection

Section 2: Heat Loss Calculations

Heat Loss/Gain Based on Internal Temperature of 150℃(302˚F)

SURFACE	HEAT LOSS @ 25℃(77˚F)
Bare Steel	1836 W/m²(582 BTU/hr/ft²)
3.5 mm of TEMP-COAT 101	173 W/m²(55 BTU/hr/ft²)

Recommendation:

- Based on the given ambient and substrate conditions, 3.5 mm of TEMP-COAT 101 should be used to insulate the turbine.

Material Estimation Chart

Substrate Temperature (C)	mm Thickness Recommendation	Coverage Rate SQFT/GAL **Including Loss Using Practical Coverage**	Gallons Needed to Cover _____sqm
150	3.5	6.5	

Section 3: Installation of TEMP-COAT 101

Surface Preparation

- Substrate shall be oil and contaminate free. Minimum surface preparation shall meet SSPC-2 requirements.

Substrate Surface Temperature

- Substrate temperature shall be a minimum of 45F and rising to ensure proper adhesion.

Application of TEMP-COAT 101

- Product shall be installed with Airless spray equipment with a minimum rating of 2 to 3 gallons/minute at 3000 psi. For small diameter piping and tight areas, the "Quick Gun" may be considered for application of TEMP-COAT. Additional information may be found in our literature.
- For substrates at ambient temperature, TEMP-COAT 101 shall be installed in 0.5mm (20mil) coats. Each coat shall be allowed to dry to the touch prior to re-coating.
- For substrates in operation and hot, the first 1 to 3 coats shall be applied in a mist coat. These mist coats will begin to alleviate the heat stress on the product to stop the later coats from blistering.
- In areas of frequent traffic, a fiberglass membrane may be utilized to minimize wear and to provide a textured walking surface.

Practical Application Thickness Guide

Degrees in Fahrenheit	Degrees in Centigrade	Thickness in Mils (1/1000s of an inch)	Thickness in 64ths o f an inch	Thickness in Millimeters
500*	260	250 - 280	280 = 18/64	280 = 7.0 mm
450*	232	210 - 250	250 = 16/64	250 = 6.0 mm
400*	204	160 - 210	210 = 13/64	210 = 5.0 mm
350*	177	130 - 160	160 = 10/64	160 = 4.0 mm
300	149	110 - 130	130 = 8/64	130 = 3.0 mm
250	121	80 - 110	110 = 7/64	110 = 2.5 mm
200	93	50 - 80	80 = 5/64	80 = 2.0 mm
32	0	15 - 20	20 = 1/64	20 = 0.5 mm
0	-18	20 - 40	40 = 3/64	40 = 1.0 mm
-30	-34	40 - 50	50 = 4/64	50 = 1.2 mm
-45	-40	50 - 60	60 = 5/64	60 = 1.5 mm

** Temperatures greater than 350^{o} F may require the use of TEMP-COAT HT high heat base priming system. Please consult your TEMP-COAT Brand Products representative.

Practical Application Thickness Guide

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250	121	80 - 110	110 = 7/64	110 = 2.5 mm
200	93	50 - 80	80 = 5/64	80 = 2.0 mm
32	0	15 - 20	20 = 1/64	20 = 0.5 mm
0	-18	20 - 40	40 = 3/64	40 = 1.0 mm
-30	-34	40 - 50	50 = 4/64	50 = 1.2 mm
-45	-40	50 - 60	60 = 5/64	60 = 1.5 mm

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Practical Coverage Chart

***Note: This chart provides practical coverage rates considering loss. TEMP-COAT 101 is 83% solids by volume and has a Theoretical Coverage of <u>66.6 ft²/gal</u>**

Mil Thickness Chart to Figure a Job

Desired Mil Thickness	Sq.Ft. per Gallon Divided by Factor	**Sq.Ft. per Gallon**
300 (300/1000)	60 ÷ 20 =	**3.0**
250 (250/1000)	60 ÷ 16.7 =	**3.6**
240 (240/1000)	60 ÷ 16.0 =	**3.75**
200 (200/1000)	60 ÷ 14.0 =	**4.25**
180 (180/1000)	60 ÷ 12.0 =	**5.0**
160 (160/1000)	60 ÷ 11.0 =	**5.5**
140 (140/1000)	60 ÷ 9.0 =	**6.5**
120 (120/1000)	60 ÷ 8.0 =	**7.5**
100 (100/1000)	60 ÷ 7.0 =	**8.5**
80 (80/1000)	60 ÷ 5.0 =	**12.0**
60 (60/1000)	60 ÷ 4.0 =	**15.0**
40 (40/1000)	60 ÷ 3.0 =	**20.0**
30 (30/1000)	60 ÷ 2.0 =	**30.0**
20 (20/1000)	60 ÷ 1.5 =	**40.0**
15 (15/1000)	60 ÷ 1.0 =	**60.0**

*** For detailed installation instructions, please consult our Installation Guide or call TEMP-COAT Brand Products for assistance. 1-800-950-9958; info@tempcoat.com**

TEMP-COAT 101®

Delta T Chart

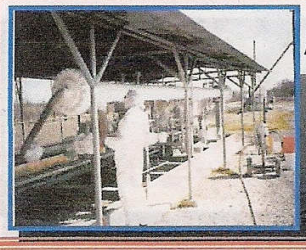
Mils

F°	20	40	60	80	100	120	140	160
430	290	265	240	190	170	160	155	150
400	278	240	210	170	160	155	153	148
370	255	237	192	158	150	148	145	145
340	225	215	170	162	142	138	134	130
280	200	190	155	120	110	106	106	102
250	165	160	130	100	95	85		
220	165	140	128	96	90	80		
160	115	95	85					
130	80	75						

THIS CHART IS DEVELOPED FROM INFORMATION GATHERED IN TWO INDEPENDENT TEST STUDIES.

THE EXTRAPOLATED DATA PRESENTED ABOVE WAS CREATED UNDER IDEAL LAB CONDITIONS.

IN PLANT OR EXTERIOR CONDITIONS RESULTS MAY VARY.



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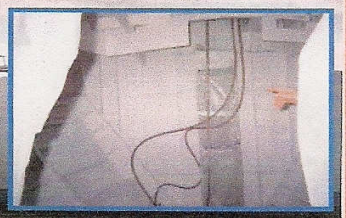

REDI-SPEC

I PRODUCTS

TEMP-COAT 101®

II Properties of TEMP-COAT®

Percent Solids by Volume: (+/-) 83%

Wet Weight: 5.25 lb/gal

Shipping Weight per 5gal pail: 28.5 lbs

Dry Weight: 0.8 oz/ft² @ 20 mils
4.0 oz/ft² @ 100 mils

Theoretical Coverage @ 20 mils:
66.6 ft²/gallon

Expected Coverage: Please see application guide or contact technical rep.

VOC Content: 0.0099 expressed per EPA Method 24 (weight fraction)

Thermal Value: $k_{(eqv)}$= 0.23 (Btu·in)/(hr·ft²·°F)

The operating temperature range for **TEMP-COAT®** can be from –80°F(-62C) to 400°F (+177C)*. It can be applied to temperatures ranging from 45°F to 350°F**. On extremely warm to hot surfaces, beginning coats must be thin to avoid blistering.

** In some instances for temperatures 350°F to 400°F a mesh/membrane must be used and the High Heat Application Instructions must be followed. Please consult technical representatives of TEMP-COAT® Brand Products

III DESCRIPTION

TEMP-COAT® is a general purpose insulation which comes in liquid form.

TEMP-COAT® liquid ceramic insulation is a thin film that performs extremely well on piping, tanks, air and heat duct work, exposed water pipes, oxygen lines, steam lines, chilled water lines, cryogenics, vehicle/transportation and has many other uses.

TEMP-COAT® provides an inexpensive alternative to the high cost of industrial insulations. Because it physically adheres to the surface that it is insulating, it significantly reduces (CUI) corrosion and rust formations found under conventional insulations.

Make Up: **TEMP-COAT®** is a complete mixture of various hollow silica and ceramic beads immersed in a high quality latex base with acrylic binders. This combination of materials makes the product extremely light weight and pliable, therefore, it expands and contracts with the surface to which it is applied.

TEMP-COAT® can be tinted virtually any medium to pastel color.

IV Benefits of TEMP-COAT®

- Curbs Corrosion Under Insulation (CUI) by adhering to the surface it insulates
- Ability to insulate at relatively thin film compared to conventional insulations
- Does not Require Jacketing
- Easily Repaired
- Ease of inspection
- Can be applied on surfaces up to 350°F without disruption of operations
- Will not absorb moisture or liquids
- Will not harbor bacteria, rodents or insects
- Eliminates waste
- Ease of Application

V. APPLICATION

Surface Preparation

Apply **TEMP-COAT®** on any clean, dry substrate which is free from oil, grease, wax or dirt and assuming the existing coating or surface is stable. A minimum of SP-2/SP-3 or equivalent. A sufficient amount of Primer on all surfaces prone to rust and to prevent bleed through is recommended.

Mixing

A rectangular Sheet Rock Mud paddle is needed to blend the product.*

Equipment

Spray equipment requirement: Pump capable of producing 2 to 3 gpm at 3000psi (28:1 ratio airless sprayer or larger) *

Our air assisted **"Quik-Gun"** is designed for small or hard to reach applications. This gun operates on 80 psi air supply.*

Brush and roller is only recommended for touch ups and repairs.*

Application Conditions:

Surface temperature should be 45°F and rising.*

Product should be applied in 20 mil coats, allowing the product to dry to the touch prior to successive coats. Total cure time is 24 hours under normal conditions.*

Clean-Up

TEMP-COAT® is a water based acrylic product. Clean up immediately after use with soap and water. *Caution:* Use drop cloths and necessary protection to prevent damage from drips or overspray under windy conditions.*

***Please see our Application/Instruction Manual.**

Distributed by:

TEMP-COAT® Is listed with the following:

Approved for use by:

TEMP-COAT® Brand Products, LLC

info@tempcoat.com · 1-800-950-9958

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VI APPROVALS & ACCEPTANCE

UL Listed: PD# 08M33835
CRRC Prod. ID 0998-0001
MAS Certified Green Product
Energy Star Partner
Lloyd's Register of Shipping #SAS FOI0506
GSA/NSN #8030 01 387 1027
Approved: U.S. Coast Guard, MLCA Std 6300N P .35
Accepted for Certification by: USDA Accepted by: FDA
Approved by: Dept. of Energy
Accepted by: Navy Safety & Survivability
Accepted by: British Royal Navy Health and Safety
S.I.C. Code: 5033
All Ingredients TSCA Listed

VII TEST RESULTS

TEMP-COAT® has been tested under a number of varying conditions to produce "R" factor equivalence which is available in the information below. The product has also undergone a number of ASTM tests including:

THERMAL PROPERTIES

Independent Thermal Evaluation: Thermal conductivity value determined by comparative testing.

$k_{(eqv)}$= 0.23 (Btu·in)/(hr·ft²·°F)

Thermal properties directly relate to the thickness of product required to insualte a given substrate.

CERTIFIED LAB & ASTM RESULTS

SOLAR REFLECTANCE RATING TESTED TO	87.7% Average	
EMITTANCE RATING	85%	
FLAMMABILITY		
FLAME SPREAD	5	ASTM E-84
SMOKE DEVELOPED	5	ASTM E-84
TOXICITY	0	ASTM E-84
MECHANICAL PROPERTIES		
CROSS HATCH ADHESION	100%	ASTM D-3359
TENSILE STRENGTH (LB/IN²)	66.7%	ASTM D-882
ELONGATION	65%	ASTM D-882
PHYSICAL PROPERTIES		
FUNGAL GROWTH	NONE	MIL-STD-810
VAPOR TRANSMISSION	0.635	ASTM E96, Meth. E
ACCELERATED AGING	200 HR. PASSSED	ASTM G-53
DENSITY (g/ch³) @ 24C DRIED FILM	0.41	ASTM D- 792
VOLUME NON-VOLATILES	43%	
VOLUME DRIED FILM	83% (+/-2)	
Ph	8.7	
SPECIFIC GRAVITYY	0.69	
HEAVY METALS	NONE DETECTED	
CHLROIDES - MERCURY	NONE DETECTED	

- SEVERE SERVICE AND WEATHER TESTING BY ARCO ALASKA, PROD. - APPROVED.
- PIPE COATING, SEVERE SERVICE FOR P&G - PASSED
- SALT FOG, McDONNELL DOUGLAS - 2,100 HRS PASSED
- PERSONNEL SAFETY TEST INGALLS SHIPBUILDING - PASSED
- DB INSERTION REDUCTION CHARACTERISTICS NOTED IN BOEING TESTS

ROOF COATING: THERMAL AND REFLECTIVE COMPARATIVE TESTING BY CERTIFIED LABS SHOW TEMP-COAT® EQUIVALENT TO 4" OF STYROFOAM RATED AT R-20

VIII OTHER EXCEPTIONAL FEATURES:

The product, in addition to its outstanding insulating qualities and superior adhesion, has low flame spread, is impact and abrasion resistant, is flexible and assists in protecting coated surfaces from wind driven rain, cold-heat cycling, chemical vapors and mildew. These qualities make it the standard in ceramic coatings.

IX SHIPPING AND SUPPLY METHOD

TEMP-COAT® Brand Products are available FOB shipping point or from a distributor near you. Call 1-800-950-9958 for availability in your area and price information.

X WARRANTY

Limited Warranty: TEMP-COAT® Brand Products, LLC. warrants TEMP-COAT® as an insulation under normal use and installation conditions for a period of 10 years from the date of application. Insul-All™ 8 years. Complete warranty and installation information is available upon request.

XI MSDS INFORMATION

All ingredients are TSCA registered and are not harmful. For Material Safety Data Information, contact TEMP-COAT® Brand Products, LLC 1-800-950-9958, Fax (985)651-2964,
E-mail INFO@TEMPCOAT.COM.

XII PRICE

Contact your local distributor or TEMP-COAT® Brand Products, LLC for cost information.

XIII SURFACES

TEMP-COAT® can be applied to any of the following clean, dry surfaces.

Steel Chrome Galvanize Aluminum Iron Fiberglass Brass Cloth Copper Stone Slate Stainless Tar Vinyl Glass Polyurethane Foam Plexi-glass Cardboard Paper Magnesium Plastic Glass Pipe Plastics Masonite Primed Surfaces Asbestos Fiberboard Painted Surfaces Wood Granulated Roof Shingles ...and many more

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