# DETAILED PROJECT REPORT
# ON
# ENERGY EFFICIENT PUMP FOR JET DYEING MACHINE (150 KG)
# (SURAT TEXTILE CLUSTER)

## Bureau of Energy Efficiency

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ISTSL

# ENERGY EFFICIENT PUMP FOR JET MACHINE (150 KG)

## SURAT TEXTILE CLUSTER

BEE, 2010

***Detailed Project Report on Energy Efficient Pump For Jet Machine (150 kg)***

Textile SME Cluster, Surat, Gujrat (India)

New Delhi: Bureau of Energy Efficiency;

Detail Project Report No.**: *SRT/TXT/EEP/08***

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We take this opportunity to express our appreciation for the excellent support provided by Textile 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).

ZESPL 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.

**Zenith Energy Services Pvt. Ltd.**

**Hyderabad**

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## *List of Abbreviations*

| | |
|---|---|
| kWh | kilo Watt Hour |
| FD | Forced Draft |
| ID | Induced Draft |
| MoMSME | Ministry of Micro Small and Medium Enterprises |
| GHG | Green House Gas |
| EE | Energy Efficient |
| BEE | Bureau of Energy Efficiency |
| DPR | Detailed Project Report |
| O&M | Operational & Maintenance |
| NPV | Net Present Values |
| ROI | Return on Investment |
| IRR | Internal Rate of Return |
| DSCR | Debt Service Coverage Ratio |
| PBT | Profit Before Tax |
| PAT | Profit After Tax |
| SIDBI | Small Industries Development of India |

# *EXECUTIVE SUMMARY*

Zenith Energy Services Pvt. Ltd is executing BEE-SME program in Surat textile cluster, supported by Bureau of Energy Efficiency (BEE) with an overall objective of improving the energy efficiency in cluster units.

Surat textile cluster is one of the largest textile 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 textile clusters in India.

The main energy forms used in the cluster units are electricity and fuel such as wood, coal, natural gas and other biomass product. Mostly used in boilers, thermopac, Jet dying, stenter, loop machine, scouring, bleaching, Jiggers, Jumbo, hydro extractor, small pumps and lighting.

Installation of Energy Efficient Pump with Jet dying machine or Jigger or Jumbo will reduces electricity consumption & production cost and also reduces the environmentally harmful green house gases emission.

Project implementation i.e. installation of energy efficient pump (150 kg) for jet machine will lead to reduction in electricity consumption by 61740 kWh per annum however; this intervention will not have any effect on the existing consumption pattern of fossil fuel.

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) | 4.40 |
| 2 | Electricity saving | kWh / year | 61740 |
| 3 | Monetary benefit | ₹(in lakh) | 3.46 |
| 4 | Debit equity ratio | ratio | 3:1 |
| 5 | Simple payback period | years | 1.27 |
| 6 | NPV | ₹(in lakh) | 8.47 |
| 7 | IRR | %age | 59.54 |
| 8 | ROI | %age | 27.74 |
| 9 | DSCR | ratio | 3.71 |
| 10 | Process down time | day | 1 |

***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 the energy performance in 25 selected SMEs clusters. Surat Textile Cluster is one of them. The BEE's SME Programme intends to enhance the 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:***

***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.

***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 up energy efficiency projects in the clusters

***Implementation of energy efficiency measures***

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

***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 About the Surat textile cluster

The products manufactured in Surat Textile Cluster are synthetic sarees and dress materials and the products are renowned in the country and abroad. The main raw material for the cluster units is grey cloth and is procured from local weaving units and agents. The cost of energy (electrical and thermal energy) as percentage of manufacturing cost varies between 12 and 15%.

Majority of the cluster units are of integrated type, where the raw material "grey cloth" is processed in-house to the final product like sarees and dress materials. Most of the units of the cluster are working on Job basis, where the textile agents will provide design and grey cloth and the unit's process as per design provided by the clients. The energy cost is next to the raw materials cost.

### 1.1.1 Production process

The main process operation for dyeing and printing process of synthetic sarees and dress materials adopted in cluster units are as follows:

***Fabric pre-treatment***

The main purpose of the fabric pre-treatment process is to remove oil, grease and other materials and to whiten the grey cloth though bleaching. The various process adopted in pre-treatment are scouring, bleaching and shrinking process.

***Dyeing***

Dyeing is the process of imparting colors to the material through a dye (color). In which a dye is applied to the substrate in a uniform manner to obtain an even shade with a performance and fastness appropriate to its final use. This process is mainly performed in Jet Dyeing Machines and Jigger machines

Dyeing of fabric is carried out in jet dyeing machines. The temperature of the solution is raised to 50℃. Concentrated dyestuff solution is prepared separately and is added to the liquor. After the addition of dyes, the temperature is raised to 130℃ and maintained for about 60 minutes.

After whitening/dyeing, the fabric is unloaded from the machine and taken to the folding and rolling machines for improving the width of cloth, which gets shrunk during the washing and dyeing process.

***Printing***

In Surat cluster three types printing methods are used. Most of the units are use flat bed printing, rotary printing and some units follows hand printing. Hand printing is the old method to print the fabric. The flat bed printing has provision for printing 10 to 14 colors simultaneously. The color print paste prepared is fed onto the screens from which it is transferred to the fabric fed in. The fabric after print paste transfer is passed through a drying chamber at 145℃. The dried and printed fabric is taken for further processing.

***Drying and Finishing***

After printing, the drying process is performed in loop machine, where the temperature is maintained between 130℃ to 170℃ for better colour setting. After passing through the loop machines, the printed fabric is washed in a series of normal water and hot water washing in the presence of chemicals for colour setting. After completion of the washing process, the printed and washed fabric is subjected to heat setting process in Stenter and then pressing and finishing treatments.

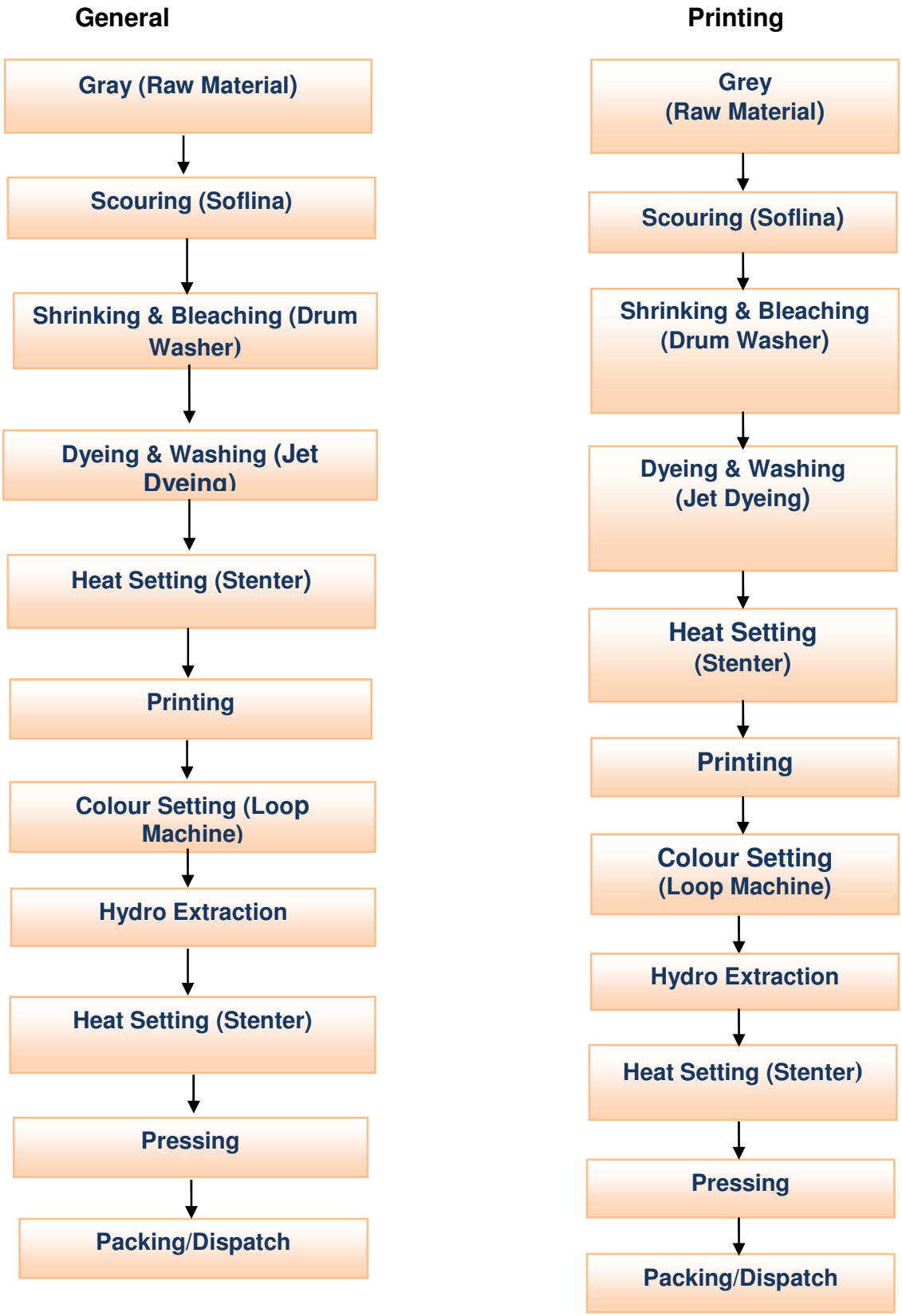



**Figure 1.1 Process Flowchart of Surat Textile Cluster**

## 1.2 Energy performance in existing situation

### 1.2.1 Fuel and electricity consumption of a typical unit

The main energy forms used in a typical unit in the cluster are electricity, coal/lignite and natural gas. Electricity is used for driving the prime movers of pumps, fans, stenter fans, ID and FD fans, conveyers, loop machines drives, lighting etc. Imported coal and lignite are used as fuel in boilers for steam generation and whereas natural gas is used as fuel in generators for electricity generation, stenters, printing and loop machines. The energy consumption of a typical unit in the cluster using local make pumps and having about 15 Jet machines is furnished in Table 1.1 below:

**Table 1.1: Energy consumption of a typical unit**

| S.No | Details | Unit | Value |
|---|---|---|---|
| 1 | Coal/lignite consumption | tonne/year | 7200 |
| 2 | Grid electricity consumption | MWh/annum | 1078 |
| 3 | Natural gas consumption | million SCM/year | 1.286 |
| 4 | Production (quantity processed) | meter (In lakh)/year | 175 |

### 1.2.2 Average production by a typical unit in the cluster

The average production in a year in a typical unit is 175 lakh meters of final product.

## 1.3 Identification of technology/equipment to be upgraded

### 1.3.1 Existing/Conventional technology/equipment

There are about 4200 circulation pumps connected to the jet machines in entire cluster units and these pumps are of local make and are inefficient. As per the detailed studies undertaken in various units of the cluster, the efficiency of the pumps is found to be in the range of 40 to 60% only, where as the new energy efficient pumps have efficiencies above 65%. The low efficiency of the installed pumps is due to inferior design of the pumps.

### 1.3.2 Role in process

The project activity is the installation of new energy efficient pumps for jet machines by replacing the existing pumps. The pumps are used for circulation of water/cloth during pre-treatment and dyeing process.

## 1.4 Establishing the baseline

### 1.4.1 Design and operating parameters

The present power consumption of a Jet machine water circulation pump (1nos) motor is 6.8 kWh installed for 150 kg capacity Jet Machine and connected with 10 hp motor.

The average production is 750 kg/day per machine. The jet machines are operated for 24 hours in a day.

### 1.4.2 Quantity of hot drained water

The power consumption of various jet machines water circulation pump of three cluster units is furnished in Table 1.2 below:

**Table 1.2 Electricity consumption of typical units**

| S. No | Name of the unit | Jet Machines Capacity (kg) | Power consumption (kWh/day) | Efficiency of pump (%) |
|---|---|---|---|---|
| 1 | Navanidhi Dyeing and Printing Mills Pvt Ltd | 150 | 136 | 42.5 |
| 2 | Niharika Dyeing and Printing Mills Pvt Ltd | 150 | 124 | 53.7 |
| 3 | Akashaganga Processors Pvt Ltd | 150 | 112 | 58.0 |

## 1.5 Barriers for proposed energy efficient equipment

### 1.5.1 Technological Barriers

The major technical barriers that prevented the implementation of the energy efficient pump in the cluster are:

- Lack of awareness of energy efficient pumps
- Dependence on local equipment suppliers, who doesn't have technical knowledge

### 1.5.2 Financial Barrier

The lack of awareness of the losses and monetary benefit of energy efficient pumps

### 1.5.3 Skilled manpower

Not applicable

### 1.5.4 Other barrier (If any)

Information on the energy efficient technologies not available among cluster unit owners, though the suppliers are available locally of energy efficient pumps, the information was not disseminated among cluster units.

# 2 TECHNOLOGY/EQUIPMENT FOR ENERGY EFFICIENCY IMPROVEMENTS

## 2.1 Detailed description of equipment selected

### 2.1.1 Description of equipment

The project activity is replacement of jet machine conventional pumps with new energy efficient pumps. The new pumps will have overall efficiency more than 65%. The energy efficient pumps will have critically designed impellers, volute, eye and casing. The impeller is made of Stainless Steel material and are resistant to corrosion and scale formation.

In Surat Textile Cluster units, the pumps installed for jet machines have efficiencies in the range of 40% to 60% only due to inferior design of pumps and mismatch selection.

Considering the above facts and for reducing electricity consumption of Jet machine pumps, it is suggested to install new energy efficient pumps. The details of power consumption of various pumps installed for jet machines and efficiency levels are provided in Annexure 1.

### 2.1.2 Equipment specifications

The detailed specification of the pump suggested is furnished in the Annexure 7.

### 2.1.3 Replacement of pump with existing pump

The efficiency of the present pumps installed is of low efficiency (40 to 60%) and efficiency of the energy efficient pumps will be of 65%. Replacing the conventional pumps with new energy efficient pumps will reduce power consumption and reduces production cost.

The pump selected will have same flow and pressure and can be installed to the present Jet machine.

### 2.1.4 Superiority over existing equipment

The new energy efficient pumps are superior to the existing pumps for the following features:

- Will have constant flow and pressure throughout the life of the pump
- Lower break downs due to special mechanical sealing
- Low operation and maintenance cost
- Life of the equipment is multifold than the present pumps

### 2.1.5 Availability of the proposed equipment

The new energy efficient pump make dealers are available in Surat and the details of the suppliers are provided in Annexure 6.

### 2.1.6 Source of equipment for the project

This technology is locally available

### 2.1.7 Service/technology providers

The service providers are locally available and contact details of service providers are given in Annexure 6.

### 2.1.8 Terms and condition in sales of equipment.

The terms of sales of the equipment supplier are:

**TERMS & CONDITIONS:**

| | | |
|---|---|---|
| **1. PRICES** | - | F.O.R. OUR WORKS. |
| **2. DUTIES** | - | **E.D.@10.30%** Extra<br>No ED applicable Base Frame & coupling,<br>Gate pass for Modavate will be provided. |
| **3. TAXES** | - | **VAT@4%** Extra & **VAT@14.5%** Extra on Above 10 HP Motor |
| **4. P & F** | - | **@3%** Extra |
| **5. DELIVERY** | - | S.No.2 – Pump Ex stock subject to Prior Sale,<br>Remaining Within 8-10 weeks after receipt of your P.O |
| **6. PAYMENT** | - | 25% Advance balance against Performa invoice Prior to dispatch/<br>Documents through bank. |
| **7. VALIDITY** | - | 15 days |
| **8. DISCOUNT** | - | **@5% ON PUMPS & ACCESSORIES, @48% ON MOTOR** |

We now request you to kindly place your valuable order on us.
Thanking you and assuring you of our best services at all times.

### 2.1.9 Process down time during implementation

The process down time is considered only one day, as it requires only assembling

## 2.2 Life cycle assessment and risks analysis

The operational life of the new energy efficient pumps is considered to be 15 years.

## 2.3 Suitable unit for implementation of proposed equipment

The proposed pump will give the same output w.r.t existing pumps and suitable for Jet machine having 150 kg capacity.

# 3 ECONOMIC BENEFITS OF PROPOSED EQUIPMENT

## 3.1 Technical benefits

### 3.1.1 Fuel saving

No fuel savings is envisaged due to implementation of the project activity.

### 3.1.2 Electricity saving

The power savings due to installation of new energy efficient pumps for one Jet machine is 1.47 kWh and for 5 Jet machines annual electricity saving would be 61740 kWh per annum. A detail saving calculation is shown in Annexure 1.

### 3.1.3 Improvement in product quality

There is no significant impact on product quality ***directly or indirectly.***

### 3.1.4 Increase in production

The product quality may improve, as the new pump will give required flow and pressure.

### 3.1.5 Reduction in raw material consumption

No significant impact on raw materials consumption ***directly or indirectly.***

### 3.1.6 Reduction in other losses

There is no significant reduction in other looses ***directly or indirectly.***

## 3.2 Monetary benefits

The monetary benefit by implementation of the energy efficient pump is estimated at ₹ 3.46 lakh per annum due to reduction in electricity consumption. Energy & monetary benefit analysis of energy efficient pump are shown in Table 3.1 below:

**Table 3.1 Energy and Monetary Benefit due to Project Implementation**

| *S. No.* | *Particulars* | *Unit* | *Value* |
|---|---|---|---|
| 1 | Electricity Saving per hour | kWh | 1.47 |
| 2 | Operating days per year | days | 350 |
| 3 | Electricity Saving per annum per jet machine | kWh | 12348 |
| 4 | Cost of electricity | ₹/kWh | 5.6 |
| 5 | Saving per Jet machine | ₹ in lakh | 0.69 |
| 6 | Monetary Saving per annum | ₹ In lakh | 3.46 |

### 3.3 Social benefits

#### 3.3.1 Improvement in working environment in the plant

The project activity identified will utilize state-of-the-art technologies to ensure energy efficiency and energy conservation of non renewable fuels and the project activity reduce the breakdowns and leakages hence improves working environment

#### 3.3.2 Improvement in skill set of workers

The equipment selected for the implementation is new and energy efficient. The equipment implemented will create awareness among the workforce and improves the skill of the workers.

### 3.4 Environmental benefits

#### 3.4.1 Reduction in effluent generation

The project activity will reduce effluent generation, as with new pumps, the leakages may reduce.

#### 3.4.2 Reduction in GHG emission

The major GHG emission reduction source is $CO_2$. The technology will reduce grid electricity consumption and emission reductions are estimated at 52 tonne of $CO_2$ per annum due to implementation of the project activity.

#### 3.4.3 Reduction in other emissions like $SO_x$

The equipment reduces the coal consumption and also reduces $SO_x$ emissions.

# 4 IMPLEMENTATION OF PROPOSED EQUIPMENT

## 4.1 Cost of equipment implementation

### 4.1.1 Cost of equipment

The total cost for 5 pumps is estimated at ₹ 4.15 lakh (` 4.04 lakh+0.11 lakh), which includes motor, pump and base coupling.

### 4.1.2 Other costs

The total cost of implementation of the energy efficient pump is estimated at ₹ 4.40 lakh. The above cost includes cost of equipment / machinery, cost of fabrication (and/or) commissioning charges and the details are furnished below:

**Table 4.1 Details of Proposed Equipment Installation Cost**

| S. No | Particulars | Unit | Cost |
|---|---|---|---|
| 1 | Equipment Cost | ₹ (In Lakh) | 4.15 |
| 2 | Panel, switch & cabling, Elec.modi etc | ₹ (In Lakh) | 0.25 |
| 3 | Interest during Implementation | ₹ (In Lakh) | 0.00 |
| 4 | Total Cost | ₹ (In Lakh) | 4.40 |

## 4.2 Arrangement of funds

### 4.2.1 Entrepreneur's contribution

The entrepreneur's contribution is 25% of total project cost, which works out at ₹ 1.10 lakh.

### 4.2.2 Loan amount

The term loan is 70% of the total project, which is ₹3.30 lakh.

### 4.2.3 Terms & conditions of loan

The interest rate is considered at 10% which is SIDBI's rate of interest for energy efficient 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

Considering the above discussed assumptions, the net cash accruals starting with ₹ 2.74 lakh in the first year operation gradually increases to ₹ 14.38 lakh at the end of eighth year.

### 4.3.2 Simple payback period

The total project cost of the proposed technology is ₹ 4.40 lakh and monetary savings due to reduction in electricity consumption is ₹ 3.46 lakh and the simple payback period works out to be 16 months.

### 4.3.3 Net Present Value (NPV)

The Net present value of the investment at 10.00% interest rate works out to be ₹ 8.47 lakh.

### 4.3.4 Internal rate of return (IRR)

The after tax Internal Rate of Return of the project works out to be 59.54%. 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 27.74% for an investment of ₹ 4.40 lakh. The average debt service coverage ratio works out at 3.71.

## 4.4 Sensitivity analysis in realistic, pessimistic and optimistic scenarios

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

- Increase in electricity savings by 5%
- Decrease in electricity savings by 5%

In each scenario, other inputs are assumed as constant. The financial indicators in each of the above situation are indicated along with standard indicators are shown in Table 4.2 below:

**Table 4.2 Sensitivity analysis at different scenarios**

| *Particulars* | *IRR* | *NPV* | *ROI* | *DSCR* |
|---|---|---|---|---|
| Normal | 59.54 | 8.47 | 27.74 | 3.71 |
| 5% decrease in electricity savings | 55.90 | 7.81 | 27.60 | 3.52 |
| 5% increase in electricity savings | 63.17 | 9.13 | 27.87 | 3.90 |

The project is highly sensitive to electricity savings, the debt service coverage ratio works out to be 3.52 times in worst scenario, which indicates the strength of the project.

### 4.5 Procurement and implementation schedule

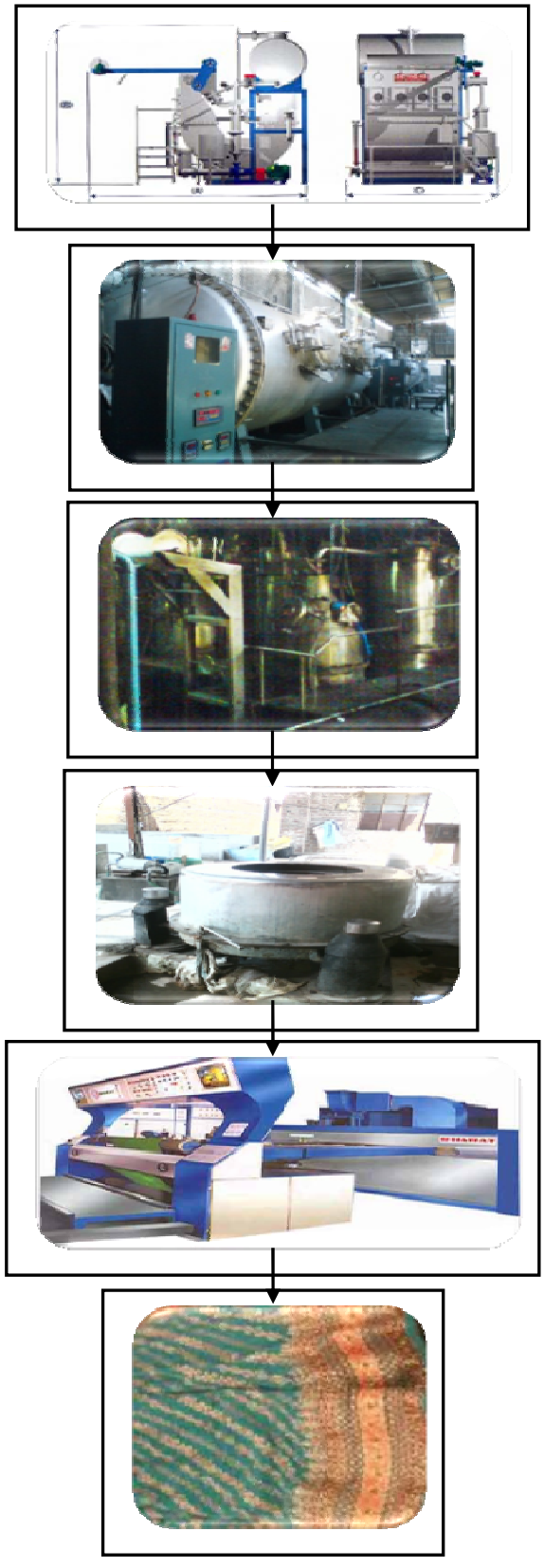
The project is expected to be completed in 1 week from the date of financial closure. The detailed schedule of project implementation is furnished in Annexure 6.

**Annexure**

## Annexure 1 Baseline establishment and energy saving

| S No | Parameter | Units | Details |
|---|---|---|---|
| 1 | Present electricity consumption @ 51 % efficiency | kWh | 6.8 |
| 2 | Electricity consumption in new pump @ 65 % efficiency | kWh | 5.33 |
| 3 | Electricity Saving per hour per jet machine | kWh | 1.47 |
| 4 | Operating hours per day | hr | 24 |
| 5 | Operating days per year | days | 350 |
| 6 | Electricity Saving per annum per jet machine | kWh | 12348 |
| 7 | Cost of electricity | ₹/kWh | 5.6 |
| 8 | Saving per jet machine | ₹/ Jet machine | 0.69 |
| 9 | Monetary Saving per annum (5 jet Machine) | ₹ In lakh | 3.46 |
| 10 | Total investment | ₹ In lakh | 4.40 |
| 11 | Payback period | Years | 1.27 |

**Annexure 2 Process flow diagram**



**Annexure 3 Technology Assessment Report – Energy Efficient Pump**

The jet machines are the most commonly found equipment in the cluster units and considerable quantities of hot water or colour water is required for the dyeing process and this water is supplied by the water pump which consumes lot of electricity. This study was carried out in 75 industries, and all the units are using conventional pump for supply of water with high electricity consumption.

The Installation of energy efficient pump will reduce the electricity consumption and also reduces the green house gas emission.

***Basis for Selection of Equipment***

The various factors influence the selection of the energy efficient pump. The following were considered:

- Efficiency and electricity consumption of conventional water pump.
- Space availability
- Cost economics

## Annexure 4 Detailed financial calculations & analysis

### *Assumption*

| ***Name of the Technology*** | ***Jet Machine Pumps*** | | |
|---|---|---|---|
| ***Rated Capacity*** | ***150 Kg*** | | |
| ***Flow and head*** | ***50 cum/hr and 30 m H*** | | |
| ***No. of pumps to be replaced*** | ***5*** | | |
| ***Details*** | ***Unit*** | ***Value*** | ***Basis*** |
| No of working days | Days | 350 | |
| ***Proposed Investment*** | | | |
| Plant & Machinery | ₹ (in lakh) | 4.15 | |
| Erection & Commissioning | ₹ (in lakh) | 0.25 | |
| Total Investment | ₹ (in lakh) | 4.40 | |
| ***Financing pattern*** | | | |
| Own Funds (Equity) | ₹ (in lakh) | 1.10 | Feasibility Study |
| Loan Funds (Term Loan) | ₹ (in lakh) | 3.30 | Feasibility Study |
| Loan Tenure | years | 5 | Assumed |
| Moratorium Period | Months | 6 | Assumed |
| Repayment Period | Months | 66 | Assumed |
| Interest Rate | % | 10.00 | SIDBI Lending rate |
| ***Estimation of Costs*** | | | |
| O & M Costs | % on Plant & Equip | 4.00 | Feasibility Study |
| Annual Escalation | % | 5.00 | Feasibility Study |
| ***Estimation of Revenue*** | | | |
| Power Saving | kWh | 61740 | |
| Cost | ₹/ KWh | 5.6 | |
| 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 | 3.30 | 0.24 | 3.06 | 0.30 |
| 2 | 3.06 | 0.48 | 2.58 | 0.28 |
| 3 | 2.58 | 0.56 | 2.02 | 0.24 |
| 4 | 2.02 | 0.68 | 1.34 | 0.18 |
| 5 | 1.34 | 0.86 | 0.48 | 0.10 |
| 6 | 0.48 | 0.48 | 0.00 | 0.01 |
| | | 3.30 | | |

### *WDV Depreciation*

| ***Particulars / years*** | ***1*** | ***2*** |
|---|---|---|
| ***Plant and Machinery*** | | |
| Cost | 4.40 | 0.88 |
| Depreciation | 3.52 | 0.70 |
| WDV | 0.88 | 0.18 |

### *Projected Profitability*

| *Particulars / Years* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* |
|---|---|---|---|---|---|---|---|---|
| ***Revenue through Savings*** | | | | | | | | |
| Power savings | 3.46 | 3.46 | 3.46 | 3.46 | 3.46 | 3.46 | 3.46 | 3.46 |
| Total Revenue (A) | 3.46 | 3.46 | 3.46 | 3.46 | 3.46 | 3.46 | 3.46 | 3.46 |
| ***Expenses*** | | | | | | | | |
| O & M Expenses | 0.18 | 0.18 | 0.19 | 0.20 | 0.21 | 0.22 | 0.24 | 0.25 |
| Total Expenses (B) | 0.18 | 0.18 | 0.19 | 0.20 | 0.21 | 0.22 | 0.24 | 0.25 |
| PBDIT (A)-(B) | 3.28 | 3.27 | 3.26 | 3.25 | 3.24 | 3.23 | 3.22 | 3.21 |
| Interest | 0.30 | 0.28 | 0.24 | 0.18 | 0.10 | - | - | - |
| PBDT | 2.98 | 2.99 | 3.03 | 3.08 | 3.14 | 3.23 | 3.22 | 3.21 |
| Depreciation | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 |
| PBT | 2.75 | 2.76 | 2.79 | 2.85 | 2.91 | 3.00 | 2.99 | 2.98 |
| Income tax | - | 0.78 | 1.03 | 1.05 | 1.07 | 1.10 | 1.10 | 1.09 |
| Profit after tax (PAT) | 2.75 | 1.98 | 1.77 | 1.80 | 1.84 | 1.90 | 1.89 | 1.89 |

### *Computation of Tax*

*₹(in lakh)*

| *Particulars / Years* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* |
|---|---|---|---|---|---|---|---|---|
| Profit before tax | 2.75 | 2.76 | 2.79 | 2.85 | 2.91 | 3.00 | 2.99 | 2.98 |
| Add: Book depreciation | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 |
| Less: WDV depreciation | 3.52 | 0.70 | - | - | - | - | - | - |
| Taxable profit | (0.54) | 2.28 | 3.03 | 3.08 | 3.14 | 3.23 | 3.22 | 3.21 |
| Income Tax | - | 0.78 | 1.03 | 1.05 | 1.07 | 1.10 | 1.10 | 1.09 |

### *Projected Balance Sheet*

*₹(in lakh)*

| *Particulars / Years* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* |
|---|---|---|---|---|---|---|---|---|
| ***Liabilities*** | | | | | | | | |
| Share Capital (D) | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 |
| Reserves & Surplus (E) | 2.75 | 4.73 | 6.50 | 8.30 | 10.14 | 12.04 | 13.93 | 15.82 |
| Term Loans (F) | 3.06 | 2.58 | 2.02 | 1.34 | 0.48 | 0.00 | 0.00 | 0.00 |
| Total Liabilities D)+(E)+(F) | 6.91 | 8.41 | 9.62 | 10.74 | 11.72 | 13.14 | 15.03 | 16.92 |

| *Assets* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Gross Fixed Assets | 4.40 | 4.40 | 4.40 | 4.40 | 4.40 | 4.40 | 4.40 | 4.40 |
| Less: Accm. Depreciation | 0.23 | 0.46 | 0.70 | 0.93 | 1.16 | 1.39 | 1.63 | 1.86 |
| Net Fixed Assets | 4.17 | 3.94 | 3.70 | 3.47 | 3.24 | 3.01 | 2.77 | 2.54 |
| Cash & Bank Balance | 2.74 | 4.48 | 5.91 | 7.26 | 8.48 | 10.13 | 12.26 | 14.38 |
| Total Assets | 6.91 | 8.41 | 9.62 | 10.74 | 11.72 | 13.14 | 15.03 | 16.92 |
| Net Worth | 3.85 | 5.83 | 7.60 | 9.40 | 11.24 | 13.14 | 15.03 | 16.92 |
| Dept equity ratio | 2.78 | 2.35 | 1.84 | 1.22 | 0.44 | 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 | 1.10 | - | - | - | - | - | - | - | - |
| Term Loan | 3.30 | | | | | | | | |
| Profit After tax | | 2.75 | 1.98 | 1.77 | 1.80 | 1.84 | 1.90 | 1.89 | 1.89 |
| Depreciation | | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 |
| Total Sources | 4.40 | 2.98 | 2.21 | 2.00 | 2.03 | 2.08 | 2.13 | 2.13 | 2.12 |
| ***Application*** | | | | | | | | | |
| Capital Expenditure | 4.40 | | | | | | | | |
| Repayment of Loan | - | 0.24 | 0.48 | 0.56 | 0.68 | 0.86 | 0.48 | - | - |
| Total Application | 4.40 | 0.24 | 0.48 | 0.56 | 0.68 | 0.86 | 0.48 | - | - |
| Net Surplus | - | 2.74 | 1.73 | 1.44 | 1.35 | 1.22 | 1.65 | 2.13 | 2.12 |
| Add: Opening Balance | - | - | 2.74 | 4.48 | 5.91 | 7.26 | 8.48 | 10.13 | 12.26 |
| Closing Balance | - | 2.74 | 4.48 | 5.91 | 7.26 | 8.48 | 10.13 | 12.26 | 14.38 |

***Calculation of Internal Rate of Return***

***₹(in lakh)***

| *Particulars / months* | *0* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* |
|---|---|---|---|---|---|---|---|---|---|
| Profit after Tax | | 2.75 | 1.98 | 1.77 | 1.80 | 1.84 | 1.90 | 1.89 | 1.89 |
| Depreciation | | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 |
| Interest on Term Loan | | 0.30 | 0.28 | 0.24 | 0.18 | 0.10 | - | - | - |
| Cash outflow | | | | | - | - | - | - | - |
| Net Cash flow | (4.40) | - | - | - | - | - | - | - | - |
| IRR | 59.54% | | | | | | | | |

| | |
|---|---|
| NPV | 8.47 |

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

| *Particulars / Years* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* |
|---|---|---|---|---|---|---|---|---|
| *Variable Expenses* | | | | | | | | |
| Oper. & Maintenance Exp (75%) | 0.13 | 0.14 | 0.15 | 0.15 | 0.16 | 0.17 | 0.18 | 0.19 |
| Sub Total (G) | 0.13 | 0.14 | 0.15 | 0.15 | 0.16 | 0.17 | 0.18 | 0.19 |
| *Fixed Expenses* | | | | | | | | |
| Oper. & Maintenance Exp | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.06 | 0.06 | 0.06 |
| Interest on Term Loan | 0.30 | 0.28 | 0.24 | 0.18 | 0.10 | 0.00 | 0.00 | 0.00 |
| Depreciation *(H)* | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 |
| Sub Total (I) | 0.57 | 0.56 | 0.52 | 0.46 | 0.39 | 0.29 | 0.29 | 0.29 |
| Sales (J) | 3.46 | 3.46 | 3.46 | 3.46 | 3.46 | 3.46 | 3.46 | 3.46 |
| Contribution (K) | 3.33 | 3.32 | 3.31 | 3.30 | 3.30 | 3.29 | 3.28 | 3.27 |
| Break Even Point (L= G/I) | 17.27 % | 16.95 % | 15.65 % | 13.88 % | 11.68 % | 8.77 % | 8.88 % | 8.99 % |
| Cash Break Even {(I)-(H)} | 10.28 % | 9.95% | 8.63% | 6.85% | 4.64% | 1.71 % | 1.80 % | 1.89 % |
| Break Even Sales (J)*(L) | 0.60 | 0.59 | 0.54 | 0.48 | 0.40 | 0.30 | 0.31 | 0.31 |

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

| *Particulars / Years* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *Total* |
|---|---|---|---|---|---|---|---|---|---|
| Net Profit Before Taxes | 2.75 | 2.76 | 2.79 | 2.85 | 2.91 | 3.00 | 2.99 | 2.98 | 23.03 |
| Net Worth | 3.85 | 5.83 | 7.60 | 9.40 | 11.24 | 13.14 | 15.03 | 16.92 | 83.01 |
| | | | | | | | | | 27.74% |

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

| *Particulars / Years* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *Total* |
|---|---|---|---|---|---|---|---|---|---|
| **Cash Inflow** | | | | | | | | | |
| Profit after Tax | 2.75 | 1.98 | 1.77 | 1.80 | 1.84 | 1.90 | 1.89 | 1.89 | 12.04 |
| Depreciation | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 1.39 |
| Interest on Term Loan | 0.30 | 0.28 | 0.24 | 0.18 | 0.10 | 0.00 | 0.00 | 0.00 | 1.09 |
| Total (M) | 3.28 | 2.50 | 2.23 | 2.21 | 2.17 | 2.13 | 2.13 | 2.12 | 14.53 |

***Debt***

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Interest on Term Loan | 0.30 | 0.28 | 0.24 | 0.18 | 0.10 | 0.00 | 0.00 | 0.00 | 1.09 |
| Repayment of Term Loan | 0.24 | 0.48 | 0.56 | 0.68 | 0.86 | 0.48 | 0.00 | 0.00 | 2.82 |
| Total (N) | 0.54 | 0.76 | 0.80 | 0.86 | 0.96 | 0.48 | 0.00 | 0.00 | 3.91 |
| Average DSCR (M/N) | 3.71 | | | | | | | | |

**Annexure 5 Procurement and Implementation plan schedule**

***Project Implementation Schedule – Energy Efficient Pump***

| S. No. | Activities | weeks | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| 1 | Placement of Orders for Equipment | | | | |
| 2 | Supply of Pump's | | | | |
| 3 | Installation and trial runs | | | | |
| 4 | Installation and trial runs | | | | |

Note: Process down time required for only 1 day.

## Annexure 6 Details of equipment and service providers

| *Equipment details* | *Source of technology* | *Service/technology providers* |
|---|---|---|
| Energy Efficient Pumps | | **Deraz Engineers**<br>6-3-1177/90, Deraz house,<br>BS Maktha, Begumpet<br>India-500016<br>E-mail: deraz@deraz.in<br>Mobile:+91 9948353601<br>Telefax:+040 23412165 |

## Annexure 7 Quotations or Techno-commercial bids for proposed equipment

Article I.

1.Pump Type: MEGACHEM C 50-160 c (Q=50.0m3/hr, H=30.0mtrs.)

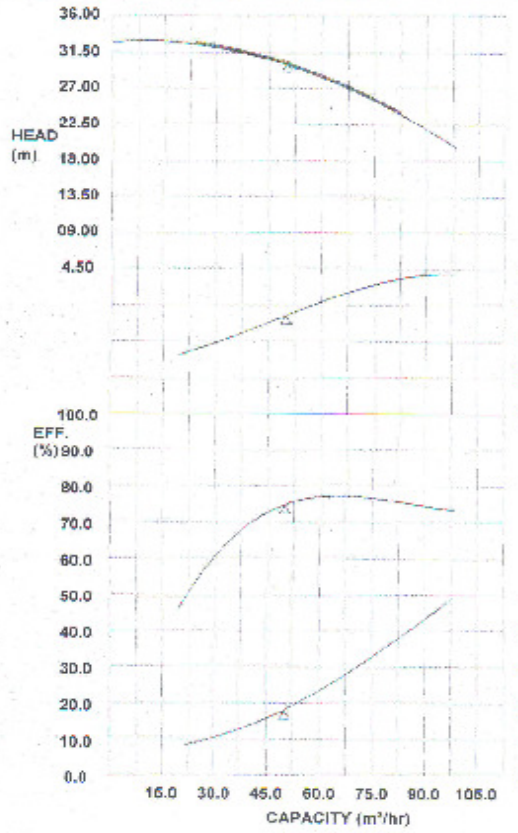
| S.No. | Description | Qty. Req. | UNIT PRICE |
|---|---|---|---|
| 01 | Pump Price | 01 No. | Rs.50,457/- |
| 02 | Motor,7.5kw/10.0hp, 2910 rpm | 01 No. | Rs.24,653/- |
| 03 | Base Frame & Coupling | 01 set. | Rs.9,765/- |

2.Pump Type: MEGA GC 40-160c (Q=50.0m3/hr, H=30.0mtrs.)

| S.No. | Description | Qty. Req. | UNIT PRICE |
|---|---|---|---|
| 01 | Pump Price | 01 No. | Rs.46,336/- |
| 02 | Motor,7.5kw/10.0hp, 2910 rpm | 01 No. | Rs.24,653/- |
| 03 | Base Frame & Coupling | 01 set. | Rs.9,765/- |

## Quotation

| | | | |
|---|---|---|---|
| Client | | Enq. No | mail - 30/03/2010 |
| Consultant | | Item No | 1 |
| Project | | Service | |
| Plant | | SQ No | 2KX09283 |
| Pump Type | MEGACHEM C 50-160 c | Date | 30/03/2010 |




**Operating Data**

| | |
|---|---|
| Capacity(m³/hr) | : 50 |
| Head(m) | : 30 |
| NPSHr(m) | : 2.21 |
| Efficiency(%) | : 74.3 |
| Fluid Handled | |
| Temperature(°c) | : 140 |
| Sp. Gravity | : 1 |
| Speed(rpm) | : 2910 |
| Power(bkW) | : 5.5 |
| Rec. Motor Rating(kW) | : 7.5 |

**Design**

| | |
|---|---|
| Suc/Dis Size DN (mm) | : 80 / 50 |
| Suc/Dis Pipe Sizes(mm) | : 100 / 65 |
| Flange Drilling | : ASME B16.5 CL.#150_RF |
| Lubrication | : Grease |
| Dir.of rotation | : Clockwise-DE |
| Shaft sealing | : Gland Packing |

**Materials**

| | |
|---|---|
| Volute Casing | : CF8M |
| Discharge Cover | : CF8M |
| Bearing Bracket | : C.I. |
| Shaft | : 45C8 |
| Impeller | : CF8M |
| Cooling Cover | : C.I. |
| Shaft Prot.Sleeve | : Type 316 |
| Cooling Plan | : C |
| Motor Make | : SIEMENS |
| Motor kW | : 7.5 |
| Frame | : 132S |

| Scope of Supply | Qty /Set | Rate (Rs./Set) | Total (Rs.) |
|---|---|---|---|
| Pump - 'MEGACHEM C 50-160 c' with | - | - | - |
| | | Price Basis | - |
| | | Validity | Days |
| | | Delivery | |
| | | | E & OE |

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M/s. Zenith Energy Services P.Ltd,
10-5-6/B,My Home Plaza.
Masabtank, Hyderabad-500028
Ph.No.040-23376630/23376631,Ext.220,Fax.No.040-23322517
Email: sammireddy@zenithenergy.com

Kind Attn – Mr.N.Sammireddy,

Dear Sir,

Sub –Quotation for KSB Make Pumps & Siemens Make Motors.
Ref – Your Mail Enquiry, Dt: 29-03-10.

With reference to the above, we are pleased to submit our offer as given below with final Price

Technical data sheets enclosed

TERMS & CONDITIONS:

1. PRICES - F.O.R. OUR WORKS.
2. DUTIES - E.D.@10.30% Extra
   No ED applicable Base Frame & coupling,
   Gate pass for Modavate will be provided.
3. TAXES - VAT@4% Extra & VAT@14.5% Extra on Above 10 HP Motor
4. P & F - @3% Extra
5. DELIVERY - S.No.2 – Pump Ex stock subject to Prior Sale,
   Remaining Within 8-10 weeks after receipt of your P.O
6. PAYMENT - 25% Advance balance against Performa invoice Prior to dispatch/
   Documents through bank.
7. VALIDITY - 15 days
8. DISCOUNT - @5% ON PUMPS & ACCESSORIES, @48% ON MOTOR

We now request you to kindly place your valuable order on us.
Thanking you and assuring you of our best services at all times.

Yours faithfully,
For DERAZ ENGINEERS

(K.A.ABDUL RAZAKH)
CHIEF EXECUTIVE OFFICER

Note: For further clarification Please contact Mr. C.Gopinath(Sr.Manager-sales)-9948353616

HO: Hyderabad 6-3-1177/90, 'Deraz House', BS Makthа, Begumpet 500 016
Ph: 23402442, 23408843, 23404732. Fax: 040 - 23412165. Cell: 9948353601 e-mail: deraz@deraz.in, sales@deraz.in
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BO: Visakhapatnam Flat No. 206, Sreemithra Heights, Opp: Bus Depot, Gopalapatnam 530 027. Cell: 9948353610
BO: Tirupathi 19 7 97b, Gopalraju Colony, RC Road 517 501. Telefax: 0877 - 2246378, Cell: 9948353614

**Bureau of Energy Efficiency (BEE)**
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