DETAILED PROJECT REPORT

ON

ENERGY COST REDUCTION WITH INSULATION IMPROVEMENT BY INSULATION PAINT COATINGS

(BATALA, JALANDHAR, LUDHIANA FOUNDRY CLUSTER)

ENERGY IS LIFE

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Bureau of Energy Efficiency (BEE)

Prepared By

CII

Confederation of Indian Industry

Reviewed By

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ROTARY FURNACE INSULATION IMPROVEMENT BY INSULATION PAINT COATINGS

BATALA, JALANDHAR, LUDHIANA FOUNDRY CLUSTER

BEE, 2011

Detailed Project Report on Improvement in Insulation for The Rotary Furnaces in Foundry Units

Foundry SME Cluster, Batala, Jalandhar , Ludhiana (Punjab) (India)

New Delhi: Bureau of Energy Efficiency

Detail Project Report No.: **BJL/INS/RTFR/06**

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Acknowledgement

We are sincerely thankful to the Bureau of Energy Efficiency, Ministry of Power, for giving us the opportunity to implement the 'BEE SME project in "BJL Foundry Cluster, Batala, Jalandhar & Ludhiana". We express our sincere gratitude to all concerned officials for their support and guidance during the conduct of this exercise.

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CII – AVANTHA Centre for Competitiveness for SMEs, Confederation of Indian Industry (CII) is also thankful to Industry Associations for their valuable inputs, cooperation, support and facilitating the implementation of BEE SME program in BJL Foundry Cluster.

We take this opportunity to express our appreciation for the excellent support provided by Foundry Unit Owners, Local Service Providers, and Equipment Suppliers for their active involvement and their valuable inputs in making the program successful and in completion of the Detailed Project Report (DPR).

CII – AVANTHA Centre for Competitiveness for SMEs, Confederation of Indian Industry (CII) is also thankful to all the SME owners, plant in charges and all workers of the SME units for their support during the energy use and technology audit studies and in implementation of the project objectives.

CII – AVANTHA Centre for Competitiveness for SMEs

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List of Abbreviations

BEE	Bureau of Energy Efficiency
SME	Small and Medium Enterprises
DPR	Detailed Project Report
GHG	Green House Gases
PF	Power Factor
EEF	Energy Efficient Motor
CDM	Clean Development Mechanism
DSCR	Debt Service Coverage Ratio
NPV	Net Present Value
IRR	Internal Rate of Return
ROI	Return on Investment
FO	Furnace Oil
MT	Metric Tonne
SIDBI	Small Industries Development Bank of India

EXECUTIVE SUMMARY

Confederation of Indian Industry is executing BEE-SME program in Batala, Jalandhar and Ludhiana Foundry Cluster, supported by Bureau of Energy Efficiency (BEE) with an overall objective of improving the energy efficiency in cluster units.

Batala, Jalandhar and Ludhiana Foundry cluster, is one of the largest Foundry clusters in India; accordingly this cluster was chosen for energy efficiency improvements by implementing energy efficient measures / technologies, so as to facilitate maximum replication in other Foundry clusters in India. The main energy forms used in the cluster units are grid electricity & fuel.

Most of the Industrial installations in the country have large electrical loads which are severely inductive in nature, such as motors, large machines etc which results in a high power consumption and fuel consumption with harsh operating conditions measured 120 ^{0}C of skin and around 80 ^{0}C around the rotary furnaces.

Implementation and application of Insulation Paint will not reduce the running cost of the furnace but also will help in improving working environment. It helps in reducing the money spent on buying Furnace oil used as a fuel in a rotary furnace. Project implementation will lead to reduction in fuel bill by ` 20029 per year.

This DPR highlights the details of the study conducted for the Coating of Insulation Paint on the walls of melting Furnace, possible Energy saving and its monetary benefit, availability of the technologies/design, local service providers, technical features & proposed equipment specifications, various barriers in implementation, environmental aspects, estimated GHG reductions, capital cost, financial analysis, sensitivity analysis in different scenarios and schedule of Project Implementation.

This bankable DPR also found eligible for subsidy scheme of MoMSME for “Technology and Quality Upgradation Support to Micro, Small and Medium Enterprises” under “National Manufacturing and Competitiveness Programme”. The key indicators of the DPR including the Project cost, debt equity ratio, monetary benefit and other necessary parameters are given in table.

S. No.	Particular	Unit	Value
1	Project cost	`(in lakh)	0.21
2	Monetary benefit	`(in lakh)	0.20
3	Debit equity ratio	Ratio	3:1

S. No.	Particular	Unit	Value
4	Simple payback period	years	1.06
5	NPV	(in lakh)	0.54
6	IRR	%age	73.87
7	ROI	%age	28.29
8	Process down time	weeks	3
9	DSCR	Ratio	3.92
10	CO_2 reduction	Tonne/year	2.29

The projected profitability and cash flow statements indicate that the project implementation will be financially viable and technically feasible.

ABOUT BEE'S SME PROGRAM

Bureau of Energy Efficiency (BEE) is implementing a BEE-SME Programme to improve energy performance in 29 selected SMEs clusters. Batala, Jalandhar and Ludhiana Foundry Cluster is one of them. The BEE's SME Programme intends to enhance energy efficiency awareness by funding/subsidizing need based studies in SME clusters and giving energy conservation recommendations. For addressing the specific problems of these SMEs and enhancing energy efficiency in the clusters, BEE will be focusing on energy efficiency, energy conservation and technology up gradation through studies and pilot projects in these SMEs clusters.

Major Activities in the BEE - SME Program are furnished below:

Activity 1: Energy Use and Technology Audit

The energy use technology studies would provide information on technology status, best operating practices, gaps in skills and knowledge on energy conservation opportunities, energy saving potential and new energy efficient technologies, etc for each of the sub sector in SMEs.

Activity 2: Capacity Building of Stake Holders in Cluster on Energy Efficiency

In most of the cases SME entrepreneurs are dependent on the locally available technologies, service providers for various reasons. To address this issue BEE has also undertaken capacity building of local service providers and entrepreneurs/ managers of SMEs on energy efficiency improvement in their units as well as clusters. The local service providers will be trained in order to be able to provide the local services in setting of energy efficiency projects in the clusters.

Activity 3: Implementation of Energy Efficiency Measures

To implement the technology up gradation projects in clusters, BEE has proposed to prepare the technology based detailed project reports (DPRs) for a minimum of five technologies in three capacities for each technology.

Activity 4: Facilitation of Innovative Financing Mechanisms for Implementation of Energy Efficiency Projects

The objective of this activity is to facilitate the uptake of energy efficiency measures through innovative financing mechanisms without creating market distortion.

1. INTRODUCTION

1.1. Brief Introduction about the Cluster

Indian foundry industry is very energy intensive. The energy input to the furnaces and the cost of energy play an important role in determining the cost of production of castings. Major energy consumption in medium and large scale foundry industry is the electrical energy for induction and Arc furnaces. Furnace oil is used in rotary furnaces. In Small foundry industry, coal is used for metal melting in Cupola furnaces. The energy costs contribute about 25 - 30% of the manufacturing cost in Indian foundry industry.

There are approximately 450 units, engaged in Foundry Cluster (automobile parts, agricultural implements, machine tools, diesel engine components, manhole covers, sewing machine stands, pump-sets, decorative gates and valves) production. The major locations wherein the units are spread are G.T. Road, Industrial area, Focal Point in Batala. In Jalandhar Dada Colony Industrial Area, Focal point, Focal Point Extn, Udyog Nagar, I.D.C, Kapurthala Road & Preet Nagar. In Ludhiana Focal Point Phase 5 to 8, Janta Nagar, Bhagwan Chowk Area & Industrial area – A/B. .

Availability of Electricity in Batala – across Dhir Road, GT Road is an issue; power is available from the grid for maximum 12/14 hours a day. There are some units in Jalandhar and Ludhiana having induction furnace in the range of 500 kg to 1 ton capacity whereas other units which are using local scrap as well as have high melting temperatures are having cupola and rotary furnace and has a capacity of minimum 5 ton per day.

The foundry produces a wide variety of castings such as manhole covers, pipe and pipe fittings, sanitary items, tube well body, metric weights, automobile components, railway parts, electric motor, fan body etc. 90% of the castings produced are from the SSI sector.

1.1.1. Energy Usage Pattern

Major energy sources being used in foundry cluster are electricity and fuels such as Coal, Furnace Oil, and Diesel. Electrical energy is being used in melting of iron in induction furnaces, operation of electrical utilities and thermal energy is being used in cupola furnaces operation.

1.1.2. Classification of Units

Broadly units are classified with respect to production capacity;

- Large Scale Units

- Medium Scale Units
- Small Scale Units

1.1.3. Production Wise Unit Breakup

Foundry cluster at Batala, Jalandhar and Ludhiana can be broken into three categories viz. small, medium and large size unit. Table 1.2 shows that production wise breakup of Foundry cluster.

Table 1.1 Production Wise Unit Breakups

S. No.	Type of Unit	Production Capacity
1	Large scale unit	More than 1500 MT
2	Medium scale unit	250 to 1500 MT
3	Small scale unit	Less than 250 MT

1.1.4. Products Manufactured

Foundry SME cluster at Batala, Jalandhar and Ludhiana produces a wide variety of castings such as manhole covers, pipe and pipe fittings, sanitary items, tube well body, metric weights, automobile components, railway parts, electric motor, fan body etc.

1.2. Process Flow diagram of a Foundry Cluster

The manufacturing process is described as below;

Melting Section:

The raw material is melted in melting furnace. The melting furnace can be an induction furnace or rotary or arc furnace or cupola furnace. Molten metal from the melting furnace is tapped in Ladles and then transferred to the holding furnaces. Typically the holding furnaces are induction furnaces. The holding furnace is used to maintain the required molten metal temperature and also acts as a buffer for storing molten metal for casting process. The molten metal is tapped from the holding furnace whenever it is required for casting process.

Sand Plant:

Green sand preparation is done in the sand plant. Return sand from the molding section is also utilized again after the reclamation process. Sand Muller's are used for green sand preparation. In the sand millers, green sand, additives and water are mixed in appropriate proportion. Then the prepared sand is stored in bunkers for making moulds.

Pattern Making:

Patterns are the exact facsimile of the final product produces. Generally these master patterns are made of Aluminum or wood. Using the patterns the sand moulds are prepared.

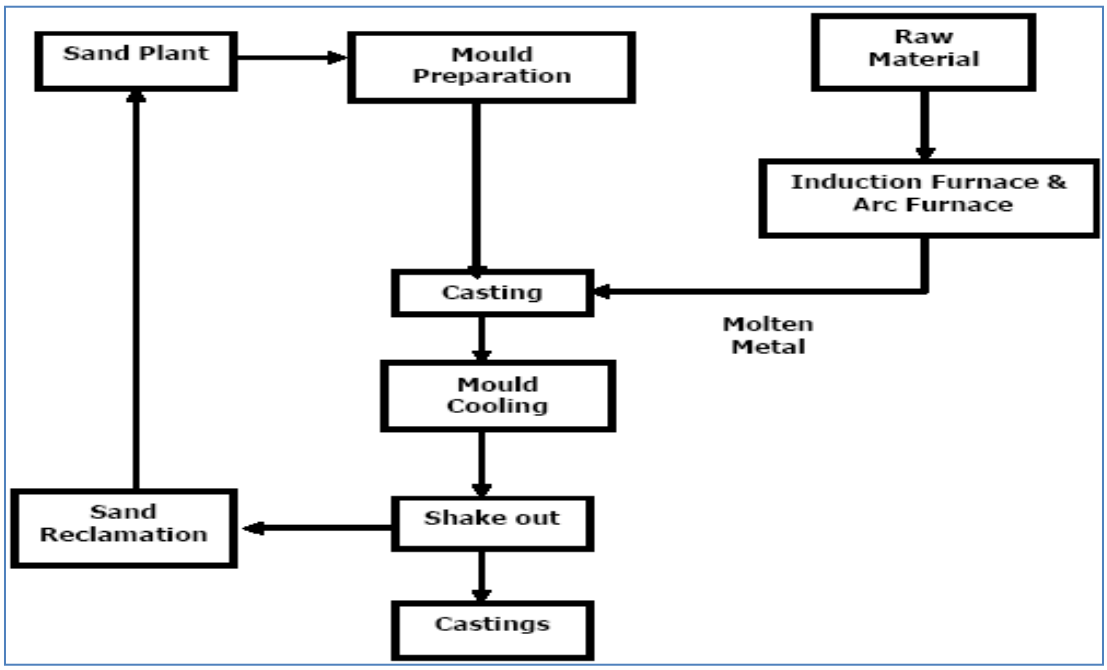

Figure 1.1 Process flow diagram of Typical foundry Units

Mould Preparation:

In small-scale industries still the moulds are handmade. Modern plants are utilizing pneumatic or hydraulically operated automatic molding machines for preparing the moulds. After the molding process if required the cores are placed at the appropriate position in the moulds. Then the moulds are kept ready for pouring the molten metal.

Casting:

The molten metal tapped from the holding furnace is poured into the moulds. The molten metal is allowed to cool in the moulds for the required period of time and the castings are produced. The moulds are then broken in the shake out for removing the sand and the used sand is sent back to the sand plant for reclamation and reuse. The castings produced are sent to fettling section for further operations such as shot blasting, heat treatment etc. depending upon the customer requirements.

1.3. Energy performance in existing situation

Major energy sources being used in foundry cluster are electricity and fuels such as Coal, Furnace Oil, and Diesel. Electrical energy is being used in melting of iron in induction furnaces, operation of electrical utilities and thermal energy is being used in cupola furnaces operation.

1.3.1. Average Production

The Average Production of the Foundry Units in above mentioned category during Year 2009-10 are as follows;

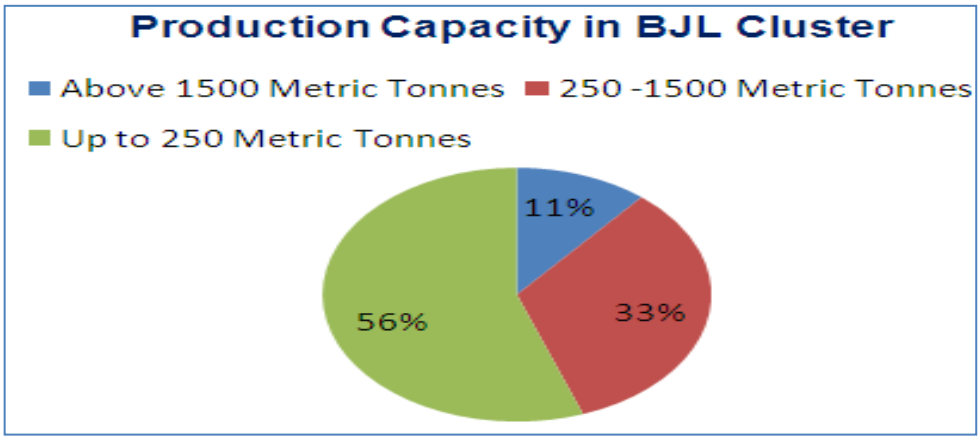

Figure 1.2 Production Capacity BJL Foundry cluster

Table 1.2 Annual Production Capacities

S. No.	Production Capacities	% of Units
1	Above 1500 Metric Tonne	11
2	250 to 1500 Metric Tonne	33
3	Below 250 Metric Tonne	56

1.3.2. Energy Consumption

Energy consumption (electrical) in a typical Foundry plant for different types of products is given in Table 1.3 below:

Table 1.3 Annual Energy Consumption (Electricity)

Electricity Consumption Pattern	Unit Consumed in kWh	Total Unit Consumption kWh
Blower Motor for Cupola	962100	26.92 Lakhs
Rotary Motor for Rotary Furnace	330000	
Melting material in Induction Furnace	1400000	

Table 1.4 Annual Energy Consumption (Coal & Furnace Oil)

Thermal Energy Consumption Pattern	Consumption per Year
Coal for Cupola	5000 Metric Tonnes

Thermal Energy Consumption Pattern	Consumption per Year
Furnace Oil for Rotary Furnace	17.8 Lakhs Litter

1.3.3. Specific Energy Consumption

Specific energy consumption of Foundry units depends upon the production capacity & their corresponding power consumption. Specific energy consumption also depends on type of furnace. A brief summary of specific energy consumption depending upon type of furnace is shown in below table;

Table 1.5 Specific Energy Consumption

S. No	Types of Furnace	Types of Fuel	Specific Fuel Consumption / One kg Molten Material	Cost of Fuel in `
1	Cupola	Coal	0.2 kg	2.6
2	Rotary Furnace	Furnace Oil	0.15 Lt	4.20
3	Arc / Induction Furnace	Electricity	0.72 kWh	3.6

**Assuming Coal rate Rs.15.0 /kg*

**Assuming F.O rate Rs. 28.0 /Lt.*

**Assuming electricity rate Rs 5.0/kWh*

1.4. Proposed Technology/Equipment

1.4.1. Description about the existing technology

Rotary Furnace is mainly used in Foundry industry to produce molten material for castings. Furnace oil is used as a fuel in the rotary furnace. Surface temperature of the rotary furnace was observed to be 120 deg C as compared to the ambient temperature of around 40deg C. This leads to the radiation loss and raise in surrounding temperature which was measured to be around 80 to 90 deg C. This radiation loss can be reduced by providing insulation paint on the outer surface of the rotary furnace. Rotary furnace insulation improvement, will lead to saving in furnace oil consumption in rotary furnace. Presently many of the Foundry units in Batala, Jalandhar and Ludhiana are operating with rotary furnaces. Furnace oil is used as a fuel in these furnaces. Damaged or less insulation leads to excessive radiation loss from the outer surface. A coating of insulation paint on the outer surface will optimize the radiation loss and will also reduce the consumption of furnace oil.

1.5. Establishing the Baseline for the Proposed Technology

Presently many of the Foundry units in Batala, Jalandhar and Ludhiana are operating with rotary furnaces. Furnace oil is used as a fuel in these furnaces. Damaged or less insulation leads to excessive radiation loss from the outer surface. A coating of insulation paint on the outer surface will optimize the radiation loss and will also reduce the consumption of

furnace oil. The existing energy consumption profile of the Rotary furnace is tabulated below:

Table 1.6 Baseline Consumption

S. No.	Parameters	Units	Existing System
1.	Skin Temperature of Rotary (T_S)	^0C	120
2.	Ambient Surrounding Temperature (T_A)	^0C	40
3.	Surface Area of Furnace	M^2	5
4.	Surface Heat Loss	Kcal/Hr.	4371
5.	Calorific value of fuel	Kcal/lit	10500
6.	Fuel Wastage per hour	kg/ hr	0.42
7.	Operating hours 8*250	hrs	2000
8.	Annual Fuel Wastage due to Radiation heat losses from surface of the Furnace	Lit/ Year	833
9.	Rate of Fuel	`/ Lit	28
10.	Cost of Fuel	`	23312.61

1.6. Barriers in adoption of proposed technology

1.6.1. Technological Barrier

- Due to lack of technical knowledge and expertise, conventional cupola furnaces are used in the Foundry units.
- In this cluster, like many others, there is lack of leadership to take up the energy efficiency projects in the plant.
- The majority of the foundry plant owners are only concern about their production instead on efficiency improvement.
- Dependence on local equipment suppliers for uninterrupted after sales service

1.6.2. Financial Barrier

Availing finance is not the major issue. Among the SMEs, the larger units, if convinced they are capable of either financing it themselves or get the finance from their banks. The smaller units will require competitive loan and other support to raise the loan. However as most of them have been able to expand their setup and grow, there is readiness to spend for energy efficiency technologies which have good returns. Energy Efficiency Financing Schemes such as SIDBI's, if focused on the cluster, will play a catalytic role in implementation of identified energy conservation projects & technologies.

1.6.3. Skilled Manpower

In Foundry cluster at Batala, Jalandhar and Ludhiana, the availability of skilled manpower is one of the limitations; this issue gets further aggravated due to more number of Foundry units as compared to the availability of skilled manpower. For major equipments of Foundry units like Rotary furnace for maintenance or the repair works of these equipments take care by the equipment suppliers itself.

2. PROPOSED TECHNOLOGY

2.1. Detailed Description of Technology

2.1.1. Description of Technology

Furnaces installed in the Foundry industry at Batala, Jalandhar and Ludhiana were studied from the insulation perspective to avoid the heat loss due to radiation from the surface from the furnace.

Efficiency of the rotary furnace is around 30% to 40% and remaining 60% to 70% are losses from the furnace. Out of these losses, a significant percentage is the radiation loss from the surface of the furnace. The inner insulation is done by refractory bricks. If this insulation is found to be proper, the outside surface temperature of the furnace should also be checked. If it is observed to be very high as compared to the ambient temperature it will lead to radiation loss. This radiation loss can be reduced by insulating the outer surface of the furnace by insulation paint coating. This improvement in insulation will lead to saving in fuel consumption the rotary furnace.

One of the important aspects in this work is to maintain the repaired insulation which can be done by checking the surface temperature timely. Units need to keep thermocouple & infra read gun type portable temperature measuring instruments to measure the surface temperature and plant persons should check it themselves status of the insulation. Both of these instruments are extremely cost effective.

To sustain the improved insulation level, insulation levels must be regularly checked. If timely corrective actions are not taken then the losses may increase. This measure can be implemented during annual shut down period to avoid loss of production. To maintain the sustainability of achieved results from the insulation improvement, awareness creation is mainly required. Loss quantification due to poor insulation needs to be explained by the LSP to the unit owners, and then this will drive the unit owners to maintain the implemented and achieved results of insulation improvement project on a regular basis.

2.1.2. Technology Specification

For implementation of the proposed project, skin of the rotary furnace should be regularly monitored by thermometer and when required the coating of the insulation paint could be done. There are various vendors in the market for the insulation paint and the technology specifications are provided by them in the quotation provided by them.

Table 2.1 Technical specifications

No.	*Parameter*	*Specification*
1.	Curing Schedule	Chemical curing 12 hours (After mixing base to hardener in given ratio)
2a.	Consistency	Slight texture
2b.	Viscosity	ford cup 4 90 ±3 sec @25 ^{0}C
3.	Finish	semi glossy
4.	Colour	Diamond white
5.	Fastness to light	To pass the test
6.	Scratch Hardness	No such scratch as to show the bare metal after heating for more than 24 hrs above 100 ^{0}C
7.	Flexibility and adhesion after 48 hours of curing	No visible damage or detachment of the film after put in use for 48 hrs
8.	Protection against corrosion under condition of condensation	No signs of corrosion
9.	Resistance to petroleum hydrocarbon/solvent 145/205	No permanent injury to film
10.	Flash point (minimum)	30 ^{0}C
11.	Delivery	Within three weeks from the date of receipt of Purchase order
12.	Volume solids.	40% minimum
13.	Heat Resistance	upto 400 ^{0}C
14.	Solvent	UGAM thinner for heat resistant Paints
15.	Covering	Maximum 25 sq ft per liter should be applied for optimum results

2.1.3. Suitability or Integration with Existing Process and Reasons for Selection

This is the simplest and widely accepted measure for energy cost reduction in all the industries. It does not affect the process but improves the process efficiency since these furnaces save fuel consumption.

Rotary Furnace is mainly used in Foundry industry to produce molten material for castings. Furnace oil is used as a fuel in the rotary furnace. Surface temperature of the rotary furnace was observed to be 120 deg C as compared to the ambient temperature of around 40deg C. This leads to the radiation loss and raise in surrounding temperature which was measured to be around 80 to 90 deg C. This radiation loss can be reduced by providing insulation paint on the outer surface of the rotary furnace. Rotary furnace insulation improvement, will lead to saving in furnace oil consumption in rotary furnace. The proposed insulation paint will reduce the skin temperature to 60 deg C and

surrounding temperature to gradually lower nearer to the ambient level of temperature around the furnace. Presently many of the Foundry units in Batala, Jalandhar and Ludhiana are operating with rotary furnaces. Furnace oil is used as a fuel in these furnaces. Damaged or less insulation leads to excessive radiation loss from the outer surface. A coating of insulation paint on the outer surface will optimize the radiation loss and will also reduce the consumption of furnace oil.

Advantages:-

- High efficiency
- Less losses

Efficiency of the rotary furnace is around 30% to 40% and remaining 60% to 70% are losses from the furnace. Out of these losses, a significant percentage is the radiation loss from the surface of the furnace. The inner insulation is done by refractory bricks. If this insulation is found to be proper, the outside surface temperature of the furnace should also be checked. If it is observed to be very high as compared to the ambient temperature it will lead to radiation loss. This radiation loss can be reduced by insulating the outer surface of the furnace by insulation paint coating. This improvement in insulation will lead to saving in fuel consumption the rotary furnace.

2.1.4. Availability of Technology

Now days when fuel cost is high, improper or less insulation leads to excess fuel consumption. As far as technology is concerned Insulation Paints are available in local/ national market. It is well proven technology which is adopted in many of the other similar and dissimilar units. Local vendors can arrange Insulation Paints at order. Local service providers are also available at Batala, Jalandhar and Ludhiana. More details of service provider are given in annexure 6.

2.1.5. Source of Technology

Local and National vendors and brands are widely available in the market. The quotations were invited to furnish insulation paint placed at annexure 7.

2.1.6. Terms and Conditions after Sale

Warranty period of one year will be provided from the date of invoice against any manufacturing defects. Details are provided in Annexure 7.

2.1.7. Process down Time during Implementation

Technology provider will bring the complete setup for the proposed project from their site and make all the arrangements for implementation at the client's site. And the process

will be effected for a period of 2 to 3 weeks, when all the required is at the client's site.

2.2. Life Cycle Assessment

Life of the proposed Rotary furnace insulation paint will be around 3 to 5 years which will depend upon the operating conditions and maintenance at client's side.

2.3. Suitable Unit for Implementation of the Identified Technology

For estimation of the saving potential on implementation of this project, here the Foundry units engaged in making castings, having rotary furnaces could be considered.

3. ECONOMIC BENEFITS FROM PROPOSED TECHNOLOGY

3.1. Technical Benefits

3.1.1. Electricity savings per year

Project of Installation of Insulation paint on the walls of oil fired furnace will not result in savings of electricity consumption but will lead to reduction in the fuel consumption 715 lit per year of furnace oil.

3.1.2. Improvement in product quality

This project is not contributing to any improvement in product quality.

3.1.3. Improvement in production

This project is not contributing for increasing in production in Foundry units. But it reduces the fuel consumption by 715 lit per year of furnace oil for producing the same casting.

3.1.4. Reduction in raw material consumption

Raw material consumption will not change year after the implementation of the proposed project.

3.1.5. Reduction in other losses

This project contributes in reduction of radiation losses, which results in the savings of fuel consumed and enhance efficiency of the furnace.

3.2. Monetary Benefits

Annual monetary savings on implementing coating of insulation paint on oil fired furnace will be **`20029** per year with reduction in consumption in fuel (FO) is estimated to be about **715** lit per year of furnace oil for producing the same casting.

Table 3.1 Monetary savings

S. No.	Parameters	Units	Existing System	Proposed System	Savings
1.	Skin Temperature of Rotary (T_S)	^0C	120	60	--
2.	Ambient Skin Temperature (T_A)	^0C	40	40	--
3.	Surface Area of Furnace	M^2	5	5	--
4.	Surface Heat Loss	Kcal/Hr.	4371	794	3577
5.	Calorific value of fuel	Kcal/lit	10000	10000	10000
6.	Fuel Wastage per hour	kg/ hr	0.44	0.08	0.36

S. No.	Parameters	Units	Existing System	Proposed System	Savings
7.	Operating hours 8*250	hrs	2000	2000	2000
8.	Annual Fuel Wastage due to Radiation heat losses from surface of the Furnace	Lit/ Year	874	159	715
9.	Rate of Fuel	`/ Lit	28	28	28
10.	***Cost of Fuel***	`	***24478.25***	***4448.94***	***20029***
11.	***Annual Monetary savings***	`	**--**	**--**	***20029***
12.	Cost of Proposed Insulation Paint	`	--	--	***21284***
13.	**Pay back**	Years	--	--	**1.06**

3.3. Social Benefits

3.3.1. Improvement in Working Environment in the Plant

The proposed system will burn the fuel efficiently, so less fuel would be required every batch thus working environment in the plant will be cleaner when compared to the existing system.

3.3.2. Improvement in Skill Set of Workers

The technical skills of workers will definitely improve. Training on the regular maintenance will help in improving the technical understanding of the workers.

3.4. Environmental Benefits

The major GHG reduction would be in CO_2 reduction. Emission reductions are estimated around 2.29 tons of CO_2 per annum.

4. INSTALLATION OF THE PROPOSED TECHNOLOGY

4.1. Cost of Technology Implementation

The cost of technology quoted by the vendor is ` 21284.

Table 4.1 Details of Proposed Technology Installation Cost

S. No.	Particular	Cost in `
1	Cost of Primer Required	4875
2	Cost of Top Coat Required	5400
3	Cost of Thinner required	787.5
4	Cost of Paint	11062.5
5	Taxes 2% CST against Form C	221.25
6	Misc. Costs	10000
7	Total Insulation Painting Cost	21284

4.1.1. Technology Cost

Cost of the project is about ` 21284 which includes the purchase of Insulation Paint for rotary Furnaces. Details of the cost calculations are given at annexure 2.

4.1.2. Other Cost

Other costs required will be `0.10 Lakh which includes commissioning, manpower cost, transportation contingency etc.

4.2. Arrangements of Funds

4.2.1. Entrepreneur's Contribution

Entrepreneur will contribute 25% of the total project cost which is `0.05 Lakhs.

4.2.2. Loan Amount

Remaining 75% cost of the proposed project will be borrowed from bank, which is ` 0.16 Lakhs.

4.2.3. Terms & Conditions of Loan

The interest rate is considered at 10% which is normal rate of interest for energy efficiency projects. The loan tenure is 5 years excluding initial moratorium period is 6 months from the date of first disbursement of loan.

4.3. Financial Indicators

4.3.1. Cash Flow Analysis

Profitability and cash flow statements have been worked out for a period of 8 years. The financials have been worked out on the basis of certain reasonable assumptions, which

are outlined below. The cost of equipment considered is inclusive of hot water storage tanks also.

- The Operation and Maintenance cost is estimated at 4 % of cost of total project with 5 % increase in every year as escalations.
- Interest on term loan is estimated at 10 %.
- Depreciation is provided as per the rates provided in the companies Act.

Based on the above assumptions, profitability and cash flow statements have been prepared and calculated in Annexure-3.

4.3.2. Simple Payback Period

The total project cost of the proposed technology is ***`21284*** and monetary savings due to reduction in electricity consumption is ***`20029*** hence, the simple payback period works out to be 1.06 years.

4.3.3. Net Present Value (NPV)

The Net present value of the investment at 10% works out to be 0.54 Lakhs.

4.3.4. Internal Rate of Return (IRR)

The after tax Internal Rate of Return of the project works out to be 73.87%. Thus the project is financially viable.

4.3.5. Return on Investment (ROI)

The average return on investment of the project activity works out at 28.29%.

Table 4.2 Financial Indicators of Proposed Technology

S No	Particular	Unit	Value
1	Simple Payback	Year	1.06
2	NPV	` In Lakh	0.54
3	IRR	%age	73.87
4	ROI	%age	28.29
5	DSCR	Ratio	3.92

4.4. Sensitivity analysis in realistic, pessimistic and optimistic scenarios

A sensitivity analysis has been carried out to ascertain how the project financials would behave in different situations like when there is an increase in rupees savings or decrease in rupees savings. For the purpose of sensitive analysis, two following scenarios have been considered.

- **Optimistic scenario (Increase in monetary savings by 5%)**

- **Pessimistic scenario (Decrease in monetary savings by 5%)**

In each scenario, other inputs are assumed as a constant. The financial indicators in each of the above situation are indicated along with standard indicators.

Table 4.3 Sensitivity Analysis in Different Scenarios

Scenario	Monetary Benefit(`Lakh/year)	IRR (%)	NPV(in Lakh)	ROI (%)	DSCR
Pessimistic	0.19	69.52	0.50	28.18	3.72
Base	0.20	73.87	0.54	28.29	3.92
Optimistic	0.21	78.21	0.57	28.39	4.12

4.5. Procurement and Implementation Schedule

Procurement and implementation schedule required for implementation of this technology is about 8 weeks and 2 to 3 weeks required as a process break down. Details of procurement and implementation schedules are shown in Table 4.4 below

Table 4.4 Procurement and Implementation Schedule

S. No.	Activities	Weeks						
		1	2	3	4	5	6	7
1	Identification of Rotary Furnace for Insulation Improvement							
2	Planning and material order							
3	Procurement							
4	Commissioning							

ANNEXURES

Annexure 1: Energy audit data used for baseline establishment

S. No.	Parameters	Units	Existing System
1.	Skin Temperature of Rotary (T_S)	^0C	120
2.	Ambient Surrounding Temperature (T_A)	^0C	40
3.	Surface Area of Furnace	M^2	5
4.	Surface Heat Loss	Kcal/Hr.	4371
5.	Calorific value of fuel	Kcal/lit	10500
6.	Fuel Wastage per hour	kg/ hr	0.42
7.	Operating hours 8*250	hrs	2000
8.	Annual Fuel Wastage due to Radiation heat losses from surface of the Furnace	Lit/ Year	833
9.	Rate of Fuel	`/ Lit	28
10.	Cost of Fuel	`	23312.61

Rotary Furnace is mainly used in Foundry industry to produce molten material for castings. Furnace oil is used as a fuel in the rotary furnace. Surface temperature of the rotary furnace was observed to be 120 deg C as compared to the ambient temperature of around 40deg C. This leads to the radiation loss and raise in surrounding temperature which was measured to be around 80 to 90 deg C. This radiation loss can be reduced by providing insulation paint on the outer surface of the rotary furnace. Rotary furnace insulation improvement, will lead to saving in furnace oil consumption in rotary furnace. Presently many of the Foundry units in Batala, Jalandhar and Ludhiana are operating with rotary furnaces. Furnace oil is used as a fuel in these furnaces. Damaged or less insulation leads to excessive radiation loss from the outer surface. A coating of insulation paint on the outer surface will optimize the radiation loss and will also reduce the consumption of furnace oil.

Annexure 2: Detailed Technology Assessment Report

S. No.	Parameters	Units	Existing System	Proposed System	Savings
1.	Skin Temperature of Rotary (T_S)	^0C	120	60	--
2.	Ambient Skin Temperature (T_A)	^0C	40	40	--
3.	Surface Area of Furnace	M^2	5	5	--
4.	Surface Heat Loss	Kcal/Hr.	4371	794	3577
5.	Calorific value of fuel	Kcal/lit	10000	10000	10000
6.	Fuel Wastage per hour	kg/ hr	0.44	0.08	0.36
7.	Operating hours 8*250	hrs	2000	2000	2000
8.	Annual Fuel Wastage due to Radiation heat losses from surface of the Furnace	Lit/ Year	874	159	715
9.	Rate of Fuel	`/ Lit	28	28	28
10.	***Cost of Fuel***	`	***24478.25***	***4448.94***	***20029***
11.	***Annual Monetary savings***	`	***--***	***--***	***20029***
12.	***Cost of Proposed Insulation Paint***	`	--	--	***21284***
13.	***Pay back***	Years	--	--	**1.06**

Breakup of Cost

Parameter	*Units*	*Value*	*liter Required***	*For better Finish sqft per lit***	*coats****	*% of Thinner Required***
Surface Area of Furnace	M^2	5	--	--	--	--
Surface Area of Furnace	Ft^2	51.5	--	--	--	--
Primer Required	***Lit***	***6.18***	***6.50***	25	3	15
Top Coat Required	***Lit***	***4.12***	***4.50***	25	2	10
Thinner	***Lit***	***3.43***	***4.50***	--	--	--

*Parameter***	*Units*	*Value***
Rate of Primer Required	`/ Lit	750
Rate of Top Coat Required	`/ Lit	1200
Rate of Thinner required	`/ Lit	175
Cost of Primer Required	`	***4875***
Cost of Top Coat Required	`	***5400***
Cost of Thinner required	`	***787.5***

* Coats required for Desired Results

** Calculated As per Quotations

Rotary Furnace is mainly used in Foundry industry to produce molten material for castings. Furnace oil is used as a fuel in the rotary furnace. Surface temperature of the rotary furnace was observed to be 120 deg C as compared to the ambient temperature of around 40deg C. This leads to the radiation loss and raise in surrounding temperature which was measured to be around 80 to 90 deg C. This radiation loss can be reduced by providing insulation paint on the outer surface of the rotary furnace. Rotary furnace insulation improvement, will lead to saving in furnace oil consumption in rotary furnace. The proposed insulation paint will reduce the skin temperature to 60 deg C and surrounding temperature to gradually lower nearer to the ambient level of temperature around the furnace. Presently many of the Foundry units in Batala, Jalandhar and Ludhiana are operating with rotary furnaces. Furnace oil is used as a fuel in these furnaces. Damaged or less insulation leads to excessive radiation loss from the outer surface. A coating of insulation paint on the outer surface will optimize the radiation loss and will also reduce the consumption of furnace oil.

Annexure 3: Detailed Financial Calculations

Name of the Technology	Insulation Paint		
Rated Capacity	**Heat resistance upto 400 ^{0}C**		
Details	**Unit**	**Value**	**Basis**
Installed Capacity	Heat resistance	400 ^{0}C	
No. of Operating Days	Days	250	
No. of Shifts/ Hours	No. / Hours	1 / 8	
Proposed Investment			
Plant & Machinery	` (in lakh)	0.11	
Civil Work	` (in lakh)	0.00	
Erection & Commissioning	` (in lakh)	0.00	
Misc. Cost	` (in lakh)	0.10	
Total Investment	` (in lakh)	0.21	
Financing pattern			
Own Funds (Equity)	` (in lakh)	0.05	Feasibility Study
Loan Funds (Term Loan)	` (in lakh)	0.16	Feasibility Study
Loan Tenure	Years	5.00	Assumed
Moratorium Period	Months	6.00	Assumed
Repayment Period	Months	66.00	Assumed
Interest Rate	%age	10.00%	
Estimation of Costs			
O & M Costs	% on Plant & Equip	4.00	Feasibility Study
Annual Escalation	%age	5.00	Feasibility Study
Estimation of Revenue			
Coal Savings	Liter/Year	715	
Cost of Coal	`/liter	28	
St. line Depn.	%age	5.28	Indian Companies Act
IT Depreciation	%age	80.00	Income Tax Rules
Income Tax	%age	33.99	Income Tax

Estimation of Interest on Term Loan **` (in lakh)**

Years	Opening Balance	Repayment	Closing Balance	Interest
1	0.16	0.01	0.15	0.02
2	0.15	0.02	0.13	0.01
3	0.13	0.03	0.10	0.01
4	0.10	0.04	0.06	0.01
5	0.06	0.04	0.02	0.00
6	0.02	0.02	0.00	0.00
		0.16		

WDV Depreciation **`(in lakh)**

Particulars / years	1	2
Plant and Machinery		
Cost	0.21	0.04
Depreciation	0.17	0.03
WDV	0.04	0.01

Projected Profitability **` (in lakh)**

Particulars / Years	1	2	3	4	5	6	7	8
Electricity savings	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Total Revenue (A)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Expenses								
O & M Expenses	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total Expenses (B)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PBDIT (A)-(B)	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Interest	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00
PBDT	0.17	0.18	0.18	0.18	0.19	0.19	0.19	0.19
Depreciation	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PBT	0.16	0.17	0.17	0.17	0.17	0.18	0.18	0.18
Income tax	0.00	0.05	0.06	0.06	0.06	0.06	0.06	0.06
Profit after tax (PAT)	0.16	0.12	0.11	0.11	0.11	0.11	0.11	0.11

Computation of Tax **` (in lakh)**

Particulars / Years	1	2	3	4	5	6	7	8
Profit before tax	0.16	0.17	0.17	0.17	0.17	0.18	0.18	0.18
Add: Book depreciation	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Less: WDV depreciation	0.17	0.03	-	-	-	-	-	-
Taxable profit	0.00	0.14	0.18	0.18	0.19	0.19	0.19	0.19
Income Tax	-	0.05	0.06	0.06	0.06	0.06	0.06	0.06

Projected Balance Sheet **` (in lakh)**

Particulars / Years	1	2	3	4	5	6	7	8
Share Capital (D)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Reserves & Surplus (E)	0.16	0.28	0.39	0.50	0.61	0.72	0.83	0.95
Term Loans (F)	0.15	0.13	0.10	0.06	0.02	0.00	0.00	0.00
Total Liabilities (D)+(E)+(F)	0.37	0.46	0.54	0.61	0.68	0.77	0.89	1.00
Assets	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Gross Fixed Assets	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Less Accumulated Depreciation	0.01	0.02	0.03	0.04	0.06	0.07	0.08	0.09
Net Fixed Assets	0.20	0.19	0.18	0.17	0.16	0.15	0.13	0.12
Cash & Bank Balance	0.17	0.27	0.36	0.44	0.52	0.63	0.75	0.88
TOTAL ASSETS	0.37	0.46	0.54	0.61	0.68	0.77	0.89	1.00
Net Worth	0.22	0.33	0.44	0.55	0.66	0.77	0.89	1.00
Debt Equity Ratio	2.85	2.40	1.80	1.05	0.30	0.00	0.00	0.00

Projected Cash Flow **` (in lakh)**

Particulars / Years	0	1	2	3	4	5	6	7	8
Sources									
Share Capital	0.05	-	-	-	-	-	-	-	-
Term Loan	0.16								
Profit After tax		0.16	0.12	0.11	0.11	0.11	0.11	0.11	0.11
Depreciation		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total Sources	0.21	0.17	0.13	0.12	0.12	0.12	0.12	0.12	0.12
Application									
Capital Expenditure	0.21								
Repayment Of Loan	-	0.01	0.02	0.03	0.04	0.04	0.02	0.00	0.00

Particulars / Years	0	1	2	3	4	5	6	7	8
Total Application	0.21	0.01	0.02	0.03	0.04	0.04	0.02	0.00	0.00
Net Surplus	-	0.17	0.10	0.09	0.08	0.08	0.11	0.12	0.12
Add: Opening Balance	-	-	0.17	0.27	0.36	0.44	0.52	0.63	0.75
Closing Balance	-	0.17	0.27	0.36	0.44	0.52	0.63	0.75	0.88

IRR **` (in lakh)**

Particulars / months	0	1	2	3	4	5	6	7	8
Profit after Tax		0.16	0.12	0.11	0.11	0.11	0.11	0.11	0.11
Depreciation		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Interest on Term Loan		0.02	0.01	0.01	0.01	0.00	0.00	-	-
Cash outflow	(0.21)	-	-	-	-	-	-	-	-
Net Cash flow	(0.21)	0.19	0.14	0.13	0.13	0.13	0.13	0.12	0.12
IRR	73.87 %								
NPV	0.54								

Break Even Point **` (in lakh)**

Particulars / Years	1	2	3	4	5	6	7	8
Variable Expenses								
O & M Expenses (75%)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Sub Total(G)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Fixed Expenses								
O & M Expenses (25%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on Term Loan	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00
Depreciation (H)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Sub Total (I)	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01
Sales (J)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Contribution (K)	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Break Even Point (L= G/I)%	16.44%	14.23%	12.89%	11.13%	9.14%	7.51%	7.35%	7.44%
Cash Break Even {(I)-(H)}%	10.64%	8.42%	7.07%	5.30%	3.30%	1.66%	1.49%	1.57%
Break Even Sales (J)*(L)	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.01

Return on Investment **` (in lakh)**

Particulars / Years	1	2	3	4	5	6	7	8	Total
Net Profit Before Taxes	0.16	0.17	0.17	0.17	0.17	0.18	0.18	0.18	1.38
Net Worth	0.22	0.33	0.44	0.55	0.66	0.77	0.89	1.00	4.86
									28.29%

Debt Service Coverage Ratio **` (in lakh)**

Particulars / Years	1	2	3	4	5	6	7	8	Total
Cash Inflow									
Profit after Tax	0.16	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.72
Depreciation	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.07
Interest on Term Loan	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.06
Total (M)	0.19	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.84

DEBT

Interest on Term Loan	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.06
Repayment of Term Loan	0.01	0.02	0.03	0.04	0.04	0.02	0.00	0.00	0.16
Total (N)	0.03	0.04	0.04	0.05	0.04	0.02	0.00	0.00	0.22
DSCR (M/N)	7.24	3.75	3.00	2.69	2.90	7.62	0.00	0.00	3.92
Average DSCR	3.92								

Annexure 4: Procurement and implementation schedule

S. No.	Activities	Weeks						
		1	2	3	4	5	6	7
1	Identification of Rotary Furnace for Insulation Improvement							
2	Planning and material order							
3	Procurement							
4	Commissioning							

Annexure 5: Break-up of Process down Time

S No	Activities	Weeks		
		1/8	7/8	8/8
1	Identification of Rotary Furnace			
2	Surface coating and drying			
3	Testing & Trial			

Annexure 6: Details of technology service providers

S. No.	Source of product	Details of Local vendor / service provider
1.	Leader Paints	**Nitin Shah** Managing Director, Ugam Chemicals, shop no 1, Vinayak Apartments, 387, Narayan Peth, Pune, 411 030 Tel- 09371012245 website: www.leaderpaints.com
2.	Vijay Agencies	**Mr.Jagdish Agarwal** Opp Shiv Mandir , Station Bazaria,Sawai-Madhopur Tel 07462-220678 (O) 222577 (R)

Annexure 7: Quotations or Techno-commercial bids for new technology /equipment

From: Nitin Shah [mailto:ugamchem@hotmail.com]
Sent: Thursday, July 28, 2011 12:53 PM
To: gagandeep.mohey@cii.in
Subject: RE: CII - BEE Cluster - Insulation Paint Quotation Request

Dear Sir,
the rates are as follows.

1. UGAM P U S I T I primer----------750 rupees per liter----------
   covering 30 sq ft in three coats.
2. UGAM P U S I T I TOPCOAT----------1200 rupees per liter----------
   covering 40 sq ft in two coats.
3. UGAM THINNER FOR H R coatings----------175 rupees per liter ----------
   around 15 percent for primer and 10 percent for topcoat.

C.S.T. 2% against C form extra.
Rates ex Pune, Freight, Octroi, Insurance if any to your account.
Payment Advance.
Delivery within one week to transport.

--
Thanks/Regards,

Nitin Shah
Managing Director,
Leader Paints Marketing,
Swachha Services,
Ugam Chemicals,
shop no 1, Vinayak Apartments,
387, Narayan Peth, Pune, 411 030
Tel- 09371012245
website: www.leaderpaints.com

LEADER
PAINTS MARKETING.

SHOP NO 1, VINAYAK APARTMENTS,
NEAR MODI GANAPATI, 387, NARAYAN PETH,
PUNE 411 030. TEL- 020 2443 4075, 2444 1449,
2439 0514. TELEFAX- 020 2443 4075.

MAIL - ugamchem@hotmail.com
Website: *www.indiamart.com/leaderpaintsmkt*

UGAM PUSI COMPOSITE H R 400 T. I.

TECHNICAL SPECIFICATIONS.

No.	Characteristic	Specification
1.	Curing Schedule	Chemical curing 12 hours. (after mixing base to hardener in given ratio)
2.	a. Consistency	Slight Texture
	b. Viscosity.- fordcup 4	90 +3 sec @25 deg.C
3.	Finish	semi glossy
4.	Colour	Diamond white
5.	Fastness to light.	To pass the test
6.	Scratch Hardness.	No such scratch as to show the bare metal after heating for more than 24 hrs above 100 deg Celsius
7.	Flexibility and adhesion after 48.hours of curing	No visible damage or detachment of the film after put in use for 48 hrs
8.	Protection against corrosion under condition of condensation	No signs of corrosion
9.	Resistance to petroleum hydrocarbon/solvent145/205	No permanent injury to film
10.	Flash point- minimum	30 deg. C
11.	Delivery	Within three weeks from the date of receipt of Purchase order
12.	Volume solids	40% minimum
13.	Heat Resistance	upto 400 deg Celsius
14.	Solvent	Ugam thinner for heat res. Paints
15.	Covering	Maximum 25 sq ft per liter should be applied for optimum results

Manufactured by: UGAM CHEMICALS. PUNE.41. --------ISO 9001:2000 COMPANY.

The technical specification is correct to the best of our knowledge and under test conditions and we do not accept any liability towards misuse and contents of it. Product must be tested for specific use prior to use.

LEADER
PAINTS MARKETING.

SHOP NO 1, VINAYAK APARTMENTS,
NEAR MODI GANAPATI, 387, NARAYAN PETH,
PUNE 411 030. TEL- 020 2443 4075, 2444 1449,
2439 0514. TELEFAX- 020 2443 4075.

MAIL - ugamchem@hotmail.com
Website: *www.indiamart.com/leaderpaintsmkt*

UGAM PUSI COMPOSITE H R 400 T. I.

APPLICATION PROCEDURE.

Application procedure of UGAM PUSI COMPOSITE SYSTEM is as follows.

1. First clean the surface by sand blasting. If sand blasting is not possible, clean with emery paper followed by wet sanding with waterproof emery paper of 120 grit size.
2. Wipe the surface with clean dry cloth.
3. Take required quantity of UGAM P U S I PRIMER-base in one empty clean container, after proper stirring.
4. Mix UGAM Hardener for primer in given ratio mentioned over container. Please take care not to mix entire hardener with entire base as the mixture will become hard within four hours. Hence take quantity that will be used in one hour time.
5. Add UGAM H R THINNER in required quantity to make mixture suitable for application by brush or air less spray as per your convenience.
6. Apply with brush or air less spray equipment having 5000 to 7000 psi and nozzle size between 0.25 to 0.35 mm.
7. Allow it to cure for five hours.
8. Then apply second coat of UGAM P U S I PRIMER in the similar manner as above.
9. Allow it to cure for five hours.
10. Then apply third coat of UGAM P U S I PRIMER as first and second coat.
11. Allow it to cure again for five hours.
12. Then take required quantity of UGAM P U S I TOPCOAT – base in one empty clean container, after proper stirring.
13. Mix UGAM Hardener for topcoat in given ratio mentioned over container. Please take care not to mix entire hardener with entire base as the mixture will become hard within four hours. Hence take quantity that will be used in one hour time.
14. Add UGAM H R THINNER in required quantity to make mixture suitable for application by brush or air less spray as per your convenience.

15. Apply with brush or air less spray equipment having 5000 to 7000 psi and nozzle size between 0.25 to 0.35 mm.
16. Allow it to cure for five hours.
17. Then apply second coat of UGAM P U S I TOPCOAT in the similar manner as above.
18. Allow it to cure for five hours. Now your product is ready for use.

Bureau of Energy Efficiency (BEE)
(Ministry of Power, Government of India)
4th Floor, Sewa Bhawan, R. K. Puram, New Delhi – 110066
Ph.: +91 – 11 – 26179699 (5 Lines), Fax: +91 – 11 – 26178352
Websites: www.bee-india.nic.in, www.energymanagertraining.com

Confederation of Indian Industry
CII – AVANTHA Centre for Competitiveness
Block No.3, Dakshin Marg
Sector 31-A, Chandigarh - 160030
Tel: 0172-5080784 (D) / 2666517-19
Fax: 0172-2606259 / 2614974
E-mail: harinder.singh@cii.in
Website: www.ciicfc.org

India SME Technology Services Ltd
DFC Building, Plot No.37-38,
D-Block, Pankha Road,
Institutional Area, Janakpuri, New Delhi-110058
Tel: +91-11-28525534, Fax: +91-11-28525535
Website: www.techsmall.com