एनएमडीसी लिमिटेड
NMDC LIMITED

(भारत सरकार का एक उद्यम) (A Government of India Enterprise)
CORPORATE IDENTITY NUMBER : L13100AP1958GOI001674

NMDC

बैलाडीला आयरन ओर माइन, किरन्दुल कॉम्प्लेक्स
Bailadila Iron Ore Mine, Kirandul Complex

किरन्दुल – 494556, जिला – दक्षिण बस्तर दन्तेवाड़ा (छत्तीसगढ़) भारत KIRANDUL - 494556 Distt.- SOUTH BASTAR DANTEWADA (C.G.) INDIA

TO WHOM SOEVER IT MAY CONCERN

NO. BIOM/Kdl.-Comp./WCC/Civil / 9916 /2021 Dated29/ 04 /2021

1.	Name of work	: Providing and applying of heat reflective *paint on exterior roof surface for thermal* control at ,BIOM, Kirandul".
2.	Name of Agency	: M/s. Thermogreen Cool Coat Pvt. Ltd.
3.	W.O. No. & Date	: BPE/JGM(Engg.)/Thermogreen/BIOM / *Kirandul/2020 dtd. 20.02.2020*
4.	a) Work Order Value	: Rs. 10,50,990.24
5.	Period of completion	:03 (Three) months
6.	Due date of completion	: 31.10.2020 as per work order
7.	Actual date of Completion	: 31.10.2020
8.	Value of work done as per final bill	:Rs. 10,50,990.24
9.	Total value of free issue Materials used	: Rs. –NIL-
10.	Total value of work done up to final bill (*including Value of free issue materials)*	: Rs. 10,50,990.24

The contractor has completed the work satisfactorily

This certificate is being issued to the contractors on their own request.

29/4/21

उपमहाप्रबंधक (सिविल) विभागाध्यक्ष
Dy. General Manager (CME) HOD
D.G.M. (Civil) HOD
बैलाडीला लौह अयस्क खदान
Bailadila Iron Ore Mines
Kirandul Complex

Date: 30.06.2022

M/s Thermogreen Cool Coat Pvt. Ltd. was allowed for Trials and Implementation of Solar Heat Reflecting Coating System on Water Tank situated at Terrace of Tower- 4, Type-7,Kidwai Nagar East. They applied Thermacool Solar IR Heat Reflective Coating (Thermacool 0.3C) at the outer surface of the overhead tank on dated 28th April 2022. After application of said reflective paint the temperature of outer surface of the tank was noted. For comparison purpose the temperature of un-painted surfaces of another equivalent Tanks was taken simultaneously.

There was a significant difference in the temperatures of painted and unpainted tanks.

The Average difference between coated overhead tank and un-coated overhead tank was observed was 12°C approx. for 6 days at different times.

The above performance report is being issued on request of M/s Thermogreen Cool Coat Pvt. Ltd.

RPSingh 30/06/22

(R.P. Singh)
General Manager (Engg.)

Type-7, Tower-4 Terrace

Reflective Paint Reading

Sr. No.	Date	Time	OHT with paint Degree cel.	OHT without paint Degree cel.	Remarks
1.	06-06-2022	12:43 pm	47.4°C	64.2°C	Yash
2.	06-06-2022	02:15 pm	47.9°C	65.4°C	
3	07-06-2022	11:10 AM	39.7°C	44.2°C	Yash
4.	07-06-2022	12:14 PM	42.4°C	~~45.4°C~~ 52.5°C	Ramraj
~~5~~ 5.	07-06-2022	02:45 PM	43.2°C	~~46.8°C~~ 55.4°C.	
6.	08-06-2022	10:55 AM	42.8°C	50.2°C	
7.	08-06-2022	12:40 PM	46.2°C	57.6°C	Ramraj
8.	08-06-2022	03:20 PM	47.8°C	61.2°C	
9.	09-06-2022	11:05 AM	44.2°C	52.7°C	Yash
10.	09-06-2022	12:25 PM	46.4°C	58.3°C	
11.	09-06-2022	02:50 PM	47.3°C	60.6°C	
12.	10-06-2022	11:10 AM	41.6°C	49.8°C	Ramraj
13.	10-06-2022	12:35 PM	46.5°C	57.8°C	
14.	10-06-2022	02:50 PM	48.2°C	64.7°C	
15.	11-06-2022	11:15 AM	39.3°C	46.4°C	Yash
16.	11-06-2022	12:40 PM.	44.7°C	53.4°C	
17.	11-06-2022	03:20 PM	47.2°C	59.6°C	Ramraj
18.					
19.					

Amul Dairy, Anand - Application Report of Thermacool SHR Waterproofing System

Sr.No.	Parameter	Observation
1.	Location	Main Building Terrace
2.	WO Reference	K430132598, K430134324
3.	Products Used	Thermacool WP51, Thermacool 0.3C ***(Annexure 1)***
4.	Product Manufacturer	M/s Thermogreen Cool Coat Pvt. Ltd.
5.	Apply and Supply Contractor	M/s Thermogreen Cool Coat Pvt. Ltd.
6.	Application System and Method of Application for 5 Layer Thermacool SHR Waterproofing Coating 	a. Thorough Surface Preparation to remove dirt, dust, dried algae, loose held concrete etc. wire/power brush, chipping, grinding and high-pressure waterjet as needed. b. Opening of Crack. c. Saturating of Cracks and broken area with Thermacool WP51 Absorption coat and repairing with WP cement-sand mortar as needed. d. Application of Absorption coat on entire area. e. Filling of Cracks with Thermacool WP51 + Cement, Elastomeric Crack Filler and then sealing with Thermacool WP51 + Cement Elastomeric Waterproofing Coating. f. Application of 1st Coat of Thermacool WP51 + Cement Elastomeric Waterproofing Coating on entire area. g. Application of 2nd Coat of Thermacool WP51 + Cement Elastomeric Waterproofing Coating on entire area. h. Application of 1st Coat of Thermacool 0.3C Elastomeric Waterproofing Top Coat. i. Application of 2nd Coat of Thermacool 0.3C Elastomeric Waterproofing Top Coat.
7.	Date of Application	24th March – 1st April 2022
8.	Thickness of Coating System	Thermacool WP 51 Waterproofing Coat: 300 to 400 microns (each coat) Thermacool 0.3 C: 50 to 60 microns (each coat) Total DFT of System: 700 – 800 microns
9.	Min. Years of Service	5 years
10.	**Conclusion:**	A. The surface preparation done was mechanized and thorough. B. The product quality looked to be at par as explained to us. C. Application done was inspected and was fully satisfactory. D. The temperature difference is significant and can be felt vividly. E. Application picture and temp. reading attached as ***Annexure 2***

Amul is pioneer towards adopting green technology in dairy industry to reduce carbon footprints for sustainable growth. As a part of "Amul Green Initiative", we decided to implement Thermacool Coating technology at our head office building at Amul Dairy, Anand as we understood that the special type of roof top surface coating technology which contributes to reducing energy consumption thereby help reduce carbon emissions with significant reduction in surface temperature by around 20° C. The results of the coating however were above expectation since the reduction in the surface temperature of terrace from 59.6 °C to 38.4° C (i.e. about 21.2°C). With help of this coating, we can reduce large amount of electrical energy used for Air conditioning of industrial/ commercial buildings. Thermacool SHR coating can be a significant step towards clean and green energy initiates.

Mr. Amit Vyas
Managing Director
Amul Dairy, Anand

Amul Dairy, Anand - Application Report of Thermacool SHR Waterproofing System

Annexure 1

	**Thermacool WP 51** – It is a water-based nano enhanced UV resistant waterproofing clear coating having excellent compatibility with cement to form elastomeric waterproofing coat with + 450% elongation and tensile strength of min. 2.2 MPa. It is used as an absorption/pore sealing coat for concrete to eliminate the porosity and prevent the ingress of water and erosive and corrosive elements. It has excellent compatibility with cement to provide a waterproofing coating. Depending on the condition of the substrate and years of service needed, various coating systems can be applied along with Thermacool 0.3C. It's an eco-friendly product with proven performance and tested at IIT Labs. **Coverage:** 150 SqFt/Litre as Absorption Coat, 25 SqFt/Litre for each waterproofing coat. **Pack Size:** 20L Plastic bucket
	**Thermacool 0.3C** – It is water based 100% pure Acrylic, UV Resistance, Solar IR Heat reflecting Elastomeric coating with high SRI value and conforming to BIS Standard **IS 17218:2019**. This single component coating system designed to be applied on all types of cementitious surfaces like RCC roof, corrugated cement sheets, side walls etc. Modified and specially designed with true and performance pigments Thermacool 0.3C not only has UV resistant and excellent durability but also excellent elongation properties thus assisting crack bridging and water proofing when coated over waterproofing chemicals. It is a GRIHA Certified Product and is tested as per BIS and ASTM Standards at NABL approved Labs. **Coverage:** 35 SqFt/Litre for **2 Coats** **Pack Size:** 20L Plastic Bucket

Annexure 2

GRINDING

SCRAPING

OPENING OF CRACKS

BREAKING OF PILLARS

HIGH PRESSURE WATERJET CLEANING

REPAIR OF BROKEN AREAS

FILLING AND SEALING OF CRACKS

APPLICATION OF ABSORPTION COAT

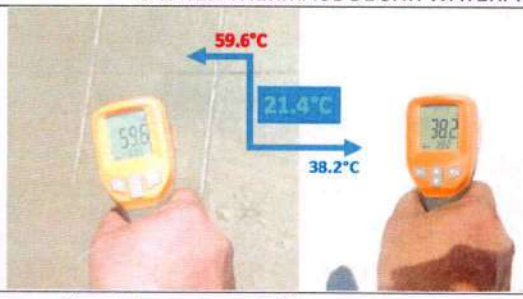
APPLN OF 1ST THERMACOOL WP COAT

APPLN OF 2ND THERMACOOL WP COAT

APPLN 1ST COAT OF THERMACOOL 0.3C

APPLN 2ND COAT OF THERMACOOL 0.3C

5 LAYER THERMACOOL SHR WATERPROOFING SYSTEM APPLICATION COMPLETED



Floor Temperature Difference – 21.4°C

Mumty Area Ceiling Temp Difference – 23.1°C

03rd Jan 2023

To Whom So It May Concern

Our terrace roof was in very bad condition with many cracks. As a result, there was heavy leakage in our rooms below and the condition was so bad that we even had to tie plastic sheets to avoid dripping water.

Nani Traps in bad shape

Condition of Leaking Terrace Roof

Multiple cracks on the roof

Bedroom covered with plastic sheet

Condition of Apartment Rooms

Fungal growth in rooms causing sickness

Thermacool SHR Waterproofing System was applied by M/s Thermogreen Cool Coat Pvt. Ltd. The quality of product appeared excellent and the quality of service was very technical and professional. The waterproofing system was a 5 coats system with assured life of 5 years. The project started on 31st July 2020 and got completed on 2nd Aug 2020.

Thoroughly Prepared Surface

Application of TC WP51 as Absorption Coat

TC WP51 Waterproofing 2 Coat Applied

Application of 2 Coats of TC 0.3C

In 2020 monsoon, from 3rd Aug 2020 to 6th Aug 2020, there was very heavy record-breaking rain of 46 years in Mumbai however there was no leakage in our apartment. In 2021 rainy season too, extremely heavy (over 3000 mm) rainfall was experienced along with Tauktae cyclone however none of our apartment rooms had any leakage i.e. **3 years of very good performance and still the 5 layer Thermacool SHR Waterproofing System looks very robust**. Our rooms also felt way cooler in summers whereas earlier it was unbearable because of heat radiating from ceiling. When we checked the roof in afternoon sun, we could easily walk over it barefoot.

The quality of product and quality of work done by M/s Thermogreen Cool Coat Pvt. Ltd. was very professional and to our satisfaction. We are very optimistic that it will provide the service of 5 years. Thermacool Brand Products that are development of IIT-Bombay, seems very genuine and I recommend Thermacool Coatings for anyone who wishes to use them.

(**Mr. Pabitra Gouda**)
Room 8, Bldg 169, Naval Civilian Residential Colony, Powai, Mumbai
Mob: 97028 65046, 97024 13525

(90)

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फैक्स/ Fax : 011-25671907

मुख्यालय
Headquarters
कमांडर वर्क्स इंजिनियर्स (एयर फ़ोर्स)
Commander Works Engineers (AF)
मिलिट्री इंजिनियर सर्विस
Military Engineer Service
पालम , दिल्ली कैंट – १०
Palam, Delhi Cantt

2000/AP/ 90 /E2

24 May 2022

HQ CE (AF) WAC Palam

TRIAL OF SOLAR HEAT REFLECTIVE PAINT : M/S THERMOGREEN COOL COAT PVT LTD

1. Delhi faces tremendous heat wave commencing April every year. The heat wave leads to discomfort and heavy reliance on cooling appliances resulting in high consumption of electricity as well as wear & tear of appliances and subsequent expenditure on maintaining them. A number of innovative ideas has been attempted with mixed results to lower the effect of heat on buildings by MES. Towards this, a new product, 'Thermacool 0.3C' was subjected to trials to AF Stn Palam in May 2022.

2. **Firm & Product**. M/s Thermogreen Cool Coat Pvt Ltd is a Mumbai based firm which jointly with IIT Bombay has developed Thermacool coating , a patented product. The coating provides innovative dual functions of high infra red heat reflection and heat insulation. The combined action of above mentioned results in a substantial temperature drop. The coating works with IR reflecting pigments which has a high solar reflectance index (SRIs) value of 102. It is supported by BIS standard IS 17218:2019. The firm claims that the coating reduces the roof top temperature by 15° to 20° C resulting in lowering of inner room temperature by 4° to 8°C. For buildings using HVAC equipments, the electricity consumption is reduced by 25-40%.

3. **Trial at 3 Wg AF**. Based on directions received from HQ WAC, a trial of Thermacool 0.3C coating was conducted at Palam in the first week of May 22. The coat painting was carried out at the roof of Jhelum Guest Room near officer Mess, RV Area of AFS Palam. The detailed report on the trial and the result obtained is attached at Appx 'A'.

4. **Comments on the Performance of Product**. The trial was conducted in the presence of the undersigned and CMD of M/s Thermogreen Cool Coat Pvt Ltd. The temperature reading in the uncoated part of the roof was found to be 57°C and that of the coated roof was 37°C . A temperature difference of almost 19° to 20°C was observed in the roof. Further the inside the building/ room, the effect was felt palpable and the occupants were comfortable even without the use of ceiling fan.

93	

2.../-

5. **Components.** The Solar reflective coat consist of two components as under:-

(a) **Thermacool WP 51**- A water-based nano enhanced UV waterproofing clear coating having excellent compatibility with cement elastomeric waterproofing coat with + 450% elongation and tensile strength 2.2 MPa. It is used as an absorption/pores sealing coat for concrete to eliminate porosity and prevent the ingress of water and erosive and corrosive elements. It excellent compatibility with cement to provide a waterproofing coating. Depending the condition of the substrata and years of service needed, various coating systems can be applied along with Thermacool 0.3C. It is an eco-friendly product with proven performance and tested at IIT Labs.

(i) **Coverage:** 150 Sq Ft/Litre as Absorption Coat, 25 SqFt/Litre for each waterproofing coat.

(ii) **Pack Size:** 20L Plastic Pail.

(b) **Thermacool 0.3C** It is water based 100% pure Acrylic, UV Resistance, Solar IR Heat reflecting Elastomeric coating with high SRI value and conforming to BIS Standard **IS 17218:2019.** This single component coating system designed to be applied on all types of cementitious surfaces like RCC roof, corrugated cement sheets, side walls etc. Modified and specially designed with true and performance pigments Thermacool 0.3C not only has UV resistant and excellent elongation properties thus assisting crack bridging and water proofing when coated over waterproofing chemical. It is a GRIHA Certified Product and is tested as per BIS and ASTM Standards at NABL approved Labs.

(i) **Coverage:** 35 SqFt/Litre for **2 Coats**

(ii) **Pack Size:** 20L Plastic Pails.

(c) The detailed method of Application is attached at Appx 'B'

6. **Cost Benefits analysis.** The quotation submitted by firm was analysed in detail by this office. The two type of products i.e. solar heat reflect and water proofing coat which is a 5 layer coat and the solar heat reflection coat which is a 3 layer coat to be applied on roof were analysed. The details are in subsequent Paras:-

7. The cost analysis for RV area buildings are as under:-

Ser No	Name of Bldg	Roof Area of single barrack	Cost for WPT and SHR (₹)	Amount (₹) (c x d)	Cost of SHR only	Amount (₹) (c x f)
(a)	(b)	(c)	(d)	(e)	(f)	(g)
01.	RV-Series	312.70	1100.00	3,43,200.00	410.00	1,28,200.00
02.	SV- Series	296.38	1100.00	3,26,000.00	410.00	1,21,500.00
03.	TMQ Block 'A'	900.25	1100.00	9,90,275.00	410.00	3,69,100.00
04.	HV Blocks	550.50	1100.00	6,05,500.00	410.00	2,25,700.00

3.../-

8. As it can be observed that the cost of 5 layered coating is almost three time the cost of 3 layer coating. The cost analysis does not include the cost to be incurred for cleaning of surface, roof and additional charges as applicable in a tender/contract .

9. **Implementation in RV Area.** According to the above data, a rough cost estimate for all OMQs of RV area was prepared. The details are as under:-

Ser No	Name of Bldg	Nos	Cost for SHR only	Amount
01.	RV-1 to RV-75	70	₹ 1,01,600/-	₹ 71,12,000/-
02	SV-1 to SV-12A	13	₹ 96,300/-	₹ 12,51,900/-
03.	TMQ 'A' Block to 'V' Block	12	₹ 2,92,500/-	₹ 35,10,000/-
04	HV-76 to HV-92	17	₹ 1,79,000/-	₹ 30,43,000/-
			Total	₹ 1,49,16,900/-
			Say Rs	₹ 150 lakhs

10. **Recommendation**. The following are the recommendation based on the findings of the trial:-

(a) **Efficiency of the product**. The product was found to efficient and has achieved result as claimed by the firm. The resultant cooling effect in the inner room will result in enhanced ever comfort and further reduction in electricity tariff.

(b) **Implementation.** Based on the cost analysis and Para 9 above, it is recommended that a special project be taken up at RV area of AFS Palam/Subroto Park of WAC and funds be allotted as a LBW/SR to roof. The buildings where the coating is to be done may be identified by the Stn in consultation with MES executives and work be sanction at HQ WAC level.

11. An exercise similar to Para 9 above is also being undertaken for Subroto Park on Priority.

12. For info and necessary action please.

(वी पी षजिल)
(V P Shajil)
कर्नल
Col
सी डब्लू ई (ए एफ) पालम
CWE (AF) Palam

Encls : (As above)

Copy to:-

HQ WAC, AF
Wks Section
Subroto Park

3 Wg AF
AF Stn Palam

HQ WAC (U), AF
Subroto Park

GE (AF) Palam

GE (AF) Subroto Park

} For info please.

Report

Application and performance report of Thermacool Solar Heat Reflective Coating on Indian Oil Corporation Limited, Pipelines Head Office Noida

Vendor	SNEH SALES CORPORATION Ground Floor (Western Side) KHEWAT NO 3
Vendor Code	13261226
PO Numbers	27513369 dated 18.01.2022 and 27671920 dated 21.03.2022
Site	Terrace of Indian Oil Bhawan, Pipelines Head Office, Noida-201301
Coating System & Product Applied	3 Layer Thermocool Solar IR Heat Reflective System confirming BIS Standard IS 17218:2019
Readings at ambient temperature of 45degC	

Time	Uncoated Surface Reading in °C	Coated Surface Reading in°C	Difference in°C
13:00 Hr	54.2	38.6	15.6
14:00 Hr	54.9	38.1	16.8

Step1: - Cleaning of roof with water

Step2:- Brooming of surface to identify the crake

Step3: - Application of WP51+Cement coat to fill the crakes in concrete

Step4:- Absorption coat applied for proper bonding of Thermacool

Step5: - Application of first coat of 0.3C Thermacool paint

Step6:- Application of second coat of Thermacool paint

Roof after final coat of paint

Conclusion: -

1. The 3-layer Thermacool Solar IR Heat Reflective System comprised of primer/absorption coat of Thermacool WP51 for pores sealing and as waterproofing coat by mixing with cement. This was top coated with 2 coats of Thermacool 0.3C coat of Thermacool 0.3C confirming to IS 17218:2019.
2. Temperature reduction by around 15 to 17 deg. C of the terrace roof was observed after the Thermacool System application. The reduction is on expected line considering the ambient temperature of 45deg C on the day of measurement. This reduction gets higher with higher ambient temperatures. The reduction will reduce the conduction of solar heat from the roof into the air-conditioned room below which reducing the power consumption.
3. On the larger perspective such saving of power by cool coated surfaces, will contribute to reducing the urban heat island effect proportionate to its area. It will also help to reduce the stress on the roof due to thermal expansion and contraction thus preventing cracking & leaking of substrate and increasing the service life of the roof.

प्रशान्त त्यागी / Prashant Tyagi
सहायक प्रबंधक (संपदा)
Assistant Manager (Estate)
इंडियन ऑयल कॉर्पोरेशन लिमिटेड
INDIAN OIL CORPORATION LIMITED
(पाइपलाइन्स प्रभाग/Pipelines Division)
ए-1, उद्योग मार्ग, सैक्टर-1, नौएडा-201301
A-1, UDYOG MARG, SECTOR-1, NOIDA - 201301

Trial Report of Thermacool SHR Waterproofing System at Central Railways

S.No.	Parameter	Observation
1.	Location	Railway Colony Mazagaon, G/Bldg., Transit Qtr., Sir JJ Road Nagpada, Byculla, Mumbai 400008
2.	Area of Application	Roof of Lift Room
3.	Products Used	Thermacool WP51, Thermacool 0.3C ***(Annexure 1)***
4.	Product Manufacturer	M/s Thermogreen Cool Coat Pvt. Ltd.
5.	Name of the Contractor	M/s Asdin Enterprises, Mumbai
6.	Application System and Method of Application for 5 Layer Thermacool SHR Waterproofing Coating 	a. Thorough Surface Preparation to remove porous deteriorated coal tar coating. b. Opening of Crack. c. Saturating of Cracks and Slab Joints with Thermacool WP51 Absorption coat. d. Application of Absorption coat on entire area. e. Filling of Cracks with Thermacool WP51 + Cement, Elastomeric Crack Filler. f. Sealing of filled crack with Thermacool WP51 + Cement Elastomeric Waterproofing Coating. g. Application of 1st Coat of Thermacool WP51 + Cement Elastomeric Waterproofing Coating on entire area. h. Application of 2nd Coat of Thermacool WP51 + Cement Elastomeric Waterproofing Coating on entire area. i. Application of 1st Coat of Thermacool 0.3C Elastomeric Waterproofing Top Coat. j. Application of 2nd Coat of Thermacool 0.3C Elastomeric Waterproofing Top Coat. k. Application Pictures are attached as ***Annexure 2.***
7.	Date of Application	23rd to 27th Sept 2020
8.	Thickness of Coating System	Thermacool WP51 Waterproofing Coat: 250 to 300 microns (each coat) Thermacool 0.3C: 50 to 60 microns (each coat) Total DFT of System: 600 – 700 microns
9.	Min. Years of Service	5 years
10.	**Conclusion:**	A. The product, coating system and application methodology is robust. B. A video representation of the application process is submitted to us. C. The coated surface was monitored for leakage and seepage of water and found to be impervious and leakproof. D. The room felt comparatively very cool after coating with Thermacool System.